NOVATEL WIRELESS

Novatel Wireless, Inc.
PCI Express Mini-card

Integration & Design Guidelines
Version 1. A

Document Revision History

Rev.	Date	Brief Description of Change	Originator	Approved by
1.0	March 28, 2005	Initial Draft	John Ross	
1.1	August 1,2005	Added SDK and AT Commands	Matt Golden	
1. A	September 30,2005	Second Draft	Sharon Lee	

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Introduction

PCI Express Mini Card

Novatel Wireless has designed a line of embedded broadband access modules around the PCI Express Mini Card standard. This product line provides platform developers and system integrators with the ability to enable global 3G broadband access. The governing body for PCI Express standardization is PCI SIG (Peripheral Component Interconnect Special Interest Group.) The website for PCI SIG can be found at the following URL:

www.pcisig.com/home

Getting Started

Introduction

The purpose of this document is to provide advance design and integration information to assist in the integration planning and evaluation of Novatel Wireless PCI Express Mini-cards. This document is intended to specify key components of the integration tools available for the Novatel Wireless line of PCI Express Mini-cards.

The EV620 is Novatel Wireless's versatile module to add WLAN capability to other devices. It was developed to be integrated into other devices such as kiosks or vending machines based on the PCI Express Mini-card specification 1.0.

The EU730™ and EU740™ are Novatel Wireless's mini-card developed for small form factor PCI Express cards specifically used for Wide Area Wireless (WAN, i.e. cellular) technology.

Therefore, the EU730™ and EU740™ will work with all Windows driven laptops given the drivers are properly installed. When you install MobiLink™ on a Windows OS system it will automatically include the drivers necessary to communicate with the PCI Express Mini Card. MobiLink™ is Novatel's Windows application manager for the PCI Express Mini Card. MobiLink provides an easy interface to make a data connection, change operating parameters, and view alerts such as SMS or signal strength indicator. However, anyone can still install the drivers manually and so will be discussed in the following sections. In addition, once the drivers are installed, following the Phoenix Client API functions, anyone could develop their Client side software manager to interact with the PCI Express Mini Card.

When using any of these devices, EU730, EU740™ or the EV620, activation is required for the device to be allowed on the operator's network. For example, Sprint requires the customer to run IOTA, Internet Over-The-Air, provisioning to prepare the device to work on the wireless network.

Activation is required for the EV620 while the EU730™ and EU740™ require a valid SIM card before it can be used on the operator's wireless network. Please refer to section on provisioning with IOTA for assistance.

Windows Platforms

The Phoenix API will interface with your top level applications and provide the abstraction of the module specifics to the upper applications. Please refer to the Phoenix API Interface Chapter for details.

Please refer to the MobiLink Phoenix SDK chapter for details on developing applications and communicating with the modem on Windows platforms.

Safety Warning

Neither the EV620 nor EU730 / EU740 products may be used in an environment where radio frequency equipment is prohibited or restricted in its use. This includes aircraft/airports, hospitals, and other sensitive electronic areas.

Under extended operation the EU730™ and EU740™ modem will generate a noticeable amount of heat. Like all PC Cards, the modem generates heat during normal operation and will be heated by the host computer. For this reason it is recommended that after extended periods of operation, prior to removal and handling, you allow the modem to cool down.

FCC RF Interference Statement

FCC applies to EV630 and EU730/740. Refer to sections on Regulatory Compliance for more details.

Federal Communications Commission Radio Frequency Interference Statement: The EV620 product has been certified to comply within the limits of a class B digital device pursuant to Part 15, Part 22 and Part 24 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential situations. This equipment generates, uses, and can radiate radio frequency energy, and, if not properly installed and used in accordance with the instructions, may cause harmful interference to radio or television reception, or to laptop computers and PDA's. This can be determined by turning the equipment on and off. You are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna of the television, radio or cordless telephone.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for additional suggestions.

Radio Frequency Exposure Evaluation Requirements

The radio frequency exposure evaluation requirements for the embedded module are specified in the module Product Specification. In general, for the United States market, the embedded modules are treated as “mobile devices” as per FCC CFR47 paragraph 2.1091.

A mobile device is defined as “a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter’s radiating structure(s) and the body of the user or nearby persons.” The antenna type used for the radio frequency exposure evaluation must be specified in the documentation and sold with the module. If the module is used with a different antenna type and/or in a design where the separation distance of 20 cm is not normally maintained, the radio frequency exposure evaluation should be repeated for the new configuration. In some cases the module use may fit the definition of “portable devices” as per FCC CFR47 paragraph 2.1093.

Some devices are not subject to radio frequency exposure evaluation prior to equipment authorization, depending on the transmitter power level and frequency band of operation.

Technical Support Contacts

WWW: http://www.nvtl.com/support/index.html

Email: support@novatelwireless.com

Device Specifications

Introduction

The purpose of this document is to provide the specifications for the EU730/EU740 and the EV620 module. This section is intended to specify electrical, mechanical and software interfaces and performance; and to provide the information necessary to integrate the module into an overall product design.

Product Overview

The EV620 will operate in the 800/1900 CDMA bands. The EV620 is primarily targeted for the North American market.

The EU730 and EU740 are wireless modem modules designed to be embedded into laptop computers and other host devices.

The EU730 & EU740 provide for quad band GSM support as well as UMTS/HSDPA operation at 800MHz, 1900MHz & 2100MHz. The EU730 is primarily targeted for the North American market and the EU740 is primarily targeted for EMEA (Europe, Middle East and African) markets.

- The EU740 will operate in the 850/900/1800/1900 GPRS/EDGE bands and 2100 UMTS/HSDPA band.
- The EU730 will operate in the 850/900/1800/1900 GPRS/EDGE bands, and 1900 MTS/HSDPA band.

The modules will be compatible with Windows™ compliant applications including VPN, e-mail, and web browsing.

The core protocol stack will be supplied by Qualcomm and contains UMTS, HSDPA, GPRS and EDGE technologies for EU730/740, and CDMA, CDMA 1XRTT, and CDMA 1XEV-DO technologies for EV620. Around this core, Novatel Wireless has created the firmware drivers that provide access to the hardware on the embedded modem. The feature set is comprised of the data device features supported in the Qualcomm protocol stack.

The hardware consists of a PCI Express Mini Card compliant interface (except as detailed herein), a baseband chipset from Qualcomm™, an RF radio chipset from Qualcomm™, and the various other components used to support these major components. The baseband and firmware are based on the MSM6275 series chipset for EU730/740 and MSM6500 series chipset for EV620.

Hardware

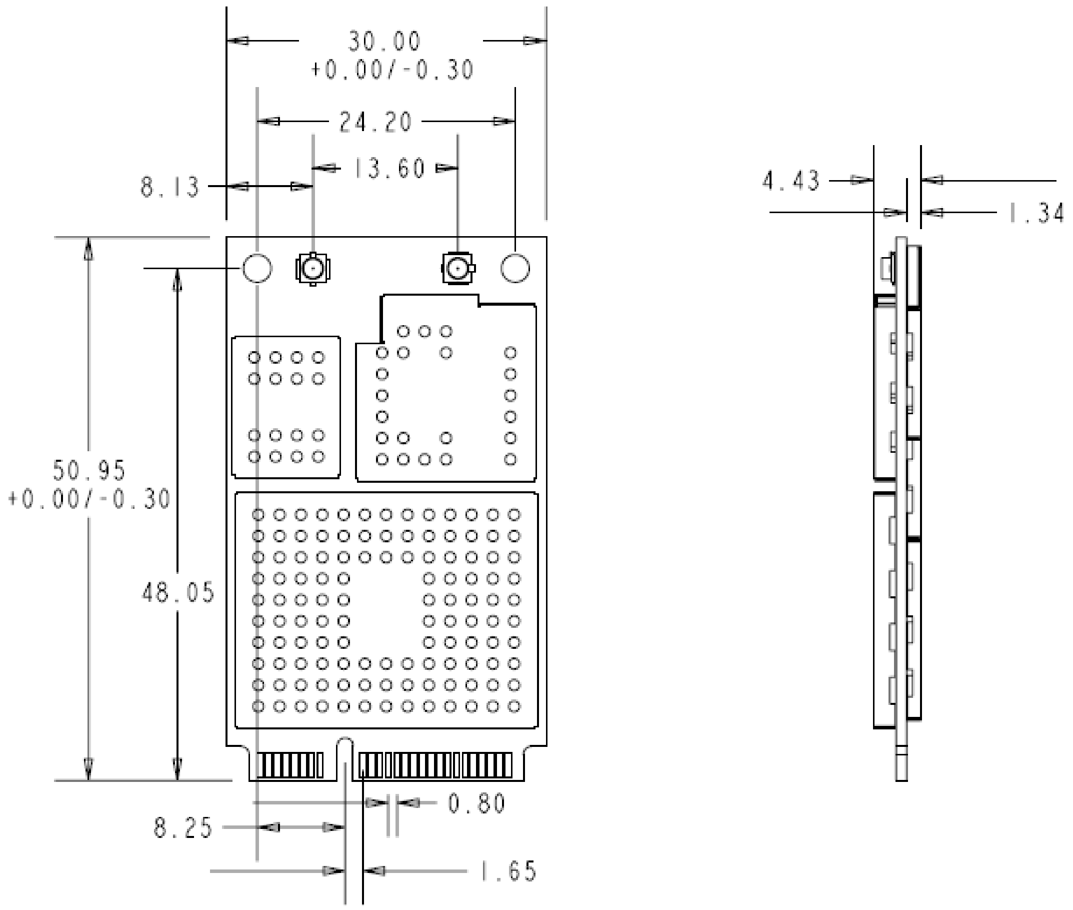
Card Specifications

The EV620, EU730 and EU740 are designed to meet the PCI Express Mini Card electro-mechanical card standard with some exceptions to accommodate the power requirements. The EU730 and EU740 are USB only cards.

Mechanical Specification

The drawing below shows the dimensions of the EV620 module. The measurements given below are typical. Consider thickness to be 5.0 max in designing.

Figure 1: EV620 Module



The drawing below shows the dimensions of the EU730/EU740 module.

Figure 2: EU730/EU740 Module

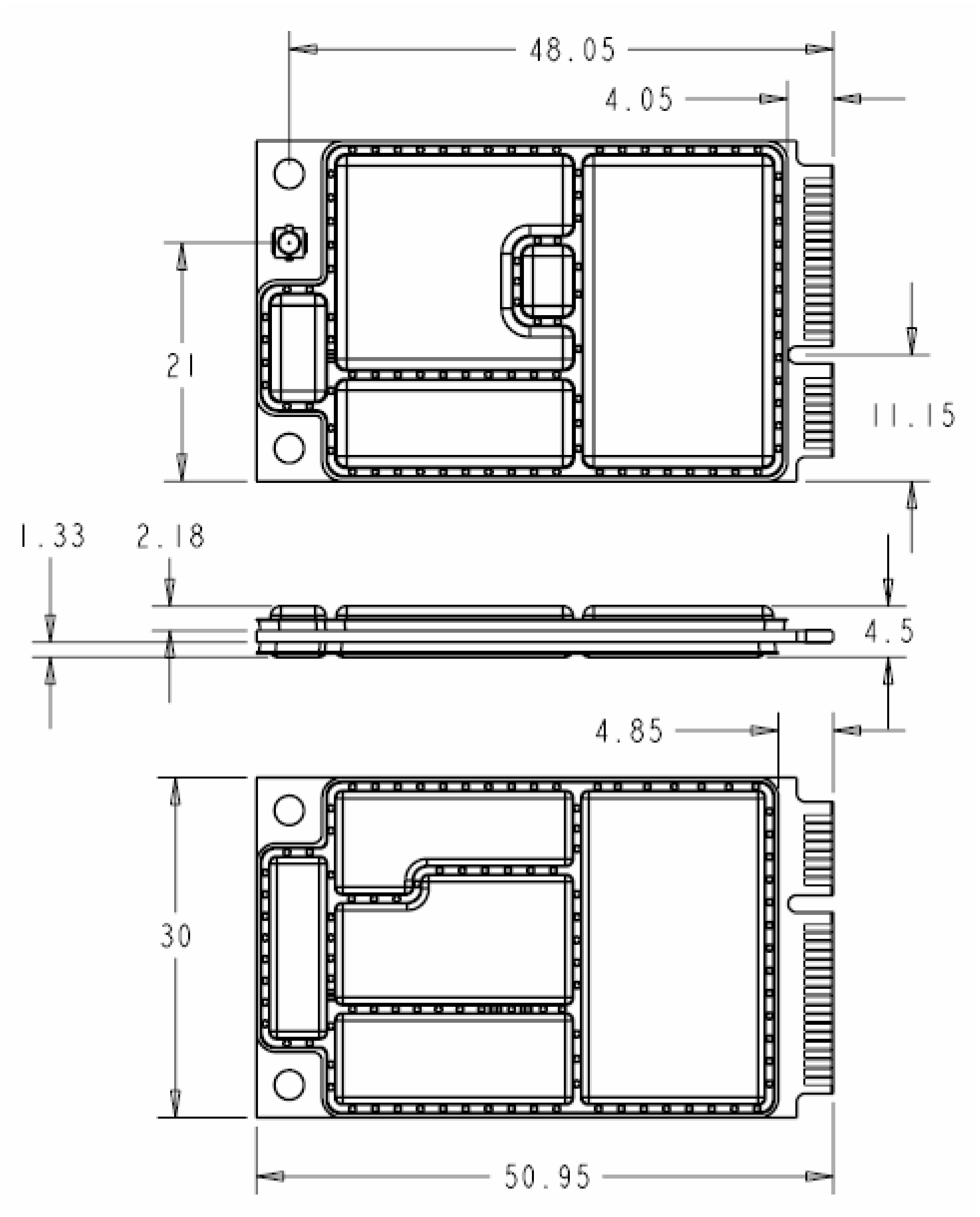
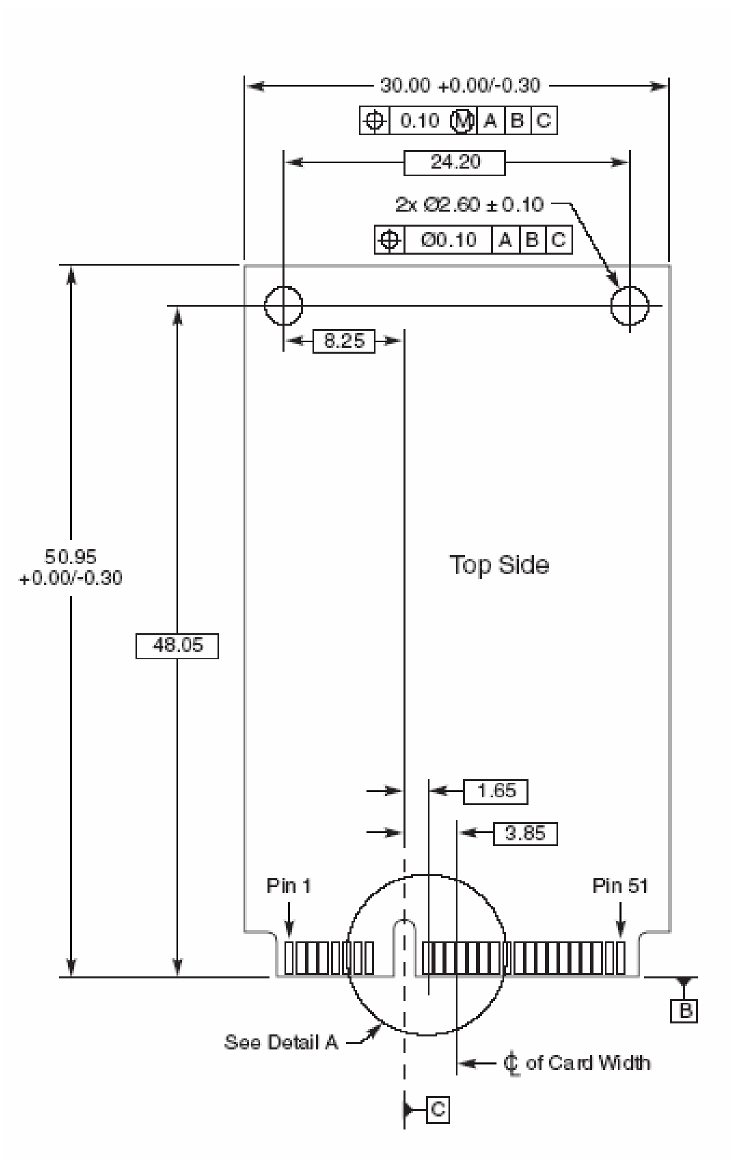
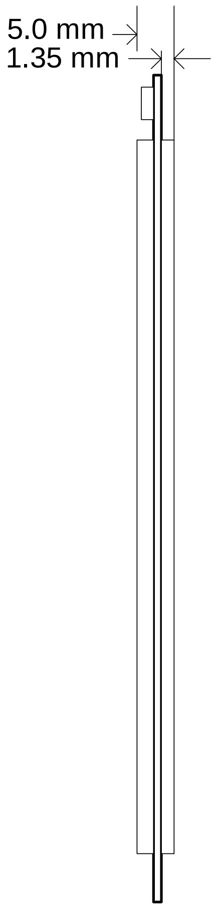


Figure 3: PCIe Minicard Module Envelope





Shielding / Mechanical enclosure

The EU730 and 740 use a metalized plastic shield technology. The shields are held in place using solder balls.

The EV620 will use a stamped sheet metal shield technology. The shields are held in place with solder.

Host Interface connector

The host interface connector is a 1 mm wide card edge connector. This is compatible with the following host connectors:

Molex	67910-0002
FCI	10019331-001

The host connector should be compliant with the Mini PCI express Electromechanical specification.

Interface Specification

Host Interface

The EV620 and EU730/740 is designed to meet the PCI Express Mini-Card specification. The table below gives a description of the pin-out and usage. The USB option of the specification is supported. Deviations from the Mini PCI Express card specification are noted.

The PCI Express Mini Card provides two power sources: one at 3.3V (+3.3V) and one at 1.5V (+1.5V). The auxiliary voltage source (+3.3Vaux) is sourced over the same pins as the primary voltage (+3.3V) and is available during the system's stand-by/suspend state to support wake event 5 processing on the communications card.

Table 1: Host Interface specification

Pin	PCIe Spec	EV620	EU730/740	Pin	PCIe Spec	EV620	EU730/740
1	WAKE#	NC	NC	2	3.3V	3.3V	3.3V
3	Reserved	NC	NC	4	GND	GND	GND
5	Reserved	NC	NC	6	1.5V	NC	NC
7	CLKREQ#	NC	NC	8	UIM_PWR	UIM_PWR	UIM_PWR
9	GND	GND	GND	10	UIM_DATA	UIM_DATA	UIM_DATA
11	REFCLK-	NC	NC	12	UIM_CLK	UIM_CLK	UIM_CLK
13	REFCLK+	NC	NC	14	UIM_RESET	UIM_RESET	UIM_RESET
15	GND	GND	GND	16	UIM_VPP	NC	NC
Mechanical Key							
17	Reserved	NC	NC	18	GND	GND	GND
19	Reserved	NC	NC	20	W_DISABLE#	W_DISABLE#	W_DISABLE#
21	GND	GND	GND	22	PERST#	NC	NC
23	PERn0	NC	NC	24	+3.3Vaux	NC	NC
25	PERp0	NC	NC	26	GND	GND	GND
27	GND	GND	GND	28	+1.5V	NC	NC
29	GND	GND	GND	30	SMB_CLK	NC	NC
31	PETn0	NC	NC	32	SMB_DATA	NC	NC
33	PETp0	NC	NC	34	GND	GND	GND
35	GND	GND	GND	36	USB_D-	USB_D-	USB_D-
37	Reserved	GND	GND	38	USB_D+	USB_D+	USB_D+
39	Reserved	3.3V	3.3V	40	GND	GND	GND
41	Reserved	3.3V	3.3V	42	LED_WWAN#	LED_WWAN#	LED_WWAN#
43	Reserved	GND	GND	44	LED_WLAN#	NC	NC
45	Reserved	NC	NC	46	LED_WPAN#	NC	NC
47	Reserved	NC	NC	48	+1.5V	NC	NC
49	Reserved	NC	NC	50	GND	GND	GND
51	Reserved	NC	NC	52	3.3V	3.3V	3.3V

USB Interface

The Mini card acts as a peripheral device and supports the USB 2.0 standard at low speed (1.5 Mbps) and full speed (12 Mbps). It does not support the high speed (480 Mbps) mode of operation.

RF Interface

The EV620 and EU730/740 are designed to be connected to an external antenna integrated into the laptop. The antenna port presents a nominal 50Ω impedance.

Subscriber Identification Module (SIM) Interface

A 5 line SIM interface is provided on the mini-card edge connector for the EU730/740. The signal levels comply with the ETSI standard Specification of the 3 Volt Subscriber Identity Module - Mobile Equipment (SIM-ME) interface (GSM 11.12 version 4.3.1). Note that no ESD protection will be provided on the card. The host device is expected to provide the ESD protection at the SIM connector.

The OEM Module supports a 3.3V SIM as described in ETSI 11.12. The relevant signals are brought out on the 70 pin connector.

The ETSI specification also dictates that the system be made aware if the SIM card is disconnected during operation. This function is handled by the SIM_IN signal. This line should be asserted high when a SIM is present. The SIM_IN signal is pulled low on the OEM Module by a 4.7kΩ resistor so that when a SIM is not present the line will be low. Care should be taken not to use a weak pull-up for the SIM_IN signal. If the OEM Module will be integrated into a system in which the SIM cannot be removed.

USIM Interface

The USIM will be provided by the host. A SIM connector is not included on the card. The interface to the USIM is provided on the host interface connector.

LED Interface

The LED_WWAN signal provides an LED driver as per the Mini Express PCI card specification. The LED operation is outlined in the table below.

Table 2: LED Function

State	**LED function**
On	The WWAN radio is on, and capable of transmitting.
Off	The WWAN radio is not capable of transmitting
Slow Blink	Powered but not associated or authenticated; searching
Intermittent blink	Activity proportional to transmitting/ receiving speed

Power Supply

Power is drawn from the 3.3V pins on the Mini Card connector as shown in tables following. The current in the various operating modes in given.

Table 3: EV620 DC Specifications

Symbol	Parameter	Min	Typical	Max	Units
Vcc	Supply Voltage	3.0	3.3	3.6	V
Icc max	maximum supply current			1000	mA
Icc stdby	Target Standby supply current			TBD	mA

Table 4: EU740 DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
Vcc	Supply Voltage	3.04	3.3	3.56	V
Icc max	maximum supply current			2750	mA
Icc stdby	Target Standby supply current		180		mA
Icc csd	Target CSD supply current		500	TBD	mA
Icc grps avg	Target GPRS supply current average		750	TBD	mA
Icc grps peak	Target GPRS supply current peak		2200	TBD	mA
Icc WCDMA	Target WCDMA supply current		900	TBD	mA

Table 5: EU730 DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
Vcc	Supply Voltage	3.04	3.3	3.56	V
Icc max	maximum supply current			2750	mA
Icc stdby	Target Standby supply current		180		mA
Icc csd	Target CSD supply current		500	TBD	mA
Icc grps avg	Target GPRS supply current average		750	TBD	mA
Icc grps peak	Target GPRS supply current peak		2200	TBD	mA
Icc WCDMA	Target WCDMA supply current				mA

Table 6: GPRS/GSM Duty Cycles and Typical power consumption

Mode	Average battery power	Peak & duty cycle
GPRS Transmitting	2.3 W average	7.0 W / 25%
GPRS Receiving	2.3 W average	7.0 W / 25%
GSM Transmitting	1.7 W average	7.7 W / 12.5%
GSM Receiving	1.7 W average	7.7 W / 12.5%

Power Class

The power classes are shown in following tables.

Table 7: EV620 Power Class

Band (MHz)		**Power Class**	**Comment**
800	CDMA	Class III	+23dBm ERP
	CDMA 1XRTT	Class III	+23dBm ERP
	CDMA 1XEV-DO	Class III	+23dBm ERP
1900	CDMA	Class II	+23dBm EiRP
	CDMA 1XRTT	Class II	+23dBm EiRP
	CDMA 1XEV-DO	Class II	+23dBm EiRP

Table 8: EU740 Power Classes

Band (MHz)		**Power Class**	**Comment**
850	GPRS	4	+33 dBm nominal
	EDGE	E2	+27 dBm nominal
900	GPRS	4	+33 dBm nominal
	EDGE	E2	+27 dBm nominal
1800	GPRS	1	+30 dBm nominal
	EDGE	E2	+26 dBm nominal
1900	GPRS	1	+30 dBm nominal
	EDGE	E2	+26 dBm nominal
2100	UMTS/HSDPA	3	+24 dBm nominal

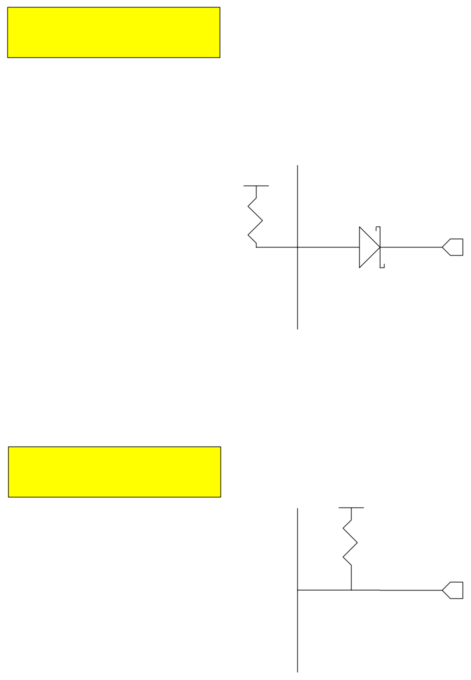
Table 9: **EU730 Power Classes**

Band (MHz)		Power Class	Comment
850	GPRS	4	+33 dBm nominal
	EDGE	E2	+27 dBm nominal
900	GPRS	4	+33 dBm nominal
	EDGE	E2	+27 dBm nominal
1800	GPRS	1	+30 dBm nominal
	EDGE	E2	+26 dBm nominal
1900	GPRS	1	+30 dBm nominal
	EDGE	E2	+26 dBm nominal
1900	UMTS/HSDPA	4	+21 dBm nominal
850	UMTS/HSDPA	4	+21 dBm nominal

WDISABLE

The modem is made incapable of transmitting when the WDISABLE pin is pulled low. The following diagram illustrates the Pull-Up resistor configuration:

Figure 4: W_Disable Pull-up Configuration



Electrostatic Discharge and Electro-Magnetic Interference

The modem does not protect itself from ESD. It is the responsibility of the host to ensure that there will not be any harmful discharges to the modem.

With regard to EMI, the modem will meet FCC part 15 for North American markets, and ETSI EN 301 489-1 for European markets. This device when incorporated in any other product may require FCC and/or other approvals. It is the user's responsibility to do this.

Firmware

Overview

The firmware for the EU730/740 is comprised of the Qualcomm supplied UMTS/GPRS protocol stack (Advanced Mobile Subscriber Station (AMSS) 6275 Software) with additional Novatel Wireless firmware specific to the Mini Card implementation. The firmware runs on ARM9 core in the MSM6275 ASIC.

The firmware for the EV620 is comprised of the Qualcomm supplied CDMA2000 protocol stack (Advanced Mobile Subscriber Station (AMSS) 6500 Software) with additional Novatel Wireless firmware specific to the PC card implementation. The firmware runs on ARM9 core in the MSM6500 ASIC.

Memory

In order to reduce the MSM6275 and the MSM6500 firmware memory footprint, unused application features, drivers and services are removed. The network protocol layers (Mobility Management, Data services, Radio Resource Control, Radio Link Control, Media Access Control, Physical Layer control and Drivers to Qualcomm's RF chipsets) remains unaltered.

EU730/740 Firmware Features

Protocol of HSDPA Features for EU730/740

- UMTS: 3GPP Release 5, June 2004
- UE Category 12, QPSK, 1.8 Mbps Peak Rate
  - QTC Release 2 will support 384 Ul and 1.8 M DL
- PS RAB (DL: up to 1.8M and UL: up to 384 K) on HSDPA channel
- DCCH 3.4 Kbps
- Establish/ Release/ Reconfigure of HSDPA channel
- HSDPA channel re- pointing (Synchronized and non- synchronized cell change) for mobility.
- Up switching and Down switching of PS RAB between DPCH and HS- DSCH
- Switching between HSDPA channel and common channel
- Integrity protection and ciphering
- Primary PDP context.

GPRS/EGPRS Protocol and Feature Rollout for EU730/740

GPRS

- channel coding schemes CS1-4
- link adaptation
- multislot class 10
- One-phase packet access
- Two-phase packet access
- GPRS test modes (ETSI test mode A and B)
- **Attach / Detach**
  - GPRS detach only
  - Combined GPRS/IMSI detach
  - MS-initiated detach
  - NW-initiated detach
  - Automatic GPRS attach at power-up
  - GPRS attach status indication

EGPRS

- Uplink modulation and coding schemes MCS 1-4
- downlink modulation and coding schemes MCS 1-9
- 8PSK modulation on both uplink and downlink for MCS 5-9
- multislot class 1
- One-phase packet access
- Two-phase packet access
- EGPRS test modes (ETSI test mode A and B)
- EGPRS link adaptation
- EGPRS incremental redundancy
- EGPRS multislot class 10

NC0
Medium access modes – dynamic allocation
RLC-acknowledged operation mode
RLC unacknowledged operation mode
LLC-acknowledged transmission mode
LLC-unacknowledged transmission mode
GSM network operation mode I
GSM network operation mode II
PBCCH/PCCCH support in NOM I

PDP Context

- Mobile-originated PDP context activation
- Mobile-originated PDP context deactivation
- Network-originated PDP context deactivation
- Network-originated PDP context activation
- PDP context modification (NW initiated)
- Active PDP context indication
- PDP address (IPv4)
- PDP address (IPv6)
- **PDP context type – IP**
  - Static IP
  - Dynamic IP

    - RFC1144 TCP/IP header compression
    - WINS address support-primary and secondary
- **QoS**
    - Support QoS profile (release 97)
    - Enhanced QoS (refer to 3GPP TS 22.060, Section 5.6.2; TS 24.008, Section 10.5.6.5)
    - Support QoS profile (release 99, EGPRS-capable terminals)
    - Background QoS class supported
    - Interactive QoS class supported
    - Streaming QoS class supported

V.42bis data compression
Carrier will be able to program GPRS service parameters (PDP context) (via Application Profile)
Data counter (time and transferred bytes per session and cumulative sessions)
Packet enhanced measurement report (PEMR)
Network-assisted cell change (R4 GERAN Feature Set 1)
Extended UL TBF mode (R4 GERAN Feature Set 1)

UMTS

- Cell_PCH and URA_PCH
- WCDMA-to-GPRS reselection in CELL_FACH
- 64K Sync CSD
- Radio link failure (RRC)
- Inter-frequency reselection in Cell_FACH
- CLTD mode 1
- SIB scheduling
- Path loss measurements
- 6F/6G (UE internal)
- Re-establishment procedure
- SIB modification
- SIB 7
- Inter-frequency redirection
- Inter-RAT redirection (RRC connection reject to GSM)
- HCS

Security

- Support of encryption A5/1
- Support of encryption A5/2
- GPRS ciphering algorithm GEA1
- GPRS ciphering algorithm GEA2
- PAP for RADIUS authentication - GPRS/EGPRS
- CHAP for RADIUS authentication - GPRS/EGPRS
- Support for encryption algorithm UEA1 (Kasumi)
- Support for integrity algorithm UIA1 (Kasumi)
- IMEI Security
- OMA DRM v1.0
    - Forward lock
    - Combined delivery
    - Separate delivery
- OMA DRM v2.0
- SIM lock

SMS

- Mobile-originated SMS (MO-SMS) over CS channel
- Mobile-originated SMS (MO-SMS) over PS channel
- Mobile-originated SMS over PS shall fall back to CS if: a) PS service is not available, or b) there is a PS network failure
- Mobile-originated SMS (MO-SMS) concatenation (minimum of 5 segments)
- Mobile-terminated SMS (MT-SMS) over CS channel
- Mobile-terminated SMS (MT-SMS) over PS channel
- Mobile-terminated SMS (MT-SMS) concatenation (minimum of 5 segments)
- Mobile-originated SMS email
- Mobile-originated SMS email concatenation (minimum of 5 segments)

USSD

- Unstructured supplementary service data – mobile-originated (MO-USSD)
- Unstructured supplementary service data – mobile-terminated (MT-USSD)

SS

- Calling Line Identification Restriction (CLIR)
- Calling Name Presentation (CNAP)
- Barring of All Outgoing Calls (BAOC)
- Barring of Outgoing International Calls (BOIC)
- Barring of Outgoing International Calls except to Home PLMN (BOIC-exHC)
- Barring of All Incoming Calls (BAIC)
- Barring of All Incoming Calls when Roaming outside the Home PLMN (BIC-Roam)
- International Access Function “+“

Network Selection

- Support for the network selection procedures described in 3G 22.011, R4 minimum
- Support for the network selection procedures described in 3G 23.122, R4 minimum
- Support for the RRC connection reject message to redirect from a 3G system to a 2G system, according to 25.331, R4 minimum
- Support for the network selection procedures described in 3G 43.022, R4 minimum
- Support for an initial HPLMN scan at a 2mins after power on
- Support for a HPLMN rescan irrespective of the serving MCC
- Support of equivalent PLMN
- Network selection within 30 seconds upon power up

Inter-RAT and Inter-Frequency

- GSM900 1 WCDMA2100 handover – blind mode
- GSM1800 1 WCDMA2100 handover – blind mode
- GSM900 " WCDMA2100 handover – idle frame measurements
- GSM1800 " WCDMA2100 handover – idle frame measurements
- GSM900 1 WCDMA2100 cell reselection
- GSM1800 1 WCDMA2100 cell reselection
- GSM900 1 WCDMA2100 CCO
- GSM900 1 WCDMA 2100 CCO
- GSM900 (w/BCCH/ PBCCH) " WCDMA2100 reselection in packet transfer
- GSM1800 (w/BCCH/ PBCCH) " WCDMA2100 reselection in packet transfer

- PS data continuity during OOS and RAT change
- PS data continuity with MPDP (primary and secondary contexts) and RAT change
- EDGE 1 WCDMA cell reselection in packet transfer
- Inter-RAT NACC 2G 1 3G
- 3G background PLMN search while in 2G
- 3G background PLMN search while in 3G

HSPDA

- Category 12 (QPSK)
- **Code Rates**
  - Rate ¼
  - Rate ½
  - Rate 1/3
- **HSDPA Logical Channels**
  - HS-SCCH
  - HS-DPCCH
  - HS-PDSCH
  - Up to 5 HS-PDSCH channels support
- **HSPDPA Transport Channels**
  - HS-DSCH
  - . 120 kbps
  - . 240 kbps
  - . 360 kbps
- Fast L1 HARQ
- Incremental redundancy
- Chase combining retransmission scheme
- Multi-Code Operation 1 code
  - 5 codes
  - 480 kbps
  - 600 kbps
  - 720 kbps
  - 1.2 Mbps
  - 1.8 Mbps
- Fast link adaptation
- Vary the effective code rate
- HARQ, MAC-HS disassembly
- MAC-HS reordering queue distribution and processing support
- Synchronous and non-synchronous cell change support
- Intra-NodeB (softer re-pointing) cell change support
- Inter-NodeB (soft re-pointing) cell change support
- Up-switching and down-switching of PS RAB between HS-PDSCH and DPCH
- Ciphering on the HS channel
- Support to not resume the HS channel if inter-RAT handover fails, but save the RB mapping information
- Support to not resume the HS channel if a radio link failure occurs, but save the RB mapping information
- **QoS**
  - Background QoS class supported
  - Interactive QoS class supported
  - Streaming QoS class supported

System

- Network Selection
- Enhanced Network Selection (ENS)
- Supplementary Services

SIM

- Dual IMSI

Fixes to Feature and Protocol deficiencies identified through testing of Beta Release
HSDPA Compressed mode with active HS channel
Video on DPCH
MAC-d de-multiplexing

EV620 Firmware Features

Firmware Naming Convention

There are two firmware release strings that can be retrieved from the device, a short form consisting of a three digit decimal starting at 100 and run sequentially and a long string M6500C-BBIRD-XXXXX.YYY [MMM DD HH:MM:SS]. XXXXX is the Qualcomm base release and patch level, YYY is identical to the three digit decimal from the short form, [] contains the release date and time.

The starting version of firmware is 136.

Standards Support

- IS-707: 14.4 kbps Data Services
- TSB-74: 14.4 kbps Radio Link Protocol and Interband Operations
- TIA/EIA/IS-2000 PN-4756 (Ballot Version): Addendum 1 (to the IS-2000 standard)
- IS-707A: CDMA Data Services Revision for IS-95B
- IS-707A-1: CDMA Data Services Revision for cdma2000 Rel. 0
- IS-95A, IS-95B: CDMA Dual-Mode Air Interface Standard
- PN-4430 (Ballot Resolution Version 0.14, to be published as TIA/EIA-IS-2000.4): cdma2000: Signaling Layer 2 Standard for Spread Spectrum Systems
- J-STD-008: IS-95 adapted for 1900 MHz frequency band
- PN-4429 (Ballot Resolution Version, to be published as TIA/ EIA-IS-2000.3): Medium Access Control (MAC) for cdma2000 Spread Spectrum Systems
- TIA/EIA-95-B: Mobile Station-Base Station Compatibility Standard for Dual-Mode Spread Spectrum Systems
- IS-683A: OTA Update: Roaming System Selection and Programming Block
- PN-4428 (Ballot Resolution Version, to be published as TIA/ EIA-IS-2000.2): Physical Layer Standard for cdma2000 Spread Spectrum Systems
- IS-637A: Short Message Service including mobile-origination
- PN-4431 (Ballot Resolution Version 1.06, to be published as TIA/EIA-IS-2000.5): Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems
- IS-856-2 (3GPP2 C.S0024): cdma2000® High Rate Packet Data Air Interface Specification

Frequency Band Support

- Band Class 0 – Cellular 800 MHz
- Band Class 1 – PCS 1.9 GHz

CDMA Air Interface

- TIA/EIA/IS-95-A Air Interface
- TIA/EIA-95-B Air Interface
- J-STD-008 + TSB74 Air Interface
- TIA/EIA/IS-2000-0 Air Interface
- TIA/EIA/IS-2000-A Air Interface
- TIA/EIA/IS-2001 Data Session Handoff
- TIA/EIA-126 Loop back Services
- TIA/EIA/IS-870 Test Data Services
- TIA/EIA/IS-871 Markov Services
- TIA/EIA/IS-707-A Data Services
- TIA/EIA-637-A Short Message Services
- TIA/EIA/IS-683-A OTASP Services
- Traffic State Receiver Diversity Combining
- Idle State Low-Power Slotted Mode
- Dynamic P_REV Specification
- Dynamic Feature Selection

1XEV-DO Air Interface

- TIA/EIA/IS-856-2 Air Interface
- TIA/EIA-878 Authentication and Session Handoff
- TIA/EIA/IS-890-1 Test Application
- Connected State Receiver Diversity Combining
- Idle State Low-Power Slotted Mode
- Acquisition State Micro Searching
- Connected State Off-Frequency Neighbor Searching
- Extended Username and Password for AN Authentication
- System Access Inhibit Response
- Air Interface Session Association With PPP Session
- 1xEV-DO to 1x Hand-Down Algorithm DRC Filter
- 1xEV-DO Suspend timer disabled

Multimode Services

- System Determination 2.0
- Multimode Call Manager
- TIA/EIA/IS-683C Preferred Roaming List
- CDMA-Only Mode
- HDR-Only Mode
- CDMA+HDR Mode
- CDMA+HDR Hybrid Mode
- CDMA QPCH in Hybrid Idle State
- Hybrid in CDMA Power-Save

Data Services

- TIA/EIA/IS-707 AT Command Processing
- TIA/EIA/IS-835 Wireless IP Networking
- Internet Protocol Stack (TCP/UDP/IP/PPP)
- Simple IP Address Management
- Mobile IP Address Management
- RFC1750 Dynamic Mobile IP Key Update (DMU)
- Embedded internet over the air (eIOTA) activation Client
- Relay Mode Operation
- Network Mode Operation
- Sockets Mode Operation
- Socket Layer API

UIM Card Services

- No R-UIM Support will be provided.

Universal Serial Bus Interface

- USB Specification 2.0
- Full Speed Device Operation
- Communications Device Class Profile
- Composite Device Profile
- Data Service Interface
- Diagnostics Service Interface
- Download Service Interface

Application Software

Novatel provides Mobilink™ application software . The software is defined in later Chapter.

MobiLink™ connection manager software to install and configure modem (for all supported platforms)

AT Command Set Support per IS-707

Fully compatible and interoperable with current Microsoft OS platforms: PPC 2000/2002/HPC, Windows 98, Windows 2000, Windows ME, & Windows XP

Integrated drivers for Windows OS, configurable as either a modem or network card

PCI Express Mini-card

Compatibility with all major brands of PC's and PPC computing platforms

Sleep Mode capabilities

Uses common base technology shared with OEM Module

IS-683A compliant - Over-The-Air activation and parameter update capabilities.

On-line help, getting started guide, documentation

All software applications necessary to communicate with the PCI Express Mini Card will operate with the following platforms: PPC 200/2002/HPC, Windows 98, Windows 2000, Windows ME, & Windows XP

All software shall support 640x480, 640x240, and 800x600 color and monochrome displays

MobiLink™ allows the user to configure the modem easily

MobiLink provides diagnostic capability

MobiLink provides a Help menu that is Context Sensitive

Environmental

The EU730/740 and EV620 will be compliant with the Mini PCI Express Electromechanical specification as detailed in the table below.

It should be noted that Novatel Wireless cannot guarantee that the host device (laptop; PDA; notebook etc.) will be able to endure these same environmental conditions. Users are advised to consult the host device documentation for specifications and observe any restrictions of use.

Table 10: EU730/740 Environmental Specification

Parameter	Condition
Low Temperature Storage	-20 °C
High Temperature Storage	85 °C
Low Temperature Operating	0 °C
High Temperature Operating (within spec)	65 °C[1]
High Temperature Operating (relaxed spec)	85 °C
Relative Humidity	95% maximum (non condensing)
Vibration and High Frequency	147m/s2 (15G) peak; 10 to 2000 Hz
Drop	75 cm

Table 11: EV620 Environmental Specification

Parameter	Condition
Low Temperature Storage	-30 °C
High Temperature Storage	85 °C
Low Temperature Operating	-20 °C
High Temperature Operating	65 °C[2]
Relative Humidity	95% maximum (non condensing)
ESD	8kV Air / 4kV Contact

[1] It is required that the shield temperature not exceed 80°C at anytime. It may be necessary for the system integrator to provide some method to insure this surface temperature is not exceeded.
[2] It is required that the shield temperature not exceed 80°C at anytime. It may be necessary for the system integrator to provide some method to insure this surface temperature is not exceeded.

Vibration and High Frequency	147m/s^2 (15G) peak; 10 to 2000 Hz
Drop	75 cm

The EV620 product operates in a reliable fashion consistent with CDMA (IS-98C) and PCMCIA V2.1 standards. It will withstand three-foot drop and still remain functional.

Provisioning with IOTA

This applies only to the EV620. The EU730 & 740 use SIM cards and don't require any type of IOTA.

Sprint PCS uses IOTA to perform their provisioning before a wireless device is allowed on the data network. This process is operator specific so there maybe variations as to how provisioning is done. In all cases, please contact the network operator if you have questions concerning activation and subscriber related questions.

When using the PCI Express Mini Card, the activation is done by MobiLink™. MobiLink™ will automatically detect if the EV620 module needs to perform any provisioning on Sprint's network.

Since the EV620 module does not use MobiLink, you must run IOTA from the primary port on the EV620 module. Novatel Wireless has developed an embedded IOTA Client called, eIOTA that interfaces through AT commands. This Client will allow the subscriber to execute an IOTA session to perform provisioning of the EV620. Once this is done, the EV620 can access the 1xRTT and 1xEVDO networks.

For use with Sprint PCS, the subscriber first needs to contact a sales representative to activate the EV620. The Sprint PCS representative will present to the subscriber the MDN or MIN numbers with the SPC. These parameters need to be entered into the EV620 if it does not already exist. Upon the time of receiving these parameters, Sprint PCS has a time provisioning requirement of 1.5 days to 2 days for the EV620 to perform and complete an IOTA session. If the subscriber does not complete the IOTA provisioning within this time, the subscriber will have to call Sprint PCS again to reset the provisioning timer.

At the end of this section, there is a flowchart diagram that further explains the process of using eIOTA.

eIOTA

eIOTA is a subscriber unit provisioning Client, or Provisioning Service Agent. Embedded in the CDMA wireless modem, the Client communicates with Handset Configuration Manager, the operator's IOTA server, to download provisioning data to the subscriber unit or upload settings per server's request. It allows the operator to remotely perform provisioning without having to bring the wireless device into a sales location.

eIOTA is disabled by default from the factory. This is done because if eIOTA was active, it would automatically attempt an eIOTA session if the EV620 has not already completed provisioning. When the subscriber finishes entering the MDN or MIN, they could either enable eIOTA and have the EV620 automatically attempt an IOTA session after a power cycle or initiate a manual IOTA session.

Enabling, disabling, and starting eIOTA

eIOTA Client can be enabled or disabled by issuing the AT commands:

- To enable: AT+IOTA=1
- To disable: AT+IOTA=0
- To force start: AT+IOTA=2

There are two ways to start eIOTA, NIIP(Network Initiated Initial Provisioning) or CIIP(Client Initiated Initial Provisioning). In NIIP, operator's IOTA server pushes a special SMS message to the Client to trigger an IOTA session. In CIIP, a session can be triggered by locally issuing an AT command: AT+IOTA=2.

Checking eIOTA status

The AT command: AT+IOTA=? Is used to query the eIOTA status while IOTA is active.

Please refer to AT+IOTA in the AT Commands Chapter for details.

Cautions that need to be taken when eIOTA is active

DO NOT power off the unit until IOTA session is finished.

DO NOT remove the antenna from the unit.

DO NOT disconnect the data call issued by eIOTA.

When running eIOTA, to ensure no power lost, make sure to use the AC power and NOT the battery power.

Development Board

Fixture Diagram/Assembly Diagram

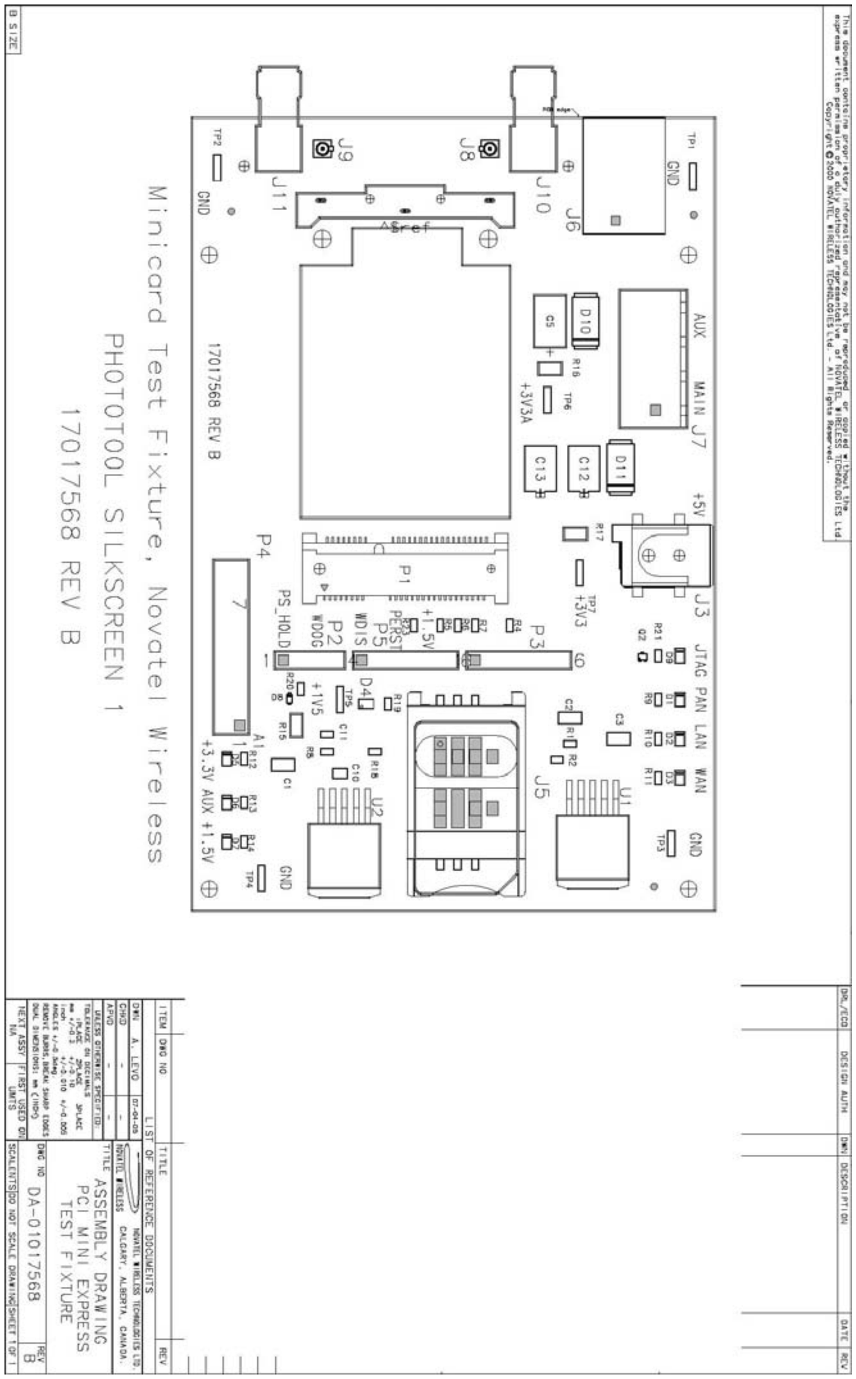
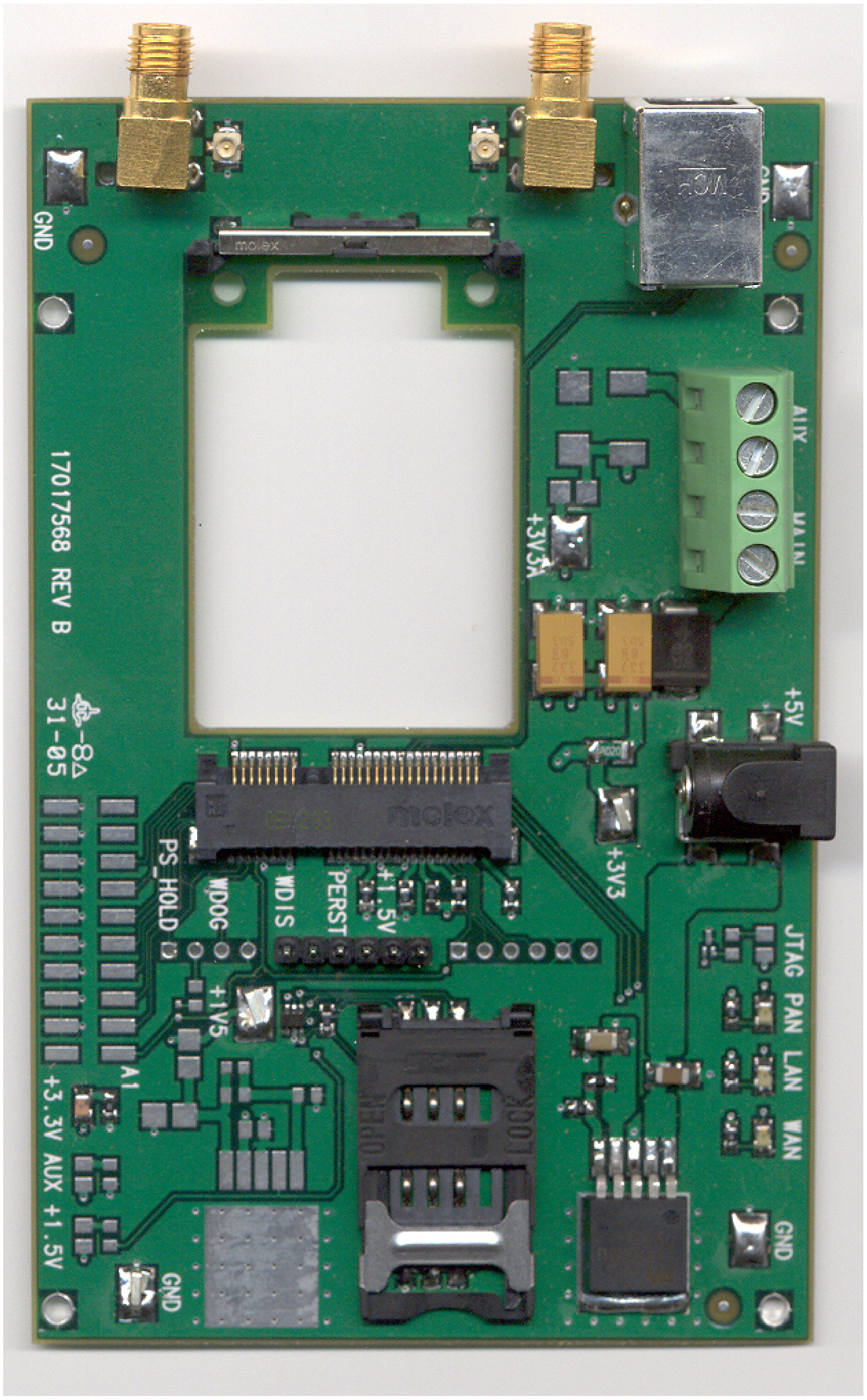
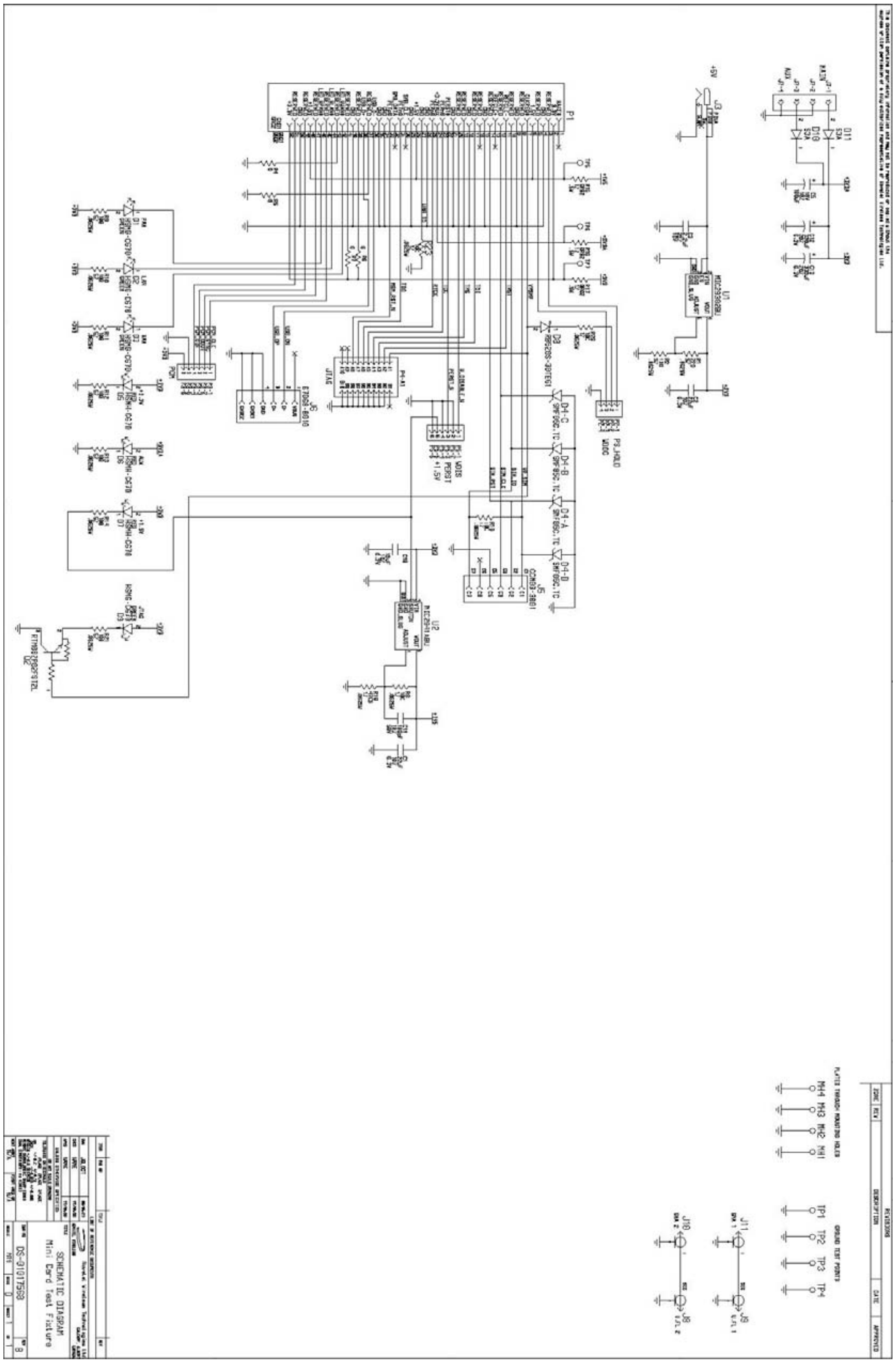


Photo of Top View



Schematic



Power Supply Requirements for GSM Bursting

One power ramping scheme uses two timings for high and low power levels, as shown in the following representative ramps.

Figure 5: Up-ramp for Highest Power Levels

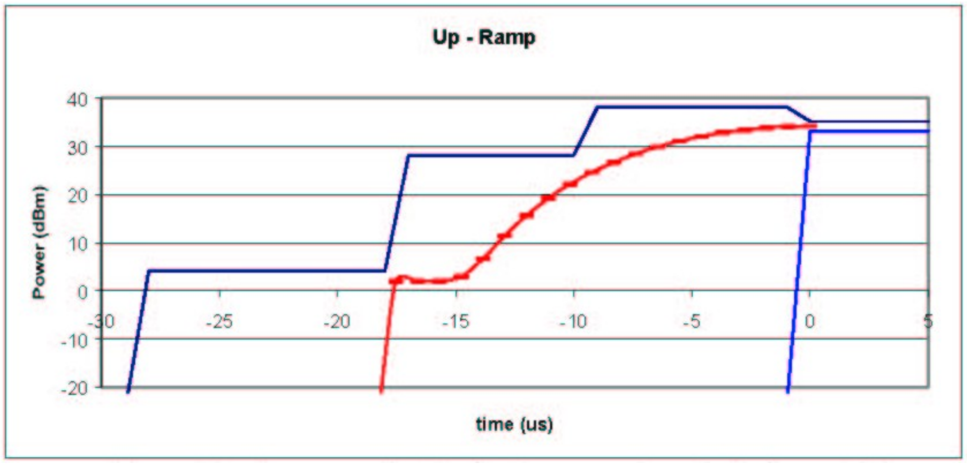
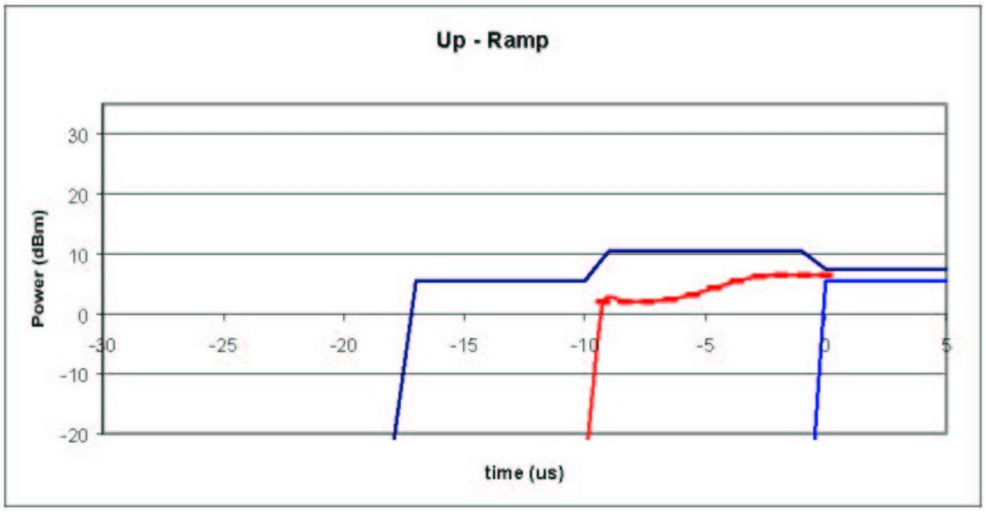


Figure 6: Up-Ramp for Lowest Power Levels

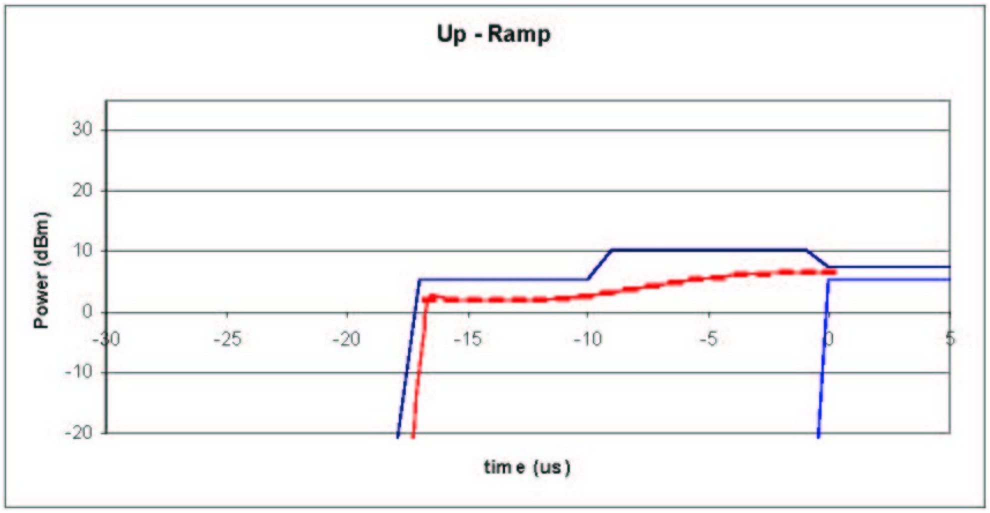


The Second power ramping scheme uses one timing for all power levels. A representative ramp for low power levels is shown, with suggested ramp timings.

Table 12: Suggested Ramp Timing for Scheme 2

	TX_Enable high	Vramp start	Vramp length (to full power)
GSM PL 5 – 16	-17 us	-15 us	14 us
GSM PL 17 – 19	-17 us	-8 us	7 us
DCS PL 0 – 10	-17 us	-15 us	14 us
DCS PL 11 –15	-17 us	-8 us	7 us

Figure 7: Up-Ramp for Lowest Power Levels (Scheme 2)



SIM Card Socket Location

SIM Card must be placed so as to minimize trace length between SIM Card and Connector. If there is too much distance this will impede good performance.

Antenna

1XEV-DO Diversity Antenna Requirements

Table 13: Design specifications for the Diversity EVDO antenna

Description	**Minimum**	**Maximum**	**Unit**
Primary Antenna (Transmit & Receive)			
Peak Antenna Gain	1.0		dBi
Average Gain	-3.0		dBi
Efficiency	-4.0 (40)		dB (%)
Polarization (Ratio Gv:Gh)	0.0		dB

Input VSWR		2.5:1	
Average Power Handling	2.0		Watt
Secondary Antenna (Receive Only Diversity)			
Average Gain	-9.0		dBi
Efficiency	-10.0 (10)		dB (%)
Polarization (Ratio Gv:Gh)	0.0		dB
Input VSWR		2.5:1	
Antenna to Antenna Requirements			
Isolation		-8.0	dB
Fading Correlation Coefficient		0.5	dB (%)

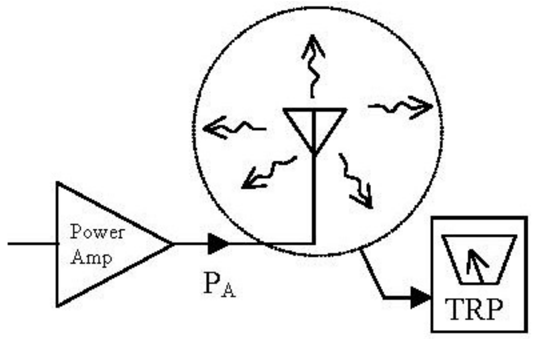
FCC Implications – Mobile vs. Portable Devices

Testing for SAR for Portable Device must be done if within 20 cm of body. SAR testing is not necessary for Mobile Devices.

TRP (Total Radiated Power) Requirements

Good radiated performance is critical to the effective operation of a mobile in networks. A comprehensive characterizing of radiated performance enables carriers to know how well mobiles work within the specific network design constraints. Generally , peak EIRP (Effective Isotropic Radiated Power) is not a good indication of mobile performance in the field. From a field performance perspective, measurement of the average and peak EIRP on a head model is more meaningful than measurement of peak EIRP in free-space conditions. This spherical effective isotropic radiated power is termed TRP (Total Radiated Power.) The TRP is the sum of all power radiated by the antenna, regardless of direction or polarization, as illustrated below.

Figure 8: Total Radiated Power



Tests shall be carried out for three different frequency pairs across the bands supported by the device, as defined for CDMA TIA/EIA-98-D and for GSM 1900 3GPP TS 51.010 in the tables below.

Table 14: CDMA Test Frequencies

Band	Channel Pair	Designation	Frequency (MHz)
Cellular A	1013	CH_1-TX	824.7
Cellular A	1013	CH_1-RX	869.7
Cellular B	384	CH_2-TX	836.52
Cellular B	384	CH_2-RX	881.52
Cellular B	777	CH_3-TX	848.31
Cellular B	777	CH_3-RX	893.31
PCS A	25	CH_4-TX	1851.25
PCS A	25	CH_4-RX	1931.25
PCS B	600	CH_5-TX	1880.00
PCS B	600	CH_5-RX	1960.00
PCS C	1175	CH_6-TX	1908.75
PCS C	1175	CH_6-RX	1988.75

Table 15: GSM-1900 Test Frequencies

Band	Channel Pair	Designation	Frequency (MHz)
PCS A	512	CH_1-TX	1850.20
PCS A	512	CH_1-RX	1930.20
PCS B	661	CH_2-TX	1880.00
PCS B	661	CH_2-RX	1960.00
PCS C	810	CH_3-TX	1909.80
PCS C	810	CH_3-RX	1989.80

Radiated power measurements will be recorded in the “free-space” configuration on all applicable frequencies. For portable units , TPR measurements are repeated on all applicable frequencies. TPR will be reported using the Figure of Merit for industry analysis. Device power shall comply with the power levels specified in the relevant industry standards.

MobiLink Phoenix SDK

Introduction

This document describes the high-level architecture and design of the Phoenix SDK. This SDK is meant for Novatel Wireless data products.

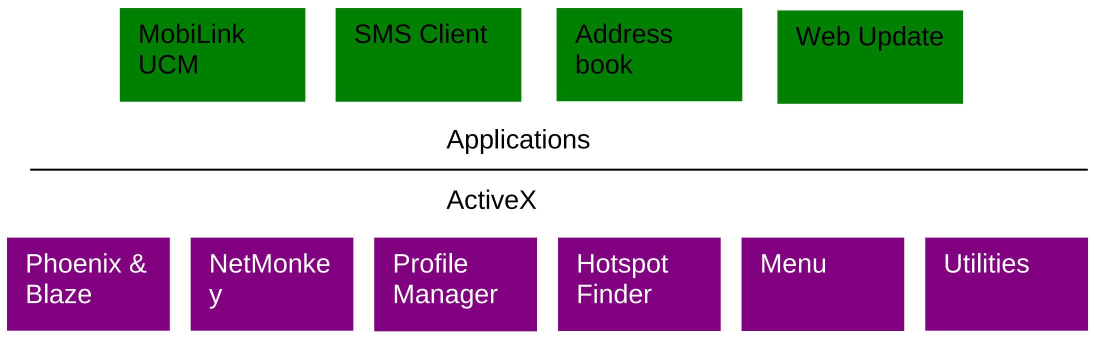
Requirements

- Single Server
- Multiple Clients
- Support Novatel Wireless product line
- Single, Internal State Machine
- Event Driven support for 2-way communication

SDK MODULES

Any number of Client applications can take full advantage of the Phoenix SDK.

Figure 9: Applications



Phoenix & Blaze

Phoenix is the brains of the SDK. Phoenix maintains a single state machine which all Clients communicate with. Anything and everything involving communication to the device takes places through the Phoenix server. Implemented as a Document/View executable supporting automation, the Phoenix server automatically keeps a count of how many Clients are attached to it via COM interfacing. The server is initialized automatically once the first Client is instantiated and shut down once the last Client instance is terminated. With the beauty of OLE Automation, the Phoenix server can be utilized using many different programming languages, including C++, MFC, JavaScript, VBScript, etc. Refer to *Phoenix.chm* for API documentation. If wanting to use Phoenix in Visual Studio, import the type library *Phoenix.tlb* and create a wrapper class for it.

Blaze ActiveX control helps Client applications to receive events fired by the Phoenix server. This allows for simple 2-way communication, replacing redundant loop checking used in the past. Refer to *Blaze.chm* for API documentation. If wanting to use Blaze ActiveX control in Visual Studio, add the NVTL Blaze control from the registered Components and Controls Gallery and create a wrapper class for it.

Sample Code: Refer to PhoenixClient VC++/MFC Project

NetMonkey

NetMonkey ActiveX control provides interfaces to some very useful networking components for managing WLAN, LAN, & WWAN. The WLAN component utilizes Windows XP's Wireless Zero Config when managing and configuring Wi-Fi access points for seamless and easy-to-use access. Currently, the WWAN component supports only Novatel Wireless products, given the proper NDIS drivers. Refer to *NetMonkey.chm* for API documentation.

Profile Manager

Profile Manager ActiveX control helps to manage many types of WWAN network configurations needed in order to make successful connections to a network. Mostly utilized by UMTS/HSDPA networks, it provides a means to store settings like PDP type, PDP Address, APN, Quality of Services settings, IP addresses, proxy settings and more. Each profile is maintained in a local database in a proprietary XML format. Profile properties allow for seamless use via the Phoenix server API. Refer to *ProfileManager.chm* for API documentation.

Hotspot Finder

Hotspot Finder ActiveX control, given a database directory of Wi-Fi hotspots, provides a simple GUI which allows the end-user to easily refine searches in order to find the closest Wi-Fi hotspot. Refer to *Hotspots.chm* for API documentation.

Menu

Menu ActiveX control, currently used in MobiLink, provides a set of GUI's for the end-user. The Properties dialog displays details relating to the currently selected device. The Configuration dialog provides a means to change certain UI settings, as well as change a limited amount of WWAN, WLAN, and LAN settings. The Report dialog shows connection logs and statistics, while the Unlock dialog provides a UI for unlocking the current device. Lastly, the Activation dialog provides a step-by-step Wizard for the user to activate his or her device, while the Debug dialog provides immediate network debugging information for technical support. Refer to *Menu.chm* for API documentation. (*Debug Info and Activation work in progress*)

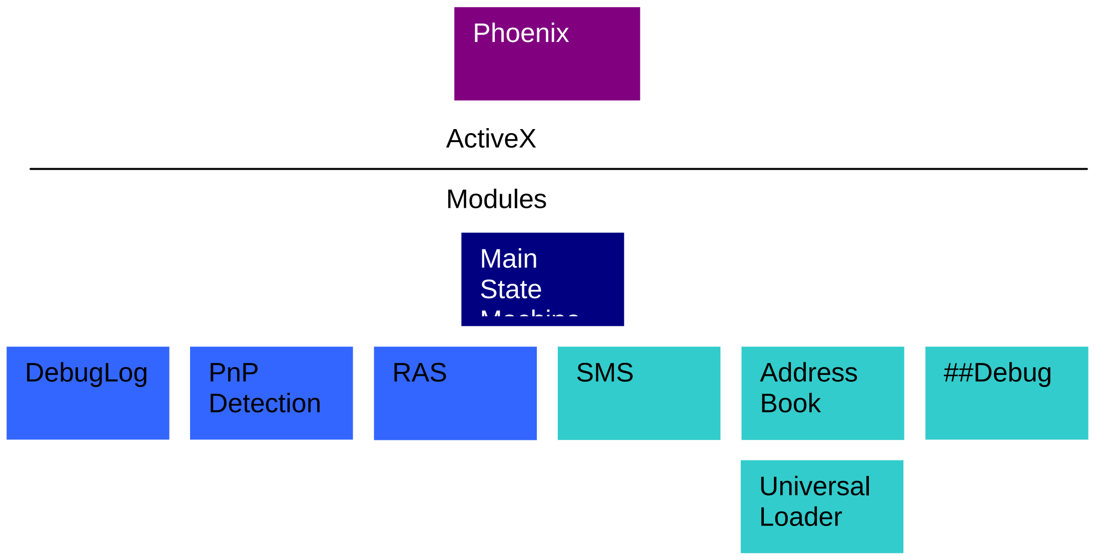
Utilities

Utilities ActiveX control mainly provides a set of Novatel Wireless proprietary utility components. Currently available is the Language component, which provides a set of translations for a number of languages. Components involving any kind of UI take advantage of the Language component in order to support localization. Refer to *Utilities.chm* for API documentation.

PHOENIX SERVER Software design

Overall module design is shown below.

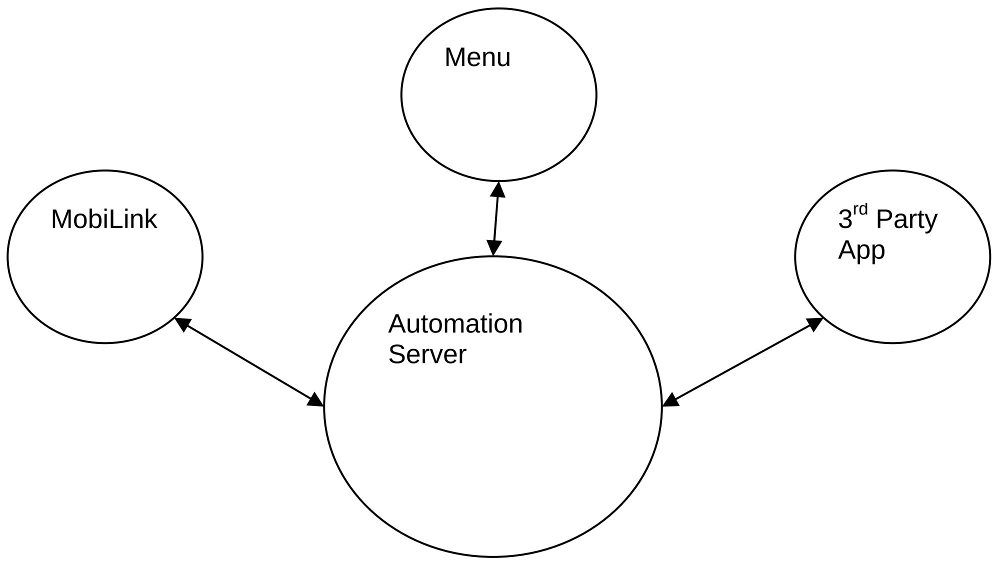
Figure 10: Module Design



Single Server and Multiple Clients

Server-Client design has been implemented using COM and OLE Automation.

Figure 11: Automation Server

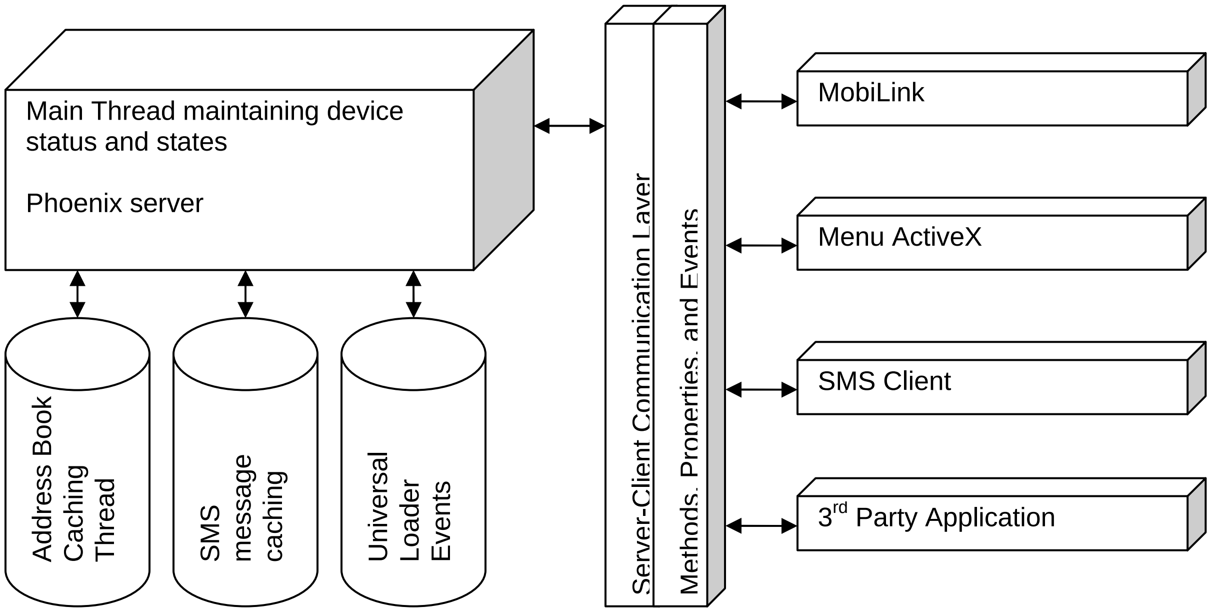


Novatel Wireless Product Line Support

Customer driven product line will be support via the Universal Loader which will allow Phoenix a generic means of communication to all products.

State Machine with 2-Way Communication

Figure 12: State Machine



Main Thread maintaining device status and states
Phoenix server
Address Book Caching Thread
SMS message caching
Universal Loader Events
Server-Client Communication Layer
Methods, Properties, and Events
MobiLink
Menu ActiveX
SMS Client
3rd Party Application

MobiLink Connection Manager

Overview

Firmware is installed in all modems prior leaving the manufacturing facility. Firmware updates in the EV620 can be performed by using the EV620 Development Kit Interface Board and Novatel's MobiLink. However in the EU730™ and EU740™, all that is necessary is the MobiLink software. The MobiLink tool can also be used to change CDMA parameters and many other settings. All these actions will be explained in the following sections.

These instructions may change for future product release.

The Novatel Wireless MobiLink™ Communications Software Suite is a family of wireless connectivity applications that connect mobile devices using wireless wide area networks (WWAN) as well as WiFi and Ethernet in a single application to allow quick and easy access to email, the Internet and corporate networks anytime, anywhere. With MobiLink and a wide area wireless device, mobile users can stay productive and connected to customers and colleagues while out of the office. MobiLink is optimally engineered to work with all of Novatel Wireless' Wireless Modems for best in class 3G wireless broadband access solutions.

The MobiLink Communications Software Suite of applications contains a messaging Client that manages 2 way SMS operations, an addressbook Client that manages contacts and phone number, connection manager that manages the connectivity, and a customization utility to manage and generate install customization settings. The following section will detail the features of each application.

Purpose

This section provides high level user interface information regarding the appearance and operation of the **MobiLink™** Connection Manager application developed for Windows 2000, XP Pro, and XP Home.

Applicable Documents

All software names and version numbers displayed should meet the requirements outlined in the ***Consistency & Naming Conventions Requirements Document***. This document also covers the requirements for the desktop, including the necessary icons and the use of the Start menu.

For more details on meeting the requirements for Microsoft Windows certification, refer to the document entitled, ***Application Specification for Microsoft Windows 2000 and Windows XP for Desktop Applications,*** which can be found on Microsoft's web site.

GENERAL FEATURES

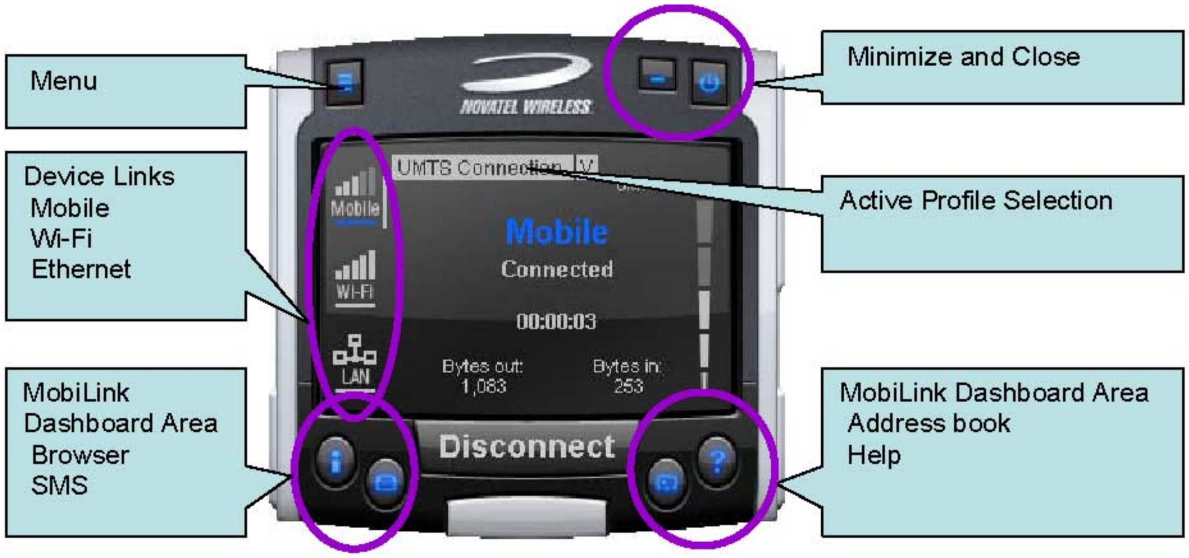
User Interface Functionality

The first design principle for MobiLink applications is that the basic information and controls needed for day-to-day operations are quickly and easily accessible while less frequently used functions are located deeper in the menu system. The user interface is designed to be intuitive to use and will not require a large learning curve for the average user. The second design principle for MobiLink is to be easily customizable in order to be able to meet the various requirements of a global market.

Layout

The general layout of the main windows is designed to display important information for connectivity while making it easy to navigate to other functions. The main function such as mobile status and signal strength display is shown in the main window. The connection button is prominently displayed and easily accessible. The main MobiLink display is shown below.

Figure 13: Main MobiLink Display



The menu button is located on the left upper corner and contains additional functionality such as settings and configurations. The menu system is designed as a button that when clicked, shows a drop down list of other options. Because it's a drop down list, it allows for expansion of functions as well as reduces the clutter on the main display.

The Device Links area is an active navigation bar that shows status for all the three types of connections as well as a clickable area to shift the main display information to the specific type of connection

The Dashboard Area in the layout is designed as a launching area for other applications. The default applications in the current design are internet browser, SMS Client, Addressbook, and Help file. Other applications can be launched.

The Active Profile Selection is a list that allows for easy access to choose the active profile to use for connection. For 3G, this list is a list of connection profiles while for WiFi, this is a list of access points found. For WiFi, this list also shows the signal quality and whether the access point is encrypted.

Lastly, there are the standard minimize and close buttons that are the main stay of any application. The minimize button hides the application as a tray icon and the close button gracefully closes the application.

Mouse Over

Mouse over is a feature of the application that displays helpful hint about the function of the application as the mouse is moved over an active area of the application such as the menu button.

Snap to Edge

Snap to edge is a feature that makes the MobiLink application window snap to the sides of the Windows desktop as the user drags the application close to the edge.

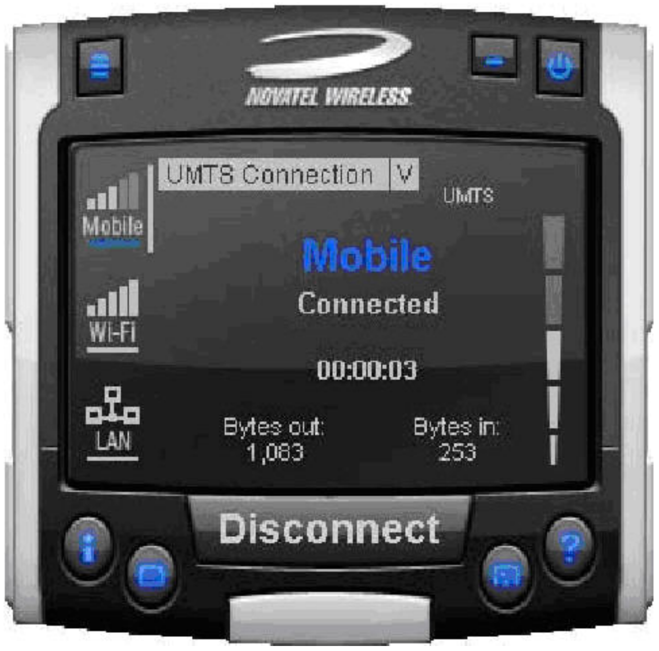
Hot Swapping

The design of MobiLink allows for hot swapping of the 3G device. Users can plug and unplug a 3G wireless device and MobiLink will automatically recognize the technology and dynamically change the display to show the relevant information.

Skinning Customization

Due to the software design and the underlying graphics engine used, the main “skin” of MobiLink is completely customizable. The skin is contained in separate resource files that can be easily changed for branding or function. One design is shown below and more can be developed.

Figure 14: Skin Design



Localization

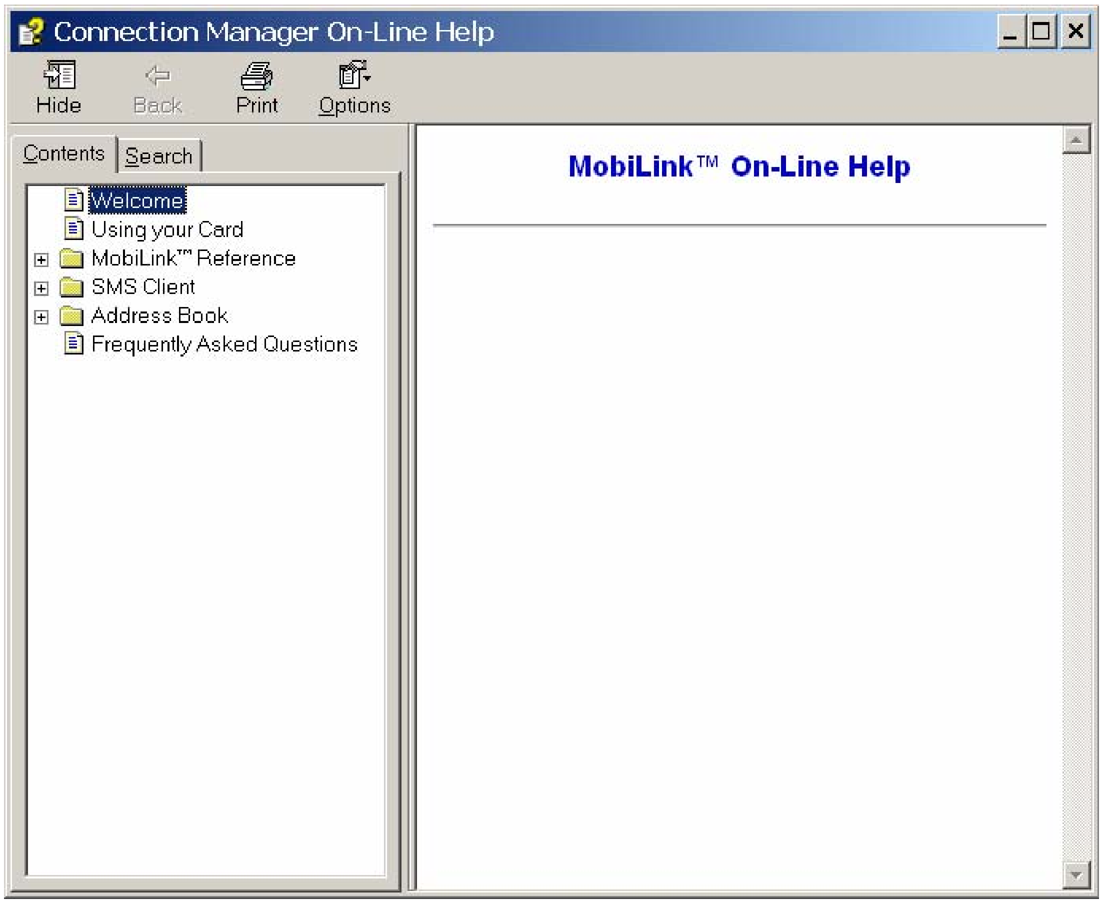
It is the intent of the MobiLink™ connection manager design to be able to support localization. Double byte Unicode is used and all the text used by MobiLink is kept in resource files that can easily be translated and added. Currently MobiLink supports the following languages:

- Chinese Simplified
- Chinese Traditional
- Danish
- English
- French
- German
- Italian
- Spanish
- Swedish
- Polish

File

The MobiLink™ connection manager shall contain a help file that can be accessed through a help button or via F1 key. The help file is also localizable and is in HTML format as shown below:

Figure 15: On-Line Help



MOBILINK™ FEATURES

The following sections describe the various features of MobiLink.

Main Display Window

The main display area of MobiLink is used for status indication of the different types of connections. The following information is displayed.

Figure 16: Status Indication

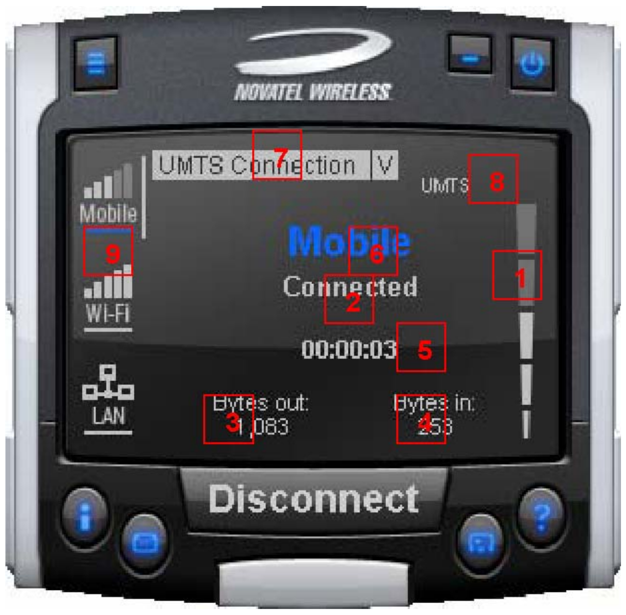


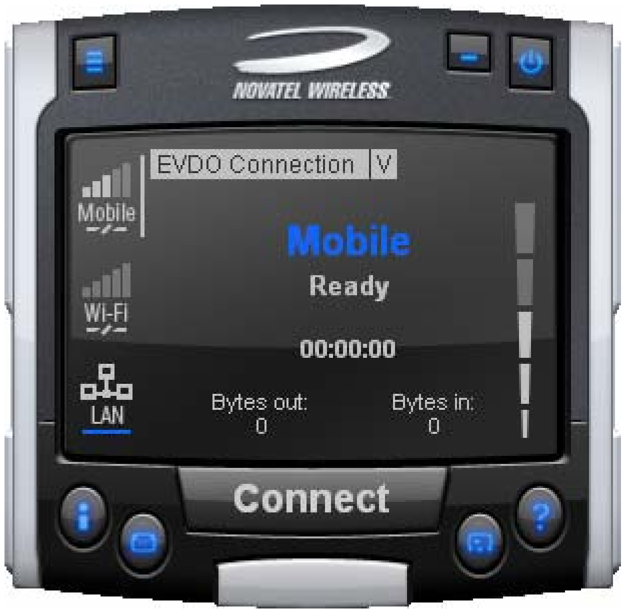
Table 16: Status Indication

Number Reference	Status Information	Description
1	Signal Strength Bar	This is the quality of the signal for the selected
2	Connection Status	This is a text indicating the connection status
3	Connect Duration	This indicates the number of hours, minutes, and seconds the current connection has been up
4	Bytes Out/Packets Out	This indicates the number of bytes sent for the current connection

5	Bytes In/Packet In	This indicates the number of bytes received for the current connection
6	Network Name	For UMTS/HSDPA, this would show the network name received from the AT+COPS command
7	Profile List	This is the list of supported profiles that contains the connection settings such as username and password and QoS for 3G. This is a list of the 3G profiles for the 3G networks and a list of WiFi profiles for the WiFi network. The displayed profile is the active profile.
8	Indicators	The indicators are icons that show additional status of the 3G wireless. Each indicator will be described below.
9	Connection Type Selection Bar	This is a navigation bar that selects which connection information is displayed in the main window. As the connection is selected, the main window will slide to show the right information. Each of the connection icons for this navigation bar also shows the signal strength of the respective connection.

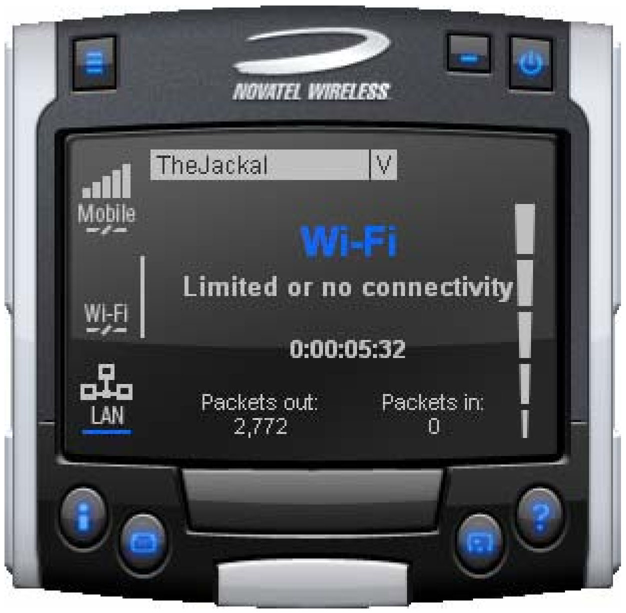
The connection navigation bar was added to support the universal connection management functionality. By having a navigation bar, the user is presented with just the information that is required for the connection of interest. The pictures below show the three views for each connection type.

Figure 17: 3G Wireless View



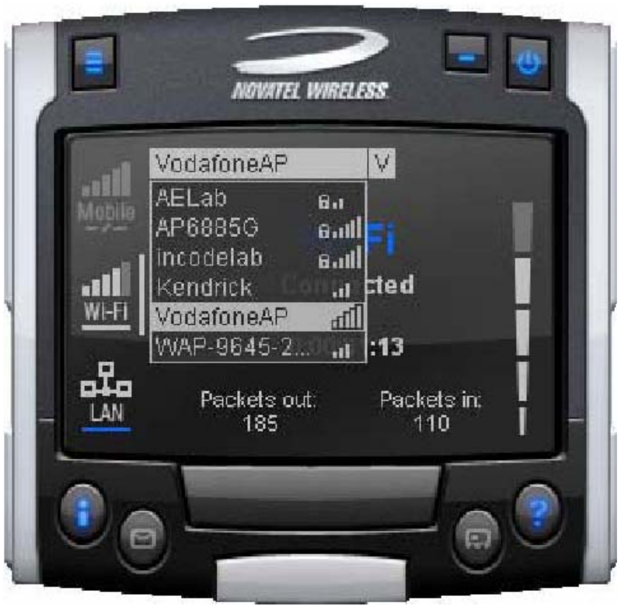
With the 3G Wireless view, connection button can be used to connect to the chosen profile displayed. The status icons for 3G will be displayed on the top right corner and when connected, byte count and time displayed will be shown. The vertical bar next to the navigation bar indicates which view is currently active. When the user clicks on the WiFi navigation button, the WiFi view will be shown.

Figure 18: WiFi View



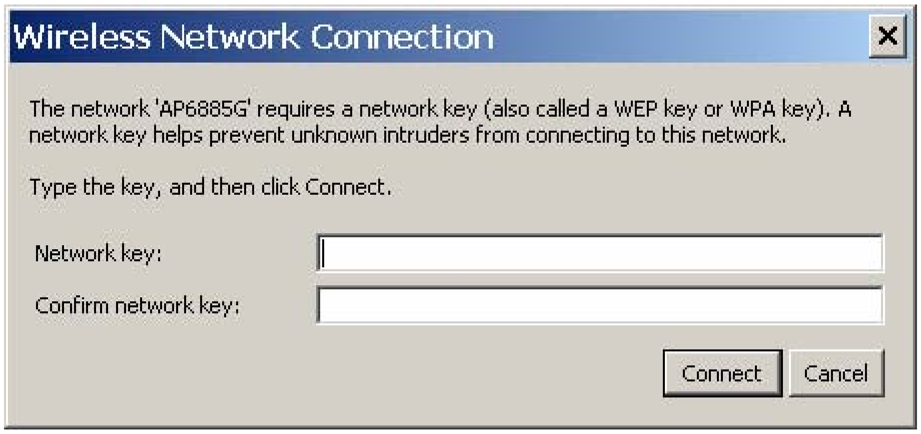
The WiFi view does not have a connection button since WiFi is a connectionless adaptor. The view does show signal strength, packet count, and connection time as well as connection status. Since MobiLink's WiFi is developed using Windows zero configuration, MobiLink WiFi control can coexist with Windows wireless network connection. The default hotspot is shown in the selection list in the same place as the 3G profile list. The list of hotspots is dynamically generated based on a WiFi network scan of the area. Users can chose to make another hotspot active by clicking on the selection list shown below.

Figure 19: HotSpot Activation



The connection list displays all the available hotspots seen by the WiFi adaptor. The list is arranged in alphabetical order and the signal level for each is shown on the side. Also, if the hotspot is WEP protected, a lock icon will be shown. To change hotspot, users can select one from the list. If the hotspot is WEP protected the following dialog will be displayed to query for the network key.

Figure 20: Network Connection



Wireless Network Connection

The network 'AP6885G' requires a network key (also called a WEP key or WPA key). A network key helps prevent unknown intruders from connecting to this network.

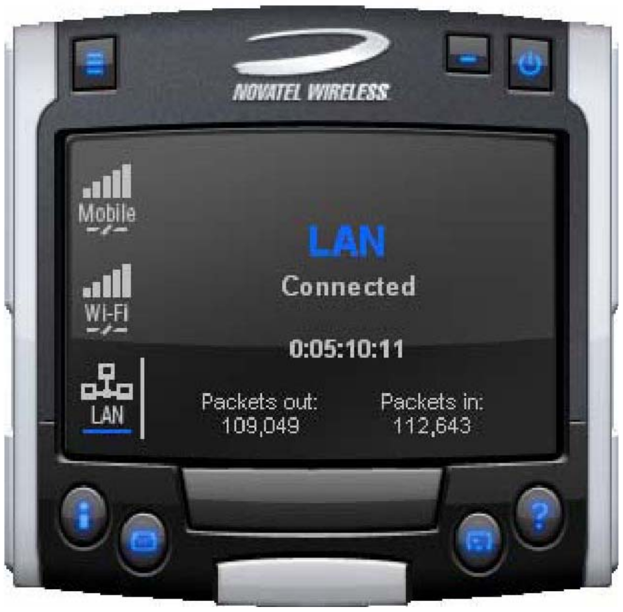
Type the key, and then click Connect.

Network key:

Confirm network key:

Lastly, the user can view the Ethernet connection by clicking on the Ethernet navigation bar icon.

Figure 21: Ethernet View



LAN
Connected
0:05:10:11
Packets out: 109,049
Packets in: 112,643

The Ethernet view shows the connection status, the packet count, and the connection duration.

Indicators

3G indicators are shown on the right upper corner of the main status display. The design of these indicators is based on standard 3G indicators used on mobile devices. The following table describes all the indicators.

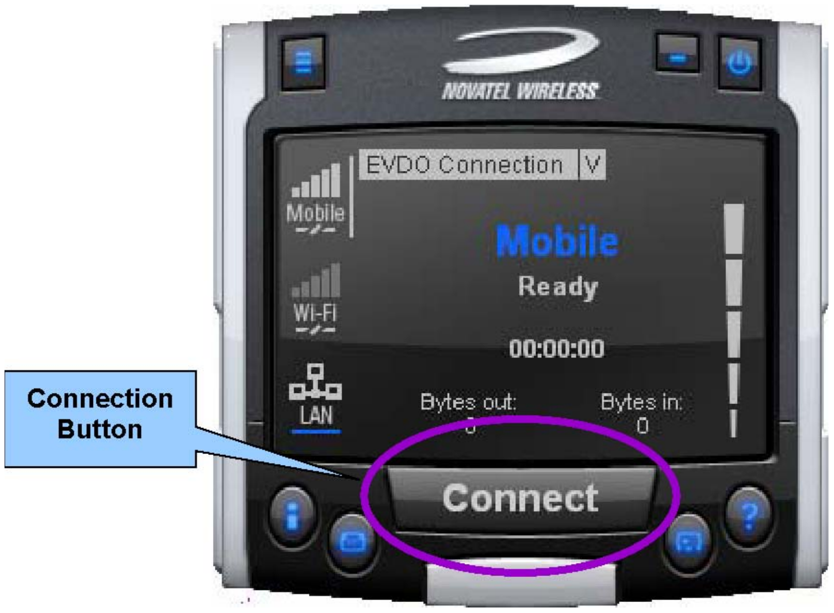
Table 17: 3G Indicators

Indicator	Status/Description
▲	3G radio is roaming
Z	3G in dormant mode (May not be applicable for all MAs)
✉	New SMS is available
🔒	3G device is locked
WWAN Network	This is the type of WWAN protocol that is acquired. The types are: • HSDPA • UMTS • GPRS • GSM • IS95a • 1XRTT • EVDO

Connect/Disconnect Button

Since the main purpose of MobiLink's connection manager is for connecting the user to the internet, the connection button is prominently placed. The Connection button is used to initiate a 3G data connection. The connection button is not used for WiFi or Ethernet since the network adaptors are connectionless and will automatically connect as long as there is a valid connection.

Figure 22: Connection Button



Menu

When the Menu button is clicked, the following menu subjects are displayed:

Table 18: Menu Subjects

Menu Item	Description
Profile Manager	This menu item opens up the dialog for creating, editing, and deleting profiles
Configuration	This menu item opens up a dialog for changing MobiLink settings
Properties	This menu item opens up a dialog that displays the properties of the 3G modem
Report	This menu item opens up a dialog that displays the connections statistics and connection history

Transparency	This menu item is to set the application display transparency. This feature allows the desktop items below the application to be shown through the transparency
About	This menu item brings up information about the MobiLink application
Exit	This menu item will quit the MobiLink application

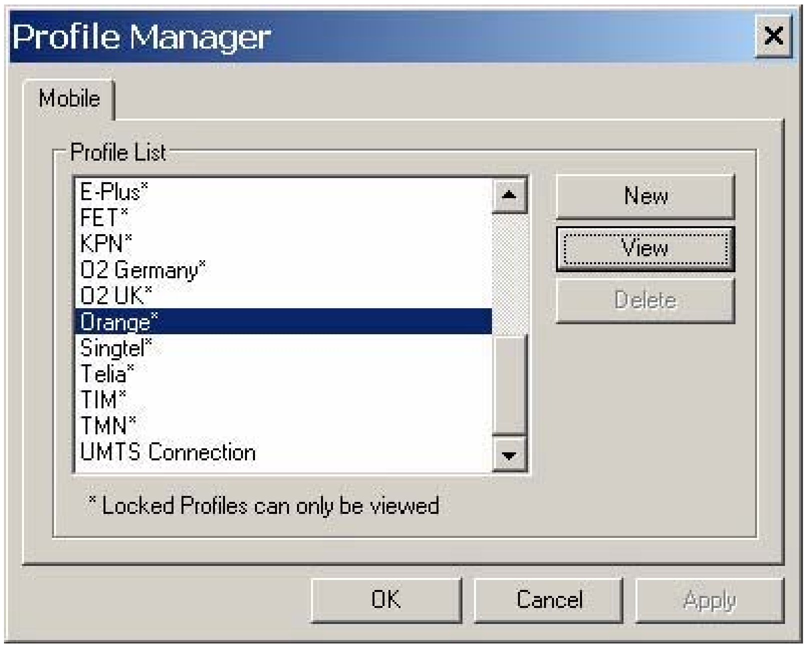
Profile Manager

The profile manager allows the user to manage the connection profiles for both the 3G connection and WiFi connection. The user can create a profile using the New, edit or view the profile, and delete a profile.

3G Wireless Profiles

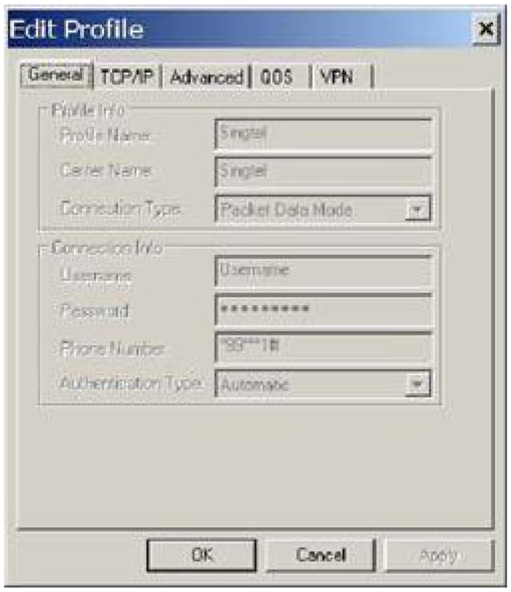
The first tab shows the 3G wireless profiles as shown below.

Figure 23: 3G Profiles



The wireless profiles can be selected for viewing in the case of a locked profile and for editing in the case of an unlocked profile. Locked profiles are preset and can not be deleted or altered. This is to reduce the incidence of connection problems related to incorrect settings due to user error. The dialog below shows the actual profile settings. For locked profiles, the settings are grayed out and cannot be modified.

Figure 24: Profile Settings

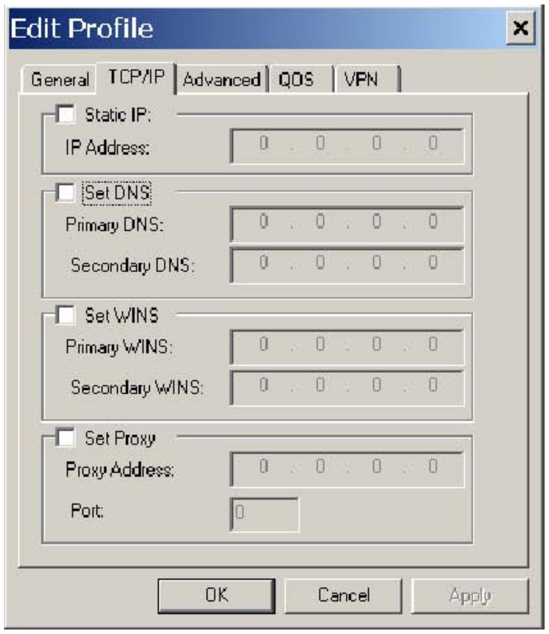


Profile Info
Profile Name: Singtel
Carrier Name: Singtel
Connection Type: Packet Data Mode

Connection Info
Username: Username
Password: **********
Phone Number: *99***1#
Authentication Type: Automatic

The profile settings are categorized under different tabs and can be different for UMTS and CDMA. In the case of CDMA, the QoS tab does not apply. The following screens show the various settings under each tab.

Figure 25: Different Tab Settngs

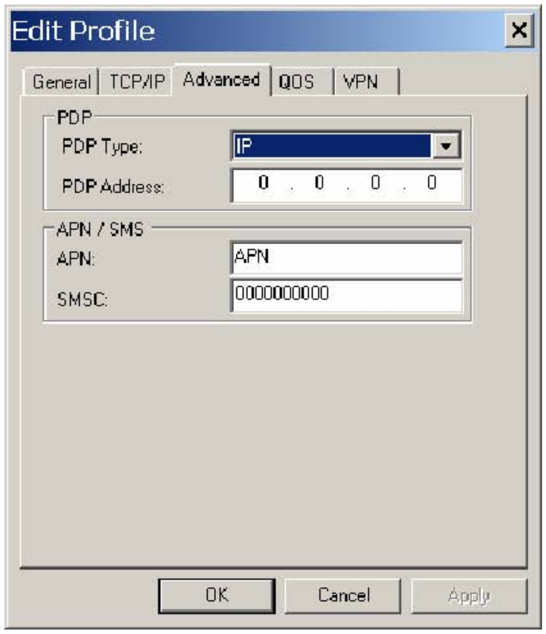


☐ Static IP:
IP Address: 0 . 0 . 0 . 0

☐ Set DNS
Primary DNS: 0 . 0 . 0 . 0
Secondary DNS: 0 . 0 . 0 . 0

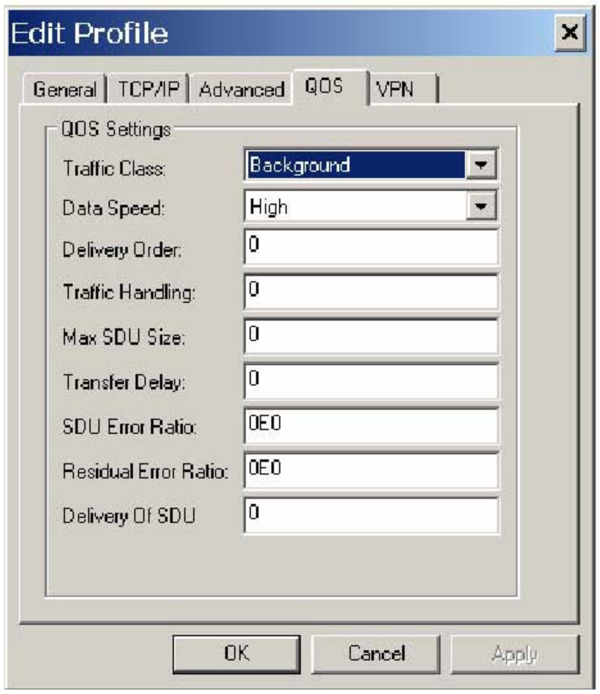
☐ Set WINS
Primary WINS: 0 . 0 . 0 . 0
Secondary WINS: 0 . 0 . 0 . 0

☐ Set Proxy
Proxy Address: 0 . 0 . 0 . 0
Port: 0



PDP
PDP Type: IP
PDP Address: 0 . 0 . 0 . 0

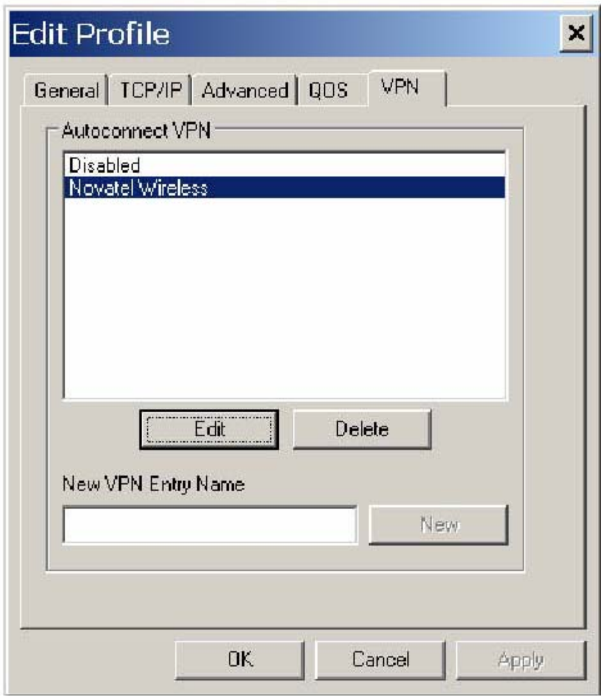
APN / SMS
APN: APN
SMSC: 0000000000


Edit Profile

General | TCP/IP | Advanced | QOS | VPN

QOS Settings

Traffic Class:	Background
Data Speed:	High
Delivery Order:	0
Traffic Handling:	0
Max SDU Size:	0
Transfer Delay:	0
SDU Error Ratio:	0E0
Residual Error Ratio:	0E0
Delivery Of SDU	0


Edit Profile

General | TCP/IP | Advanced | QOS | VPN

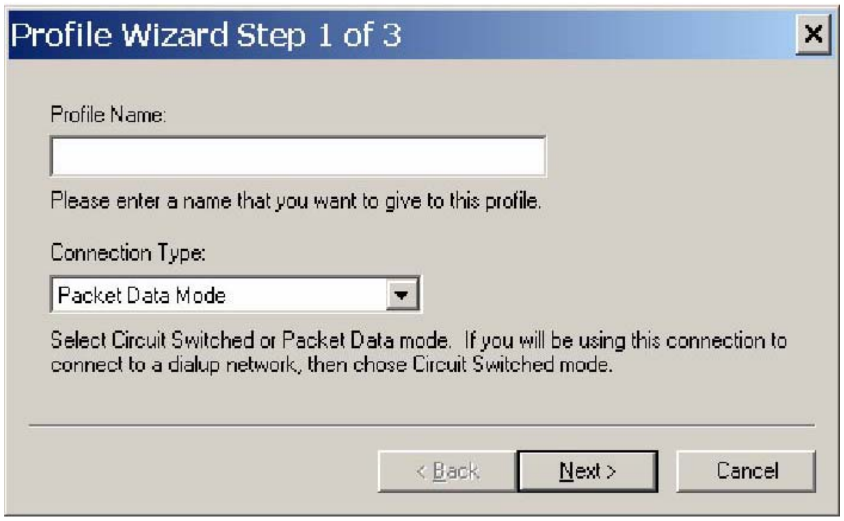
Autoconnect VPN

Disabled
Novatel Wireless

When changes are made to any of the tabs, the user must click the Apply button to effect the changes. Cancel can be clicked to cancel the settings. The exception is the on the last VPN tab. When creating a new VPN, the VPN entry is created when the user clicks the New button with an entry name. The apply button is used to change the associated VPN for the profile. VPN association is used to automatically establish a VPN session after a successful 3G connection.

When creating a profile by clicking on the New button, the profile wizard is used to guide the user through some simple steps for creating a new profile. The advanced settings are preset based on a template profile for the carrier network and hidden from the user. In the rare case where advanced parameters need to be changed, the user can then select the newly created profile and click on Edit to edit the parameters.

Figure 26: Profile Wizard Step 1


Profile Wizard Step 1 of 3

Profile Name:

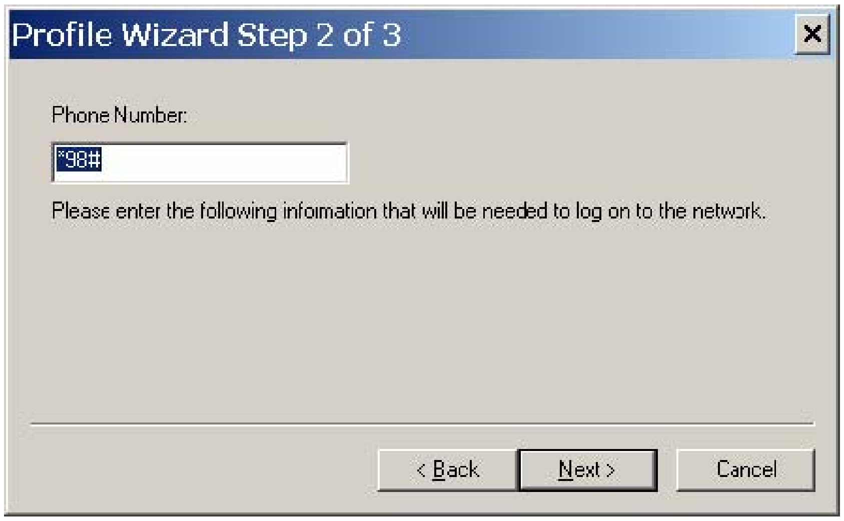
Please enter a name that you want to give to this profile.

Connection Type:

Packet Data Mode

Select Circuit Switched or Packet Data mode. If you will be using this connection to connect to a dialup network, then chose Circuit Switched mode.

Figure 27: Profile Wizard Step #2

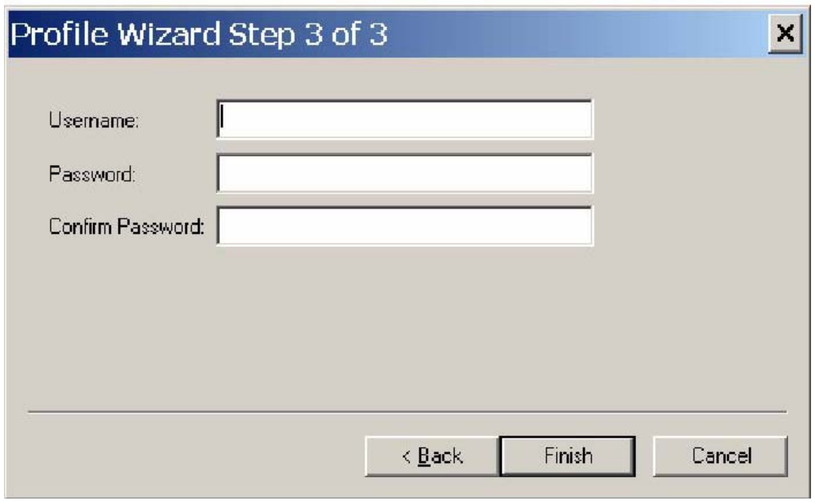

Profile Wizard Step 2 of 3

Phone Number:

*98#

Please enter the following information that will be needed to log on to the network.

Figure 28: Profile Wizard Step #3


Profile Wizard Step 3 of 3

Username:

Password:

Confirm Password:

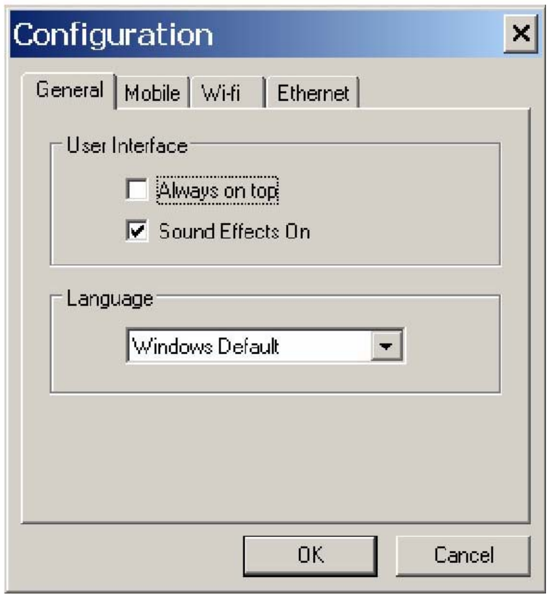
WiFi Profiles

TBD

Configuration

The configuration menu has all the available settings for MobiLink. The configuration window is broken down in to four functional tabs. The General tab is for the user interface settings and language selection. The Mobile tab is used to set parameters for the 3G device. The WiFi tab has settings for WiFi adaptor, and the Ethernet tab is used to set the Ethernet adaptor. Each of the tabs is shown below.

Figure 29: General Tab



- [ ] Always on top
- [x] Sound Effects On

Language: Windows Default

Table 19: General Tab Features

General Tab Feature	Description
Always on top	When checked, the application is always the top most application on the desktop
Sound Effects On	When checked, sounds will be played on user actions
Language	This is a selection list for choosing the language to be used for MobiLink. Windows Default will base the language on what Windows uses as the native language

Figure 30: Mobile Tab

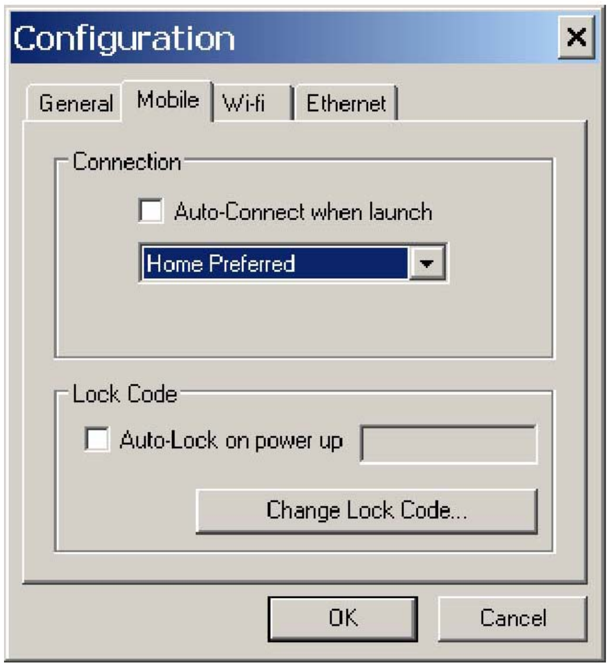
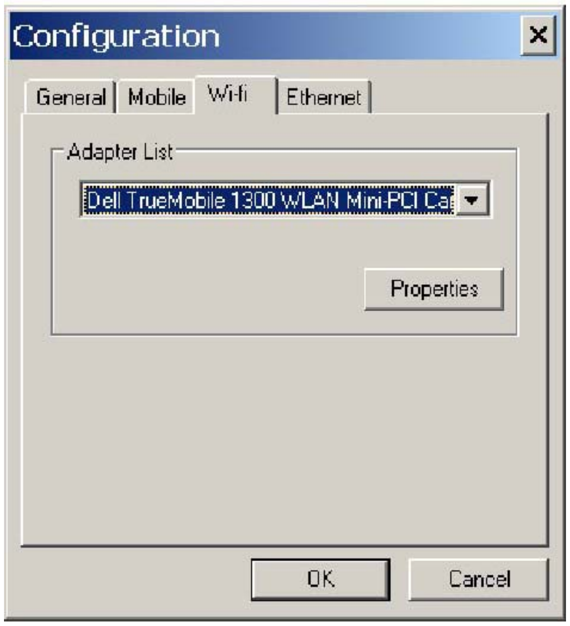

Configuration

Table 20: Mobile Tab Features

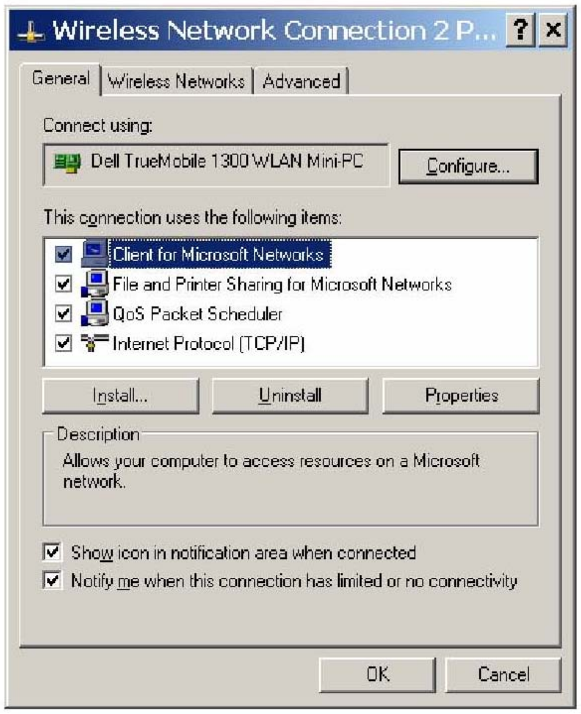
Feature	Description
Auto-Connect when launch	This feature is for MobiLink to automatically connect to the network when launched
Network Selection	This selection is used to select the network preference. For CDMA, this is to select the operating network and for UMTS/HSDPA, it’s for selection the radio access technology
Auto-Lock on power up	Check to lock the SIM upon power up. A 4 to 8 digits code must be supplied to turn on and off the auto lock feature.
Change Lock Code	Chick this button to change the lock code. This button is only active if the auto-lock SIM feature is turned on.

Figure 31: WiFi Tab



The WiFi tab allows user to choose the WiFi adaptor from a list of detected adaptors. Also, the adaptor properties can be modified by clicking on the properties button. The wireless adaptor properties window is shown below.

Figure 32: WAP Window



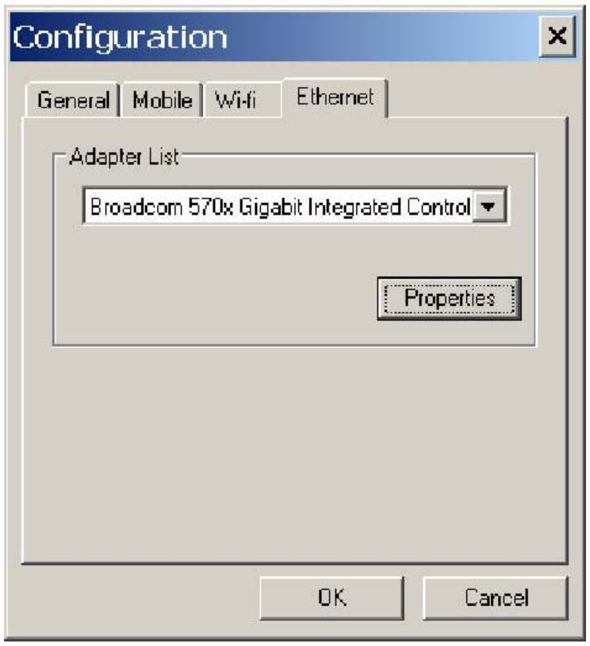
Connect using:
Dell TrueMobile 1300 WLAN Mini-PC

This connection uses the following items:
- ☑ Client for Microsoft Networks
- ☑ File and Printer Sharing for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ Internet Protocol (TCP/IP)

Description
Allows your computer to access resources on a Microsoft network.

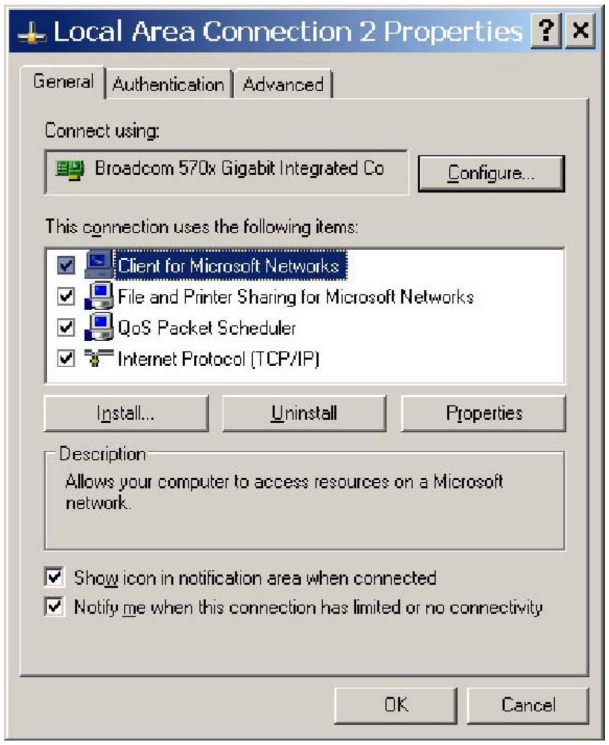
☑ Show icon in notification area when connected
☑ Notify me when this connection has limited or no connectivity

Figure 33: Ethernet Tab



The Ethernet tab allows user to choose the Ethernet adaptor from a list of detected adaptors. Also, the adaptor properties can be modified by clicking on the properties button. The adaptor properties window is shown below.

Figure 34: AP Window



Connect using:

Broadcom 570x Gigabit Integrated Co

This connection uses the following items:

- ☑ Client for Microsoft Networks
- ☑ File and Printer Sharing for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ Internet Protocol (TCP/IP)

Description

Allows your computer to access resources on a Microsoft network.

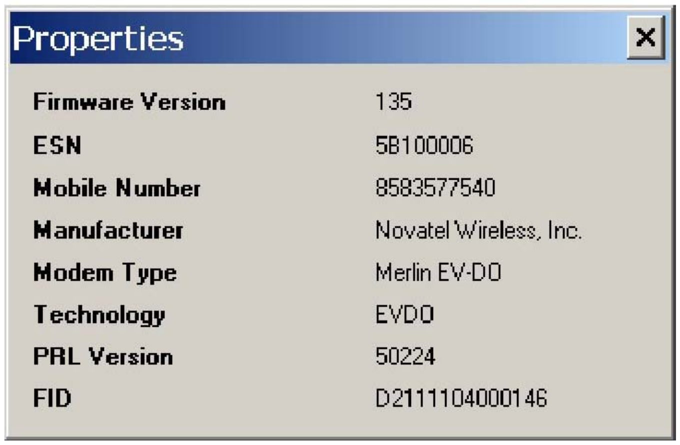
☑ Show icon in notification area when connected

☑ Notify me when this connection has limited or no connectivity

Properties Menu

The properties menu displays some of the key properties of the UMTS and EVDO devices.

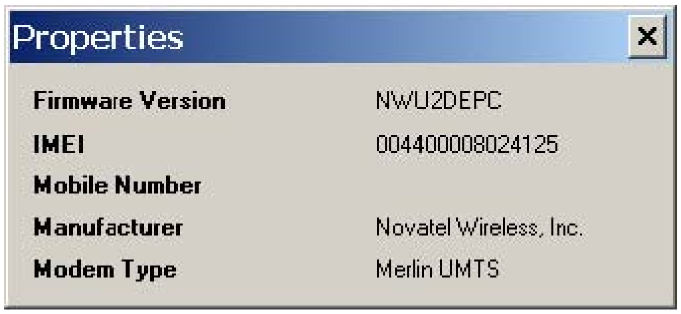
Figure 35: CDMA



Properties

Firmware Version	135
ESN	5B100006
Mobile Number	8583577540
Manufacturer	Novatel Wireless, Inc.
Modem Type	Merlin EV-DO
Technology	EVDO
PRL Version	50224
FID	D2111104000146

Figure 36: UMTS/HSDPA



Properties

Firmware Version	NWU2DEPC
IMEI	004400008024125
Mobile Number	
Manufacturer	Novatel Wireless, Inc.
Modem Type	Merlin UMTS

Table 21: Identity Properties

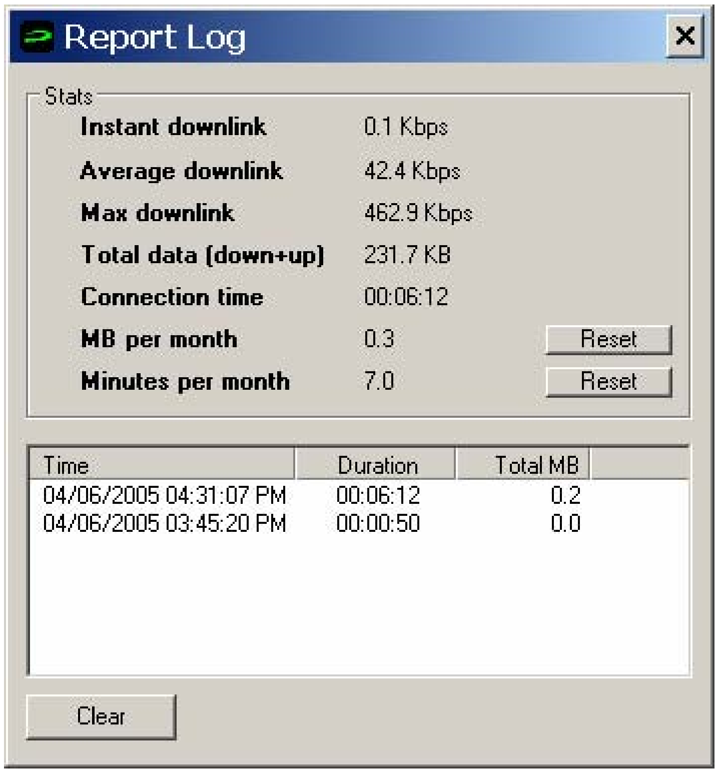
Property	Description
Firmware Version	Firmware version of the 3G device
IMEI/ESN	International Mobile Equipment Identity (UMTS)/ Electronic Serial Number (CDMA)
Mobil Number	Number for the mobile
Manufacturer	Who produced the modem
Modem Type	Modem technology

Technology	3G technology
PRL version	Preferred Roaming List version number(CDMA)
FID	Factory ID. This is a unique tracking number for factory builds

Report Log

The report log has statistic information about the current connection as well as a history list of past connections.

Figure 37: Report Log



Instant downlink	0.1 Kbps
Average downlink	42.4 Kbps
Max downlink	462.9 Kbps
Total data (down+up)	231.7 KB
Connection time	00:06:12
MB per month	0.3
Minutes per month	7.0

Time	Duration	Total MB
04/06/2005 04:31:07 PM	00:06:12	0.2
04/06/2005 03:45:20 PM	00:00:50	0.0

Table 22: Report Values

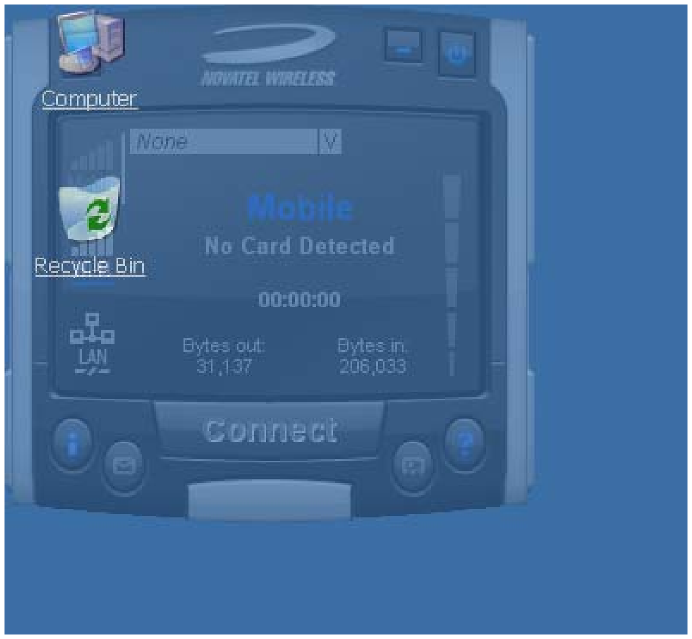
Value	Description
Instant downlink	This is most recent measured downlink throughput
Average downlink	This is the average of all the measured downlink throughput
Max downlink	This is the maximum achieved downlink throughput

Total data	This is the total data that has been ever sent since MobiLink has been installed on the machine
Connection time	The is the amount of time the connection has lasted
MB per month	This is a resettable counter of how many bytes since the last reset
Minutes per month	This is a resettable counter of how many minutes since the last reset

Transparency

This menu feature allows the user to select the percent transparency for MobiLink. The choices range from 0% to 90% with 0% being solid and 90% being very transparent. Transparency allows desktop items below MobiLink to be displayed for better multitasking. Below is an example of MobiLink transparency on a desktop.

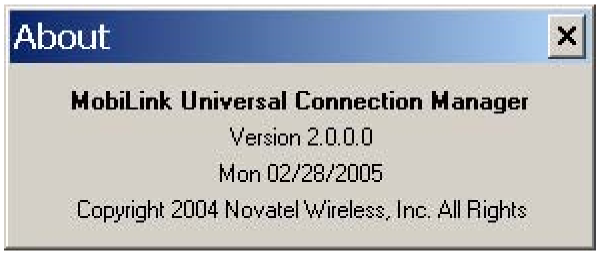
Figure 38: Desktop Transparency



About

The About dialog displays MobiLink information such as version number, release date, and copyright.

Figure 39: About Dialogue

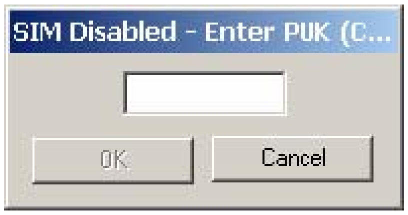

About

MobiLink Universal Connection Manager
Version 2.0.0.0
Mon 02/28/2005
Copyright 2004 Novatel Wireless, Inc. All Rights

SIM/Lock Management

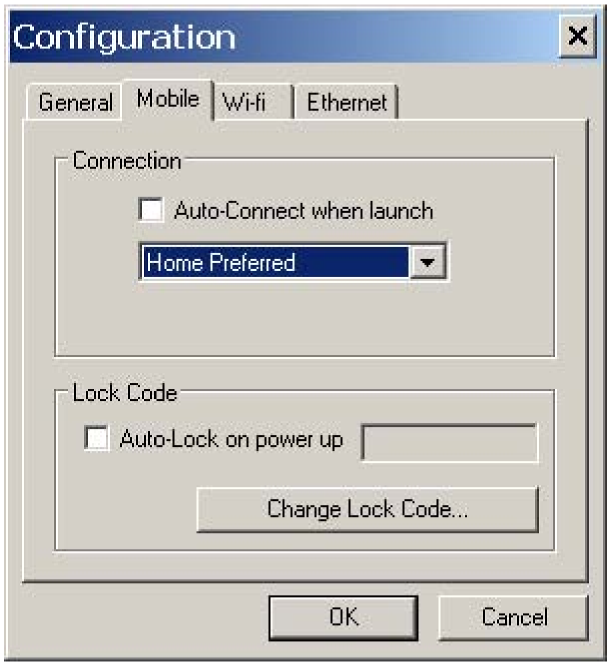
Upon Mobilink startup, ff the device is locked on power up, a small dialog will be displayed such as below to ask the user to enter the unlock code prior to continuing with MobiLink.

Figure 40: Enter PUK



The lock setting and code can be managed in the Mobile tab of the configuration menu shown below.

Figure 41: Configuration Menu



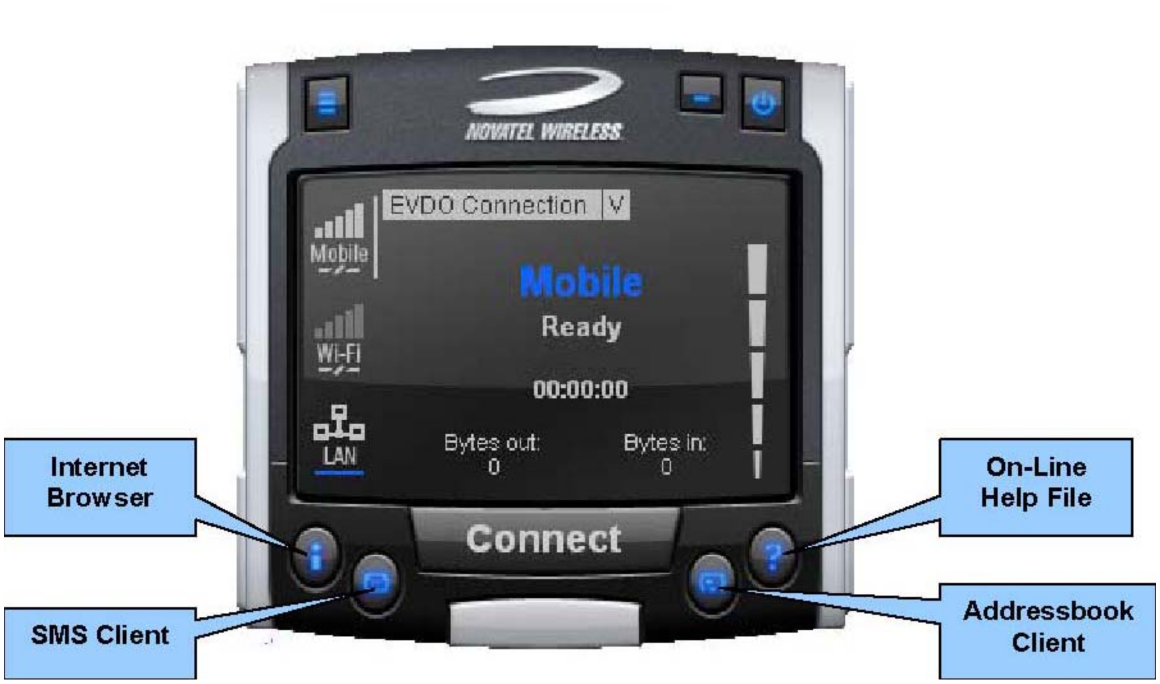
Auto-Connect when launch: unchecked
Home Preferred

Auto-Lock on power up: unchecked

Quick Access Buttons

The quick access buttons are designed to provide a launch pad for other applications. Four buttons are provided and can be remapped to other applications. The picture below shows the default functions assigned to the quick access buttons.

Figure 42: Quick Access Button Default Functions



Software Web Upgrade

TBD

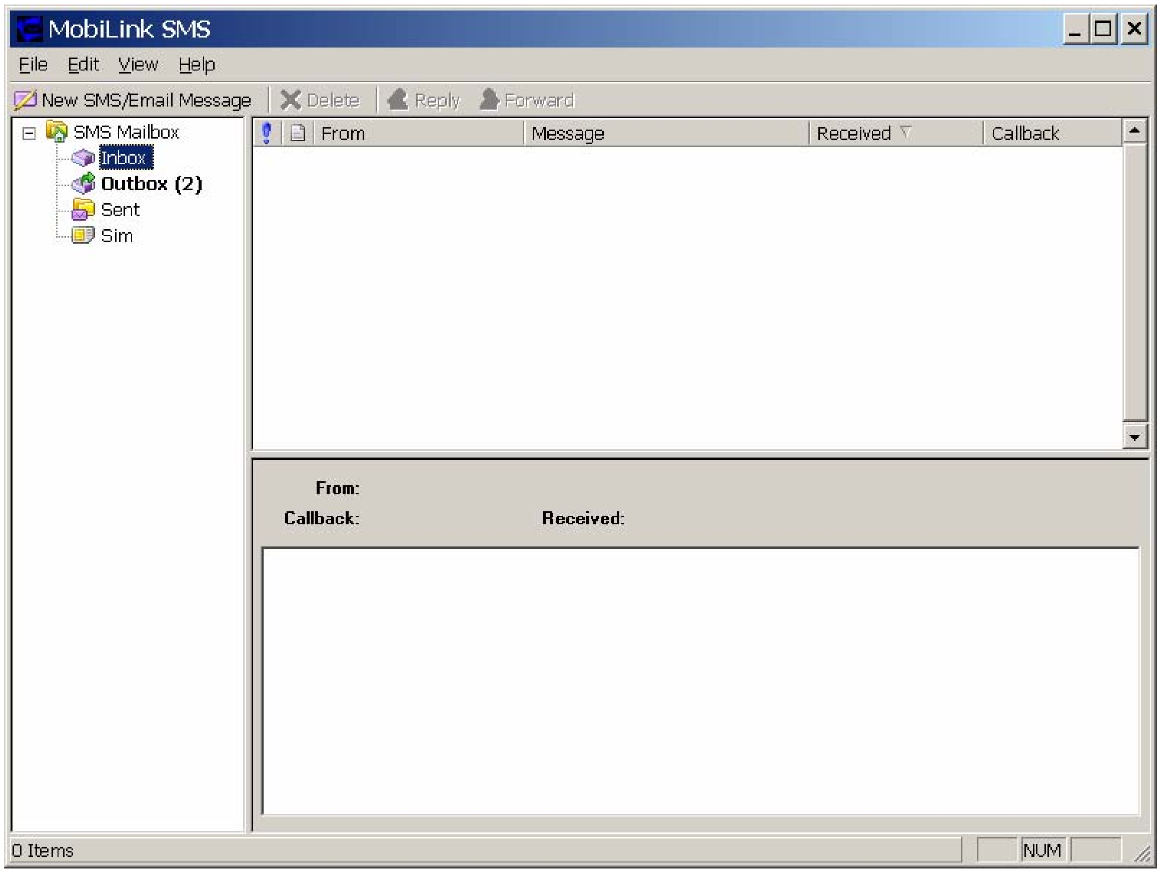
SMS Client

The MobiLink SMS Client is used to manage reading and sending SMS messages. The SMS Client is an application that is part of the MobiLink application suite. The design of this application is to emulate an email Client to reduce the amount of new learning that is required to start using this application. This application is launched from the main connection manager Quick Access button. The following features are supported.

- Send new messages
- Reply to message
- Forward message
- Email interworking
- Concatenated SMS
- Set priority of message
- Rich text editing functions
- Printing
- Support for embedded hyper links and email links in message

- Auto language selection
- Send to multiple recipients
- Status receipt of sent messages
- Status bar to indicate number of messages, character count, etc…

Figure 43: MobiLink SMS Client



SMS Mailboxes

Very much like an email Client, the SMS Client has multiple mail boxes to store different types of messages.

Table 23: Mailbox List

Mailbox	Description
Inbox	All incoming SMS is delivered to this mail box and will be highlighted if unread.
Outbox	All outgoing SMS will be put into this mailbox. If the SMS has not been sent to the card, it will be held here until it can be sent.
Sent	All sent SMS messages are placed here.

SIM	All SMS messages that are still stored on the SIM.

The message panel contains the key information for a list of messages. The messages can be reorder in the message panel by clicking on the fields located on the top strip. The fields are the following:

Table 24: Fields List

Field	Description
!	Importance
From	Where the message is from. Only shown when Inbox is selected.
To	Where the message is sent. Only shown in when Outbox or Sent box is selected.
Message	Displays the first few characters of the message
Received	Time when the message is received
Sent	Time when the message is sent
Callback	Callback number

Menu Bar

The menu bar contains the following items:

Menu	**Item**	**Description**
• File	o Exit	Exits the application
• Edit	o Undo	Undo last text editing
	o Cut	Cut the selected text
	o Copy	Copy the selected text
	o Paste	Paste text on clipboard
	o Select All	Select all text in message content panel
• View	o Toolbar	Display tool bar
	o Statusbar	Display Status bar
• Help	o About SMSClient	Display About dialog

Toolbar

The tool bar is accessible across the top and gives user quick access to common tasks. The tool bar contains the following buttons:

Table 25: Tool Bar Button

Button	Description
New SMS Message	Opens up dialog to create a new SMS message
Delete	Deletes the highlighted message or group of messages.
Reply	Reply to the highlighted message.
Forward	Forward the contents of the highlighted message.

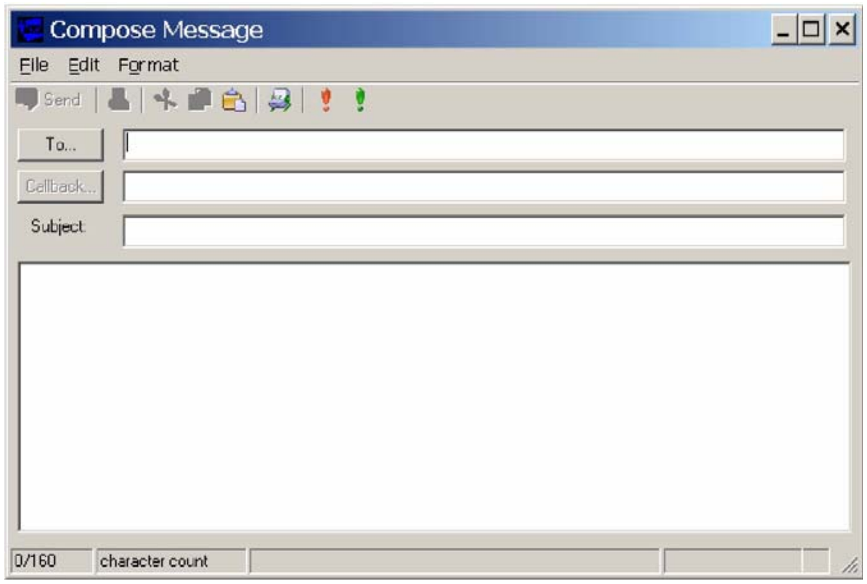
Status Bar

The status bar displays information about each of the mailbox selected. It will give the number of messages and the number of unread messages. The status bar is located on the bottom strip.

Compose Message Window

Clicking on the New SMS Message button will bring up the following dialog: This window allows the user to enter the destination address, SMS message, a callback number for CDMA, and a subject text. Standard text editing such as cutting, copying, pasting is supported in the message box. In addition, the user can use the tool bar or the menu to set the priority and encoding of the message. Both Unicode and ASCII are supported. Unicode is used to send characters not in the standard ASCII character set.

Figure 44: Compose Message



For the destination address, users can chose to select from the address book by clicking on the To button. Also, multiple destinations can be entered separated by a comma or semicolon.

The toolbar supports the following functions: Clicking on the “To” button or the Addressbook button will bring up the following dialog to select the contact to insert into the destination field. Multiple destination addresses can be selected.

Table 26: Destination Addresses

Button	Description
Send	Send the SMS message
🖨	Print the SMS message
✂ 📄 📋	Editing functions. Cut, copy, and paste text
📖	Open the addressbook to select from
!	Emergency priority
!	Urgent priority
🔤	Set Unicode encoding for message

Email Interworking

A new feature added to this version of MobiLink is the ability for email interworking. What this feature does is to allow an email message to be sent over an SMS message. If the user types in an email address in the To filed, the application will automatically format the SMS message so that the SMSC on the network side will forward it as an email.

The recipient of this email can simply reply to the message and the message will be forwarded back to the wireless device.

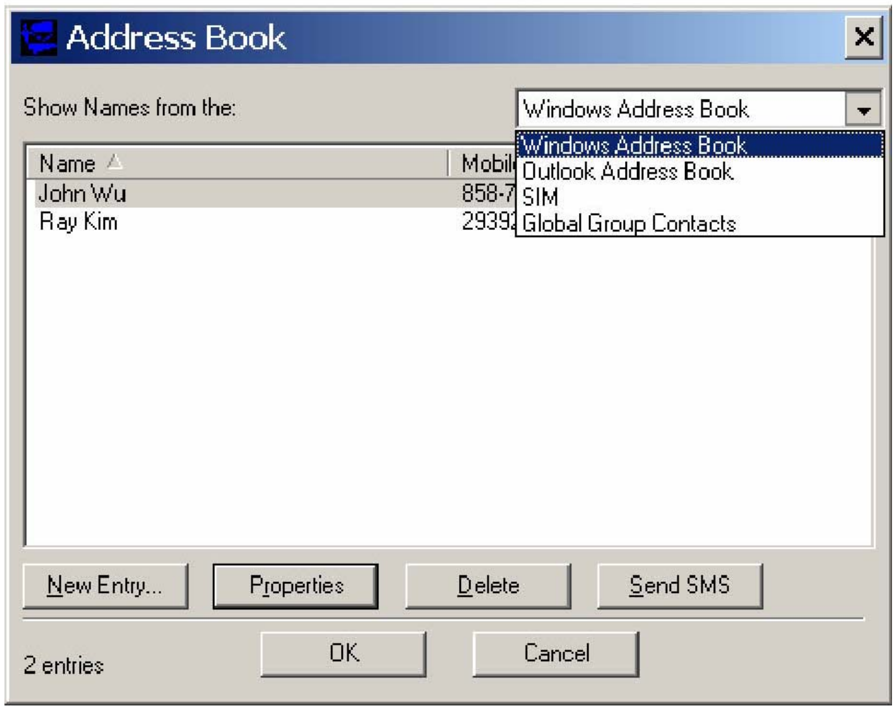
Concatenated SMS

With the addition of email interworking, the ability to send an SMS that is longer than the limited 160 characters is very important. To address that issue, the SMS Client will allow the user to enter a long message and automatically segment the message and send it as separate SMS with a special tag to indicate the messages are segments of a long message.

Addressbook Features

The MobiLink address book allows the management of phone numbers on the SIM, Windows Address Book and Outlook. The following screen shows the address book Client.

Figure 45: Address Book



The address book Client has a selection box that allow the user to chose which address book to view. The following addresses can be selected:

Table 27: Address Books

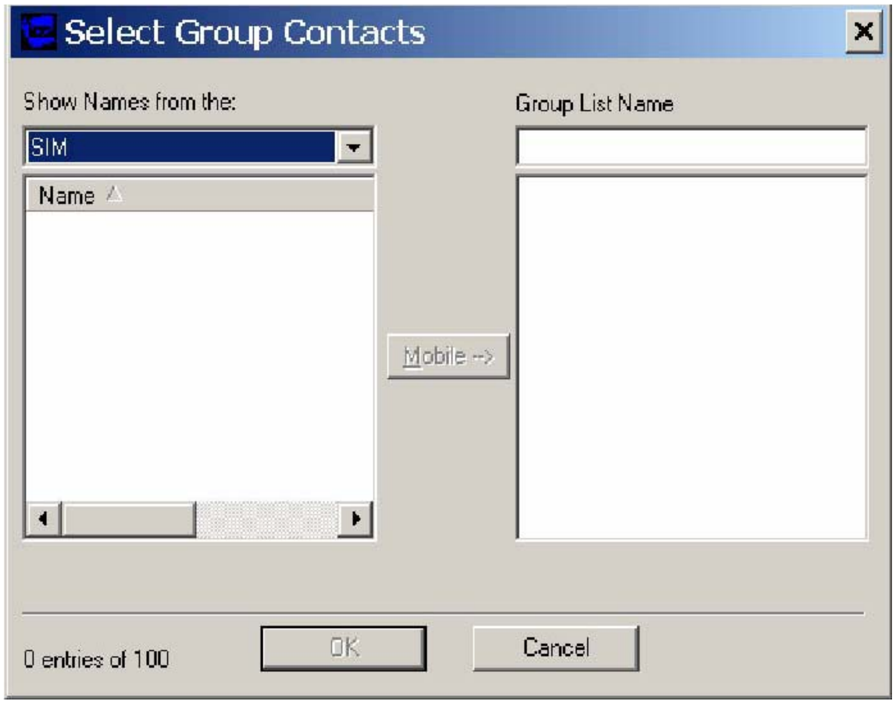
Addressbook	Description
Windows Address Book	This is the native Windows Addressbook that is part of Windows Accessories folder
Outlook Address Book	This is the local Outlook Addressbook. This is only accessible if Outlook is installed on the computer
SIM	This is the address book located on the 3G device or the SIM of the device
Global Group Contact	This is the group contacts that contain distribution lists created by the user. This list can contain contacts from any of the above address books

User can create, delete, and view contact properties as well as send an SMS message using the selected contact by clicking on one of the buttons on the bottom of the Address Book Client.

Global Group Contact

Global Group Contact feature allows users to create distribution lists for sending SMS.

Figure 46: Select Group Contacts



When the user chooses to create a Global Group Contact, a new dialog will be opened up to allow the user to select from the different address books and move them to create a new distribution list. The total number in a distribution list is up to 100. The list can contain a mixture from different address books and can contain both mobile numbers as well as email addresses.

Phoenix API Interface to PCI Express Mini Card

Overview

This is the Phoenix API Command Set Reference for the Novatel Wireless CDMA Modem product. This document describes the modem API used by host applications running on Windows 2000, and Windows XP.

The SDK provides universal API support for both 1XEV-DO and HSDPA mini-cards. This provides interfaces through the Windows XP and Windows 2000 operating systems. It includes API support as well as sample code to provide for ease of application development.

Phoenix is the brains of the SDK. Phoenix maintains a single state machine that all Clients communicate with. Anything and everything involving communication to the device takes places through the Phoenix server. Implemented as a Document/View executable supporting automation, the Phoenix server automatically keeps a count of how many Clients are attached to it via COM interfacing. The server is initialized automatically once the first Client is instantiated and shut down once the last Client instance is terminated. With the beauty of OLE Automation, the Phoenix server can be utilized using many different programming languages, including C++, MFC, JavaScript, VBScript, etc. Refer to Phoenix.chm for API documentation. If you want to use Phoenix in Visual Studio, import the type library Phoenix.tlb and create a wrapper class for it.

Blaze ActiveX control helps Client applications to receive events fired by the Phoenix server. This allows for simple 2-way communication, replacing redundant loop checking used in the past. Refer to Blaze.chm for API documentation. If you want to use Blaze ActiveX control in Visual Studio, add the NVTL Blaze control from the registered Components and Controls Gallery and create a wrapper class for it.

Phoenix API is the communication engine between host applications and a Novatel Wireless CDMA modem. It is a DLL library that provides an interface for user/host applications to communicate commands to the modem for purposes of serial access, general diagnostic, NV programming, SMS messaging, and general modem functions. It provides the hardware abstraction that the host applications don't need to involve itself with.

The following facts and conventions are applicable across the whole document unless specially specified.

- All API calls are synchronous. The calling thread will be blocked until the function call returns.
- HANDLE hCom is used in most Loader functions as the first argument. It will not be repeated in the Parameters section for every function. The com port handle must be obtained by calling function Open_Output_Handles( ). NULL is not a valid handle value. The handle should be closed before applications quit.
- Modem: Novatel Wireless CDMA Modem
- Loader: Novatel Wireless CDMA Modem Loader API
- Applications: Host applications using Loader API to access Novatel Wireless CDMA PC Card Modem

Client Object

The Client object uses the following methods:

ChangeLockCode method

Description: Used to change the lock code of the device.

Return Type: A **Long** value.

Syntax: object**.ChangeLockCode**(lpszLockCode As String, lpszNewLockCode As String)

The ChangeLockCode method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
lpszLockCode	String
lpszNewLockCode	String

Sample Code using ChangeLockCode Method:

```
long IPhoenixWrapper::ChangeLockCode(LPCTSTR lpszLockCode, LPCTSTR
lpszNewLockCode)
{
                long result;
                static BYTE parms[] =
                                VTS_BSTR VTS_BSTR;
                InvokeHelper(0x18, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                                lpszLockCode, lpszNewLockCode);
                return result;
}
```

Connect method

Description: To initiate a PS or CS (if supported by device) call.

Return Type: **A Long value.**

Syntax:
*object***.Connect**(*lpszUsername As String, lpszPassword As String, lpszNumber As String, varErrorMsg As Variant, nIPAddress As Long, nPrimaryDNS As Long, nSecondaryDNS As Long, nPrimaryWINS As Long, nSecondaryWINS As Long, nPapChap As Long, lpszVPN As String*)

The Connect method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
lpszUsername	String
lpszPassword	String
lpszNumber	String
varErrorMsg	Variant
nIPAddress	Long
nPrimaryDNS	Long
nSecondaryDNS	Long
nPrimaryWINS	Long
nSecondaryWINS	Long

nPapChap	Long
lpszVPN	String

Sample Code using Connect Method:

```
long IPhoenixWrapper::Connect(LPCTSTR lpszUsername, LPCTSTR lpszPassword, LPCTSTR
lpszNumber, VARIANT* varErrorMsg, long nIPAddress, long nPrimaryDNS, long
nSecondaryDNS, long nPrimaryWINS, long nSecondaryWINS, long nPapChap, LPCTSTR
lpszVPN)
{
	long result;
	static BYTE parms[] =
		VTS_BSTR VTS_BSTR VTS_BSTR VTS_PVARIANT VTS_I4
VTS_I4 VTS_I4 VTS_I4 VTS_I4 VTS_I4 VTS_BSTR;
	InvokeHelper(0x5, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
		lpszUsername, lpszPassword, lpszNumber, varErrorMsg,
nIPAddress, nPrimaryDNS, nSecondaryDNS, nPrimaryWINS, nSecondaryWINS, nPapChap,
lpszVPN);
	return result;
}
```

DebugPrint method

Description: Used to write out to the log file.

Syntax: *object*.**DebugPrint**(*nModule As Long, nLevel As Long, lpszDebug As String*)

The DebugPrint method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nModule	Long
nLevel	Long
lpszDebug	String

Sample Code using DebugPrint Method:

```
void IPhoenixWrapper::DebugPrint(long nModule, long nLevel, LPCTSTR lpszDebug)
{
	static BYTE parms[] =
		VTS_I4 VTS_I4 VTS_BSTR;
	InvokeHelper(0x1e, DISPATCH_METHOD, VT_EMPTY, NULL, parms,
		 nModule, nLevel, lpszDebug);
}
```

DeleteMessage method

Description: Delete a message.

Return Type: **A Long value.**
Syntax: *object*.**DeleteMessage**(*nMsgBoxEnum As Long, nIndex As Long*)

The DeleteMessage method syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type Client.
nMsgBoxEnum	Long
nIndex	Long

Sample Code using DeleteMessage Method:

```
long IphoenixWrapper::DeleteMessage(long nMsgBoxEnum, long nIndex)
{
		long result;
		static BYTE parms[] =
				VTS_I4 VTS_I4;
		InvokeHelper(0x21, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				nMsgBoxEnum, nIndex);
		return result;
}
```

Disconnect method

Description: To terminate call.

Return Type: **A Long value.**
Syntax: *object*.**Disconnect**

The Disconnect method syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type Client.

Sample Code using Disconnect Method:

```
long IphoenixWrapper::Disconnect()
{
		long result;
		InvokeHelper(0x6, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
		return result;
}
```

GetAdapter method

Description: Get the name of the currently selected/active device.

Return Type: A **String** value.
Syntax: *object*.**GetAdapter**

The GetAdapter method syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type Client.

Sample Code using GetAdapter Method:

```
Cstring IphoenixWrapper::GetAdapter()
{
		Cstring result;
```

```
        InvokeHelper(0x1b, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
        return result;
}
```

GetAdapterList method

Description: Get a list of currently available devices.

Return Type: **A Long value.**
Syntax: *object***.GetAdapterList**(*varAdapterList As Variant*)

The GetAdapterList method syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type Client.
varAdapterList	Variant

Sample Code using GetAdapterList Method:

```
long IphoenixWrapper::GetAdapterList(VARIANT* varAdapterList)
{
        long result;
        static BYTE parms[] =
                VTS_PVARIANT;
        InvokeHelper(0x1d, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                varAdapterList);
        return result;
}
```

GetConnectStatus method

Description: Once connected, get RAS status info of the current connection.

Return Type: **A Long value.**

Syntax:
*object***.GetConnectStatus**(*varState As Variant, varError As Variant, varBytesIn As Variant, varBytesOut As Variant, varDuration As Variant*)

The GetConnectStatus method syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type Client.
varState	Variant
varError	Variant
varBytesIn	Variant
varBytesOut	Variant
varDuration	Variant

Sample Code using ConnectStatus Method:

```
long IphoenixWrapper::GetConnectStatus(VARIANT* varState, VARIANT* varError, VARIANT*
varBytesIn, VARIANT* varBytesOut, VARIANT* varDuration)
```

```
{
            long result;
            static BYTE parms[] =
                        VTS_PVARIANT VTS_PVARIANT VTS_PVARIANT
VTS_PVARIANT VTS_PVARIANT;
            InvokeHelper(0x8, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                        varState, varError, varBytesIn, varBytesOut, varDuration);
            return result;
}
```

GetContact method

Description: Get the contact's name and details by index.

Return Type: A Long value.
Syntax: *object***.GetContact**(*nIndex As Long, varContactName As Variant, varContactDetails As Variant*)

The GetContact method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nIndex	Long
varContactName	Variant
varContactDetails	Variant

Sample Code using GetContact Method:

```
long IphoenixWrapper::GetContact(long nIndex, VARIANT* varContactName, VARIANT*
varContactDetails)
{
            long result;
            static BYTE parms[] =
                        VTS_I4 VTS_PVARIANT VTS_PVARIANT;
            InvokeHelper(0x28, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                        nIndex, varContactName, varContactDetails);
            return result;
}
```

GetContactInfo method

Description: Get phonebook's max size, contact name's max length, and contact detail's max length.

Return Type: A Long value.
Syntax: *object***.GetContactInfo**(*varPhonebookMax As Variant, varContactNameMax As Variant, varContactDetailsMax As Variant*)

The GetContactInfo method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
varPhonebookMax	Variant

varContactNameMax	Variant
varContactDetailsMax	Variant

Sample Code using GetContactInfo Method:

```
long IphoenixWrapper::GetContactInfo(VARIANT* varPhonebookMax, VARIANT*
varContactNameMax, VARIANT* varContactDetailsMax)

{
			long result;
			static BYTE parms[] =
					VTS_PVARIANT VTS_PVARIANT VTS_PVARIANT;
			InvokeHelper(0x27, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
					varPhonebookMax, varContactNameMax,
varContactDetailsMax);
			return result;
}
```

GetDeviceId method

Description: Get the device ID (ESN/IMEI) of the device

Return Type: **A String value.**
Syntax: *object*.**GetDeviceId**

The GetDeviceId method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetDeviceID Method:

```
Cstring IphoenixWrapper::GetDeviceId()
{
			Cstring result;
			InvokeHelper(0xe, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
			return result;
}
```

GetDeviceModel method

Description: Get the model name of the device.

Return Type: **A String value.**
Syntax: *object*.**GetDeviceModel**

The GetDeviceModel method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetDeviceModel Method:

```
Cstring IphoenixWrapper::GetDeviceModel()
{
```

```
                 Cstring result;
                 InvokeHelper(0xc, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
                 return result;
}
```

GetDeviceNetwork method

Description: Get currently attached network type.

Return Type: **A String value.**
Syntax: *object*.**GetDeviceNetwork**

The GetDeviceNetwork method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetDeviceNetwork Method:

```
Cstring IphoenixWrapper::GetDeviceNetwork()
{
                 Cstring result;
                 InvokeHelper(0x3, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
                 return result;
}
```

GetDeviceState method

Description: Get device state. Refer to SDK.h for possible states.

Return Type: **A Long value.**
Syntax: *object*.**GetDeviceState**

The GetDeviceState method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetDeviceState Method:

```
long IphoenixWrapper::GetDeviceState()
{
                 long result;
                 InvokeHelper(0x11, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
                 return result;
}
```

Possible States

```
typedef enum _PX_DEVICE_STATE
{
//               PX_STATE_MIN                              = 0,
			PX_STATE_UNKNOWN		= 0,		// State of device cannot be
determined
			PX_STATE_NOCARD				= 1,
			PX_STATE_INITIALIZING	= 2,
			PX_STATE_DISABLED			= 3,		// Disabled by
Fn-F2 or user intervention
			PX_STATE_LOCKED				= 4,
			PX_STATE_SEARCHING		= 5,
			PX_STATE_IDLE				= 6,
			PX_STATE_CONNECTING		= 7,
			PX_STATE_AUTHENTICATING			= 8,
			PX_STATE_CONNECTED			= 9,
			PX_STATE_NDIS						= 10,
			PX_STATE_SHUTDOWN			= 11,
			PX_STATE_STANDBY						= 12,
//			PX_STATE_MAX
}PX_DEVICE_STATE;

// States that all public SMS functions will return
typedef enum {
			SMS_STATE_EMPTY = 60000,
			SMS_STATE_UNREAD,
			SMS_STATE_UNREAD_PRIORITY,
			SMS_STATE_READ,
			SMS_STATE_FORWARDED,
			SMS_STATE_REPLIED,
			SMS_STATE_SENDING,
			SMS_STATE_SENT,
			SMS_STATE_DELIVERED,
			SMS_STATE_FAILED_SEND
} SMSMessageState;

typedef enum {
			SMSInbox,
			SMSOutbox,
			SMSSentbox,
			SMSSIM
```

```
} SMSBoxEnum;
```

GetDeviceTechnology method

Description: Get device technology defined by NovatelModemAPI.h.

Return Type: **A Long value.**
Syntax: *object*.**GetDeviceTechnology**

The GetDeviceTechnology method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetDeviceTechnology Method:

```
long IphoenixWrapper::GetDeviceTechnology()
{
		long result;
		InvokeHelper(0x2, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
		return result;
}
```

GetFID method

Description: Get the FID of the device. (CDMA/EVDO Only)

Return Type: **A String value.**
Syntax: *object*.**GetFID**

The GetFID method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetFID Method:

```
Cstring IphoenixWrapper::GetFID()
{
		Cstring result;
		InvokeHelper(0x10, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
		return result;
}
```

GetHardwareVersion method

Description: Get the hardware version of the device

Return Type: **A String value.**
Syntax: *object*.**GetHardwareVersion**

The GetHardwareVersion method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetHardwareVersion Method:

```
Cstring IphoenixWrapper::GetHardwareVersion()
{
            Cstring result;
            InvokeHelper(0xb, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
            return result;
}
```

GetLockStatus method

Description: Determine whether the device is locked, including autolock setting.

Return Type: A Long value.
Syntax: *object*.**GetLockStatus**(*varLockStatus As Variant, varAutoLockOn As Variant*)

The GetLockStatus method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
varLockStatus	Variant
varAutoLockOn	Variant

Sample Code using GetLockStatus Method:

```
long IphoenixWrapper::GetLockStatus(VARIANT* varLockStatus, VARIANT* varAutoLockOn)
{
            long result;
            static BYTE parms[] =
                        VTS_PVARIANT VTS_PVARIANT;
            InvokeHelper(0x17, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                        varLockStatus, varAutoLockOn);
            return result;
}
```

GetMessage method

Description: Retrieve message given which message box and an index.

Return Type: A Long value.
Syntax: *object*.**GetMessage**(*nMsgBoxEnum As Long, nIndex As Long, varState As Variant, varMsg As Variant, nMsgSize As Long*)

The GetMessage method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nMsgBoxEnum	Long

nIndex	Long
varState	Variant
varMsg	Variant
nMsgSize	Long

Sample Code using GetMessage Method:

```
long IphoenixWrapper::GetMessage(long nMsgBoxEnum, long nIndex, VARIANT* varState,
VARIANT* varMsg, long nMsgSize)
{
		long result;
		static BYTE parms[] =
				VTS_I4 VTS_I4 VTS_PVARIANT VTS_PVARIANT VTS_I4;
		InvokeHelper(0x20, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				nMsgBoxEnum, nIndex, varState, varMsg, nMsgSize);
		return result;
}
```

GetMessageCount method

Description: Get current count given which message box.

Return Type: **A Long value.**
Syntax: *object***.GetMessageCount**(*nMsgBoxEnum As Long*)

The GetMessageCount method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nMsgBoxEnum	Long

Sample Code using GetMessageCount Method:

```
long IphoenixWrapper::GetMessageCount(long nMsgBoxEnum)
{
		long result;
		static BYTE parms[] =
				VTS_I4;
		InvokeHelper(0x24, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				nMsgBoxEnum);
		return result;
}
```

GetMessageStatus method

Description: Get a message status. Refer to SDK.h for possible states.

Return Type: **A Long value.**
Syntax: *object***.GetMessageStatus**(*nMsgBoxEnum As Long, nIndex As Long, varState As Variant*)

The GetMessageStatus method syntax has these parts:

Part	Description

object	An expression evaluating to an object of type Client.
nMsgBoxEnum	Long
nIndex	Long
varState	Variant

Sample Code using GetMessageStatus Method:

```
long IphoenixWrapper::GetMessageStatus(long nMsgBoxEnum, long nIndex, VARIANT*
varState)
{
                long result;
                static BYTE parms[] =
                                VTS_I4 VTS_I4 VTS_PVARIANT;
                InvokeHelper(0x22, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                                nMsgBoxEnum, nIndex, varState);
                return result;
}
```

GetMobileNumber method

Description: Get the mobile number (MDN) of the device.

Return Type: A String value.
Syntax: *object*.**GetMobileNumber**

The GetMobileNumber method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GeMobileNumber Method:

```
Cstring IphoenixWrapper::GetMobileNumber()
{
                Cstring result;
                InvokeHelper(0xd, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
                return result;
}
```

GetNetworkOperatorList method

Description: Get a list of operators. (UMTS/HSDPA Only)

Return Type: A Long value.
Syntax: *object*.**GetNetworkOperatorList**(*varOperatorList As Variant*)

The GetNetworkOperatorList method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

varOperatorList	Variant

Sample Code using GetNetworkOperatorList Method:

```
long IPhoenixWrapper::GetNetworkOperatorList(VARIANT* varOperatorList)
{
		long result;
		static BYTE parms[] =
				VTS_PVARIANT;
		InvokeHelper(0x1a, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				varOperatorList);
		return result;
}
```

GetNetworkPreference method

Description: Get network mode: RAT_MODE_AUTO (0), RAT_MODE_GSM (1), RAT_MODE_WCDMA (2) (UMTS/HSDPA Only)

Return Type: A Long value.
Syntax: *object***.GetNetworkPreference**(*varMode As Variant*)

The GetNetworkPreference method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
varMode	Variant

Sample Code using GetNetworkPreference Method:

```
long IPhoenixWrapper::GetNetworkPreference(VARIANT* varMode)
{
		long result;
		static BYTE parms[] =
				VTS_PVARIANT;
		InvokeHelper(0x2d, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				varMode);
		return result;
}
```

GetNewMessageCount method

Description: Get new message count.

Return Type: A Long value.
Syntax: *object***.GetNewMessageCount**

The GetNewMessageCount method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetNewMessageCount Method:

```
long IPhoenixWrapper::GetNewMessageCount()
{
        long result;
        InvokeHelper(0x1f, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
        return result;
}
```

GetOSVersionInfo method

Description: Get the OS versioning info.

Return Type: A Long value.
Syntax: *object***.GetOSVersionInfo**(*varMajorVersion As Variant, varMinorVersion As Variant, varCSDVersion As Variant*)

The GetOSVersionInfo method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
varMajorVersion	Variant
varMinorVersion	Variant
varCSDVersion	Variant

Sample Code using GetOSVersionInfo Method:

```
long IPhoenixWrapper::GetOSVersionInfo(VARIANT* varMajorVersion, VARIANT*
varMinorVersion, VARIANT* varCSDVersion)
{
        long result;
        static BYTE parms[] =
                VTS_PVARIANT VTS_PVARIANT VTS_PVARIANT;
        InvokeHelper(0x9, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                varMajorVersion, varMinorVersion, varCSDVersion);
        return result;
}

CString IPhoenixWrapper::GetSoftwareVersion()
{
        CString result;
        InvokeHelper(0xa, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
        return result;
}
```

GetPRLVersion method

Description: Get the PRL version of the device. (CDMA/EVDO Only)

Return Type: A String value.
Syntax: *object***.GetPRLVersion**

The GetPRLVersion method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code:

```
CString IphoenixWrapper::GetPRLVersion()

{
                Cstring result;
                InvokeHelper(0xf, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
                return result;
```

GetRasErrorString method

Description: Pass a RAS error code and get a RAS error string.

Return Type: A String value.
Syntax: *object***.GetRasErrorString**(*nErrorCode As Long*)

The GetRasErrorString method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nErrorCode	Long

Sample Code using GetRasErrorString Method:

```
CString IPhoenixWrapper::GetRasErrorString(long nErrorCode)
{
                CString result;
                static BYTE parms[] =
                                VTS_I4;
                InvokeHelper(0x1, DISPATCH_METHOD, VT_BSTR, (void*)&result, parms,
                                nErrorCode);
                return result;
}
```

GetSigStr method

Description: Get Signal Strength. Values: 0 – 5

Return Type: A Long value.
Syntax: *object***.GetSigStr**

The GetSigStr method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetSigStr Method:

```
long IPhoenixWrapper::GetSigStr()
{
			long result;
			InvokeHelper(0x4, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
			return result;
}
```

GetSoftwareVersion method

Description: Get the software (firmware) version of the device.

Return Type: **A String value.**
Syntax: *object*.**GetSoftwareVersion**

The GetSoftwareVersion method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using GetSoftwareVersion Method:

```
CString IPhoenixWrapper::GetSoftwareVersion()
{
			CString result;
			InvokeHelper(0xa, DISPATCH_METHOD, VT_BSTR, (void*)&result, NULL);
			return result;
}
```

IsDormant method

Description: Determine whether the device is currently dormant.

Return Type: **A Long value.**
Syntax: *object*.**IsDormant**

The IsDormant method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using IsDormat Method:

```
long IPhoenixWrapper::IsDormant()
{
			long result;
			InvokeHelper(0x14, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
			return result;
}
```

IsMessageMemoryFull method

Description: Check to see if the message box memory is full.

Return Type: **A Long value.**
Syntax: *object*.**IsMessageMemoryFull**

The IsMessageMemoryFull method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using IsMessageMemoryFull Method:

```
long IPhoenixWrapper::IsMessageMemoryFull()
{
                long result;
                InvokeHelper(0x26, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
                return result;
}
```

IsRoaming method

Description: Determine whether the device is currently roaming.

Return Type: **A Long value.**
Syntax: *object*.**IsRoaming**

The IsRoaming method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using IsRoaming Method:

```
long IPhoenixWrapper::IsRoaming()
{
                long result;
                InvokeHelper(0x13, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
                return result;
}
```

SendMessage method

Description: To send a message.

Return Type: **A Long value.**
Syntax: *object*.**SendMessage**(*varMsg As Variant, nMsgSize As Long, varMsgIndex As Variant*)

The SendMessage method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
varMsg	Variant
nMsgSize	Long
varMsgIndex	Variant

Sample Code using SendMessage Method:

```
long IPhoenixWrapper::SendMessage(VARIANT* varMsg, long nMsgSize, VARIANT*
varMsgIndex)
{
                long result;
                static BYTE parms[] =
                                VTS_PVARIANT VTS_I4 VTS_PVARIANT;
                InvokeHelper(0x25, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                                varMsg, nMsgSize, varMsgIndex);
                return result;
}
```

SetAdapter method

Description: To select a new active device.

Syntax: *object*.**SetAdapter**(*lpszAdapter As String*)

The SetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
lpszAdapter	String

Sample Code using SetAdapter Method:

```
void IPhoenixWrapper::SetAdapter(LPCTSTR lpszAdapter)
{
                static BYTE parms[] =
                                VTS_BSTR;
                InvokeHelper(0x1c, DISPATCH_METHOD, VT_EMPTY, NULL, parms,
                                 lpszAdapter);
}
```

SetAutoLock method

Description: To turn ON or OFF the autolock setting.

Return Type: **A Long value.**
Syntax: *object*.**SetAutoLock**(*nAutoOn As Long, lpszLockCode As String*)

The SetAutoLock method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nAutoOn	Long

lpszLockCode	String

Sample Code using SetAutoLock Method:

```
long IPhoenixWrapper::SetAutoLock(long nAutoOn, LPCTSTR lpszLockCode)
{
		long result;
		static BYTE parms[] =
				VTS_I4 VTS_BSTR;
		InvokeHelper(0x16, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				nAutoOn, lpszLockCode);
		return result;
}
```

SetCallSettings method

Description: Set the call settings, including quality of service settings. (UMTS/HSDPA Only)

Return Type: **A Long value.**
Syntax: *object***.SetCallSettings**(*nPDPType As Long, lpszAPN As String, nPDPAddress As*
Long, lpdQoS As Object)

The SetCallSettings method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nPDPType	Long
lpszAPN	String
nPDPAddress	Long
lpdQoS	Object

Sample Code using SetCallSettings Method:

```
long IPhoenixWrapper::SetCallSettings(long nPDPType, LPCTSTR lpszAPN, long nPDPAddress,
LPDISPATCH lpdQoS)
{
		long result;
		static BYTE parms[] =
				VTS_I4 VTS_BSTR VTS_I4 VTS_DISPATCH;
		InvokeHelper(0x12, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
				nPDPType, lpszAPN, nPDPAddress, lpdQoS);
		return result;
}
```

SetContact method

Description: Set the contact’s name and details by index.

Return Type: **A Long value.**
Syntax: *object***.SetContact**(*nIndex As Long, lpszContactName As String, lpszContactDetails As String*)

The SetContact method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nIndex	Long
lpszContactName	String
lpszContactDetails	String

Sample Code using SetContact Method:

```
long IPhoenixWrapper::SetContact(long nIndex, LPCTSTR lpszContactName, LPCTSTR
lpszContactDetails)
{
        long result;
        static BYTE parms[] =
                VTS_I4 VTS_BSTR VTS_BSTR;
        InvokeHelper(0x29, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                nIndex, lpszContactName, lpszContactDetails);
        return result;
}
```

SetMessageStatus method

Description: Set the state of a message.

Return Type: **A Long value.**

Syntax:
*object***.SetMessageStatus**(*nMsgBoxEnum As Long, nIndex As Long, nState As Long*)

The SetMessageStatus method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nMsgBoxEnum	Long
nIndex	Long
nState	Long

Sample Code using SetMessageStatus Method:

```
long IPhoenixWrapper::SetMessageStatus(long nMsgBoxEnum, long nIndex, long nState)
{
        long result;
        static BYTE parms[] =
                VTS_I4 VTS_I4 VTS_I4;
        InvokeHelper(0x23, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                nMsgBoxEnum, nIndex, nState);
        return result;
}
```

SetNetworkOperator method

Description: To set the network operator provided by GetNetworkOperatorList. (UMTS/HSDPA Only)

Return Type: **A Long value.**
Syntax: *object*.**SetNetworkOperator**(*nMode As Long, nFormat As Long, lpszOperator As String*)

The SetNetworkOperator method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nMode	Long
nFormat	Long
lpszOperator	String

Sample Code using SetNeworkOperator Method:

```
long IPhoenixWrapper::SetNetworkOperator(long nMode, long nFormat, LPCTSTR lpszOperator)
{
			long result;
			static BYTE parms[] =
					VTS_I4 VTS_I4 VTS_BSTR;
			InvokeHelper(0x19, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
					nMode, nFormat, lpszOperator);
			return result;
}
```

SetNetworkPreference method

Description: Set network mode: RAT_MODE_AUTO (0), RAT_MODE_GSM (1), RAT_MODE_WCDMA (2) (UMTS/HSDPA Only)

Return Type: **A Long value.**
Syntax: *object*.**SetNetworkPreference**(*nMode As Long*)

The SetNetworkPreference method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nMode	Long

Sample Code using SetNetworkPreference Method:

```
long IPhoenixWrapper::SetNetworkPreference(long nMode)
{
			long result;
			static BYTE parms[] =
					VTS_I4;
			InvokeHelper(0x2c, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                                        nMode);
                    return result;
}
```

SetProxy method

Description: Set proxy settings given a proxy IP address and port.

Return Type: A Long value.
Syntax: *object***.SetProxy**(*nProxy As Long, nPort As Long*)

The SetProxy method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nProxy	Long
nPort	Long

Sample Code using SetProxy Method:

```
long IPhoenixWrapper::SetProxy(long nProxy, long nPort)
{
                    long result;
                    static BYTE parms[] =
                                        VTS_I4 VTS_I4;
                    InvokeHelper(0x7, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                                        nProxy, nPort);
                    return result;
}
```

SetSMSC method

Description: Setting the SMSC is required for proper SMS functionality

Return Type: A Long value.
Syntax: *object***.SetSMSC**(*lpszSMSC As String*)

The SetSMSC method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
lpszSMSC	String

Sample Code using SetSMSC Method:

```
long IPhoenixWrapper::SetSMSC(LPCTSTR lpszSMSC)
{
                    long result;
                    static BYTE parms[] =
                                        VTS_BSTR;
                    InvokeHelper(0x2a, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                                        lpszSMSC);
```

```
        return result;
}
```

Shutdown method

Description: A means of synchronously shutting down the device.

Return Type: **A Long value.**
Syntax: *object*.**Shutdown**

The Shutdown method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.

Sample Code using Shutdown Method:

```
long IPhoenixWrapper::Shutdown()
{
        long result;
        InvokeHelper(0x2b, DISPATCH_METHOD, VT_I4, (void*)&result, NULL);
        return result;
}
```

Unlock method

Description: To unlock the device. Refer to NovatelModemAPI.h for possible lock types.

Return Type: **A Long value.**
Syntax: *object*.**Unlock**(*nLockType As Long, lpszLockCode As String*)

The Unlock method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type Client.
nLockType	Long
lpszLockCode	String

Sample Code using Unlock Method:

```
long IPhoenixWrapper::Unlock(long nLockType, LPCTSTR lpszLockCode)
{
        long result;
        static BYTE parms[] =
                VTS_I4 VTS_BSTR;
        InvokeHelper(0x15, DISPATCH_METHOD, VT_I4, (void*)&result, parms,
                nLockType, lpszLockCode);
        return result;
}
```

IEventPhoenixNotifySink object

The following section lists the event interface for Phoenix Clients. This is used for receiving server events for two-way communication. The IEventPhoenixNotifiy Sink object uses the following methods:

FireEventDeviceState method

Description: Event fired when the device state changes. Refer to SDK.h for possible states.

Syntax: *object*.**FireEventDeviceState**(*nState As Long*)

The FireEventDeviceState method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IeventPhoenixNotifySink.
nState	Long

FireEventDormant method

Description: Event fired when service is dormant. Values: 0 or 1

Syntax: *object*.**FireEventDormant**(*nStatus As Long*)

The FireEventDormant method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IEventPhoenixNotifySink.
nStatus	Long

FireEventIncomingCall method

Description: Event fired when receiving an incoming call.

Syntax: *object*.**FireEventIncomingCall**(*nStatus As Long*)

The FireEventIncomingCall method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IEventPhoenixNotifySink.
nStatus	Long

FireEventNetwork method

Description: Event fired when network service changes.

Syntax: *object*.**FireEventNetwork**(*nStatus As Long*)

The FireEventNetwork method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IEventPhoenixNotifySink.
nStatus	Long

FireEventRoaming method

Description: Event fired when service is roaming. Values: 0 or 1

Syntax: *object*.**FireEventRoaming**(*nRoaming As Long*)

The FireEventRoaming method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IEventPhoenixNotifySink.
nRoaming	Long

FireEventSigStr method

Description: Event fired when the signal strength changes. Values: 0 - 5

Syntax:
object.**FireEventSigStr**(*nSigStr As Long*)

The FireEventSigStr method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IEventPhoenixNotifySink.
nSigStr	Long

FireEventSMSStatus method

Description: Event fired when new SMS messages are available. Values: 0 or 1

Syntax: *object*.**FireEventSMSStatus**(*nStatus As Long*)

The FireEventSMSStatus method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type IEventPhoenixNotifySink.
nStatus	Long

QoS object

NVTL QoS Class used to set Quality of Service call settings. The QoS object uses the following properties:

deliveryofSDUError property

Description: property deliveryofSDUError

Property type: A **Long** value.
Syntax: *object***.deliveryofSDUError** [= *value*]

The deliveryofSDUError property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Qos**.
value	A **Long** value.

deliveryOrder property

Description: property deliveryOrder

Property type: A **Long** value.
Syntax: *object***.deliveryOrder** [= *value*]

The deliveryOrder property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

guarBitDL property

Description: property guarBitDL

Property type: A **Long** value.
Syntax:
*object***.guarBitDL** [= *value*]

The guarBitDL property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

guarBitUL property

Description: property guarBitUL

Property type: A **Long** value.
Syntax: *object***.guarBitUL** [= *value*]

The guarBitUL property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.

Value	A **Long** value.

maxBitDL property

Description: property maxBitDL

Property type: A Long value.
Syntax: *object*.**maxBitDL** [= *value*]

The maxBitDL property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

maxBitUL property

Description: property maxBitUL

Property type: A **Long** value.
Syntax: *object*.**maxBitUL** [= *value*]

The maxBitUL property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

maxSDUSize property

Description: property maxSDUSize

Property type: A **Long** value.
Syntax: *object*.**maxSDUSize** [= *value*]

The maxSDUSize property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

ResBitErrorRatio property

Description: property ResBitErrorRatio

Property type: A **String** value.
Syntax: *object*.**ResBitErrorRatio** [= *value*]

The ResBitErrorRatio property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **String** value.

SDUErrorRatio property

Description: property SDUErrorRatio

Property type: A **String** value.
Syntax: *object*.**SDUErrorRatio** [= *value*]

The SDUErrorRatio property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **String** value.

trafficClass property

Description: property trafficClass

Property type: A **Long** value.
Syntax:
object.**trafficClass** [= *value*]

The trafficClass property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

trafficHandling property

Description: property trafficHandling

Property type: A **Long** value.
Syntax: *object*.**trafficHandling** [= *value*]

The trafficHandling property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

transferDelay property

Description: property transferDelay

Property type: A **Long** value.

Syntax: *object*.**transferDelay** [= *value*]

The transferDelay property syntax has these parts:

Part	Description
Object	An expression evaluating to an object of type **Qos**.
Value	A **Long** value.

Blaze object

NVTL Blaze ActiveX Control module uses the following events and methods:

EventDeviceState event

Syntax
Sub object_**EventDeviceState**(*nVal As Long*)

The EventDeviceState event syntax has these named arguments:

Part	Description
nVal	Long

EventDormant event

Syntax
Sub object_**EventDormant**(*nVal As Long*)

The EventDormant event syntax has these named arguments:

Part	Description
nVal	Long

EventIncomingCall event

Syntax
Sub object_**EventIncomingCall**(*nVal As Long*)

The EventIncomingCall event syntax has these named arguments:

Part	Description
nVal	Long

EventNetwork event

Syntax
Sub object_**EventNetwork**(*nVal As Long*)

The EventNetwork event syntax has these named arguments:

Part	Description
nVal	Long

EventRoaming event

Syntax
Sub object_**EventRoaming**(*nVal As Long*)

The EventRoaming event syntax has these named arguments:

Part	Description
nVal	Long

EventSigStr event

Syntax
Sub object_**EventSigStr**(*nVal As Long*)

The EventSigStr event syntax has these named arguments:

Part	Description
nVal	Long

EventSMSStatus event

Syntax
Sub object_**EventSMSStatus**(*nVal As Long*)

The EventSMSStatus event syntax has these named arguments:

Part	Description
nVal	Long

Attach method

Syntax
object.**Attach**

The Attach method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Blaze**.

Detach method

Syntax
*object***.Detach**

The Detach method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Blaze**.

Hotspots object

NVTL Hotspots ActiveX Control Module uses the following methods:

AboutBox method

Syntax
*object***.AboutBox**

The AboutBox method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Hotspots**.

Init method

Initializes Hotspot dialog.
Return Type
A **Long** value.
Syntax
*object***.Init**

The Init method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Hotspots**.

ViewHotspots method

Shows Hotspot dialog.
Return Type

A **Long** value.
Syntax
object.**ViewHotspots**

The ViewHotspots method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Hotspots**.

Menu object

NVTL Menu Control uses the following methods:

Init method

Initializes language and reporting support.
Return Type
A **Long** value.
Syntax
object.**Init**

The Init method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowAbout method

Shows the About dialog.
Return Type
A **Long** value.
Syntax
object.**ShowAbout**

The ShowAbout method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowActivation method

Shows Activation Wizard.
Return Type
A **Long** value.
Syntax
object.**ShowActivation**

The ShowActivation method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowConfig method

Shows the Configuration dialog. Contents change depending on device technology.
Return Type
A **Long** value.
Syntax
object.**ShowConfig**

The ShowConfig method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowDebug method

Shows Debug info dialog.
Return Type
A **Long** value.
Syntax
object.**ShowDebug**

The ShowDebug method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowProp method

Shows the Properties dialog. Contents change depending on device technology.
Return Type
A **Long** value.
Syntax
object.**ShowProp**

The ShowProp method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowReport method

Shows Report dialog. Captures connection statistics and logs all sessions.

Return Type
A **Long** value.
Syntax
object.**ShowReport**

The ShowReport method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

ShowUnlock method

Shows the unlock SIM dialog. Used for PIN, PUK, and network locks.
Return Type
A **Long** value.
Syntax
object.**ShowUnlock**

The ShowUnlock method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Menu**.

Language object

NVTL Language object is contained in the UtilitiesLib ActiveX Control Module. The Language Control uses the following methods:

GetLanguageCount method

Returns a total count of all supported languages.
Return Type
A **Long** value.
Syntax
object.**GetLanguageCount**

The GetLanguageCount method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Language**.

GetLanguageIndex method

Returns the language index defined by standards.
Return Type
A **Long** value.
Syntax

*object***.GetLanguageIndex**(*nIndex As Long*)

The GetLanguageIndex method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Language**.
nIndex	Long

GetString method

Given a string id, returns the string in the currently selected language.
Return Type
A **String** value.
Syntax
*object***.GetString**(*lStringId As Long*)

The GetString method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Language**.
lStringId	Long

GetStringTableCount method

Returns a total count of all strings per language.
Return Type
A **Long** value.
Syntax
*object***.GetStringTableCount**

The GetStringTableCount method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Language**.

Init method

Initializes objects and parses all language xml files.
Return Type
A **Long** value.
Syntax
*object***.Init**(*lpszFilePath As String*)

The Init method syntax has these parts:

Part	Description

object	An expression evaluating to an object of type **Language**.
lpszFilePath	String

ProfileManager object

NVTL ProfileManager Object is contatined in the ProfileManager ActiveX Control. The ProfileManager Control uses the following methods:

AboutBox method

Syntax
object.**AboutBox**

The AboutBox method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.

CreateProfile method

Shows Profile Wizard given a technology.
Return Type
A **Long** value.
Syntax
object.**CreateProfile**(*Technology As Long*)

The CreateProfile method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.
Technology	Long

GetDefaultProfileName method

Gets the default profile name given a technology.
Return Type
A **String** value.
Syntax
object.**GetDefaultProfileName**(*Technology As Long*)

The GetDefaultProfileName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.

Technology	Long

GetProfile method

Gets a profile. Pass in object of type. Profile.
Return Type
A **Long** value.
Syntax
*object***.GetProfile**(*ProfileName As String, Technology As Long, Profile As Object*)

The GetProfile method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.
ProfileName	String
Technology	Long
Profile	Object

GetProfileNameList method

Retrieves a list of profile names given a technology.
Return Type
A **Long** value.
Syntax
*object***.GetProfileNameList**(*varNameList As Variant, Technology As Long*)

The GetProfileNameList method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.
varNameList	Variant
Technology	Long

Init method

Initializes language support and profile database.
Return Type
A **Long** value.
Syntax
*object***.Init**(*ProfilePath As String*)

The Init method syntax has these parts:

Part	Description

object	An expression evaluating to an object of type **ProfileManager**.
ProfilePath	String

SetDefaultProfile method

Sets the default profile for a given technology.
Return Type
A **Long** value.
Syntax
*object***.SetDefaultProfile**(*ProfileName As String, Technology As Long*)

The SetDefaultProfile method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.
ProfileName	String
Technology	Long

ShowProfileList method

Shows the Profile list dialog which includes Mobile, WiFi, and Ethernet.
Return Type
A **Long** value.
Syntax
*object***.ShowProfileList**(*Technology As Long*)

The ShowProfileList method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **ProfileManager**.
Technology	Long

Profile object

NVTL Profile Object is contatined in the ProfileManager ActiveX Control. The Profile Class has the following properties:

APN property

property APN
Property type
A **String** value.
Syntax
*object***.APN** [= *value*]

The APN property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

AuthenticationType property

property AuthenticationType
Property type
A **Long** value.
Syntax
object.**AuthenticationType** [= *value*]

The AuthenticationType property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

CarrierName property

property CarrierName
Property type
A **String** value.
Syntax
object.**CarrierName** [= *value*]

The CarrierName property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

ConnectType property

property ConnectType
Property type
A **Long** value.
Syntax
object.**ConnectType** [= *value*]

The ConnectType property syntax has these parts:

Part	Description

object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

DataSpeed property

property DataSpeed
Property type
A **Long** value.
Syntax
object.**DataSpeed** [= *value*]

The DataSpeed property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

DefaultGateway property

property DefaultGateway
Property type
A **Long** value.
Syntax
object.**DefaultGateway** [= *value*]

The DefaultGateway property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

DeliveryofSDUError property

property DeliveryofSDUError
Property type
A **Long** value.
Syntax
object.**DeliveryofSDUError** [= *value*]

The DeliveryofSDUError property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

DeliveryOrder property

property DeliveryOrder
Property type
A **Long** value.
Syntax
object.**DeliveryOrder** [= *value*]

The DeliveryOrder property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

DialString property

property DialString
Property type
A **String** value.
Syntax
object.**DialString** [= *value*]

The DialString property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

Fallback2GProfile property

property Fallback2GProfile
Property type
A **String** value.
Syntax
object.**Fallback2GProfile** [= *value*]

The Fallback2GProfile property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

IPAddress property

property IPAddress
Property type
A **Long** value.
Syntax
object.**IPAddress** [= *value*]

The IPAddress property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

MaxSDUSize property

property MaxSDUSize
Property type
A **Long** value.
Syntax
object.**MaxSDUSize** [= *value*]

The MaxSDUSize property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

Password property

property Password
Property type
A **String** value.
Syntax
object.**Password** [= *value*]

The Password property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

PDPAddress property

property PDPAddress
Property type

A **Long** value.
Syntax
object.**PDPAddress** [= *value*]

The PDPAddress property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

PDPType property

property PDPType
Property type
A **Long** value.
Syntax
object.**PDPType** [= *value*]

The PDPType property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

PrimaryDNS property

property PrimaryDNS
Property type
A **Long** value.
Syntax
object.**PrimaryDNS** [= *value*]

The PrimaryDNS property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

PrimaryWINS property

property PrimaryWINS
Property type
A **Long** value.
Syntax
object.**PrimaryWINS** [= *value*]

The PrimaryWINS property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

ProfileName property

property ProfileName
Property type
A **String** value.
Syntax
object.**ProfileName** [= *value*]

The ProfileName property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

ProxyAddress property

property ProxyAddress
Property type
A **Long** value.
Syntax
object.**ProxyAddress** [= *value*]

The ProxyAddress property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

ProxyPort property

property ProxyPort
Property type
A **Long** value.
Syntax
object.**ProxyPort** [= *value*]

The ProxyPort property syntax has these parts:

Part	Description

object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

ResErrorRatio property

property ResErrorRatio
Property type
A **String** value.
Syntax
object.**ResErrorRatio** [= *value*]

The ResErrorRatio property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

SDUErrorRatio property

property SDUErrorRatio
Property type
A **String** value.
Syntax
object.**SDUErrorRatio** [= *value*]

The SDUErrorRatio property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

SecondaryDNS property

property SecondaryDNS
Property type
A **Long** value.
Syntax
object.**SecondaryDNS** [= *value*]

The SecondaryDNS property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

SecondaryWINS property

property SecondaryWINS
Property type
A **Long** value.
Syntax
*object***.SecondaryWINS** [= *value*]

The SecondaryWINS property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

SetProxy property

property SetProxy
Property type
A **Long** value.
Syntax
*object***.SetProxy** [= *value*]

The SetProxy property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

SMSC property

property SMSC
Property type
A **String** value.
Syntax
*object***.SMSC** [= *value*]

The SMSC property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

SMSEmailNumber property

property SMSEmailNumber
Property type
A **String** value.
Syntax
*object***.SMSEmailNumber** [= *value*]

The SMSEmailNumber property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

StaticIP property

property StaticIP
Property type
A **Long** value.
Syntax
*object***.StaticIP** [= *value*]

The StaticIP property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

SubnetMask property

property SubnetMask
Property type
A **Long** value.
Syntax
*object***.SubnetMask** [= *value*]

The SubnetMask property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

Technology property

property Technology
Property type

A **Long** value.
Syntax
*object***.Technology** [= *value*]

The Technology property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

TrafficClass property

property TrafficClass
Property type
A **Long** value.
Syntax
*object***.TrafficClass** [= *value*]

The TrafficClass property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

TrafficHandling property

property TrafficHandling
Property type
A **Long** value.
Syntax
*object***.TrafficHandling** [= *value*]

The TrafficHandling property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

TransferDelay property

property TransferDelay
Property type
A **Long** value.
Syntax
*object***.TransferDelay** [= *value*]

The TransferDelay property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

UseDNS property

property UseDNS
Property type
A **Long** value.
Syntax
object.**UseDNS** [= *value*]

The UseDNS property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

Username property

property Username
Property type
A **String** value.
Syntax
object.**Username** [= *value*]

The Username property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

UseVPN property

property UseVPN
Property type
A **Long** value.
Syntax
object.**UseVPN** [= *value*]

The UseVPN property syntax has these parts:

Part	Description

object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

UseWINS property

property UseWINS
Property type
A **Long** value.
Syntax
*object***.UseWINS** [= *value*]

The UseWINS property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **Long** value.

VPNEntryName property

property VPNEntryName
Property type
A **String** value.
Syntax
*object***.VPNEntryName** [= *value*]

The VPNEntryName property syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **Profile**.
value	A **String** value.

NetMonkey Lib objects

NVTL NetMonkey ActiveX Control Module Objects use the following events:

EventAdapterFound event

Event fired when interface detection state changes.
Syntax
Sub object_**EventAdapterFound**

EventAdapterUpdate event

Event fired when interface updated values are available.

Syntax
Sub object_**EventAdapterUpdate**

LAN object

NVTL LAN Object is contained in the NetMonkey ActiveX Control Module. The LAN Control uses the following methods:

GetAdapter method

Gets the currently selected interface from registry.
Return Type
A **String** value.
Syntax
object.**GetAdapter**

The GetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetAdapterList method

Gets a list of LAN interfaces available.
Return Type
A **Long** value.
Syntax
object.**GetAdapterList**(*varAdapterList As Variant*)

The GetAdapterList method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.
varAdapterList	Variant

GetBytesIn method

Gets the number of bytes received.
Return Type
A **Long** value.
Syntax
object.**GetBytesIn**

The GetBytesIn method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetBytesOut method

Gets the number of bytes sent.
Return Type
A **Long** value.
Syntax
object.**GetBytesOut**

The GetBytesOut method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetConnectState method

Gets the interface connection status.
Return Type
A **Long** value.
Syntax
object.**GetConnectState**

The GetConnectState method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetDefaultGateway method

Gets the current default gateway.
Return Type
A **String** value.
Syntax
object.**GetDefaultGateway**

The GetDefaultGateway method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetDuration method

Gets the duration time of the connection.
Return Type
A **String** value.
Syntax
object.**GetDuration**

The GetDuration method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetFriendlyName method

Gets the interface friendly name.
Return Type
A **String** value.
Syntax
object.**GetFriendlyName**

The GetFriendlyName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetIPAddress method

Gets the current IP address.
Return Type
A **String** value.
Syntax
object.**GetIPAddress**

The GetIPAddress method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetLinkSpeed method

Gets the interface link speed in bps.
Return Type
A **String** value.
Syntax
object.**GetLinkSpeed**

The GetLinkSpeed method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetMacAddress method

Gets the interface MAC address in hex.
Return Type
A **String** value.
Syntax
*object***.GetMacAddress**

The GetMacAddress method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetNdisName method

Gets the interface GUID.
Return Type
A **String** value.
Syntax
*object***.GetNdisName**

The GetNdisName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

GetSubnetMask method

Gets the current subnet mask.
Return Type
A **String** value.
Syntax
*object***.GetSubnetMask**

The GetSubnetMask method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

Init method

Instantiates object and starts worker thread.
Return Type
A **Long** value.
Syntax
*object***.Init**

The Init method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.

SetAdapter method

Sets the current interface and saves it to registry.
Syntax
object.**SetAdapter**(*lpszAdapterNdisName As String*)

The SetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **LAN**.
lpszAdapterNdisName	String

WLAN object

NVTL WLAN Object is contained in the NetMonkey ActiveX Control Module. The WLAN Control uses the following methods:

AddWepKey method

Add a WEP key to an index.
Return Type
A **Long** value.
Syntax
object.**AddWepKey**(*nKeyIndex As Long, lpszKeyMaterial As String*)

The AddWepKey method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.
nKeyIndex	Long
lpszKeyMaterial	String

Disassociate method

Disassociates with the current access point.
Syntax
object.**Disassociate**

The Disassociate method syntax has these parts:

Part	Description

object	An expression evaluating to an object of type **WLAN**.

FindProfile method

Finds if a profile exists in WZConfig
Return Type
A **Long** value.
Syntax
object.**FindProfile**(*lpszProfile As String, nInfrastructureMode As Long*)

The FindProfile method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.
lpszProfile	String
nInfrastructureMode	Long

GetAccessPoints method

Gets a list of all available access points.
Return Type
A **Long** value.
Syntax
object.**GetAccessPoints**(*varAccessPoints As Variant*)

The GetAccessPoints method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.
varAccessPoints	Variant

GetAdapter method

Gets the currently selected interface from registry.
Return Type
A **String** value.
Syntax
object.**GetAdapter**

The GetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetAdapterList method

Gets a list of WLAN interfaces available.
Return Type
A **Long** value.
Syntax
object.**GetAdapterList**(*varAdapterList As Variant*)

The GetAdapterList method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.
varAdapterList	Variant

GetBssid method

Gets the associated access point's MAC address.
Return Type
A **String** value.
Syntax
object.**GetBssid**

The GetBssid method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetBytesIn method

Gets the number of bytes received.
Return Type
A **Long** value.
Syntax
object.**GetBytesIn**

The GetBytesIn method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetBytesOut method

Gets the number of bytes sent.
Return Type
A **Long** value.
Syntax
object.**GetBytesOut**

The GetBytesOut method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetConnectState method

Gets the interface connection status.
Return Type
A **Long** value.
Syntax
object.**GetConnectState**

The GetConnectState method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetDefaultGateway method

Gets the current default gateway.
Return Type
A **String** value.
Syntax
object.**GetDefaultGateway**

The GetDefaultGateway method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetDuration method

Gets the duration time of the connection.
Return Type
A **String** value.
Syntax
object.**GetDuration**

The GetDuration method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetFriendlyName method

Gets the interface friendly name.
Return Type
A **String** value.
Syntax
object.**GetFriendlyName**

The GetFriendlyName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetIPAddress method

Gets the current IP address.
Return Type
A **String** value.
Syntax
object.**GetIPAddress**

The GetIPAddress method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetLinkSpeed method

Gets the interface link speed in bps.
Return Type
A **String** value.
Syntax
object.**GetLinkSpeed**

The GetLinkSpeed method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetMacAddress method

Gets the interface MAC address in hex.
Return Type
A **String** value.
Syntax
object.**GetMacAddress**

The GetMacAddress method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetNdisName method

Gets the interface GUID.
Return Type
A **String** value.
Syntax
object.**GetNdisName**

The GetNdisName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetRssi method

Gets the interface signal strength in dDm.
Return Type
A **Long** value.
Syntax
object.**GetRssi**

The GetRssi method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetSigStr method

Gets the interface signal strength of values 0-5.
Return Type
A **Long** value.
Syntax
object.**GetSigStr**

The GetSigStr method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetSubnetMask method

Gets the current subnet mask.

Return Type
A **String** value.
Syntax
object.**GetSubnetMask**

The GetSubnetMask method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetSupportedRates method

Gets interface supported rates.
Return Type
A **String** value.
Syntax
object.**GetSupportedRates**

The GetSupportedRates method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

GetWZCServiceState method

Return Type
A **Long** value.
Syntax
object.**GetWZCServiceState**

The GetWZCServiceState method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

Init method

Instantiates object and starts worker thread.
Return Type
A **Long** value.
Syntax
object.**Init**
The Init method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

IsAdminUser method

Return Type
A **Long** value.
Syntax
object.**IsAdminUser**

The IsAdminUser method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

RemoveWepKey method

Remove a WEP key from an index.
Return Type
A **Long** value.
Syntax
object.**RemoveWepKey**(*nKeyIndex As Long*)

The RemoveWepKey method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.
nKeyIndex	Long

Scan method

Begins a scan for all available access points.
Syntax
object.**Scan**
The Scan method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

SetAdapter method

Sets the current interface and saves it to registry.
Syntax
object.**SetAdapter**(*lpszAdapterNdisName As String*)

The SetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

lpszAdapterNdisName	String

StartWZCService method

Syntax
object.**StartWZCService**

The StartWZCService method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

StopWZCService method

Syntax
object.**StopWZCService**
The StopWZCService method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WLAN**.

WWAN object

NVTL WWAN Object is contained in the NetMonkey ActiveX Control Module. The WWAN Control uses the following methods:

DisableDevice method

Disable device and turns off NDIS.
Return Type
A **Long** value.
Syntax
object.**DisableDevice**(*lpszDeviceID As String*)

The DisableDevice method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.
lpszDeviceID	String

EnableDevice method

Enables devices and turns on NDIS.

Return Type
A **Long** value.
Syntax
object.**EnableDevice**(*lpszDeviceID As String*)

The EnableDevice method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.
lpszDeviceID	String

GetAdapter method

Gets the currently selected interface from registry.
Return Type
A **String** value.
Syntax
object.**GetAdapter**

The GetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetAdapterList method

Gets a list of WWAN interfaces available.
Return Type
A **Long** value.
Syntax
object.**GetAdapterList**(*varAdapterList As Variant*)

The GetAdapterList method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.
varAdapterList	Variant

GetBytesIn method

Gets the number of bytes received.
Return Type
A **Long** value.
Syntax
object.**GetBytesIn**

The GetBytesIn method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetBytesOut method

Gets the number of bytes sent.
Return Type
A **Long** value.
Syntax
*object***.GetBytesOut**

The GetBytesOut method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetConnectState method

Gets the interface connection status.
Return Type
A **Long** value.
Syntax
*object***.GetConnectState**

The GetConnectState method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetDefaultGateway method

Gets the current default gateway.
Return Type
A **String** value.
Syntax
*object***.GetDefaultGateway**

The GetDefaultGateway method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetDuration method

Gets the duration time of the connection.

Return Type
A **String** value.
Syntax
object.**GetDuration**

The GetDuration method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetFriendlyName method

Gets the interface friendly name.
Return Type
A **String** value.
Syntax
object.**GetFriendlyName**

The GetFriendlyName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetIPAddress method

Gets the current IP address.
Return Type
A **String** value.
Syntax
object.**GetIPAddress**
The GetIPAddress method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetLinkSpeed method

Gets the interface link speed in bps.
Return Type
A **String** value.
Syntax
object.**GetLinkSpeed**
The GetLinkSpeed method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetNdisName method

Gets the interface GUID.
Return Type
A **String** value.
Syntax
*object***.GetNdisName**

The GetNdisName method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

GetSubnetMask method

Gets the current subnet mask.
Return Type
A **String** value.
Syntax
*object***.GetSubnetMask**

The GetSubnetMask method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

Init method

Instantiates object and starts worker thread.
Return Type
A **Long** value.
Syntax
*object***.Init**

The Init method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.

InitDevice method

Initializes NDIS.
Return Type
A **Long** value.
Syntax
*object***.InitDevice**(*lpszDeviceID As String, lpszNetConnName As String, nShowIcon As Long, nReEnable As Long*)

The InitDevice method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.
lpszDeviceID	String
lpszNetConnName	String
nShowIcon	Long
nReEnable	Long

IsDeviceEnabled method

Checks the status of the NDIS device.
Return Type
A **Long** value.
Syntax
object.**IsDeviceEnabled**(*lpszDeviceID As String*)

The IsDeviceEnabled method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.
lpszDeviceID	String

SetAdapter method

Sets the current interface and saves it to registry.
Syntax
object.**SetAdapter**(*lpszAdapterNdisName As String*)

The SetAdapter method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN**.
lpszAdapterNdisName	String

UpdateDeviceParam method

Update NDIS related registry keys. eg. DialString, InitString.
Return Type
A **Long** value.
Syntax
object.**UpdateDeviceParam**(*lpszDeviceID As String, lpszValName As String, dwType As Long, lpszInBuffer As String, dwBuffSize As Long, dwVal As Long*)

The UpdateDeviceParam method syntax has these parts:

Part	Description
object	An expression evaluating to an object of type **WWAN.**
lpszDeviceID	String
lpszValName	String
dwType	Long
lpszInBuffer	String
dwBuffSize	Long
dwVal	Long

AT Commands

Introduction

The purpose of this section is to provide advance design and integration information to assist in the integration planning and evaluation of Novatel Wireless PCI Express Mini-cards. This section is intended to specify supported AT Commands for the Novatel Wireless line of PCI Express Mini-cards, and to provide the information necessary to integrate the module into an overall product design.

AT Commands allow communications software to control and direct the modem. The term AT is derived from the word **AT**tention, meaning to get the modem's attention. AT Commands are issued by an intelligent device to a modem to perform a specific function. For example, AT Commands can be used to initiate a call, answer a call or to simply transmit data. The prefix AT obtains synchronization, identifies the character parameters, and indicates that a command may be in the following characters. AT Commands **are not** case sensitive; use upper or lower case letters in the command syntax

The ETSI specification created a complete set of commands to interface with the terminal adapter or modem as well as specifying certain commands from ITU 25. To make the AT Command interface easier to understand and provide faster customer integration, a number of the standard AT Commands have been implemented to substitute some of the more specialized ETSI commands. All commands relevant to the control and operation of the modem have been implemented.

NW PCI AT Command Set

Each of the following sections discusses an individual AT command and its five subsections listed below:

Description:	describes the command and defines any conditions required to use the command
Syntax:	lists the syntax the command requires
Parameters:	lists any parameters and values available to the command
Response:	lists and defines any responses the command may return
Example:	(optional) provides examples of the command

A/

Description: REPEAT LAST COMMAND

This command repeats the last command sent to the modem.

Syntax: A/

Parameters: None

Response: Returns the command response from the previous command.

Example: **AT+GMI**

```
+GMI: Novatel Wireless, Inc.
OK
A/
+GMI: Novatel Wireless, Inc.
OK
```

ATA

Description: ANSWER

This command sets the modem to answer the next call. The modem sends an off-hook signal to the remote station. Any additional commands on the same command line are ignored. The modem switches to data mode and after call is released, returns to command mode.

This command can be stopped by receiving a character during execution, except during some states of connection establishment such as handshaking.

Syntax: **ATA**

Parameters: None

Response: If the connection is successful the modem will return the string:

CONNECT<text>

then switches to data mode. The <text> is only displayed if the command ATX has been set to a value greater than 0.

When the modem releases the call and returns to command mode, it returns the string:

OK

If no connection is made, the modem will return the string:

NO CARRIER

Example: **ATA**

ATD

Description: DIAL NUMBER

This command will instruct the modem to originate a call to a disabled number. The modem attempts to set up an outgoing call.

This command can be stopped by receiving a character during execution, except during some states of connection establishment such as handshaking.

Syntax: **ATD[<value>]**

Parameters:

<value>

The string of dialing digits and the optional V.25ter modifiers. The valid dialing digits are:

`0-9, * , #, +, A, B, C`

and the V.25ter modifiers which are ignored:

Response: If there is no dial tone, the modem will return the string:

NO DIALTONE

where the command ATX has been set to 2 or 4.

If there is an error and it is related to the mobile equipment's (ME) functionality, the modem will return the string:

+CME ERROR: <error>

If the connection is busy, the modem will return the string:

BUSY

where the command ATX has been set to 3 or 4.

If the connection cannot be established, the modem will return the string:

NO CARRIER

If the connection is successful and is non-voice call, the modem switches to data state and the modem will return the string:

CONNECT<text>

where <text> is only displayed if the command ATX has been set to a value greater than 0.

If connection successful and is a voice call, the modem will return the string:

OK

When the modem releases the call and returns to command mode, it returns the string:

OK

Example:

ATD9,555-1212	DIAL 9, PAUSE, DIAL 5551212
ATD555-1234;	DIAL 5551234
ATD#777	Packet data call

ATE

Description: ECHO MODE

This command sets the echo mode of the modem, that is, whether or not the modem echoes characters received from terminal while the modem is in command mode.

Syntax: **ATE[<value>]**

Parameters: <value>

0	turns echo mode off
1	turns echo mode on

Response: This command will return the string OK.

Example:

ATE1	All further data entered is echoed
ATE0	All further data entered is not echoed

ATH

Description: HANG-UP (DISCONNECT)

This command instructs the modem to disconnect from the current connection and terminate the call.

Syntax: **ATH[0]**

Parameters: 0 – This parameter is the default, as well as the only parameter, and does not necessarily have to be typed with the command.

Response: This command will return the string OK, after the Data Carrier Detect (DCD) is turned off, if it was previously on.

Example: **ATH**

ATV

Description: VERBOSE

This command displays the modem's result codes in terse or verbose form.

In terse form, all result codes are represented by an error code number and all text messages have only a carriage return (<cr>) character appended to them.

In verbose form, all result codes are returned as words or sentences and all text messages have a carriage return-line feed (<cr><lf>) character pair before and after the text message.

Syntax: **ATV[<value>]**

Parameters: <value>

0 will set the response format to terse

1will set the response format to verbose

Response: If the command has been set to **0**, it will return the response:

0

If the command has been set to **1**, it will return the response:

OK

Example: **ATV1**

ATZ

Description: RESET PARAMETERS TO SAVED SETTINGS

This command uses the user-defined modem settings profile stored in the non-volatile memory as the active profile. If the user-defined profile is invalid, the modem will use the factory default settings. Any additional commands on the same command line are ignored. This command uses the profile created by the AT&W command.

Syntax: **ATZ[0]**

Parameters: 0 – This parameter is the default, as well as the only parameter, and does not necessarily have to be typed with the command.

Response: This command will return the string **OK**.

AT&C

Description: DATA CARRIER DETECT (DCD) MODE

This command sets the data carrier detect mode.

Syntax: **AT&C[<value>]**

Parameters: <value>

0 – sets the data carrier detect so it is always on

1 – sets the data carrier detect so it is only on in the presence of a data carrier

2 – sets data carrier detect to always on but wink when connection disconnect (Qualcomm implemented)

Response: This command will return the string **OK**.

Example: **AT&C1**

AT&D

Description: DATA TERMINAL READY (DTR) CONTROL

This command defines how the modem responds, while in data mode, to the data terminal ready (DTR) circuit changing state from ON to OFF.

Syntax: **AT&D[<value>]**

Parameters: <value>

0 – instructs the modem to ignore the data terminal ready state

1 – instructs the modem to change to command mode, while remaining connected to the call

2 – instructs the modem to disconnect from the call and then change to command mode. While the data terminal ready state is set to **off**, the modem's auto-answer function is also off.

Response: This command will return the string **OK**.

Example: **AT&D2**

AT&V

Description: VIEW ACTIVE PROFILE

This command will display the active profile settings on the terminating equipment.

Syntax: **AT&V[0]**

Parameters: 0 – This parameter is the default, as well as the only parameter, and does not necessarily have to be typed with the command.

Response: The response will be a listing of the current configuration followed by the string **OK**. For example

ACTIVE PROFILE :

```
E1 L1 M1 Q0 V1 X4 &C1 &D2
S0:0 S2:43 S3:13 S4:10 S5:8 S6:2 S7:60 S8:2 S10:15 S12:
+CBST: 7,0,1
+CSMS: 0
+CRLP: 61,61,48,6,0,3
+CRC: 0
+CR: 0
+FCLASS: 0
+IFC: 2,2
+IMODE: 0
+ICF: 3,3
+DR: 0
+CMGF: 0
+CSDH: 0
+CNMI: 2,1,0,0,0
+ILRR: 0
+IPR: 115200
+DS: 3,0,512,20
+CMEE: 0
+CREG: 0
+CCUG: 0,0,0
+CLIP: 0
+COLP: 0
+CCWA: 0
+CAOC: 1
+CLIR: 0
+CSCA: "+44385016005",145
+CSMP: 17,167

OK
```

Example: **AT&V**

AT+CFC

Description: U_m INTERFACE FAX COMPRESSION

Syntax: **AT+CFC=<value>**

Parameters: <value>

0 – No compression.

1 – V.42bis compression with parameters as set by the +CDS command

2 – Modified the Modified Read Compression.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT+CFC?	current values
Set	AT+CFC=0	OK
Test	AT+CFC=?	list of supported values

AT+CRM

Description: SET R_m INTERFACE PROTOCOL

The default value for the +CRM parameter shall be 0 if this value is supported by the MT2. If0 is not supported, the default +CRM value shall be manufacturer-specific.

Syntax: **AT+CRM=<value>**

Parameters: <value>

0 – Asynchronous Data or Fax

1 – Packet data service, Relay Layer R_m interface

2 – Packet data service, Network Layer R_m interface, PPP.

3 – Packet data service, Network Layer R_m interface, SLIP.

4 – STU-III Service.

5-127 – Reserved for future use.

128-255 – Reserved for manufacturer-specific use.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT+CRM?	current values
Test	AT+CRM=?	list of supported values
Set	AT+CRM=0	OK

AT+CSQ

Description: SIGNAL QUALITY REPORT

Execution command returns received signal strength indication and channel frame error rate from the modem. Test command returns values supported by the modem.

Syntax: AT+CSQ?

Parameters: None

Response: **+CSQ: <rssi>,<fer> OK**

RSSI (in dBm) = (<rssi> X 2) –113 (FOR 0<= <rssi> <=31)

RSSI (in dBm) = -51 (FOR 31<= <rssi> <=98)

(FOR 99<= <rssi>) rssi is not known or not detectable

FER:

0	<0.01%
1	0.01% to less than 0.1%
2	0.1% to less than 0.5%

3	0.5% to less than 1.0%
4	1.0% to less than 2.0%
5	2.0% to less than 4.0%
6	4.0% to less than 8.0%
7	>= 8.0%
99	FER not known or is not detectable

Example:	**Input**	**Response**
Test	AT+CSQ?	list of RSSI and FER OK

AT+CSS

Description: REPORT SERVING SYSTEM INFORMATION

Syntax: **AT+CSS?**

Parameters: None

Response: **+CSS: <Band Class>,<Band>,<SID> OK**

Band Class:

0	The mobile station is registered with a cellular system.
1	The mobile station is registered with a PCS system.

Band:

0	The mobile station is registered with a PCS A-band system.
1	The mobile station is registered with a PCS B-band system.
2	The mobile station is registered with a PCS C-band system.
3	The mobile station is registered with a PCS D-band system.
4	The mobile station is registered with a PCS E-band system.
5	The mobile station is registered with a PCS F-band system.
6	The mobile station is registered with a cellular A-band system.
7	The mobile station is registered with a cellular B-band system.
8	The mobile station is not registered.

SID:0-16383	The mobile station is registered with the system indicated.
99999	The mobile station is not registered.

Example:	**Input**	**Response**
Test	AT+CSS?	+CSS: 1,0,1031 OK

AT+CXT

Description: ACTION FOR AN UNRECOGNIZED COMMAND

Syntax: **AT+CXT=<value>**

Parameters: <value>

0 Do not pass unrecognized commands to the IWF.

1 When detecting an unrecognized AT command, open transport layer connection and pass unrecognized command to the IWF.

Example:	Input	Response
Query	**AT+CXT?**	**+CXT: 0 OK**
Set	**AT+CXT=0**	**OK**

AT+ER

Description: ERROR CONTROL REPORTING

This extended-format numeric parameter controls whether the extended-format +ER: intermediate result code is transmitted from the IWF over the U_m interface.

Syntax: **AT+ER=<value>**

Parameters: <value> should be referred to IS-131.

Response: This command will return the string **OK**.

Example:	Input	Response
Query	AT+ER?	current values
Set	AT+ER=0	OK

AT+ETBM

Description: CONTROLS THE HANDLING OF DATA REMAINING IN IWF BUFFERS

This extended-format compound parameter controls the handling of data remaining in IWF buffers upon service termination.

Syntax: **AT+ETBM=<value>**

Parameters: <value> should be referred to IS-131.

Response: This command will return the string **OK**.

Example:	Input	Response
Query	AT+ETBM?	current values
Set	AT+ETBM=1,1,20	OK

AT+FCLASS

Description: FAX CLASS SET OR TEST

Sets a particular mode of operation (data, fax). This causes the TA to process information in a manner suitable for that specific type of device.

Syntax: **AT+FCLASS[=<value> or ?][?]**

Parameters: <value>, [?]

0	data
2.0	fax class 2 (TIA-578-A)
?	queries the command and returns its current setting or displays the valid values for the commands parameters

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT+FCLASS?	current values
Test	AT+FCLASS=?	list of supported values
Set	AT+FCLASS=0	OK

AT+GCAP

Description: REPORT ADDITIONAL CAPABILITIES

Modem reports a list of additional capabilities.

Syntax: **AT+GCAP**

Parameters: None

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT+GCAP	+GCAP: +CIS707-A, +MS, +ES, +DS, +FCLASS OK

AT+GMI

Description: MANUFACTURER IDENTITY

Request for manufacturer identification

Syntax: **AT+GMI**

Parameters: None

Response: **+GMI: <MANUFACTURERS NAME/ID> OK**

Example:	**Input**	**Response**

Query	AT+GMI	+GMI: Novatel Wireless Inc. OK

AT+GMM

Description: MODEM IDENTITY

Request TA model identification. Unit reports one or more lines of information text which permits you to identify the specific model of device. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide any information desired.

Syntax: **AT+GMM**

Parameters: None

Response: **+GMM: <MODEL ID> OK**

Example:	**Input**	**Response**
Query	AT+GMM	EXPDV620

AT+GMR

Description: REVISION NUMBER / IDENTITY

This command reports the version, revision and date of the software or firmware used in the device. It is also used to identify the software version to facilitate easier tracking and code updates.

Syntax: **AT+GMR**

Parameters: None

Response: **+GMR: <REVISION ID> OK**

Example:	**Input**	**Response**
Query	AT+GMR	M6500C-NIRVANA_VZW-Q40305.136 [Mar 22 2005 14:00:00]

AT+GSN

Description: ESN NUMBER IDENTITY

This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit you of the MT2 to identify the individual device. Typically, the text will consist of a single line containing a manufacturer-determined alphanumeric string, but manufacturers may choose to provide any information desired.

Syntax: **AT+GSN**

Parameters: None

Response: **+GSN: <ESN(hex)> OK**

Example:	**Input**	**Response**
Query	AT+GSN	+GSN: <ESN(hex)> OK

AT$QCQNC

Description: ENABLE/DISABLE QUICK NET CONNECT (QNC)

Syntax: **AT$QCQNC=<value>**

Parameters: <value>

0	Disable QNC capability. This means that packet Originations will use the Pack Data Service Option number.
1	Enable QNC capability. This means that Packet Originations will use the Async Data Service Option number.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCQNC?	current values
Test	AT$QCQNC=?	list of supported values
Set	AT$QCQNC=0	OK

AT$QCPREV

Description: REPORT PROTOCOL REVISION IN USE

Syntax: **AT$QCPREV**

Parameters: None

Response: Returns one of the following codes:

1	JSTD008
3	IS_95A
4	IS_95B
6	IS_2000

Example:	**Input**	**Response**
Query	AT$QCPREV	6

AT$QCCLR

Description: CLEAR MOBILE ERROR LOG

This command will clear the mobile error log.

Syntax: **AT$QCCLR**

Parameters: None

Response: This command will return the string **OK**.

Example: **AT$QCCLR**

AT$QCPKND

Description: AUTOMATIC PACKET DETECTION

Enable/Disable Automatic Packet Detection after a Dial command

Syntax: **AT$QCPKND=<value>**

Parameters: <value>

0	Disable Packet No Dial. If a PPP packet is received by the mobile without a just prior dial command (that is, ATDT #), then the mobile will originate a Packet (or QNC) data call.
1	Enable Packet No Dial. Reception of a PPP packet without a just prior dial command will NOT Originate a PPP packet (or QNC) call.

Example:	**Input**	**Response**
Query	AT$QCPKND?	current values
Test	AT$QCPKND=?	list of supported values
Set	AT$QCPKND=0	OK

AT$QCVAD

Description: PREARRANGEMENT SETTING

Prearrangement setting; respond to Page message that has a Voice service option with a Page response that has a Data service option

Syntax: **AT$QCVAD=<value>**

Parameters: <value>

0	Off
1	Fax for next call
2	Fax for all calls
3	Async for next call
4	Async for all calls

Example:	**Input**	**Response**
Query	AT$QCVAD?	current values
Test	AT$QCVAD=?	list of supported values

Set	AT$QCVAD=0	OK

AT$QCMDR

Description: SET MEDIUM DATA RATE SETTING

Set Medium Data Rate (MDR) (also known as HSPD) setting.

Syntax: **AT$QCMDR=<value>**

Parameters: <value>

0 MDR Service Only. The mobile will originate with SOS 22 or SO 25. The mobile will not negotiate to any other service option if SO 22 and SO 25 are unavailable.

1 MDR Service, if available. The mobile will originate with SO 22 or SO 25, but will negotiate to a Low-Speed Packet service option if MDR is not available. The mobile will not negotiate to SO 33.

2 LSPD only. The mobile will originate a Low-Speed Packet call only. The mobile will not negotiate to SO 22, SO 25, or SO 33.

3 SO 33, if available. The mobile will negotiate to MDR or Low-Speed Packet service options if SO 33 is not available.

Example:	**Input**	**Response**
Query	AT$QCMDR?	current values
Test	AT$QCMDR=?	list of supported values
Set	AT$QCMDR=0	OK

AT$QCMIP

Description: MOBILE IP (MIP) DATA CALL

Sets the mobile to a certain type of packet data call.

Syntax: **AT$QCMIP=<value>**

Parameters: <value>

0 Mobile IP disabled, Simple IP only.

1 Mobile IP preferred.

In the initial MIP registration, if the network does not support Mobile IP, then the mobile automatically reverts to Simple IP (force a PPP renegotiation by sending a LCP C-Req).

However, if a Mobile IP session is registered, and then the mobile enters a network that does not support Mobile IP, the mobile will drop the session and inform the upper layers of the failure (for example, by dropping DCD to a laptop).

2 Mobile IP only.

The mobile will make data calls only when Mobile IP is supported in the network. During a MIP session, if the mobile hands off to a network that does not support MIP, then the mobile will drop the session and inform the upper layers of the failure (for example, by dropping DCD to a laptop).

Example:	**Input**	**Response**
Query	AT$QCMIP?	current values
Test	AT$QCMIP=?	list of supported values
Set	AT$QCMIP=0	OK

AT$QCMIPP

Description: SELECT MIP USER PROFILE TO BE ACTIVE

This value is stored in NV. This AT command is expected to be used by users to configure Dial-Up Networking.

Syntax: **AT$QCMIPP=<value>**

Parameters: <value> is between 0 and 5 for the profile number.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPP?	current values
Test	AT$QCMIPP=?	list of supported values
Set	AT$QCMIPP=0	OK

AT$QCMIPT

Description: RFC 2002bis AUTHENTICATION SETTING

Enable/disable the use of RFC 2002bis authentication. This is a bug fix to RFC 2002 where it fails to include the SPI in the calculation of the MN-HA authenticator.

Syntax: **AT$QCMIPT=<value>**

Parameters: <value>

0 Use of RFC 2002bis authentication is disabled.RFC 2002 style authentication is used instead.

1 Use of RFC 2002bis authentication is enabled.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPT?	current values
Test	AT$QCMIPT=?	list of supported values
Set	AT$QCMIPT=0	OK

AT$QCMIPEP

Description: CURRENT ACTIVE MIP PROFILE

Enable/disable currently active profile.

Syntax: **AT$QCMIPEP=<value>**

Parameters: <value>

0 Disable the currently active profile (profile is unavailable until it is re-enabled.

1 Enable the currently active profile.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPEP?	current values
Test	AT$QCMIPEP=?	list of supported values
Set	AT$QCMIPEP=0	OK

AT$QCMIPGETP

Description: REPORT ALL INFORMATION FOR A MIP PROFILE

Return all information corresponding to the specified profile number.

Syntax: **AT$QCMIPGETP=<value>**

Parameters: <value> is a number between 0 and 5. If no profile number is entered, all information corresponding to the currently active profile is returned.

Response: This command will return the string **OK**. If there is no profile associated with the specified number, an error is returned.

Example:	**Input**	**Response**
Query	AT$QCMIPGETP?	current active profile
Test	AT$QCMIPGETP=?	list of supported values
Set	AT$QCMIPGETP=0	OK

AT$QCMIPNAI

Description: SET NETWORK ACCESS IDENTIFER (NAI)

Set the NAI for the currently active profile.

Syntax: **AT$QCMIPNAI=<string>,<value>**

Parameters:

<string> length of 72 characters. Double quotes are only required if the string contains a comma.

<value>

0 Do not commit to NV.

1 Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if $QCMIPP is called.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPNAI	current values
Test	AT$QCMIPNAI=?	list of supported values
Set	AT$QCMIPNAI=test,0	OK

AT$QCMIPRT

Description: SET REVERSE TUNNELING

Set the reverse tunneling currently active profile.

Syntax: **AT$QCMIPRT=<value1>,<value2>**

Parameters:

<value1>

0 Do not request reverse tunneling.

1 Request reverse tunneling.

<value2>

0 Do not commit to NV.

1 Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Example:	**Input**	**Response**
Query	AT$QCMIPRT?	current values
Test	AT$QCMIPRT=?	list of supported values
Set	AT$QCMIPRT=0	OK

AT$QCMIPMASS

Description: SET MOBILE NODE (MN) AUTHENTICATION AUTHORIZATION ACCOUNTING (AAA) SHARED SECRET

Set MN-AAA shared secrets for the currently active profile.

Syntax: **AT$QCMIPASS=<string>,<value>**

Parameters:

<string>

length of 16 characters. Double quotes are only required if the string contains a comma.

<value>

0	Do not commit to NV.
1	Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPASS?	current values
Test	AT$QCMIPASS=?	list of supported values
Set	AT$QCMIPASS=test,0	OK

AT$QCMIPMHSS

Description: SET MOBILE NODE (MN) HOME AGENT (HA) SHARED SECRET

Set MN-HA shared secrets for the currently active profile.

Syntax: **AT$QCMIPMHSS=<string>,<value>**

Parameters:

<string>

length of 16 characters. Double quotes are only required if the string contains a comma.

<value>

0	Do not commit to NV.
1	Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPMHSS?	current values
Test	AT$QCMIPMHSS=?	list of supported values
Set	AT$QCMIPMHSS=test,0	OK

AT$QCMIPMASSX

Description: SET MOBILE NODE (MN) AUTHENTICATION AUTHORIZATION ACCOUNTING (AAA) SHARED SECRET IN HEX

Set MN-AAA shared secrets for the currently active profile in HEX.

Syntax: **AT$QCMIPMASSX=<hex value>,<value>**

Parameters:

<hex value>

length of 16 bytes.

<value>

0	Do not commit to NV.
1	Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Example:	**Input**	**Response**
Query	AT$QCMIPMASSX?	current values
Test	AT$QCMIPMASSX=?	list of supported values
Set	AT$QCMIPMASSX=5AE6F1,0	OK

AT$QCMIPMHSSX

Description: SET MOBILE NODE (MN) HOME AGENT (HA) SHARED SECRET IN HEX

Set MN-HA shared secrets for the currently active profile in HEX.

Syntax: **AT$QCMIPMHSSX=<hex value>,<value>**

Parameters:

<hex value>

length of 16 bytes.

<value>

0	Do not commit to NV.
1	Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Response: This command will return the string **OK**.

Example:	**Input**	**Response**
Query	AT$QCMIPMHSSX?	current values
Test	AT$QCMIPMHSSX=?	list of supported values
Set	AT$QCMIPMHSSX=5EF3A1,0	OK

AT$QCMIPMASPI

Description: SET MOBILE NODE (MN) AUTHENTICATION AUTHORIZATION ACCOUNTING (AAA) SECURITY PARAMETER INDEX (SPI)

Set MN-AAA SPIs for the currently active profile.

Syntax: **AT$QCMIPMASPI=<value1>,<value2>**

Parameters:

<value1>

length of 4 bytes.

<value2>

0	Do not commit to NV.
1	Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Example:	**Input**	**Response**
Query	AT$QCMIPMASPI?	current values
Test	AT$QCMIPMASPI=?	list of supported values
Set	AT$QCMIPMASPI=1234,0	OK

AT$QCMIPMHSPI

Description: SET MOBILE NODE (MN) HOME AGENT (HA) SECURITY PARAMETER INDEX (SPI)

Set MN-HA SPIs for the currently active profile.

Syntax: **AT$QCMIPMHSPI=<value1>,<value2>**

Parameters:

<value1>

Length of 4 bytes.

<value2>

0	Do not commit to NV.
1	Commit to NV.

If the value provisioned is not committed to NV, the temporary values will be deleted at the end of the following call or if AT$QCMIPP is called.

Example:	**Input**	**Response**
Query	AT$QCMIPMHSPI?	current values
Test	AT$QCMIPMHSPI=?	list of supported values
Set	AT$QCMIPMHSPI=1234,0	OK

AT$NW

Description: This command returns Novatel Wireless company description

Syntax: **AT$NW**

Parameters: None

Example:	**Input**	**Response**
Query	AT$NW	Novatel Wireless Inc. www.novatelwireless.com Developed in the USA.

AT$NVTLLTIME

Description: This command returns the local time received from the network and time zone offset. If there is no service available then the time reported starts from 1980/01/06

Syntax: **AT$NVTLLTIME**

Parameters: None

Example:	**Input**	**Response**
Query	AT$NVTLLTIME	2005.5.18.16.39.0.2.-7 OK

AT$NVTLMDN

Description: This command returns the mobile directory number of the device.

Syntax: **AT$NVTLMDN**

Parameters: None

Example:	**Input**	**Response**
Query	AT$NVTLMDN	0000000140 OK

AT+IOTA

Description: This command is used to enable/disable/start eIOTA. (Only available on the Sprint PCS Network)

Syntax: **AT+IOTA**

Parameters:

QUERY TEST, AT+IOTA=?

This command returns the range that the command supports (0-2).

ARGUMENT, AT+IOTA=<value>

This command setup the IOTA setting.

Value:

0	-	Disable eIOTA
1	-	Enable eIOTA
2	-	Start eIOTA session

QUERY, AT+IOTA?

This command returns the current status during IOTA session.

Status format:

```
IOTA Enabled or IOTA Disabled
In Progress:  <x>          (0 = not in progress, 1 = in progress)
Repeat Test OK: <x>        (x = number of repeat test OK)
Repeat Test Failed: <x>    (x = number of repeat test failed)
Retry Command: <x>         (x = retry command in numeric)
Current State: <x>         (x = current IOTA state in numeric)
Network Up or Network Down
Server Connected or Server Disconnected
Retry: <x>                 (x = the number of retry IOTA session)
Global State: <x>
Number Get: <x>
Number Post: <x>
Proxy Trusted or Proxy Not Trusted
```

AT$NWACTIVATION

Description: This command is used to manually provision the Novatel PCMCIA card (program the MDN and MIN).

Syntax: **AT$NWACTIVATION**

Parameters:

QUERY TEST, AT$NWACTIVATION =?

This command returns the range that the following string:

$NWACTIVATION: (ACTIVATION CODE:[xxxxxx] MDN:[XXXXXXXXXX] MIN:[XXXXXXXXXX])

ARGUMENT, AT$NWACTIVATION = <SPC>, <MDN>, <MIN>

This command programs the MDN and MIN into the PCMCIA card using the correct SPC.

Value:

SPC	-	Service Programming Code (6 digits)
MDN	-	Mobile Directory Number (10 digits)
MIN	-	Mobile Identification Number (10 digits)

QUERY, AT$NWACTIVATION?

This command returns the MDN, Min1, and MIN2.

AT+PZID

Description: This command is used to retrieve the PZID of the current network. Values are only 1 and 0 being non zero or else zero. (Only available on the Sprint PCS Network)

Syntax: **AT+PZID**

Parameters:

QUERY, AT+PZID?

This command returns the current PZID of serving network.

Status format:

PZID	-	1 for non zero value of PZID
		0 for zero value of PZID

AT$SPNAI

Description: This command is used to determine if the current device supports 6 MIP profiles. (Only available on the Sprint PCS Network)

Syntax: **AT$SPNAI**

Parameters:

QUERY, AT$SPNAI?

This command returns the state if the device supports 6 MIP profiles.

Status format:

SPNAI	1 current device does support 6 MIP profiles

0 does not support 6 MIP profiles

Novatel Wireless Developer Network Library

The NWDN Library is a comprehensive reference for developers writing applications for Novatel Wireless modems. It contains software API references, modem AT command set references, and any other documentation you might need to develop solutions that use Novatel Wireless modems.

AT+COPS

Description:

Set command forces an attempt to select and register the GSM network operator. <mode> is used to select whether the selection is done automatically by the ME or is forced by this command to operator <oper> (it shall be given in format <format>). If the selected operator is not available, no other operator shall be selected (except <mode>=4). The selected operator name format shall apply to further read commands (+COPS?) also. <mode>=2 forces an attempt to deregister from the network. The selected mode affects to all further network registration (e.g. after <mode>=2, ME shall be unregistered until <mode>=0 or 1 is selected). Refer subclause 9.2 for possible <err> values. This command should be abortable when registration/deregistration attempt is made.
Read command returns the current mode and the currently selected operator. If no operator is selected, <format> and <oper> are omitted.
Test command returns a list of quadruplets, each representing an operator present in the network. Quadruplet consists of an integer indicating the availability of the operator <stat>, long and short alphanumeric format of the name of the operator, and numeric format representation of the operator. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in order: home network, networks referenced in SIM, and other networks. It is recommended (although optional) that after the operator list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the operator list by two commas.

Syntax:

Command	Response
+COPS=[<mode>[,<format>[,<oper>]]]	+CME ERROR: <err>
+COPS?	+COPS: <mode>[,<format>,<oper>[,<AcT]] +CME ERROR: <err>
+COPS=?	+COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>[,<AcT>])s] [,,(list of supported <mode>s),(list of supported <format>s)] +CME ERROR: <err>

Values:

<mode>

Value	Description
0	automatic (<oper> field is ignored)
1	manual (<oper> field shall be present)
2	deregister from network
3	set only <format> (for read command +COPS?), do not attempt

	registration/deregistration (<oper> field is ignored); this value is not applicable in read command response
4	manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered **(NOT SUPPORTED)**

<format>

Value	Description
0	long format alphanumeric <oper>
1	short format alphanumeric <oper>
2	numeric <oper> <oper>: string type; <format> indicates if the format is alphanumeric or numeric; long alphanumeric format can be up to 16 characters long and short format up to 8 characters (refer GSM MoU SE.13 [9]); numeric format is the GSM Location Area Identification number (refer GSM 04.08 [8] subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A [10], plus a two BCD digit network code, which is administration specific; returned <oper> shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 2)(network code digit 1)

<stat>

Value	Description
0	Unknown
1	Available
2	Current
3	Forbidden

<AcT>

Value	Description
0	GSM
1	GSM Compact (Not Supported)
2	UTRAN
3	Automatic

Note:

<AcT> value of 3 (automatic) is an added feature not supported by 3GPP.

Example:

AT+COPS?
AT+COPS=1,1,"T-Mobile"

AT+CSPN

Description:

Returns the current service provider name.

Syntax:

Command	Response
+CSPN?	+CSPN: <oper>
+CSPN=?	ERROR, +CME ERROR: <err>
+CSPN	ERROR, +CME ERROR: <err>

Values:

<oper>
String type; long alphanumeric format can be up to 16 characters long

Example:

AT+CSPN?

AT$NWATR

Description:

This command allows the user to read the ATR (answer-to-reset) string from the SIM. Used for AT+CSIM to determine the capabilities of the SIM. The ATR string is described in ISO/IEC 7816-3 as mentioned in ETSI 31.111.

Syntax:

Command	Response
$NWATR ?	$NWATR: <length>, <atr_string>
$NWATR =?	ERROR, +CME ERROR: <err>
$NWATR =	ERROR, +CME ERROR: <err>
$NWATR	ERROR, +CME ERROR: <err>

Values:

<length>
Length of <atr_string>.

<atr_string>
string of hex characters as described in ISO/IEC 7816-3.

Example:

AT$NWATR?

AT$NWCID

Description:

Read command returns the current serving cell ID and LAC information.

Syntax:

Command	Response
$NWCID?	$NWCID: <cell id>,<lac>
$NWCID=?	ERROR
$NWCID	ERROR

Note:

$NWCID command is only available in BUILD 38 (U530) and BUILD 10 (U630) or greater.
If the UE has not camped on a cell then the read command returns "Unknown."

Example:

AT$NWCID

AT$NWFLASH

Description:

Read command returns the memory device that is populated on the PCB.

Syntax:

Command	Response
$NWFLASH?	$NWFLASH: <id 0> <id 1> <id 2> <id 3>
$NWFLASH=?	ERROR
$NWFLASH	ERROR

Note:

$NWFLASH command is only available on U630 devices.

Example:

AT$NWFLASH?

AT$NWHLR

Description:

The HLR Lock feature, when enabled, allows service providers to limit a UE's roaming area (country and network specific) as well as prohibit unauthorized or stolen SIMs from operating within their network.

The HLR Lock feature utilizes a portion of the SIM International Mobile Subscriber Identity (IMSI) number to carry out the algorithm. The makeup of the IMSI number is composed of a 3 digit MCC value, a 2 (or 3) digit MNC value and a 9 digit MSIN value. The first three leading digits of the MSIN form the HLR-value (2 digits) and a NDC identity (1 digit).

The MCC/MNC pair, NDC identity and HLR range(s) that are programmed within the UE are secured by a service provider specified password.

Syntax:

Command	Response
$NWHLR=(0,<mcc>,<mnc>)|(1,<mode>,<parm>,[hlr rangelow>,<hlr rangehigh>,…]|(2)|(3,1,<passwd>)|(4,<type>)	$NWHLR: <mcc>,<mnc> $NWHLR: <index> <ndc> <list of hlr ranges>

	OK, ERROR, +CME ERROR: <err>
$NWHLR=?	ERROR
$NWHLR?	ERROR

Values:

<cmd>

Parameter specifies the desired command.

Value	Description
0	Write new MCC/MNC value
1	Write new OR append to OR delete an HLR entry
2	Erase all HLR entries
3	Set Password/Enable HLR feature
4	Read HLR entries

<mode>

Parameter specifies the desired write operation within the specified command.

Value	Description
0	Write a new HLR entry
1	Append to an existing HLR entry
2	Erase an existing HLR entry

<type>

Parameter specifies the desired read operation within the specified command.

Value	Description
0	Read MCC/MNC entry
1	Read existing HLR list(s)

<mcc>

Parameter specifies the mobile country code.

<mnc>

Parameter specifies the mobile network code.

<parm>

Parameter specifies a valid NDC digit or valid HLR list INDEX

<passwd>

Parameter specifies the 12 digit alphanumeric password required to lock/unlock the HLR lists. Once the password is set, the user must use the facility lock (**AT+CLCK**) to unlock the HLR codes.

<hlr range$_{low}$>

Parameter specifies the numeric low value of the acceptable HLR value. Acceptable entries range from 0 to 99 inclusive.

<hlr range$_{high}$>

Parameter specifies the numeric high value of the acceptable HLR value. Acceptable entries range from 0 to 99 inclusive.

Note:

A maximum of 4 NDC values with 15 corresponding HLR range specifications may be entered. Only one MCC/MNC pair is supported.

Example:

The HLR Lock codes can be read, set, erased and locked using the following custom AT command:

```
AT$NWHLR=<cmd>,[<item1>,<item2>,…]
```

Where <***cmd*>** is one of the following:
0 : for entry of MCC/MNC pair
1 : for entry/appending/deleting of NDC/HLR values
2 : for deletion of entire HLR entries (including MCC/MNC pair)
3 : for password entry and activation of HLR Lock
4 : for displaying HLR entries

Where <***item1>,<item2>,…*** represents action items corresponding to the requested ***<cmd***> (see below for further details)

If ***< cmd >*** = 0,
<mcc>,<mnc> is comma-delimitated MCC/MNC network identifier.
(only one entry supported with this command)

If ***< cmd >*** = 1,
<mode>,<parm>,[<hlr range$_{low}$>,<hlr range$_{high}$>…] is comma-delimitated for entry, appending or deleting HLR parameters.

If ***< mode >*** = 0,
<parm> = NDC digit (IMSI 8th digit if MNC is 2 digits in length or IMSI 9th digit if MNC is 3 digits in length)
<hlr range$_{low}$>,<hlr range$_{high}$> is comma-delimitated service provider specified ranges (valid entries are from 0 to 99). Up to 5 HLR range pairs (low/high) may be entered per <mode>=0 command.

If ***< mode >*** = 1,
<parm> = index (0,1,2,3 to an existing HLR list)
<hlr range$_{low}$>,<hlr range$_{high}$> is comma-delimitated service provider specified ranges (valid entries are from 0 to 99). Up to 5 HLR range pairs (low/high) may be entered for appending to an existing list (per command).

If ***< mode >*** = 2,
<parm> = index (0,1,2,3 to delete a single HLR list entry)

If ***< cmd >*** = 2 entire HLR entries deleted (Index 0-3 and MCC/MNC pair)

If ***< cmd >*** = 3,1, To enable & lock the HLR feature.
<passwd> = "xxxxxxxxxxx" up to 12 digits in length.

If ***< cmd >*** = 4,
<type> = 0 to display the single MCC/MNC entry.
<type> = 1 to display NDC and HLR range values.

To populate the network personalization code for the HLR Lock feature (lock to network 123 02):
AT$NWHLR=0,123,02
To populate a new NDC value of 7 and the following HLR ranges; 10-15, 20-22, 34-38, and 67-70:
AT$NWHLR=1,0,7,10,15,20,22,34,38,67,70

AT$NWICCID

Description:

Read command returns the SIM ICC ID.

Syntax:

Command	Response
$NWICCID?	$NWICCID: <iccid>
$NWICCID=?	ERROR
$NWICCID	ERROR

Note:

$NWICCID command is only available on HSDPA devices.

Example:

AT$NWICCID?

AT$NWNPC

Description:

This command allows the user to read, set, and erase the network personalization codes. The network personalization codes are stored on each card. The purpose is to allow the card to function only if the MNC/MCC list on the SIM matches the list stored on the card.

Syntax:

Command	Response
$NWNPC?	ERROR, +CME ERROR: <err>
$NWNPC=?	$NWNPC: (list of supported <mode>s)
$NWNPC=0|(1,<mcc>, <mnc>)|(2, <index>)|(3, <passwd>)	$NWNPC: <mcc>,<mnc>
$NWNPC	ERROR, +CME ERROR: <err>

Values:

<mode>
Parameter specifies valid <mode>s.

Value	Description
0	Read current NPC list
1	Write new NPC entry
2	Erase NPC entry
3	Set password

<mcc>
Parameter specifies the mobile country code.

<mnc>
Parameter specifies the mobile network code.

<index>
Parameter specifies a valid NPC index number.

<passwd>
Parameter specifies the 12 digit alphanumeric password required to unlock the network personalization code. Once the password is set, the user must use the facility lock (AT+CLCK) to unlock the network personalization codes.

Note:

A maximum of 30 NPC entries are allowed to be entered. This command is only enabled in TEST state.

Example:

AT$NWNPC=0

See Also:

AT+CLCK

AT$NWPDN

Description:

This command performs an orderly shutdown of the modem saving the current MRU settings.

Syntax:

Command	Response
$NWPDN	OK

Note:

$NWPDN Command only available in Build 34 or greater.
Once the $NWPDN is issued, the OK response is returned upon completion of the command. Upon completion of the command, the card must then be power cycled before it is operational again. It is expected that $NWPDN be the last command issued by a modem manager before it removes power from the device.

Example:

AT$NWPDN

AT$NWPINR

Description:

This command allows the user to read the number of incorrect PIN entries remaining on the SIM before PUK lock is enabled.

Syntax:

Command	Response
$NWPINR?	$NWPINR: <num_of_retries>
$NWPINR=?	ERROR, +CME ERROR: <err>
$NWPINR=	ERROR, +CME ERROR: <err>
$NWPINR	ERROR, +CME ERROR: <err>

Values:

None.

Note:

This command should be used after AT+CPIN? To verify that the SIM PIN is requested. If the SIM is already unlocked and SIM PIN entry is not necessary then the command does not return a valid number of retries.

Example:

AT$NWPINR?

AT$NWRAT

Description:

Set command controls the preferred Radio Access Technology to be used by the modem. Read command returns the preferred and current Radio Access Technology being employed by the modem.

Syntax:

Command	Response
$NWRAT?	$NWRAT: <mode>,<domain>,<state>
$NWRAT=?	$NWRAT: (list of supported <mode>s, list of supported <domain>s)
$NWRAT=<mode>,<domain>	OK, ERROR, +CME ERROR: <err>

Values:

<mode>

Value	Description
0	Automatic
1	GSM Only
2	WCDMA Only

<domain>

Value	Description
0	CS Only (Circuit Switched)
1	PS Only (Packet Swicthed)

2	CS+PS

<state>

Value	Description
0	Searching
1	WCDMA CS
2	WCDMA PS
3	WCDMA CS+PS
4	GSM CS
5	GSM PS
6	GSM CS+PS

Note:

$NWRAT Command only available in Build 20 or greater.
When switching the service domain within a specific mode (RAT) the modem would not change its service domain unless it lost coverage or changed modes. For example, if the modem is GSM PS and the following command is issued AT$NWRAT=1,0 to change to GSM CS, the change will not occur until loss of coverage or change of RAT.

Example:

AT$NWRAT=2,2

Additional AT Commands

This section provides the additional details of the ETSI AT command set implementation for capable mobile equipment. This implements a minimally featured data-capable WCDMA and GSM ASIC that performs the needed circuit-switched and packet-switched (PDP type PPP and GPRS) service.

A series of tables lists these commands, with the first table describing the type of information provided in each column. Unless specifically noted in the command description, all commands listed in the following tables are rejected by the command processor when the SIM is absent or when SIM PIN validation is pending.

Each of the following sections discusses an individual AT command in the subsections below:

Description:	Describes the command. Defines any conditions required to use the command
Syntax:	Lists the syntax the command requires
Parameters:	Lists any parameters and value ranges for the command
Implementation:	Explains whether QUALCOMM has implemented the command

ATH

Description:	Hook control command to terminate call in progress. Does not terminate voice calls.
Syntax:	ATH<value>
Parameters:	<value>

	Values per Spec ITU-T V.25ter
Implementation:	Fully. Online command mode only supported for Async data

ATI

Description:	Request identification information
	This extended-format compound parameter is used to control t he operation of local flow control between the DTE and DCE.
Syntax:	ATI
Parameters:	No value accepted
Implementation:	Fully. Unit outputs: manufacturer, model number, mobile software revision, boot block version, release date, release time, IMEI, complete capabilities list

ATL

Description:	Monitor speaker loudness
Syntax:	ATL<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Command accepted, no action taken. Mobile audio stream not used for Async data

ATO

Description:	Return to online data state from online command state
Syntax:	ATO<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Fully. Online command mode only supported for Async data

ATP

Description:	Select pulse dialing
Syntax:	ATP
Parameters:	
Implementation:	Command accepted, performs normal dial. Pulse dialing not relevant to ETSI data services. ‘P’ not sent in dial string.

ATQ

Description:	Result code suppression
Syntax:	ATQ[<value>]

Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Fully

ATS0

Description:	Enable/disable automatic answering
Syntax:	ATS0=<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Fully.

ATS3

Description:	Command line termination character
Syntax:	ATS3
Parameters:	Values per Spec ITU-T V.25ter
Implementation:	Fully

ATS4

Description:	Response formatting character
Syntax:	ATS4
Parameters:	Values per Spec ITU-T V.25ter
Implementation:	Fully

ATS5

Description:	Command line editing character
Syntax:	ATS5
Parameters:	Values per Spec ITU-T V.25ter
Implementation:	Fully

ATS6

Description:	Pause before blind dialing
Syntax:	ATS6=<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Command accepted, no effect on data call. Not applicable to wireless call.

ATS7

Description:	Number of seconds to establish end-to-end data connection
Syntax:	ATS7=<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Command accepted, no effect on data call. Async data command.

ATS8

Description:	Number of seconds to pause when “.” is encountered in dial string
Syntax:	ATS8=<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Command accepted, no effect on data call. Async data command.

ATS10

Description:	Number of tenths of a second from carrier loss to disconnect
Syntax:	ATS10=<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Command accepted, no effect on data call. Async data command.

ATT

Description:	Select tone dialing
Syntax:	ATT
Parameters:	
Implementation:	Command accepted, performs normal dial. Tone dialing not relevant to ETSI data services. ‘T’ not sent in data string.

ATX

Description:	Result code selection and call progress monitoring control
Syntax:	ATX[<value>]
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Command accepted, no action taken

AT&F

Description:	Set to Factory defined configuration (effect is implementation-dependent)
Syntax:	AT&F<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Fully. Same behaviour as ATZ except it changes baud rate to default value.

AT+CBC

Description:	Report battery charge
Syntax:	AT+CBC
Parameters:	
Implementation:	Fully.

AT+CBST

Description: Selects the circuit-switched bearer service with data rate and connection element when data calls are originated

Syntax: AT+CBST=<speed>,<name>,<ce>

Parameters: <name>

0,	data circuit asynchronous
1,	data circuit synchronous
4,	data circuit asynchronous (RDI)

<speed> (in bps)

0,	autobaud
7,	9600 (V.32)
12,	9600 (V.34)
14,	14400 (V.34)
16,	28800 (V.34)
17,	33600 (V.120)
39,	9600 (v.120)
43,	14400 (v.120)
48,	28800 (v.120)
51,	48000 (v.120)
71,	9600 (v.110)
75,	14400 (v.120)
80,	28800 (v.110)
81,	38400 (v.110)
83,	56000 (x.31 flag stuffing, UDI/RDI)
84,	64000 (x.31 flag stuffing, UDI)
116,	64000
134,	64000 (multimedia)

<ce>

0,	data transparent
1,	data nontransparent

	* setting can be used in conjunction with asynchronous non-transparent UDI/RDI service in order to get Frame Tunneling mode.
Implementation:	Fully. In WCDMA mode only, data circuit synchronous UDI service is supported

AT+CCFC

Description:	Controls call forwarding supplementary service
Syntax:	AT+CCFC=<reason>, <mode>, <number>, <type>, <class>, <subaddr>, <satype>, <time>
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CCUG

Description:	Controls closed user group supplementary service
Syntax:	AT+CCUG=<n>, <index>, <info>
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CCWA

Description:	Control of Call Waiting Supplementary Services
Syntax:	AT+CCWA=[<n>[,<mod>[,<class>]]]
Parameters:	Command input.
	Unsolicited result code <class>: only 1 or 2 reported.
	Unsolicited result code optional <alpha> and <CLI validity> not supported
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CFUN

Description:	Sets the level of functionality in the ME
Syntax:	AT+CFUN=[<fun>[,<rst>]]
Parameters:	<fun>: 0, 1
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CGACT

Description:	Activate or deactivate the specified PDP context(s)

Syntax:	AT+CGACT
Parameters:	<cid>: 1 to 16
	Values per Spec 3GPP TS 27.007
Implementation:	Fully

AT+CGATT

Description:	Attach or detach from the Packet Domain Service
Syntax:	AT+CGATT
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully

AT+CGCLASS

Description:	Set the GPRS mobile class
Syntax:	AT+CGCLASS
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Command accepted, no actions taken

AT+CGDCONT

Description:	Set PDP context parameter values for a PDP context identified by connection identifier
Syntax:	AT+CGTDCONT=<cid>,<PDP_Type>,<APN>,<PDP_addr>,<d_comp>, <h_comp>
Parameters:	<cid>: 1 to 16
	<PDP_type>: IP, PDP-IP, PPP, PDP-PPP
	<d_comp>: 0, 1
	<h_comp>: 0, 1
	Values per Spec 3GPP TS 27.007
Implementation:	Fully. See $QCPDPP command for connection authentication parameters.

AT+CGDSCO

Description:	Define Secondary PDP Context
Syntax:	AT+CGDSCO=[<cid>,<p_cid>[,<d_comp>[,<h_comp>]]]
Parameters:	<cid>: 1 to 16
	<p_cid>: 1 to 16
	<d_comp>: 0, 1
	<h_comp>: 0, 1

	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CGEQMIN

Description:	Set the minimum acceptable UMTS QoS Profile against the negotiated profile in Activate PDP Context Request message
Syntax:	AT+CGEQMIN=<cid>, <Traffic_class>, <maximum_bitrate_UL>, <maximum_bitrate_DL>, <Guranteed_bitrate_UL>, <Guaranteed_bitrate_DL>, <Delivery_order>, <Maximum_SDU_size>, <SDU_error_ratio>, <Residual_bit_error_ratio>, <Delivery_of_erroneous_SDUs>, <Transfer_delay>, <Traffic_handling_priority>
Parameters:	<cid>: 1 to 16
	<Traffic_class>: 0 to 16
	<maximum_bitrate_UL>: 0 to 384
	<maximum_bitrate_DL>: 0 to 384
	<Guranteed_bitrate_UL>: 0 to 384
	<Guaranteed_bitrate_DL>: 0 to 384
	<Delivery_order>: 0 to 2
	<Maximum_SDU_size>: 0 to 1520
	<SDU_error_ratio>: 0E0, 1E1, 1E2, 7E3, 1E3, 1E4, 1E5, 1E6
	<Residual_bit_error_ratio>: 0E0, 5E2, 1E2, 5E3, 4E3, 1E3, 1E4, 1E5, 1E6, 6E8
	<Delivery_of_erroneous_SDUs>: 0 to 3
	<Transfer_delay>: 0, 100 to 4000
	<Traffic_handling_priority>: 0 to 3
	Set values are saved across power cycles
	Values per Spec 3GPP TS 27.007
Implementation:	Fully. Setting these parameters will reset +CGQMIN and +CGQREQ to defaults.

AT+CGEQREQ

Description:	Set the UMTS QoS Profile that is used in Activate PDP Context Request message
Syntax:	AT+CGEQREQ=<cid>, <Traffic_class>, <maximum_bitrate_UL>, <maximum_bitrate_DL>, <Guranteed_bitrate_UL>, <Guaranteed_bitrate_DL>, <Delivery_order>, <Maximum_SDU_size>, <SDU_error_ratio>, <Residual_bit_error_ratio>, <Delivery_of_erroneous_SDUs>, <Transfer_delay>, <Traffic_handling_priority>

Parameters:	<cid>: 1 to 16
	<Traffic_class>: 0 to 16
	<maximum_bitrate_UL>: 0 to 384
	<maximum_bitrate_DL>: 0 to 384
	<Guranteed_bitrate_UL>: 0 to 384
	<Guaranteed_bitrate_DL>: 0 to 384
	<Delivery_order>: 0 to 2
	<Maximum_SDU_size>: 0 to 1520
	<SDU_error_ratio>: 0E0, 1E1, 1E2, 7E3, 1E3, 1E4, 1E5, 1E6
	<Residual_bit_error_ratio>: 0E0, 5E2, 1E2, 5E3, 4E3, 1E3, 1E4, 1E5, 1E6, 6E8
	<Delivery_of_erroneous_SDUs>: 0 to 3
	<Transfer_delay>: 0, 100 to 4000
	<Traffic_handling_priority>: 0 to 3
	Set values are saved across power cycles
	Values per Spec 3GPP TS 27.007
Implementation:	Fully. Setting these parameters will reset +CGQMIN and +CGQREQ to defaults.

AT+CGEREP

Description:	Control sending of unsolicited result codes
Syntax:	AT+CGSMS
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Command accepted, no action taken

AT+CGMI

Description:	Request manufacturer identification
	Command processed regardless of SIM state.
Syntax:	AT+CGMI
Parameters:	
Implementation:	Fully. Init outputs “QUALCOMM INCORPORATED>”

AT+CGMM

Description:	Request model identification.
	Command processed regardless of SIM state
Syntax:	AT+CGMM

Parameters:	
Implementation:	Fully. Unit outputs: model number

AT+CGMR

Description:	Request revision identification. Command processed regardless of SIM state
Syntax:	AT+CGMR
Parameters:	
Implementation:	Fully. Unit outputs: mobile software, revision, boot block version, release date, release time.

AT+CGQMIN

Description:	Set minimum acceptable profile against the negotiated profile in Activate PDP Context Accept message
Syntax:	AT+CGQMIN=<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>
Parameters:	<cid>: 1 to 16
	<precedence>: 1 to 3
	<delay>: 1 to 4
	<reliability>: 1 to 5
	<peak>: 1 to 4
	<mean>: 1 to 18, 31
	Set values are saved across power cycles
	Values per Spec 3GPP TS 27.007
Implementation:	Fully. Setting these parameters will reset +CGEQREQ and +CGEQMIN to defaults.

AT+CGQREQ

Description:	Set the QoS Profile that is used in Activate PDP Context Request Message
Syntax:	AT+CGQREQ=<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>
Parameters:	<cid>: 1 to 16
	<precedence>: 1 to 3
	<delay>: 1 to 4
	<reliability>: 1 to 5
	<peak>: 1 to 4
	<mean>: 1 to 18, 31
	Set values are saved across power cycles
	Values per Spec 3GPP TS 27.007

Implementation:	Fully. Setting these parameters will reset +CGEQREQ and +CGEQMIN to defaults.

AT+CGREG

Description:	Presentation of unsolicited GPRS network registration status
Syntax:	AT+CGREG=[<n>]
Parameters:	<n>: 0, 1
	<stat>: 0 to 5
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CGSMS

Description:	Service Preference that will be used to send mobile-originated SMS messages.
Syntax:	AT+CGSMS
Parameters:	Parameter values supported:
	2 – packet domain preferred
	3 – circuit-switched preferred
Implementation:	Fully

AT+CGSN

Description:	Request product serial number identification. Command processed regardless of SIM
Syntax:	AT+CGSN
Parameters:	
Implementation:	Fully. Unit outputs: IMEI

AT+CGTFT

Description:	Traffic Flow Template
Syntax:	AT+CGTFT=[<cid>'[<packet filter identifier>,<evaluation precedence index> [,<source address and subnet mask> [,<protocol number(ipv4)/next header(ipv6)> [,<destination port range> [,<source port range> [,<ipsec security parameter index(spi)> [,<type of service(tos)(ipv4) and mask / traffic class(ipv6) and mask> [,<flow label(ipv6)>]]]]]]]]
Parameters:	<cid>: 1 to 16
	<packet filter identifier>: 1, 2
	<evaluation precedence index>: 0 to 255
	<source address and subnet mask>: "0.0.0.0.0.0.0.0" –

	“255.255.255.255.255.255.255.255”
	<protocol number(ipv4)/next header(ipv6)>: 0 to 255
	<destination port range>: “0.0” – 65535.65535”
	<source port range>: “0.0” – 65535.65535”
	<ipsec security parameter index(spi)>: “0” – “FFFFFFFF”
	<type of service(tos)(ipv4) and mask / traffic class(ipv6) and mask>: “0.0” – “255.255”
	<flow label(ipv6)>: “0” – “FFFFF”
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CHLD

Description:	Call related supplementary services
Syntax:	AT+CHLD=[<n>]
Parameters:	<n>: (0, 1, 1x, 2, 2x, 3, 4)
Implementation:	Fully.

AT+CHSN

Description:	HSCSD nontransparent call configuration
Syntax:	AT+CHSN
Parameters:	<wAiur> (in bps)
	0 – TA shall calculate a proper value from currently selected network user rate (,speed> subparameter from +CBST command)
	2 – 14400
	4 – 28800
	7 -- 57600
	<wRx>
	0 – TA shall calculate a proper value from currently selected <wAiur> and <codings>
	<topRx>
	0 – TA shall calculate a proper value from currently selected <wAiru> and <codings>
	<codings>
	0 – all supported codings are accepted
Implementation:	Fully.

AT+CHUP

Description:	Hang up voice call
Syntax:	AT+CHUP
Parameters:	
Implementation:	Fully.

AT+CIMI

Description:	Request International Mobile Subscriber Identity
Syntax:	AT+CIMI
Parameters:	
Implementation:	Fully. Unit outputs International Mobile Subscriber Identity.

AT+CLCK

Description:	Lock, unlock, or interrogate an ME or a network facility. Command is abortable.
Syntax:	AT+CLCK=<fac>, <mode>, <passwd>, <class>
Parameters:	<fac>: AB, AC, AG, AI, AO, IR, OI, OX, SC
	<mode>: 0 to 2
	<class>: 1 to 255
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CMEE

Description:	Report mobile equipment error
Syntax:	AT+CPBS=<n>
Parameters:	Power on value of 2 for <n>
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CMGC

Description:	Send command
Syntax:	AT+CMGC
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMGD

Description:	Delete message
Syntax:	AT+CMGD=<index>, <deflag>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMGF

Description:	Message format
Syntax:	AT+CMGF=<mode>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMGL

Description:	List message
Syntax:	AT+CMGL=<stat>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMGR

Description:	Read message
Syntax:	AT+CMGR=<index>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMGS

Description:	Send message
Syntax:	AT+CMGS=<da>, <toda>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMGW

Description:	Write message to memory
Syntax:	AT+CMGW=<oa/da>, <tooa/toda>, <stat>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CMMS

Description:	More Messages to Send
Syntax:	AT+CMMS=[<n>]
Parameters:	<n>:
	0 -- disable
	1 – enable until inter-message time expires
	2 -- enable
Implementation:	Fully.

AT+CMOD

Description:	Select Call mode
Syntax:	AT+CR=<mode>
Parameters:	<mode>
	0 – single mode
Implementation:	Fully.

AT+CMSS

Description:	Send message from storage
Syntax:	AT+CMSS=<index>, <da>, <toda>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CNMA

Description:	Acknowledge new message
Syntax:	AT+CNMA
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CNMI

Description:	New message indications to TE
Syntax:	AT+CNMI=<mode>, <mt>, <bm>, <ds>, <bfr>
Parameters:	<mode>: 0 to 2
	<mt>: 0 to 3
	<bm>: 0, 2
	<ds>: 0, 2

	<bfr>: 0, 1
	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CPAS

Description:	Report phone activity. Only states ready, ringing and call in progress are reported. Command processed when ME in limited service state.
Syntax:	AT+CPAS
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CPBF

Description:	Find phonebook entries
Syntax:	AT+CPBF=<find text>
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CPBR

Description:	Read phonebook entries
Syntax:	AT+CPBS=<index1>, <index2>
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CPBS

Description:	Select phonebook memory storage
Syntax:	AT+CPBS=<storage>, <password>
Parameters:	<storage>: “SM”, “LD”
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CPBW

Description:	Write phonebook entry
Syntax:	AT+CPBW=<index>,<number>,<type>,<text>
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CPIN

Description:	Enter PIN. Only SIM PIN/PUK and PIN2/PUK2 supported. Command processed when ME in limited service state
Syntax:	AT+CPIN=<pin>,<newpin>
Parameters:	
Implementation:	Fully.

AT+CPMS

Description:	Preferred message storage
Syntax:	AT+CPMS=<mem1>,<mem2>,<mem3>
Parameters:	<mem1>: SM, ME. MT, SR
	<mem2>: ME, MT, SM, SR
	<mem3>: ME, MT, SM, SR
	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CPWD

Description:	Set new password for a facility lock function
Syntax:	AT+CPWD=<fac>, <oldpwd>, <newpwd>
Parameters:	<fac>: AB, AC, AG, AI, AO, IR, OI, OX, P2, SC
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CR

Description:	Service reporting control
Syntax:	AT+CR=<mode>
Parameters:	<mode>
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CRC

Description:	Cellular result codes
Syntax:	AT+CRC=<mode>
Parameters:	<mode>
	Values per Spec 3GPP TS 27.007

Implementation:	Fully.

AT+CREG

Description:	Presentation of unsolicitated network registration status
Syntax:	AT+CREG=[<n>]
Parameters:	<n>: 0, 1
	<stat>: 0 to 5
	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+CRLP

Description:	Alters the RLP parameters used when nontransparent circuit-switched data calls are originated.
Syntax:	AT+CRLP=<iws>,<mws>, <T1>, <N2>
Parameters:	<iws>
	0 to 61 frames, for Version 0 and 1
	0 to 488 frames, for Version 2
	<mws>
	0 to 61 frames, for Version 0 and 1
	0 to 488 frames, for Version 2
	<TI>
	38 to 255x10ms, for Version 0 and 1
	42 to 255x10ms, for Version 2
	<N2>
	1 to 255 retransmits
Implementation:	Fully. RLP versions 0, 1, and 2 are supported. GSM only.

AT+CSCA

Description:	Service center address
Syntax:	AT+CSCA=<sca>, <tosca>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CSCB

Description:	Selects which types of CBM's are to be received by the ME
Syntax:	AT+CSCB=[<mode>[,<mds>[,<dcs>]]]

Parameters:	
Implementation:	Fully.

AT+CSCS

Description:	Select TE character set
Syntax:	AT+CSCS=<chset>
Parameters:	<chset>: IRA, GSM, UCS2
Implementation:	Fully

AT+CSDH

Description:	Show text mode parameters
Syntax:	AT+CSDH=<show>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CSIM

Description:	Generic SIM access
Syntax:	AT+CSIM=<length>,<command>
Parameters:	<length>: 10 to 520
Implementation:	Implemented without SIM Application Toolkit support

AT+CSMP

Description:	Set text mode parameters. GSM 7-bit, 8-bit and UCS2 data coding schemes supported
Syntax:	AT+CSMP=<fo>, <vp>, <pid>, <dcs>
Parameters:	Values per Spec 3G TS 27.005
Implementation:	Fully.

AT+CSMS

Description:	Select message service
Syntax:	AT+CSMS=<service>
Parameters:	<service>: 0, 1
	<bm>: not supported
	Values per Spec 3G TS 27.005
Implementation:	Fully. CBS commands not supported

AT+CSTA

Description:	Select type of address
Syntax:	AT+CSTA=<type>
Parameters:	<type>: 129, 145
Implementation:	Fully.

AT+CUSD

Description:	Controls unstructured supplementary service data
Syntax:	AT+CUSD=<n>, <str>, <dcs>
Parameters:	Values per Spec 3GPP TS 27.007
Implementation:	Fully.

AT+DR

Description:	Report use of V.42bis using intermediate result code before going to online data state after call answer of origination
Syntax:	AT+DR=<value>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Fully

AT+DS

Description:	Controls V.42bis data compression
Syntax:	AT+DS=<dir>,<neg>,<P1>,<P2>
Parameters:	<dir>: 1 to 3
	<neg>: 0
	<P1>: 512 to 2048
	<P2>: 6
	Values per Spec ITU-T V.25ter
Implementation:	Fully

AT+ES

Description:	Enables the Synchronous Mode
Syntax:	AT+ES=<orig_rqst>, <orig_fbk>, <ans_fbk>
Parameters:	<orig_rqst>: 6
	<orig_fbk>: undefined

	<ans_fbk>: 1
	Values per Spec ITU-T V.80ter
Implementation:	Fully.

AT+ESA

Description:	Preferred message storage
Syntax:	AT+ESA=<trans_idle>, <framed_idle>, <framed_un_ov>, <hd_auto>, <crc_type>, <nrzi_en>, <sync1>, <sync2>
Parameters:	<trans_idle>: 0
	<framed_idle>: undefined
	<framed_un_ov>: undefined
	<hd_auto>: undefined
	<crc_type>: undefined
	<nrzi_en>: 0
	<sync1>: 0
	<sync2>: 0 to 255
	Values per Spec ITU-T V.80ter
Implementation:	Fully.

AT+FAR

Description:	Adaptive Rate Control. Disable the DCE’s ability to adaptively detect the selected message carrier or V.21 control message and to adjust +FRM processing accordingly.
Syntax:	AT+FAR=<value>
Parameters:	<value>: 0
Implementation:	Fully. GSM only

AT+FCL

Description:	Carrier Loss Timeout. Set the duration (<time>*100 ms) used by DEC to terminate the session if no activity is detected on the carrier, i.e. the OTA interface.
Syntax:	AT+FCL=<time>
Parameters:	<time>: 0 to 255
Implementation:	Fully. GSM only

AT+FDD

Description:	Double Escape Character. Control the DCE how to use <DLE> <SUB> pair to

	encode consecutive <1/0> <1/0> in data
Syntax:	AT+FDD=<value>
Parameters:	<value>: 0, 1
Implementation:	Fully. GSM only

AT+FIT

Description:	DTE Inactivity Timeout. Set the duration (in second) used by the DCE to terminate the session if the DTE fails to respond.
Syntax:	AT+FIT=<time>, <action>
Parameters:	<time>: 0 to 255
	<action>:
	0, 1. note: 0 and 1 are treated the same, i.e. terminate the T.31 session.
Implementation:	Fully. GSM only.

AT+FRH

Description:	Receive HDLC. Directs the DCE to receive T.30 HDLC data using the specified modulation rate (mod*100bps). Command is abortable.
Syntax:	AT+FTM=<mod>
Parameters:	<mod>: 3
Implementation:	Fully. GSM only

AT+FRM

Description:	Receive Message. Directs the DCE to receive T.30 facsimile message data using the specified modulation rate (mod*100bps). Command is abortable.
Syntax:	AT+FRM=<mod>
Parameters:	<mod>: 72, 73, 74, 96, 97, 98
Implementation:	Fully. GSM only

AT+FRS

Description:	Receive Silence. Directs the DCE to listen for silence from the remote end and report back OK when silence has been detected for the specified amount of time (in 10 ms increments). Command is abortable.
Syntax:	AT+FRS=<time>
Parameters:	<time>: 0 to 255
Implementation:	Fully. GSM only

AT+FTH

Description:	Transmit HDLC. Directs the DCE to transmit T.30 HDLC data using the specified modulation rate (mod*100bps).
Syntax:	AT+FTH=<mod>
Parameters:	<mod>: 3
Implementation:	Fully. GSM only

AT+FTM

Description:	Transmit Message. Directs the DCE to transmit T.30 facsimile message data using the specified modulation rate (mod*100bps)
Syntax:	AT+FTM=<mod>
Parameters:	<mod>: 72, 73, 74, 96, 97, 98
Implementation:	Fully. GSM only

AT+FTS

Description:	Transmit Silence. Directs the DCE to stop transmitting for the specified amount of time (in 10 ms increments)
Syntax:	AT+FTS=<time>
Parameters:	<time>: 0 to 255
Implementation:	Fully. GSM only

AT+ICF

Description:	DTE-DCE character framing
	This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing that the DCE shall use while accepting the DTE commands and while transmitting information text and result codes to the DTE.
Syntax:	AT+ICF=<format>,<parity>
Parameters:	<format>: 3 8 data 1 stop
	<parity>
	Values per Spec ITU-T V.25ter
Implementation:	Fully, QUALCOMM Rm interface fixed at 8 data bits, no parity, 1 stop bit. Error returned by any other parameters.

AT+IFC

Description:	DTE-DCE local flow control.
	This extended-format compound parameter is used to control t he operation

	of local flow control between the DTE and DCE.
Syntax:	AT+IFC=<DCE by DTE>,<DTE by DCE>
Parameters:	<value>
	Values per Spec ITU-T V.25ter
Implementation:	Fully. Hardware and software flow control supported by Async service.

AT+IPR

Description:	Fixed DTE rate.
	This numeric extended-format parameter specifies the data rate at which the DCE will accept commands. Auto baud rate detection is not supported.
Syntax:	AT+IPR= <rate>
Parameters:	<rate>:
	300, 600,1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400
Implementation:	Fully.
	Default DTE rate fixed at 115200 pbs. Default DTE rate can be changed by $QCTER command.

CME ERROR Codes for CDMA Commands

Final result code **+CME ERROR: <err>** indicates an error related to mobile equipment or network, and that the command and any following commands were not executed. As no commands were executed, no result should be expected.

Table below lists and defines <err> values used by common messaging commands.

Table 28: CME Error Codes

Code of <err>	Definition
0	phone failure
1	no connection to phone
2	phone-adapter link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure

14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network time out
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
100	Unknown
101...255	Reserved

CMS Error Codes for CDMA Commands

Final result code **+CMS ERROR: <err>** indicates an error related to mobile equipment or network. The operation is similar to ERROR result code in that none of the commands in the same command line are executed. Neither **ERROR** nor **OK** result code shall be returned.

Table below lists and defines <err> values used by common messaging commands.

Table 29: CMS Error Codes

Code of <err>	Definition
0...127	GSM 04.11 Annex E-2 values, see CME ERROR codes related GSM 07.07
128...255	GSM 03.40 sub clause 9.2.3.22 values
300	ME failure
301	SMS service of ME reserved

302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy SIM wrong
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network time-out
340	no +CNMA acknowledgment expected
500	unknown error
...511	other values in range 256...511 are reserved
512...	manufacturer specific
513	Unread SM on SIM

Regulatory Approval Requirements

As both the EU730 and EU740 support four bands of GPRS operation, including North American and European bands both products are covered by regulatory requirements of North America and Europe. Both products will have FCC, PTCRB, CE and GCF certification.

The EV640, as a CDMA product in North America requires FCC certification.

FCC (Federal Communication Commission)

The EV620 and EU730/740 products conform to the requirements applicable North American laws with respect to safety; health, environment and consumer protection.

This EV620 and EU730/740 will comply, per applicable band, with the following parts of the Federal Communication Commission's (FCC) Code of Federal Regulations (CFR):

- FCC CFR47 Part 2 (General Rules and Regulations, RF Exposure Evaluation)
- FCC CFR47 Part 15 (All Radio Frequency Devices)
- FCC CFR47 Part 24 (Narrow and wideband PCS modules)
- FCC CFR47 Part 22 (Cellular Service)

A FCC grant shall be obtained in order to demonstrate compliance.

GCF (Global Certification Forum)

The product will be tested to and meet the GCF CC (Certification Criteria) requirements in order to comply with Regional Regulatory Requirements. Novatel will provide a full GCF declaration for the EU730 and EU740 including GCF-AP Annex C, D, E and F based on GCF-CC Version TBD. GCF version compliance TBD. This will be updated once the schedule is finalized.

PTCRB (PCS Type Certification Review Board)

The EU730 and EU740 products will be tested for compliance to PTCRB.

CE (Conformance European)

The EU730 and EU740 products complies with the essential requirements of the applicable European laws and directives with respect to safety; health, environment and consumer protection. The products conform to the essential requirements of the R&TTE (Radio and Telecommunications Terminal Equipment) Directive, 1999/5/EC, and have the CE mark affixed. The applicable sections of the following standards have been used to demonstrate compliance to this requirement. The EU730 and EU740 products will comply with the 3GPP standards TS 51.010 for GSM and TS 34.121 for WCDMA.

Table 30: R&TTE

R&TTE Requirement	**Discipline**	**Definition**	**Applied Standard**
Article 3.1(a)	Health	Safety Testing (flammability, etc…)	ICNIRP 1998[3] European Council Rec.1999/519 EC
Article 3.1(a)	Safety		IEC 60950-1[4]
Article 3.1(b)	EMC	EMC testing (unintentional radiators, etc.…)	EN 301 489-01[5]
			EN 301 489-07[6]
			EN 301 489-24[7]
Article 3.2	Spectrum	Network Testing (power, frequency stability, etc…)	EN 301 511[8]
			EN 301 908-1[9]
			EN 301 908-2[10]

The EU730 and EU740 products will comply with the applicable GSM/GPRS European Regional Regulatory Requirements as per the following table.

[3] International Commission on Non-Ionizing Radiation Protection
[4] Safety of Information Technology Equipment
[5]Electromagnetic compatibility and Radio Spectrum Matters (ERM) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services
Part 1: Common Technical requirements
[6]Electromagnetic compatibility and Radio Spectrum Matters (ERM) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services
Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)
[7] Electromagnetic compatibility and Radio Spectrum Matters (ERM) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services
Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (URTA) for Mobile and portable radio and ancillary equipment.
[8]Global System for Mobile communications (GSM):
Harmonized EN for mobile stations in the GSM 900 and GSM1800 bands covering essential requirements under article 3.2 of the R&TTE directive
[9]Electromagnetic compatibility and Radio Spectrum Matters (ERM) Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks.
[10] Electromagnetic compatibility and Radio Spectrum Matters (ERM) Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks.
Part 2: Harmonized EN for IMT-2000,
CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive

Table 31: GSM/GPRS European Regulations

GSM 11.10 / TS 51.010 Requirement	Description	EU / R&TTE Directive
12.1.1	Conducted spurious emissions - MS allocated a channel	Yes
12.1.2	Conducted spurious emissions - MS in idle mode	Yes
12.2.1	Radiated spurious emissions - MS allocated a channel	Yes
12.2.2	Radiated spurious emissions - MS in idle mode	Yes
13.1	Transmitter – Frequency error and phase error	Yes
13.2	Transmitter – Frequency error under multipath and interference conditions	Yes
13.3-1	Transmitter output power and burst timing - MS with permanent antenna connector	Yes
13.4	Transmitter - Output RF spectrum	Yes
13.6	Transmitter – Frequency error and phase error in HSCSD multislot configuration	Yes
13.7	Transmitter output power and burst timing in HSCSD configurations	Yes
13.8	Transmitter, Output RF spectrum in HSCSD multislot configuration	Yes
13.16.1	Frequency error and phase error in GPRS multislot configuration	Yes
13.16.2	Transmitter output power in GPRS multislot configuration	Yes
13.16.3	Output RF spectrum in GPRS multislot configuration	Yes
13.17.1	Frequency error and Modulation accuracy in EGPRS Configuration	Yes
13.17.2	Frequency error under multipath and interference conditions in EGPRS Configuration	Yes
13.17.3-1	EGPRS Transmitter output power- MS with permanent antenna connector	Yes
13.17.4	Output RF spectrum in EGPRS Configuration	Yes
14.7.1	Blocking and spurious response - speech channels	Yes
14.18.5	Blocking and spurious response in EGPRS Configuration	Yes

IOT

IOT provisioning should be completed in close cooperation with the customer.

This device when incorporated in any other product may require FCC and/or other approvals. It is the user's responsibility to do this.

Compliance Certification Process

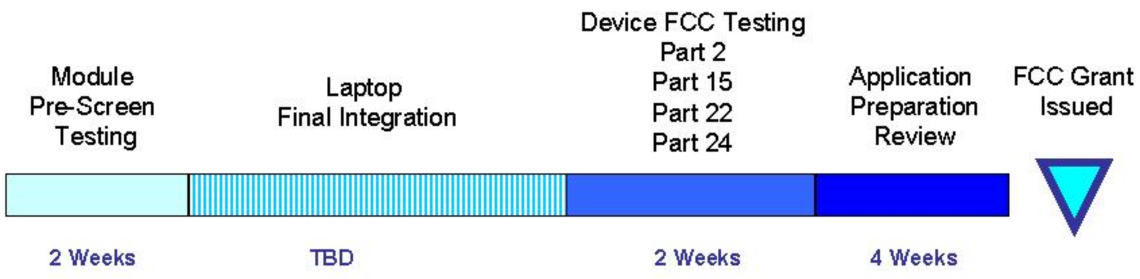
The 1-2 months Average: The average approval time for a typical carrier approval is 1-2 months, although some carriers can take up to 5 months to finish the approval.

Cost for each certification: To be fully CE/GCF certified for EU (or FCC/PTCRB for NA) can cost as much as $400k (US). Because these certifications are not mutually exclusive, certification for both EU and NA costs approximately $500k.

Drastic changes (e.g., new chipset, new antenna, major firmware revision, etc…) would probably necessitate a large degree of regression testing or re-certification. However, other minor changes would probably at most require regression testing of a small scope.

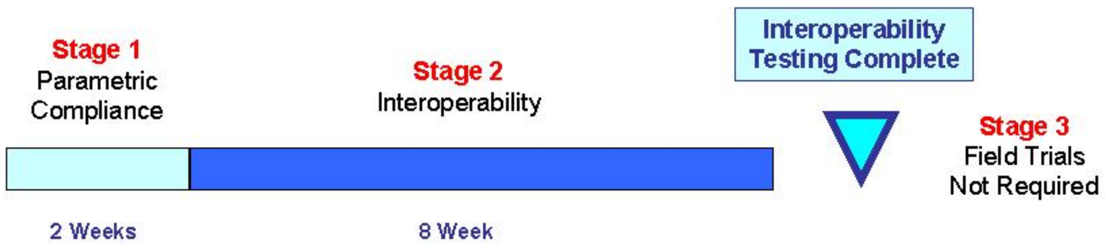
Carrier and regulatory certifications can be carried out in parallel. To what degree is basically a resource issue.

EV-DO FCC Accreditation



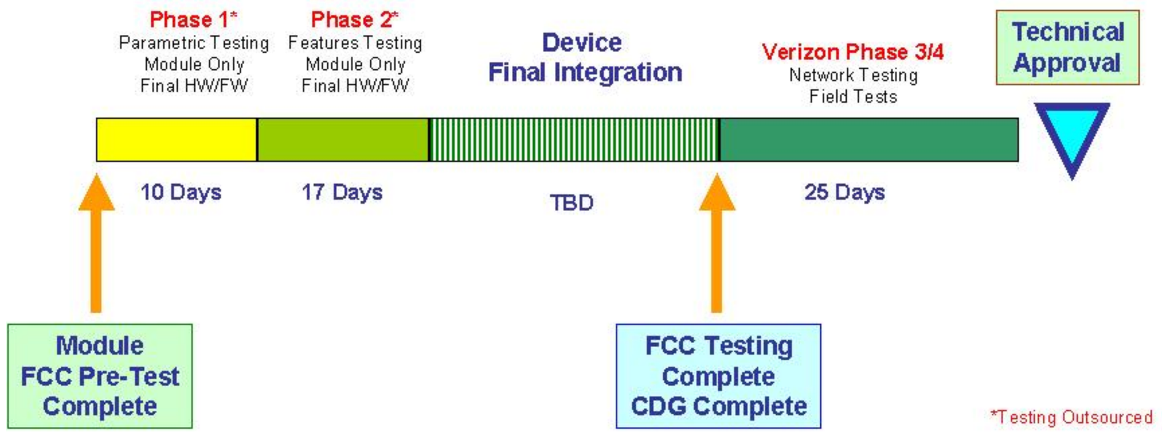
Module Pre-Screen Testing
Laptop Final Integration
Device FCC Testing Part 2 Part 15 Part 22 Part 24
Application Preparation Review
FCC Grant Issued
2 Weeks
TBD
2 Weeks
4 Weeks

EV-DO CDG Interoperability



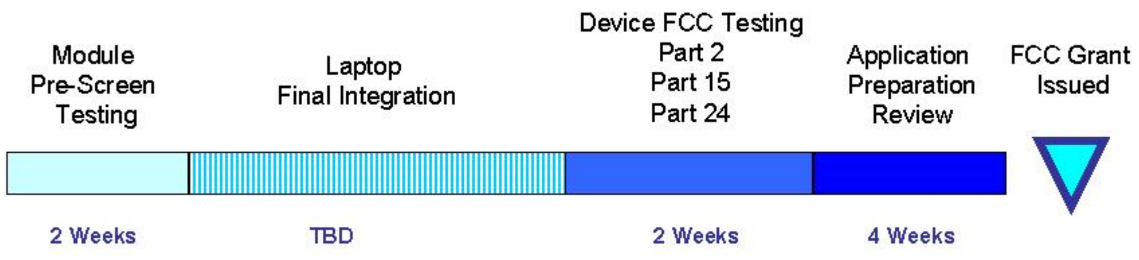
Stage 1 Parametric Compliance
Stage 2 Interoperability
Interoperability Testing Complete
Stage 3 Field Trials Not Required
2 Weeks
8 Week

EV-DO Verizon Certification Process



HDSPA FCC Accreditation

HDSPA FCC Accreditation takes approximately 4 weeks until an FCC grant is issued.



Notes:

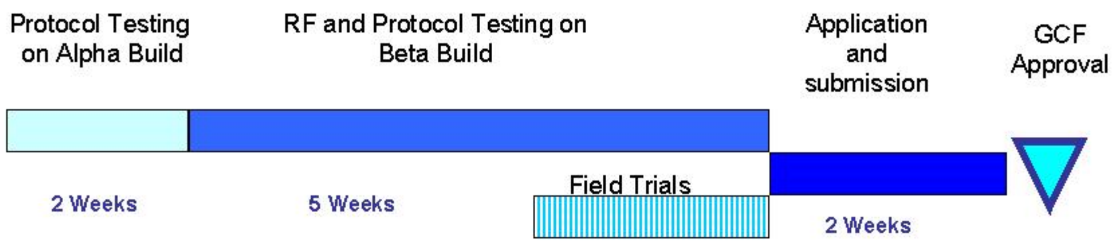
- Hardware should be near final, any changes after a module pre-screen are handled as either a Class I or Class II permissive change, depending on their scope.
- The cost for accreditation is approximately $25k (Including SAR and Emissions). However, as SAR test requirements become more numerous, these costs may increase significantly.

GCF Compliance Process

The EU740 product will be tested for compliance to GCF as per the applicable GCF test criterion at the time of testing. Novatel Wireless is a current member of the GCF (Global Certification Forum). GCF quarterly meetings are attended in order to keep appraised of new procedures, policies and technical requirements associated with GCF terminal certification. Novatel is familiar with GCF criterion having recently attained GCF certification for the U630.

GCF certification is very powerful. Because it provides for parametric as well as protocol and field test plans, certification under this body can be highly leveraged to gain accreditation on carrier networks. For North American, PTCRB provides similar coverage to GCF. As such, results from either GCF or PTCRB can be leveraged to one another.

Typically 9 weeks until GCF Approval.


Protocol Testing on Alpha Build
RF and Protocol Testing on Beta Build
Application and submission
GCF Approval
2 Weeks
5 Weeks
Field Trials
2 Weeks

Notes:

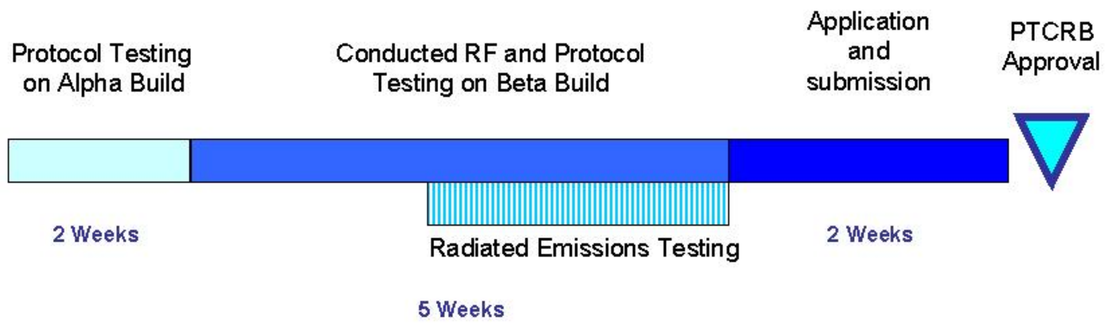
- Provides a framework to have devices accepted by most carriers in Europe.
- Cost = $325k (If performed independent of PTCRB. If combined with PTCRB certification as well, total cost for both is approximately $400k)
- There is a large amount of overlap with PTCRB (North American equivalent). Results from PTCRB can be leveraged for GCF and vice versa.
- Unlike PTCRB, this voluntary. However, it is required by Vodafone.
- It includes RF performance, emissions, protocol and field performance test cases. It is a kin to the CDG Stage 1, Stage 2, & Stage 3 recommendations for CDMA.
- Requires mandatory testing in at least 5 countries.
-

PTCRB Compliance Process

The EU730 product will be tested for compliance to PTCRB as per the applicable PTCRB test criterion at the time of testing.

North America – PTCRB (PCS Type Certification Review Board)

Novatel Wireless is a current Member of the PTCRB (PCS Type Certification Review Board). PTCRB quarterly meetings are attended in order to keep appraised of new policies, procedures and technical requirements associated with GCF terminal certification. Novatel Wireless has attained PTCRB approval with several product offerings.

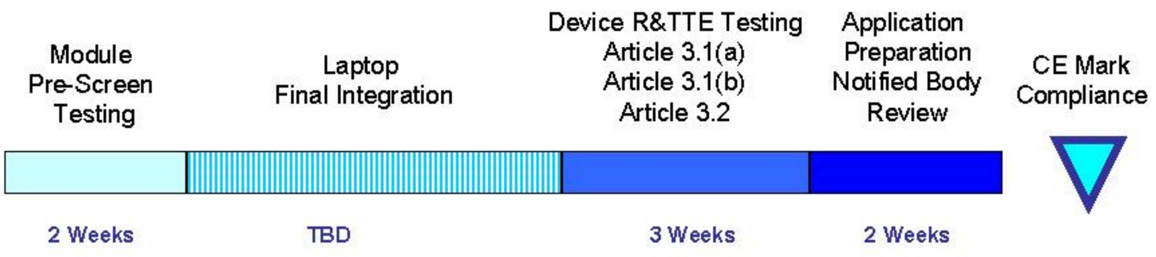

Protocol Testing on Alpha Build
Conducted RF and Protocol Testing on Beta Build
Application and submission
PTCRB Approval
2 Weeks
Radiated Emissions Testing
2 Weeks
5 Weeks

Notes:

- North American equivalent of GCF.
- This a group comprised of both Operators and Manufacturers.
- The radiated emission testing is similar to the FCC requirements but not entirely identical.
- This is mandatory in North America to operate GSM devices in the PCS band. There are approximately 1,200 test cases.
- Cost = $275k (If performed independent of GCF. If combined with GCF certification as well, total cost for both is approximately $400k)
- The protocol testing on the Alpha build does not require final design lock-down. However, it is important to test only those features which are frozen so that regression testing is not required later on.
- Any changes (MMI, RF, Baseband, etc…), no matter how insignificant which occur after certification, are to be reported to the PTCRB for review.

CE Mark Certification Process

The CE Mark Certification process takes approximately 7 weeks until CE Mark Compliance is complete.

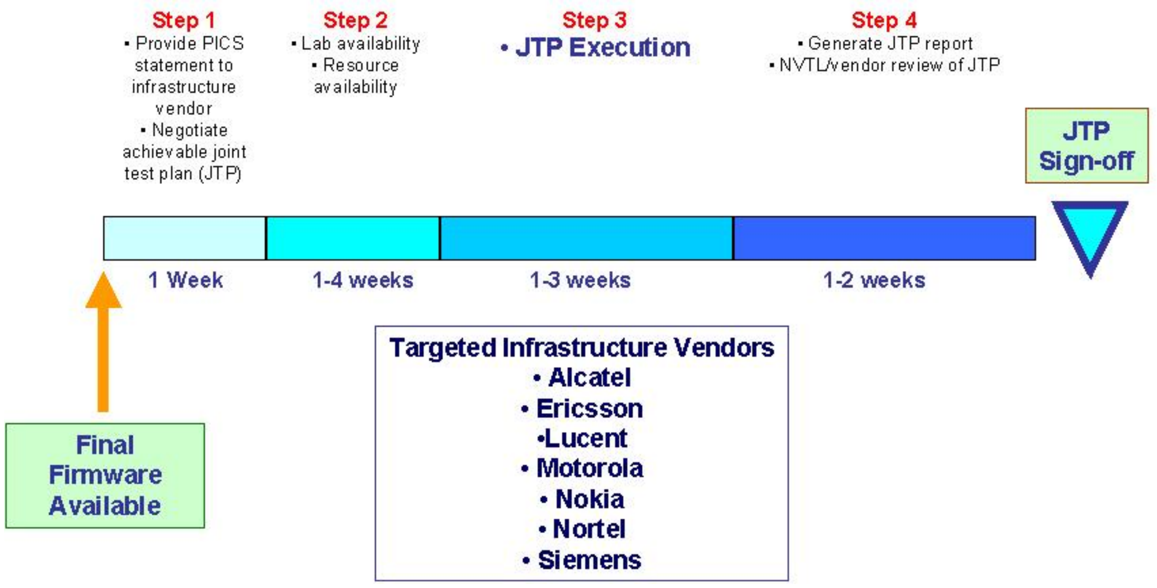

Module Pre-Screen Testing
Laptop Final Integration
Device R&TTE Testing Article 3.1(a) Article 3.1(b) Article 3.2
Application Preparation Notified Body Review
CE Mark Compliance
2 Weeks
TBD
3 Weeks
2 Weeks

Notes:

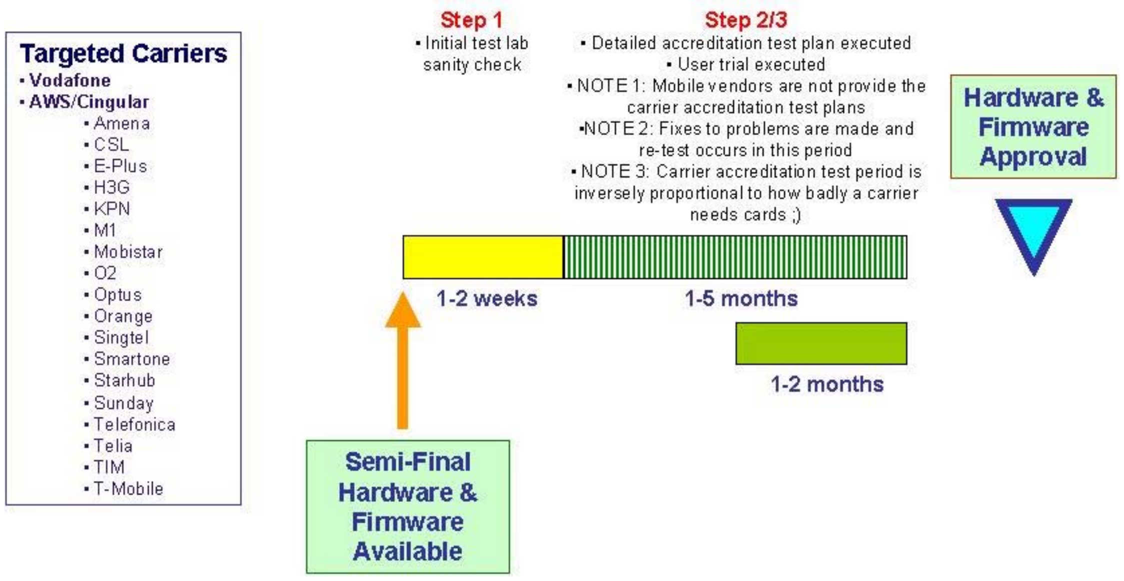
- Module hardware should be final at module pre-screen. However, modifications are self policed and are less restrictive than FCC permissive change policies.
- R&TTE governs the CE initiative.
- Costs (depending on features) = $35k to $80k
- Article Definition
- Article 3.1 (a) – Safety Testing (flammability, etc…)
- Article 3.1 (b) – EMC testing (unintentional radiators, etc.…)
- Article 3.2 – Network Testing (power, frequency stability, etc…)

Infrastructure IOT Process

A Protocol Implementation Control Statement (PICS) statement will be provided outlining the protocol supported in Qualcomm's stack as integrated into EU730 and EU740 code release. This will be used to plan IOT test cases.



Carrier Certification Process


Targeted Carriers
• Vodafone
• AWS/Cingular
• Amena
• CSL
• E-Plus
• H3G
• KPN
• M1
• Mobistar
• O2
• Optus
• Orange
• Singtel
• Smartone
• Starhub
• Sunday
• Telefonica
• Telia
• TIM
• T-Mobile
Step 1
• Initial test lab sanity check
Step 2/3
• Detailed accreditation test plan executed
• User trial executed
• NOTE 1: Mobile vendors are not provide the carrier accreditation test plans
•NOTE 2: Fixes to problems are made and re-test occurs in this period
• NOTE 3: Carrier accreditation test period is inversely proportional to how badly a carrier needs cards ;)
Hardware & Firmware Approval
1-2 weeks
1-5 months
1-2 months
Semi-Final Hardware & Firmware Available

Test Laboratories

FCC / CE Test Houses

M Flom Associates:

- Familiarity with Novatel Wireless Products
- TCB (Telecommunications Certification Body) (FCC)

Bay Area Compliance Laboratory (BACL)

- Familiarity with Novatel Wireless Products
- TCB (Telecommunications Certification Body) (FCC)
- Competent Body for the EMC Directive (CE)
- Notified Body for the R&TTE-Directive (CE)

TUV Product Service Limited

- TUV is the test house associated with BABT.

PTCRB / GCF Test Houses

7 Layers Inc. / 7 Layers UK

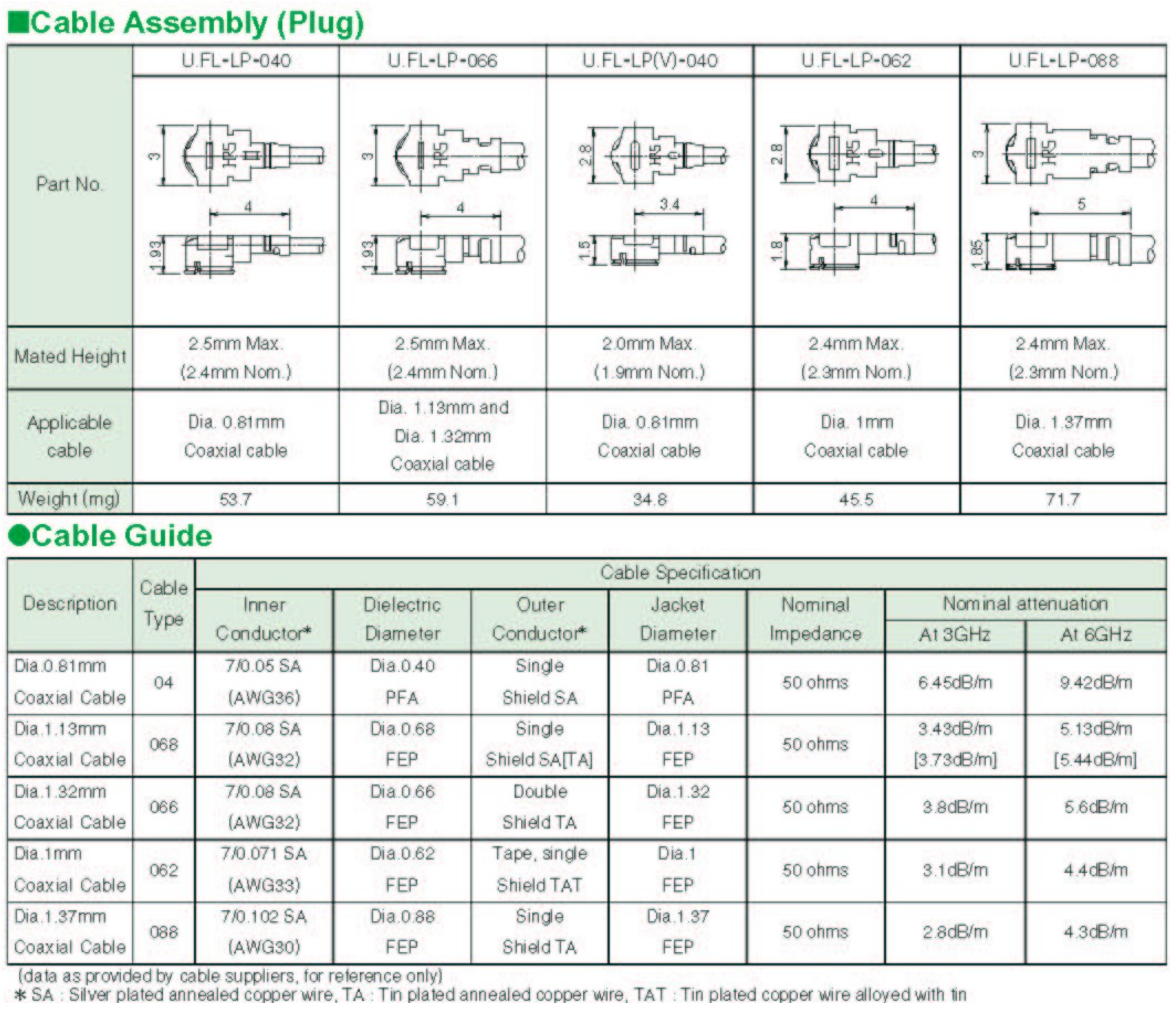
- Familiarity with Novatel Wireless Products Inc.
- PTCRB approved test Laboratory
- GCF approved test Laboratory

Reference Parts Specifications

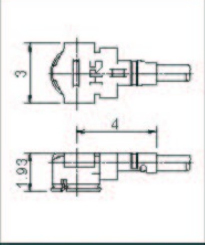
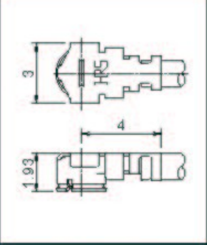
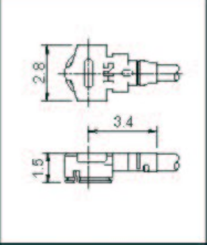
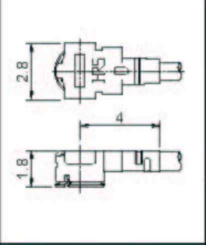
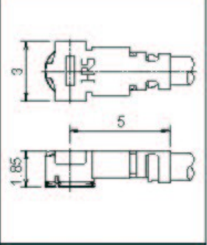
RF Connector

Hirose U.FL series, with U.FL-R-SMT receptacle mating to the following connectors illustrated. Note that . this connector is designed for a limited number of insertions. For an embedded application this is expected to be acceptable.

Figure 47: RF Connector



■Cable Assembly (Plug)

	U.FL-LP-040	U.FL-LP-066	U.FL-LP(V)-040	U.FL-LP-062	U.FL-LP-088
Part No.					
Mated Height	2.5mm Max. (2.4mm Nom.)	2.5mm Max. (2.4mm Nom.)	2.0mm Max. (1.9mm Nom.)	2.4mm Max. (2.3mm Nom.)	2.4mm Max. (2.3mm Nom.)
Applicable cable	Dia. 0.81mm Coaxial cable	Dia. 1.13mm and Dia. 1.32mm Coaxial cable	Dia. 0.81mm Coaxial cable	Dia. 1mm Coaxial cable	Dia. 1.37mm Coaxial cable
Weight (mg)	53.7	59.1	34.8	45.5	71.7

●Cable Guide

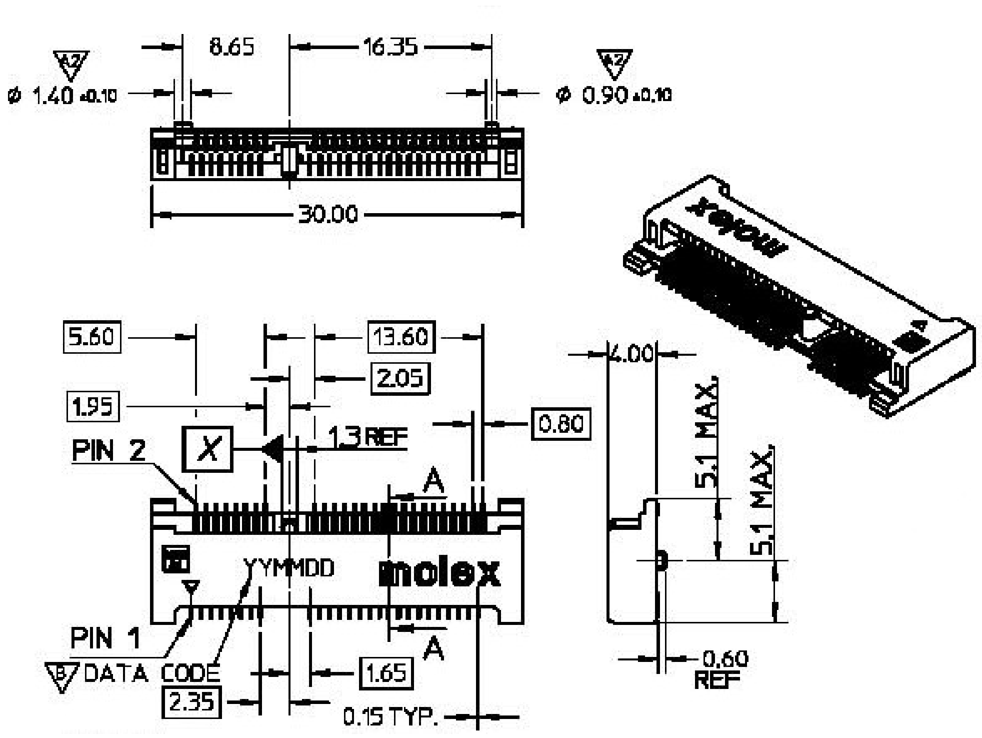
Description	Cable Type	Cable Specification						
		Inner Conductor*	Dielectric Diameter	Outer Conductor*	Jacket Diameter	Nominal Impedance	Nominal attenuation	
							At 3GHz	At 6GHz
Dia.0.81mm Coaxial Cable	04	7/0.05 SA (AWG36)	Dia.0.40 PFA	Single Shield SA	Dia.0.81 PFA	50 ohms	6.45dB/m	9.42dB/m
Dia.1.13mm Coaxial Cable	068	7/0.08 SA (AWG32)	Dia.0.68 FEP	Single Shield SA[TA]	Dia.1.13 FEP	50 ohms	3.43dB/m [3.73dB/m]	5.13dB/m [5.44dB/m]
Dia.1.32mm Coaxial Cable	066	7/0.08 SA (AWG32)	Dia.0.66 FEP	Double Shield TA	Dia.1.32 FEP	50 ohms	3.8dB/m	5.6dB/m
Dia.1mm Coaxial Cable	062	7/0.071 SA (AWG33)	Dia.0.62 FEP	Tape, single Shield TAT	Dia.1 FEP	50 ohms	3.1dB/m	4.4dB/m
Dia.1.37mm Coaxial Cable	088	7/0.102 SA (AWG30)	Dia.0.88 FEP	Single Shield TA	Dia.1.37 FEP	50 ohms	2.8dB/m	4.3dB/m

(data as provided by cable suppliers, for reference only)
∗ SA : Silver plated annealed copper wire, TA : Tin plated annealed copper wire, TAT : Tin plated copper wire alloyed with tin

Mini Card Connector

Molex 67910 series, mates with the mini PCI Express Card. Use with Latch 48099-0003.

Figure 48: Mini PCI Express Connector



FAQ (Frequently Asked Questions)

In case of both EVDO and 1x signal availability does the Novatel S620 card and/or SDK report both the signals? Or do they report only the best technology signal?

It reports only the technology that the device will be providing service on. For instance when both 1x and EVDO are available then it will report EVDO. When only 1x is available then it will report 1x.

Even if the card and/or SDK reports only the best technology signal (viz., EVDO), can a 1x connection still be initiated using the SDK, if 1x is also available?

If you are talking about packet data then the answer is no. The device will provide service on the best technology. However, with some setting changes a circuit switch call can be made on the 1x system if the carrier allows it.

When the user is connected to the network over an EVDO signal (roaming or non-roaming), and is switched to a 1x signal (roaming or non-roaming) (or vice versa), is the network connection retained? Will the Novatel S620 SDK report the change in the signal or connection status?

If the mobile IP is used (Sprint is MIP) then the answer is yes. If not it would depend on the carrier's network layout. As for between roaming partners it will also depend on network layout but the answer is most likely no. BTW, Sprint doesn't support roaming for data service. S620 will report the change of technology and automatically switch signal reporting to the specific technology that is in use.

When the user is connected to the network over a non-roaming signal and moves to a roaming signal (or vice versa), is the network connection retained? Will the Novatel S620 SDK report the change in the roaming status?

Yes you may hand off, (hand down) from DO to 1xRTT and maintain the connection (although you must be in dormant mode). You can not hand up from 1xRTT to EV-DO.

1xRTT hand down can occur when EVDO is in either active or dormant mode, there is no limitation. 1xRTT to EVDO hand up on the other hand has to wait until 1xRTT is in dormant mode before it can happen. Thus if you are continuously active on TCH in 1xRTT you will not hand up to EVDO even when you are back in EVDO coverage.

Will the Novatel V620 SDK report the change in the signal or connection status?

Yes. SDK will report change of status.

When the user is connected to the network over a non-roaming signal, and moves to roaming signal (or vice versa), is the network connection retained? Will the Novatel V620 SDK report the change in the roaming status?

Currently the device does NOT support roaming (per Sprint requirement).

References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] Void.

[2] 3GPP TS 23.038: "Alphabets and language-specific information".

[3] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) ".

[4] 3GPP TS 23.041: "Technical realization of the Cell Broadcast Service (CBS)".

[5] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[6] 3GPP TS 24.011: "Short Message Service (SMS) support on mobile radio interface".

[7] 3GPP TS 24.012: "Cell Broadcast Service (CBS) support on the mobile radio interface".

[8] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[9] 3GPP TS 27.007: "AT command set for User Equipment (UE)".

[10] 3GPP TS 51.011: "Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[11] ITU-T Recommendation V.25ter: "Serial asynchronous automatic dialing and control".

[12] ITU-T Recommendation V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[13] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[14] ITU-T Recommendation E.163: "Numbering plan for the international telephone service".

[15] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[16] 3GPP TS 31.102: "Characteristics of the USIM application".

Glossary

Abbreviations given in 3GPP TR 21.905 [15] and the following] apply.

Access Point Name (APN)
The IP domain name (i.e. Novatel Wireless.com) of the network device that acts as a gateway by connecting a CDMA wireless radio network to a wired local or wide area network.

Active Network Session
An active network session allows you to send and receive data across the Internet using point-to-point protocol through your network connection.

Anonymous Access (AA)
Network does not know the real identity of the mobile. Opposite to non-anonymous.

AP Access Point
An entry point to an external network.

AT Commands
AT commands are a language type that enables PC communications software to give the modem directions. The term **AT** comes from the command terminology which always begins with **attention**, or AT.

Authentication Authorization Accounting (AAA)
Used as shared secret passwords during a Mobile IP registration.

Baud Rate
The actual bit rate, excluding compression and other TX enhancements, on a communication line.

Border Gateway (BG)
Logical box that connects two (or more) operators together via an Inter-PLMN backbone. BG protects operator’s intra-PLMN network against intruders.

Carrier

See Service Provider

Circuit Switched Data
A wireless network connection established, using a single circuit that extends from you, directly through the network to your call’s destination. Opposite to packet switched.

CLI
Command Line Interface.

CLIR
Call Line Identification Restriction.

Code Division Multiple Access (CDMA)
Code Division Multiple Access is a spread spectrum wireless access technology that allows multiple users to share the same physical RF channel (1.25MHz for single carrier direct spread 1X) by use of orthogonal code spreading.

Connection Oriented Network Service (CONS)
Same as X.25 protocol for packet network transmission and switching.

Connection Profile

See Network Connection Profiles

CSD

See Circuit Switched Data

dBm
dBm stands for decibels below 1 milliwatt. It is essentially a device's signal output power compared against a standard input signal strength of 1 (one) milliwatt. This number represents a ratio and is expressed as a negative number (i.e. -60dBm)

Default Network Connection Profile
The default network connection profile is the connection profile, chosen by you that the Modem Manager will use to connect to the network. The default network connection profile can be thought of as the **active** network connection profile.

Direct Memory Access (DMA)
A fast method of moving data from a storage device or LAN device interface card directly to RAM which speeds up processing. DMA by passes the CPU.

Domain Name
The name assigned to a computer or group of computers that constitute an IP network domain. In general, a domain name is comprised of its local host name and its top-level domain. The top-level domain can be made up of several names, each separated by a period (.).
An example of a domain name is **novatelwireless.com**.

Domain Name System (DNS)
This is a network server used on IP networks, such as the Internet, for translating network host names and Universal Resource Locators (URL's) into IP addresses.

Domain Name System (DNS) Address
The IP (internet protocol) address of the Domain Name System (DNS).

Edge Technologies
Edge (Enhanced Data for Global Evolution) is an enhanced version of GPRS providing three to four times more capacity and data throughput. Average speeds range from 100 to 130 kbps with theoretical peak data rates of 473 kbps. Average rates are fast enough to support a wide range of advanced data services such as streaming audio and video, fast Internet access and large file downloads, EDGE can also support a greater range of enterprise applications, and more multimedia applications including push-to-talk services.

EVPF
Enhanced Validity Period Format

Firmware
Firmware is a program or set of programs that have been set permanently into a computer chip. The programs themselves usually are low-level programs that directly manipulate or interact with the hardware. An example of firmware is your desktop computer's BIOS.

General Packet Radio Service (GPRS)
GRPS is a packet-based, always-on data connection standard.

High Speed Downlink Packet Access (HSDPA)
HSDPA is a packet-based data service that improves upon UMTS by increasing speeds to 500-800 kbps with peak data rates of up to 10 Mbps (five times faster than UMTS and other 3G technologies) in a 5 Mhz channel. In addition, HSDPA significantly improves packet data

throughput capacity, thereby increasing the number of users that can be supported at higher data rates on a single radio carrier.

Home Agent (HA)
A router in the home subnet of the mobile node. Used in part with Mobile IP.

Home Public Land Mobile Network (HPLMN)
The home network.

IMEI
IMEI stands for International Mobile Station Equipment Identity.

Internet Protocol (IP)
Internet Protocol works in conjunction with Transmission Control Protocol (TCP). TCP/IP are part of a group of protocols that provide communication across interconnected networks. TCP/IP is the protocol used on the Internet. The TCP protocol first establishes a connection between the two systems in order to send and receive data, and then breaks and sequentially marks the message into small packets. The IP protocol routes and sends the packets based on the IP address.

Internet Control Message Protocol (ICMP)
IP network control protocol.

Internet Over-The-Air (IOTA)
Network operators can remotely provision a device on their network by using an Internet Over-The-Air implementation. Usually, a newly purchased device needs to initiate an IOTA session to perform provisioning before it is allowed to be on the operator’s wireless network.

IP Addresses
As with personal computers that access the Internet, modems using CDMA technology also have a dedicated Internet Protocol (IP) address, which is used to identify the node or access point for the modem on the Internet. The service provider assigns this IP address.
The 32-bit host address is usually represented in dotted decimal notation, e.g. 128.121.4.5. The address can be split into a network number (or network address) and a host number unique to each host on the network and sometimes also a subnet address.

IP Network
A network of computer networks that employ Internet Protocol allowing a user to access the Internet, provided that the user has a modem; telephone line, cable line, or wireless data network (e.g. CDPD); and a service provider.

Local Area Network (LAN)
A computer network that spans a relatively small area (typically up to a 1 km radius), although most LANS are confined to a single building or group of buildings. This type of networking allows for easy interconnection of terminals, printers, and computers within a building or buildings.

Logical Link Control (LLC)
Protocol layer between MS and SGSN.

Medium Access Control (MAC)
Protocol in the radio level that is used to allocate the radio channel.

Megahertz (MHz)
One million hertz. Hertz is another word for cycles in a radio frequency.

Mobile Directory Number (MDN)	
Mobile Identification Number (MIN)	
Mobile IP (MIP)	Mobile IP provides a method to allow IP traffic to find nodes whose point of attachment to the Internet changes.
Mobile Node (MN)	This is either an application running on a handset, or a data device connected to a handset with IP connectivity.
Mobile Station (MS)	The device being used to receive/transmit data and/or voice.
Mobile-Terminal (MT)	
Network Access Identifier (NAI)	Used as an Identifier/login for Mobile IP.
Network Connection Profiles	A network connection profile is a group of connection settings that define a specific network connection to the Modem Manager. This includes such settings as network ID, network password, APN, DNS addresses and so on.
Novatel Wireless Inc. (NWI) (NVTL)	
Original Equipment Manufacturer (OEM)	The original manufacturer of a pieces of equipment, typically complete boards, duplexers or enclosures etc.
Over-The-Air (OTA)	
Packet	A short block of data transmitted across a network.
Packet Data Network (PDN)	Network that carries user data in packets. ex. Internet and X.25
Packet Size	The size of a packet expressed in bytes.
PC Card	A PC Card, similar in size to a credit card, is used for adding devices on to portable computing devices such as laptop, handheld, and palmtop computers. Some examples of these devices are modems, network cards, disk drive adapters, and extra memory. PC cards are often called PCMCIA cards.
Peripheral Component Interconnect Special Interest Group (PCI SIG)	
PCMCIA Card Slots	The PCMCIA card slots are the sockets in the computing device, in which the PCMCIA card is inserted. It is the hardware interface between the computing device and the PCMCIA card.
Point to Multipoint (PTM)	Widely used IP protocol used to connect, i.e. PC and ISP via modems.
Point to Point (PTP)	One sender on receiver.

Point-to-Point Protocol (PPP)
PPP is an interconnection protocol which allows a device, such as a wireless IP modem, to connect to a network or the Internet.

Primary Domain Name System
In order to get the translated IP addresses, the modem will try to connect to the server with the primary DNS address. If the modem cannot connect to this address, it will try to connect using the secondary DNS address.

Primary Roaming List (PRL)

Protocol Data Unit (PDU)
One data packet.

Quality of Service (QoS)
Definition of the service class of the connection between MS and the network.

Radio Link Protocol (RLP)

Registration
In order to send and receive data across a given network, a CDMA modem must first register to a CDMA network. This involves the selection of an available channel and interaction with various systems on the CDMA network to set up a communication path.

Remote Access Service (RAS)
Software that enables distant PCs and workstations to get into a Remote Access Server to retrieve software and/or data on a corporate LAN. This service is provided through modems, analog telephone lines or digital ISDN lines.

Routing Area (RA)
A set of cells that belongs to one group. RA is always a subset of an LA (Location Area).

Secondary Domain Name System
If the modem cannot connect to the DNS using the primary address, it will try to connect using the secondary DNS address.

Security Parameter Index (SIP)
Used in part with Mobile IP.

Segment
Each IP network address consists of four numeric segments, which are divided by a period ("."). For example, 204.119.63.40.

Service Provider
A company that provides network connections to the Internet.

Short Message Service (SMS)
Short messages either in binary (160 characters) or text messages (140 bytes) format.

Terminal Equipment (TE)

Transmission Control Protocol (TCP)
Protocol layer on top of conventional IP protocol.

Type II PCMCIA Card
A Type II PCMCIA card is identical to the Type I PCMCIA card in all ways except that it is thicker than the Type I card. The Type II PCMCIA card is in general use now.

U_m
Mobile-to-Base Station air interface link.

Universal Product Support Tool (UPST)

The Universal Product Support Tool (UPST) consists of the UPST Framework and UPST device DLLs. The UPST Framework is a Windows 32 application (UPST.exe) that uses UPST device Dynamic Link Libraries (DLLs) to provide basic device provisioning functions such as Refurbish, Software upgrades, Preferred Roaming List (PRL) upgrades, and Phone Settings programming.

User Datagram Protocol (UDP)

Another protocol on top of IP.

Wireless IP Network

A wireless network (e.g. CDMA) that uses Internet Protocol (IP)