Manual

Neon 2000 Family

Neon Metering Modules (NMM) &

Neon Remote Modules (NRM)

2013F GSM 3G

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules in the U.S.A. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment has been tested for compliance with European regulations as follows:

Application of Council Directive:
2004/108/EC

Standards to which Conformity is declared:
EN-61000-6-1:2001
EN-61000-4-2:1995
EN-61000-4-3:1995
EN-61000-4-4:1995
EN-61000-4-6:1996
ENV-50204:1995

Any changes or modifications to this equipment not expressly approved by the manufacturer Unidata Pty Ltd could void the user's authority to operate this equipment.

Revision History

File name/Revision	Date	Author & Change Details	Checked/ approved
Unidata Manual - Neon 2000 Family Remote Terminals and Modules issue 4.0	25/09/2013	MP – Reformat for web site	
Unidata Manual - 2013F GSM 3G NMM Family - 28 05 2015.docx	28 05 2015	PC – Major Update	
Unidata Manual - 2013F GSM 3G NMM Family - 09 06 2015.docx	09 06 2015	PC – Reviewed	

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References

This manual should be read in conjunction with the associated StarlogV4 User Manual which describes the setting up of logging schemes for NMM terminals as well as all other Unidata Data loggers.

This manual should also be read in conjunction with the Neon Server Documentation which is available in PDF form from the Unidata web site and is also available as help screens within the Neon Server system.

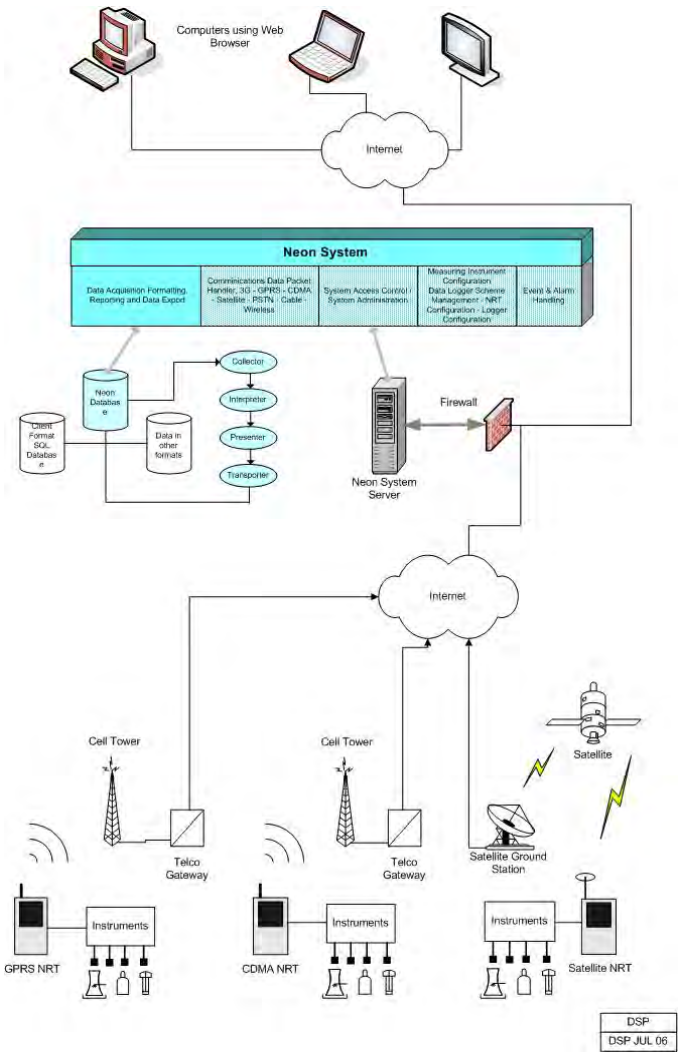
The NMM User Manual, the StarlogV4 User Manual and the Neon Server User & Administrator Documentation form part of the documentation suite for the overall Neon System.

1.0 NEON TECHNOLOGY AND MODULES OVERVIEW

Neon is a system for collecting measurements from field instruments and transmitting the measurements to a central system for data recording, analysis, reporting and data transfer to other external systems.

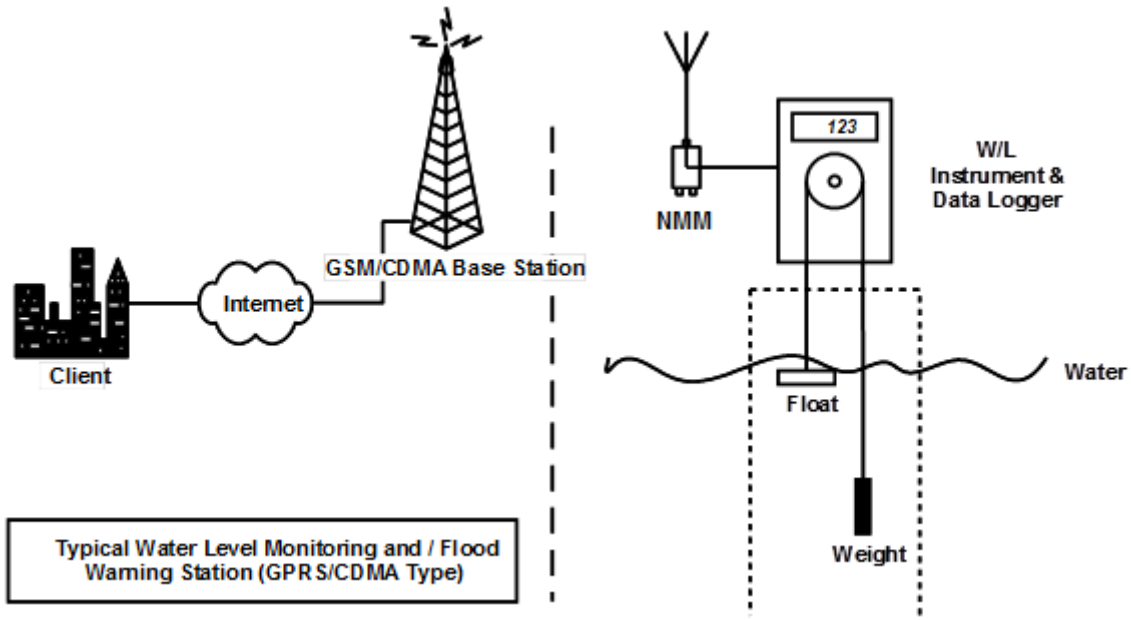
The Neon system also provides facilities for data collection, analysis, reporting and field measurement equipment and management within specified areas as defined by the system. Examples of this include country wide access, regional access and different access levels according to the rights and privileges of users, e.g. supervisor level, manager level, coordinator level and read only user level. The Neon System is suited to a range of uses such as environmental monitoring of remote instrumentation and automated industrial and utility metering.

The Neon system may be offered on a system basis, with the customer purchasing the server and a software license from Unidata, or can be provided on an application service basis where the customer pays a service fee for Unidata to run the application on a Unidata central server.



Overview of the Neon System

1.1 Typical Neon Measurement System



The figure above is an example of a Neon installation showing an NMM connected to a Water Level Instrument. Every day the NMM will send a "packet" of information containing the data in raw format via GSM / 3G to the Neon server. The Neon server extracts the raw data from the packet. The data is then stored on a secure server until the client accesses the data using a standard Web Browser.

1.2 The Internet

The Internet provides the transport mechanism between the Neon Servers and the telecommunication provider gateways. This means that NMM units can be used anywhere in the world.

1.3 GSM

GSM (Global System Mobile) is a cell phone standard developed for second-generation (2G) digital cellular networks used by mobile phones in most parts of the world. GSM provides the "backbone" upon which GPRS, voice and data communication travel.

1.4 GPRS

GPRS (General Packet Radio Service) is an IP-enabled cellular solution for urban communications. The power requirements are low and the GPRS electronics are fully integrated within the NMM. GPRS communications are generally available wherever GSM communications are available.

By this means a logger or field instrument connected to a GPRS-enabled communications device (such as a Neon NMM) can deliver data to any Internet connected computer.

GPRS provides an always-connected service – i.e. there is no dial up required. Typically the user pays for data use and not for time.

1.5 3G

3G is the third generation of mobile telecommunications technology. 3G provides for faster information transfer rates.

1.6 Satellite Packet Data Service

There are several low earth orbit and equatorial orbit packet data service providers. The NMM Satellite uses either the Globalstar system or the Inmarsat system.

The Globalstar system provides a service very similar to the Cellular based GSM GPRS service except via a satellite network.

The Inmarsat system provides IP (Internet Protocol) connectivity via the international Inmarsat GEO Satellite network from any location on the globe, except the Arctic and Antarctica. The Inmarsat system is used by Ethernet models of NMM.

1.7 NMM Internal Architecture

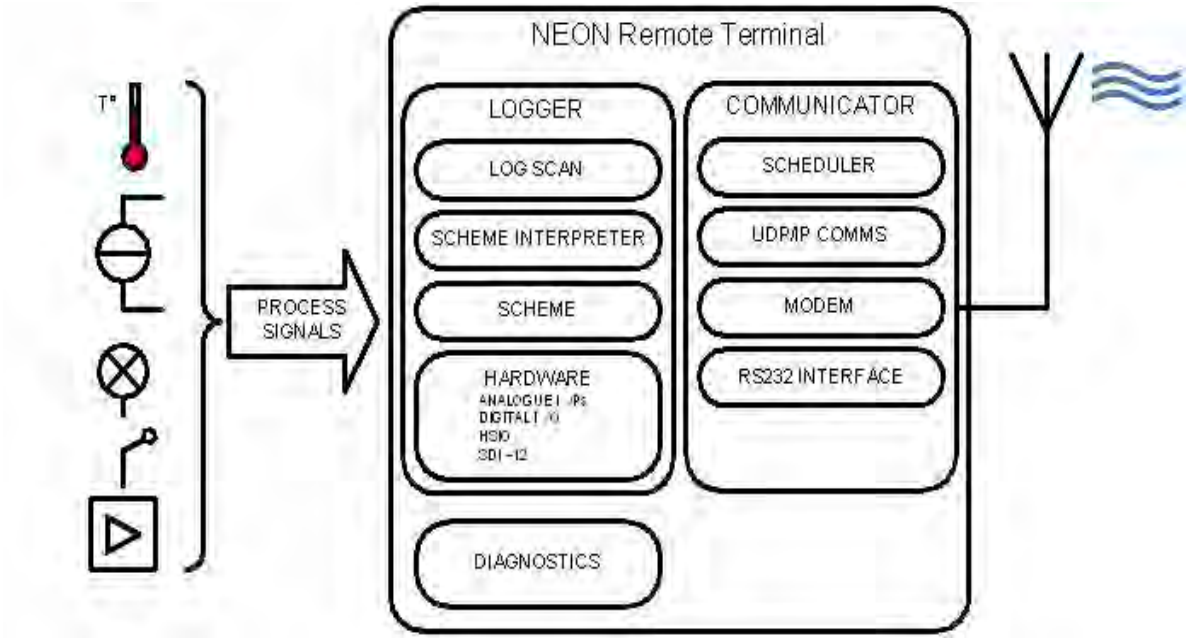
The NMM Internal architecture is shown below. It contains two discrete sections,

A LOGGER section where the terminal connects to the field transducers and the logging scheme, scan rates and diagnostics are managed.

The StarlogV4 support software allows a user to generate a logger scheme which defines transducer information, logging scan rates, logger interval etc and various engineering unit definitions. These files are called, for example the LDR and KBD files.

A COMMUNICATOR section which deals with communications to the server. This section contains, for example, a scheduler component and the modem component, either a Cellular Network modem or a Satellite Network modem. The communicator manages functions such as the reporting interval, the number of communications attempts per communications session, etc.

The StarlogV4 support software allows a user to generate a configuration file for the Communicator section, called an FPO file in which the user sets the required communications parameters.



2.0 SUMMARY OF NEON REMOTE MODULES

Neon Metering Modules (NMM units) are small, ultra-low power microprocessor-based devices designed to collect data from data loggers and SDI-12 instruments. This data is then sent via Cellular Networks or Satellite packet data to a Neon server on a programmed schedule or as required for alerts.

The NMM also incorporates a fully-programmable data logger so that simple analogue and digital signals may be directly connected and recorded.

NMMs are classified according to the communications network over which they communicate. That is as either: Terrestrial (Cellular), Satellite (Globalstar or Inmarsat) or Ethernet.

There are many different models of Neon Metering Modules.

- Plastic case models are referred to as Neon Metering Modules (NMMs),
- Plastic case models with an LCD are referred to as Neon Remote Modules (NRMs) and
- Metal enclosure models are referred to Neon Remote Terminals (NRTs).

This manual refers to all NMMs/NRMs/NRTs as NMMs due to their similarities.

All Neon Metering Modules are small self-contained units in compact cases that connect to sensors in the field, collect readings from those sensors and transmit the collected data to a central Neon server. The type of network over which the collected data is transmitted varies from model to model.

The Neon central server system can be provided either on a Neon Data Service basis or on a Neon Client System basis. Both provide a central computer system to monitor and receive data from many Neon Metering Modules in the field.

All Neon Metering Modules are designed to automate collection of remote data from environmental monitoring, industrial measurements and utility metering via a communications network from any location within the network coverage area.

Fully bi-directional communications are possible via the Neon server. Data can be collected directly and the Neon module can be programmed from any internet connection.

The Neon modules also support integrated logging or automated collection of data from an external data logger.

All Neon Metering Modules utilise built-in modems that support packet data. They have long battery life and low operating costs through use of advanced microcontroller technology.

All Neon Metering Modules provide Input /Output functions as standard, including analog and digital inputs and SDI-12 data logger interface. There is also Modbus support via a partial implementation of the Modbus protocol, which allows for reading from and writing to specific registers within the Modbus RTU on an RS485 connection. Further details are available on request.

2.1 2013F Neon Metering Module – GSM 3G

The 2013F NMM GSM 3G is a small self-contained plastic cased Neon Metering Module that communicates with the Neon server via GSM 3G cellular telephone networks.

2.2 2013F Neon Remote Module – GSM 3G

The 2013F NRM GSM 3G is a small self-contained plastic cased Neon Remote Module that communicates with the Neon server via GSM 3G cellular telephone networks.

3.0 NMM LED INDICATOR

The simplest indicator is the red LED which is visible in the window of the unit.

On first power on the LED will be brightly on (not flashing) for 10 seconds indicating the unit is in the process of being reset. Do not interrupt this initial start-up process. If the initial start-up is interrupted you should power down, wait a few minutes, and then power up again.

- **Slow flashing bright LED.** One flash per second indicates the NMM is establishing a network connection via the internal modem. This process takes approximately 10 to 20 seconds.
- **Fast flashing bright LED.** 3 to 5 flashes per second indicate the PPP session is running and the NMM is communicating through the internal modem to the host server. If the NMM is programmed to hold the PPP session open all the time, i.e. the always on mode, the LED will continue to flash at this rate.
- **Slow brief flashing (dim) LED.** One dim flash every Scan Interval (typically every 5 seconds) indicates normal NMM operation (sleeping). No communication is in progress. The NMM has been programmed to log data and will only establish communications at the defined reporting interval with which it has been configured.
- **Very occasional bright single flash**. This indicates the scheme is actively logging rather than sleeping at that particular time. If you have a scheme which has a 5 second Scan rate and a 1 minute Log Interval, you will see dim flashes (indicating sleep) every 5 seconds (i.e. every scan interval), then one bright flash on the minute, indicating that a log is in progress. This cycle repeats at the Log Interval, hence the LED will brightly flash every 1 minute.

When the NMM periodically communicates with the Neon server, the LED will

- slowly flash as it establishes a network connection, then
- quickly flash while it actually communicates with the Neon server (uploads log data, downloads its scheme, processes queued commands, etc), then
- slowly flash as it disconnects from the network

The durations of each stage will vary according to the telemetry type of the NMM and how much data is transferred between the NMM and Neon server.

If an NMM has been configured on the Neon server to Auto Cold Boot, then after the 10 second start up illumination, the NMM will immediately start a normal comms cycle, as previously described, following the normal slow flashing, fast flashing, slow flashing cycle.

4.0 NMM SETUP AND TEST

The NMM uses a SIM card which needs to be installed. It should then connect to the Cellular network within a few seconds of powering on.

Note the SIM card must have the security PIN number switched off or disabled. This needs to be done by using the SIM card in a normal mobile phone.

5.0 NMM POWER REQUIREMENTS

5.1 Internal Power

The NMMs can be powered by internal batteries and / or with an external battery supply. The recommended batteries are SAFT Lithium batteries which are specified in this manual. The Lithium batteries provide high inrush current required for modern cellular hand phones.

The NMM has one Lithium Battery for the internal battery supply.

5.2 External Power

If required the NMM can be powered by an external supply of 6 to 16VDC @ 2A peak (while transmitting) and 25mA (while receiving) and 30uA while on standby. Unidata recommends 12V 7.2AH SLA (Sealed Lead Acid) batteries as a good external supply. External instrumentation must be separately powered if more than 500uA is required. The download schedule is the largest consumer of power.

The Continuous Drain Equivalent rating can be used to size the external power requirements and duration of external power supplies. However, external power sources should have an additional 100uA at 12V or 50uA at 6V continuous drain added, (due to parasitic losses in the NMM circuitry).

The decision to use an external power supply should be based on the projected or known frequency of battery changes, i.e. if a high download schedule is required and frequent battery replacement is going to prove difficult or expensive, then an external power supply is desirable.

5.3 Battery Life Table

Approximate NMM Lithium Battery Life	Approximate Download Schedule	Approximate Scan Rate	Approximate Log Interval	Approximate Continuous Drain Equiv
5 years	1 per day	5 secs	15 minutes	0.12 mA
4 years	4 times per day	5 secs	15 minutes	0.21 mA
1 year	1 per hour	5 secs	15 minutes	0.53 mA
52 days	1 per 5 minutes	5 secs	1 minute	5.2 mA
10 days	1 per minute	5 secs	5 seconds	26 mA

Table 1

6.0 NMM INSTALLATION

The following section describes the NMM installation procedure. The installation process is similar for all models.

6.1 SIM Card Recommendations

It is highly recommended that the SIM is installed in the NMM before going to site. Refer to sections 8.0 for detailed SIM setup installation.

It is also recommended that the contents of the NMM installation kit are checked, and that the NMM is tested and confirmed as working before going to site. Even if wireless communication cannot be verified (for example due to coverage issues), the NMM can still be checked to ensure it has a battery and is powered on, and that communication with a laptop computer is possible.

Note that high signal strength for the NMM will minimise current drain – and prolong battery life.

6.2 Neon Setup Recommendations

The NMM should be initialised with a scheme before being installed in the field. This will allow for commissioning of the NMM and verification that communications can be established between the NMM and the Neon server before going to site.

Once in the field the NMM should be placed in the area of greatest signal strength. A good test for this is to use a mobile phone using the same carrier as the NMM, as the signal strength indicator will show the best location.

Note that due to the slow refresh rate of the mobile phone signal strength indicator, it is necessary to hold the mobile phone in place for between 30 to 60 seconds to obtain an accurate reading. If a mobile phone on the same carrier network is not available it is possible to use the NMM itself to determine signal strength.

Avoid installing the NMM enclosure in direct sunlight, as cool operating temperatures will aid longevity of the internal components.

Avoid placing the NMM enclosure inside a metal box, or in an area with large amounts of metal around the NMM enclosure, as this can adversely affect the communication abilities of the NMM. If the NMM must be located within a metal enclosure, an external antenna will be required.

Install the NMM enclosure in a secure location to avoid tampering and vandalism.

Position the enclosure to ensure cables from NMM to field devices are as short as practical.

If the NMM is to be used for real-time communication or for a higher than usual download schedule (refer to Table 1), an external power supply may be required to avoid frequent battery replacement. Provision for this should be considered during the installation, such as installing the NMM within range of a mains power outlet.

6.3 NMM Connections

NMM wiring connections are listed in the separate “Unidata Manual - NRT Family Cables & Connection Supplement” companion document.

7.0 NMM COMMISSIONING

Once the NMM has been installed and all connections made, field commissioning can be conducted. Ensure that a SIM card has been installed (see next section).

Commissioning tests may be performed as follows.

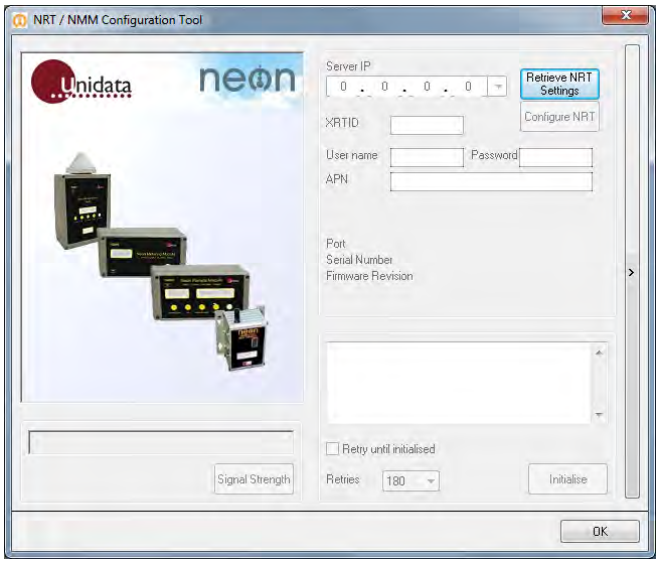
7.1 NMM Powered On

Confirm that the status LED, visible through the transparent window on the front of the unit, is flashing. With the NMM in an idle state the LED will flash faintly once every second.

7.2 NMM Confirm Configuration

Confirm proper configuration by connecting the NMM to a laptop computer running StarlogV4.

- Launch the STARLOGV4 (laptop computer) application.
- Press the 'Select' icon and select the scheme corresponding to the NMM
- Click on the 'Configure/Initialise' button to open the "NRT/NMM Configuration Tool" dialog
- Press the 'Retrieve NRT Settings' button at top right of the dialog

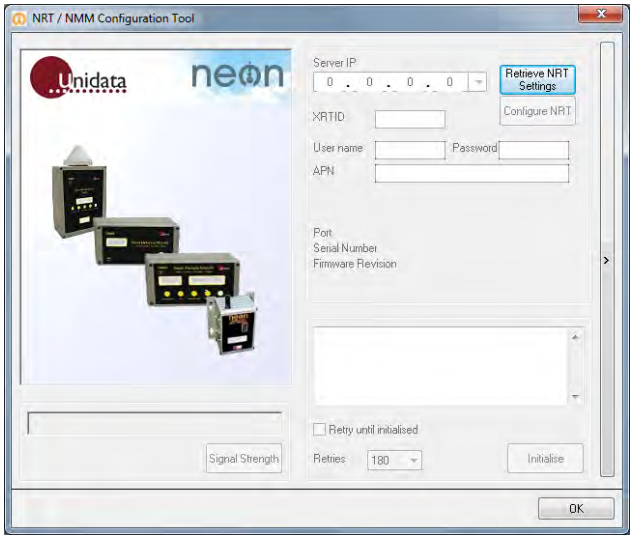


- Confirm that the correct Server IP address has been configured
- Confirm that the correct NRT ID (XRTID) has been configured
- Check the firmware version and NRT Model type
- If all checks are confirmed, the NRT may be Initialised

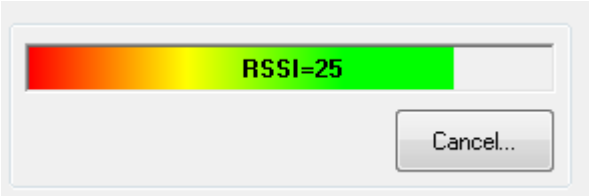
7.3 NMM Signal Strength Verification

- Connect a laptop computer to the NMM.

- Launch the STARLOGV4 application.
- Press the ‘Select’ icon and select the scheme corresponding to the NMM.
- Click on the ‘Configure/Initialise’ button to open the “NRT/NMM Configuration Tool” dialog
- Press the ‘Retrieve NRT Settings’ button at top right of the dialog



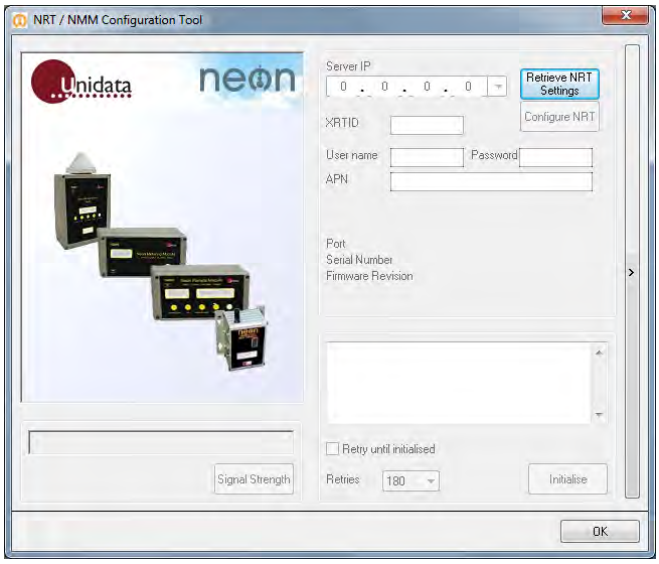
- Press the ‘Signal Strength’ button. After a short delay (10 seconds or so), the RSSI signal strength will be displayed. RSSI must be 16 or higher. If it is 99 then there is no connection to the cellular network.



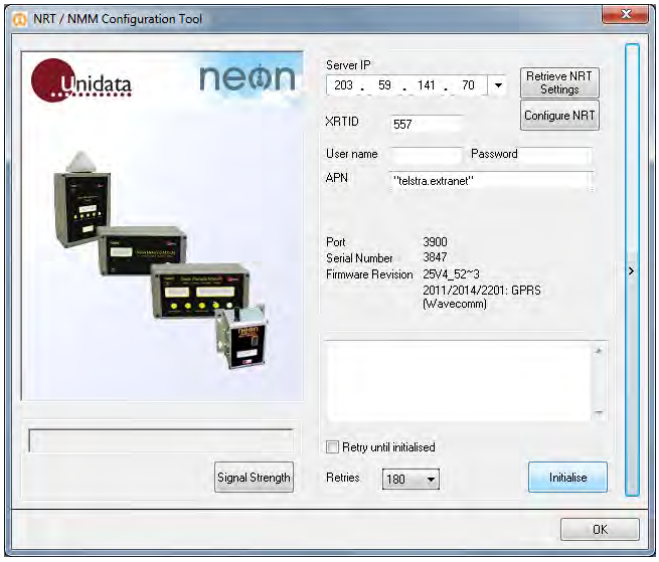
- If there is sufficient signal, press the Cancel button to exit the Signal Strength option.

7.4 NMM Initialisation

- Reconnect to the NMM if not already connected.
- Launch STARLOGV4 (laptop computer) application.
- Press the ‘Select’ icon and select the scheme corresponding to the NMM
- Click on the ‘Configure/Initialise’ button to open the “NRT/NMM Configuration Tool” dialog
- Press the ‘Retrieve NRT Settings’ button at top right of the dialog



- Press the 'Initialise' button



- The NMM will attempt to communicate with the Neon server and initialise itself.

Once communications have been established, the NMM will download any required scheme and configuration files and complete the initialisation process. The NMM should respond with a PASS message after 2 or 4 minutes. Please be patient waiting for this message.

Common Initialisation failure codes and their causes are illustrated in the table below

NRT Failure Code	Description	Resolution
00002	Failed to open GPRS & establish PPP	a) Modem is not functioning (see Troubleshooting) b) Unit is not within carrier range (see Troubleshooting) If necessary install a better aerial or change carriers. c) Access data is incorrect (see Initial Setup, and confirm your access settings with your carrier.) d) No SIM installed e) SIM has not been correctly activated by carrier (often happens when establishing accounts with a new carrier – contact your carrier.)
00004	GEN_REQ I/O Failed	NRT is not set up correctly in database. If you are managing your NRT subscriptions, check that the NRT number you have assigned to the unit exists in the database, that its devices have been assigned to clusters, and that those clusters have schemes loaded against them. If Neon Support is managing your subscription, contact your account manager.
00009	COMMS I/O Failed (RS-232 to external logger)	Check your cable connections to the external logger, and that the logger is in a state to receive a new program.

Once all commissioning tests have been completed successfully, the NMM is field-commissioned and ready for use.

8.0 SIM CARD INSTALLATION

The following section describes the procedure for installing a SIM into an NMM. This section only needs to be performed if the SIM within the NMM needs replacing or if it is known that the NMM does not contain a SIM.

Remove the lid screws (either two or four screws depending on model).

WARNING: Care should be taken when handling lithium batteries as misuse may cause damage to the NMM or the battery cells may explode.

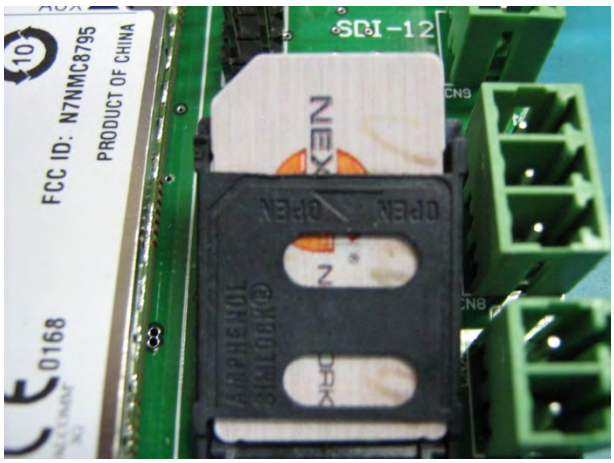
Ensure that the battery terminals are NOT shorted and that there are no loose wires in the vicinity the battery.

Remove the battery from its holder.

Locate the SIM socket.

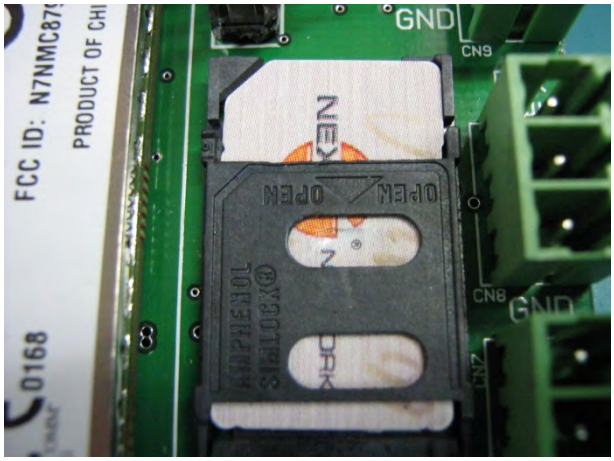
Slide the SIM cover gently with a fingernail or matchstick until it clicks. The SIM cover can now be lifted gently and hinged open.

Insert the SIM with the gold contacts away from you and the cut corner at the top left as shown below



SIM card inserted.

Close the SIM cover and slide it into place until it clicks.



SIM card installed.

Replace the battery, ensuring correct polarity.

Return the NMM assembly carefully to the case, ensuring the antenna stub is correctly located in its aperture.

Secure the NMM end plate with the four screws. Re-attach the antenna.

9.0 BATTERY TESTING

9.1 Battery Check

The presence of a battery can be verified without opening the NMM.

Look for the flashing LED through the window on the front of the NMM unit.

If the NMM is in an idle state, the LED will flash faintly once every second.

If the LED is not flashing, you will need to open the NMM and verify the presence of a battery:

If a battery is installed and the LED is not flashing, the NMM will need to be initialised. (See section on NMM Initialisation).

9.2 Battery Replacement

Always wait at least 1 minute between removing a battery and either replacing the same battery or inserting a new battery. This is to allow any residual charge within the NMM to dissipate.

The NMM battery should only be replaced with a SAFT LSH20. This is a spiral wound Lithium Thionyl Chloride [Li-SOCl2] battery with a terminal voltage of 3.6 volts.

Failure to replace the battery with the correct type may cause communication failure.

For further information on the battery and where to purchase replacements, please refer to www.saft.com

WARNING: Care should be taken when handling lithium batteries as misuse may cause damage to the NMM or the battery cells may explode.

Ensure that the battery terminals are NOT shorted and that there are no loose wires in the vicinity of the battery.