NWK300 Product Manual [DRAFT]

Draft Document

Revision History

Date	
2024/12/10	Draft Document Created

Important Notices and Warnings

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Extrovert family of products are used in a normal manner with a well constructed network, the Extrovert family of products should not be used in situations where failure to transmit or receive data could result in damage of any kind to other equipment, the user or any other party, including but not limited to personal injury, death or loss of property. Logic Supply accepts no responsibility for damages of any kind resulting from failures, delays or errors in data transmitted or received. The purchase and use of the Extrovert family of products does not come with, or constitute a wireless or data plan. A separate plan with your carrier is required.

Limitation of Liability !TODO! Legal Review/Update

The information in this manual is subject to change without notice and does not represent a commitment on the part of Logic Supply. LOGIC SUPPLY AND ITS AFFILIATES SPECIFICALLY DISCLAIM LIABILITY FOR ANY AND ALL DIRECT, INDIRECT, SPECIAL, GENERAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR

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Safety and Hazards

CAUTION: For your own safety and to ensure continued proper operation, Extrovert products should not be used where explosive atmospheres may be present or where radio interference may cause damage to, or disruption in service from, other equipment.

IMPORTANT NOTE: Maintain at least 20 cm of separation between the LTE antenna and the user's body while in regular operation. Do not use Extrovert products in the vicinity of medical equipment as it may cause potentially disruptive interference.

Do not co-locate an Extrovert-enabled device with any other transmitting system.

To comply with FCC/IC regulations in North America that limit both maximum RF output power and human exposure to RF radiation (SAR), the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed the limits outlined in the table below

Product Description

The OnLogic NWK300 is a SIM carrier board paired with the EM7590 Cellular Modem to provide 4G LTE connectivity.

Specifications

SKU	NWK300
Carriers	Regional: NA/EMEA
Bands	LTE Bands: FDD: 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 18, 19, 20, 25, 28, 29*, 32*, 66, 71 TDD: 38, 39, 40, 41, 42, 43, 48 * Downlink Only UMTS Bands: 1, 2, 4, 5, 6, 8, 9, 19 GNSS: • GPS: 1575.42 • GLONASS: 1602 • BeiDou 1561.098 • Galileo: 1575.42 • QZSS: 1575.42
Data Rate	LTE: Downlink (Cat 13 with 2CA, 256QAM=400 Mbps), Uplink (Cat 13 with 2CA contiguous, 64QAM=150 Mbps) UMTS: Downlink (Cat 24, up to 42 Mbps), Uplink (Cat 6, up to 5.76 Mbps)
Interface	M.2 B-Key,
SIM Card Socket Size	3FF
Signal Type	USB
Expansion Options	2 × 4FF SIM
Operating Temperature Range	-40°C to +85°C
Dimensions	52 mm x 30 mm x 4.5 mm (m.2 form factor)

Antenna RF interfaces

Antenna RF interfaces (ANT1 / ANT2) NWK300 is based on the Sierra EM7590 module and provides two RF interfaces for connecting the external antennas: MAIN represents the primary RF input/output for transmission and reception of LTE RF signals. The MAIN pin of NWK300 has a nominal characteristic impedance of 50 Ω and must be connected to the primary Tx / Rx antenna through a 50 Ω transmission line to allow proper RF transmission and reception.

AUX represents the secondary RF input for the reception of the LTE RF signals for the Diversity, MIMO, GPS, GLONASS, BeiDou. Galileo, and QZSS technology. The AUX pin of NWK300 has a nominal characteristic impedance of 50 Ω and must be connected to the secondary Rx antenna through a 50 Ω transmission line to allow proper RF reception.

When installed in an OnLogic computer, MAIN and AUX RF interfaces are connected to external antenna mounts. The external mounts each use an SMA (female) connector. Our line of compatible cellular antennas all use a standard SMA (male) connector.

FAQ (Frequently Asked Questions)

Which antenna connectors are for WiFi and which are for 4G?

What impedance is required for antennas and cabling?

50 Ω. Maximum antenna gain 6dBi. !TODO! Check with Steve/Jon

Known limitations

- The GPS functionality is not supported by OnLogic.

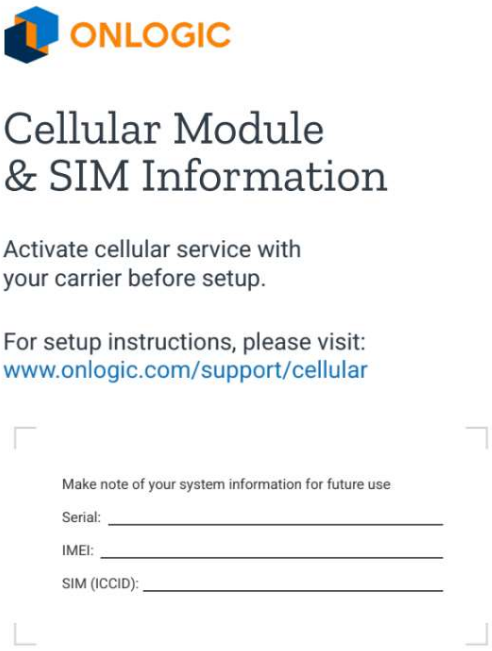
- Static IP assignment depends on carrier network and may not be possible or consistent

Drivers

- If you purchased Windows from OnLogic, drivers for the modem are pre-installed.
- If you self install Windows, you can download drivers from the page linked below. Note that you will need to register for a free account to download.
- Most recent Linux operating systems will include functional drivers for the EM7590. If you experiencing any issues please see the below linked Linux drivers
  - Windows Drivers ↗
  - Linux Drivers ↗

SIM cards and Activation

- Locate the Extrovert booklet that came with your system.
- If an ICCID number is listed, your system already has a SIM card installed internally and is ready to activate. If not, you will need to provide a SIM card. See: Using an External SIM Slot
- Contact your wireless carrier. State that you want to activate a 4G modem and provide the numbers on the front of the booklet.



DCT114 Cellular Insert

Modem Setup

- Ensure you are in an area with good signal coverage
- Connect both antennas and boot up the OnLogic PC
- Allow the PC to sit for a few minutes and see if a 4G connection is established. If not, continue with the steps below for Windows or Linux

Updating the Firmware

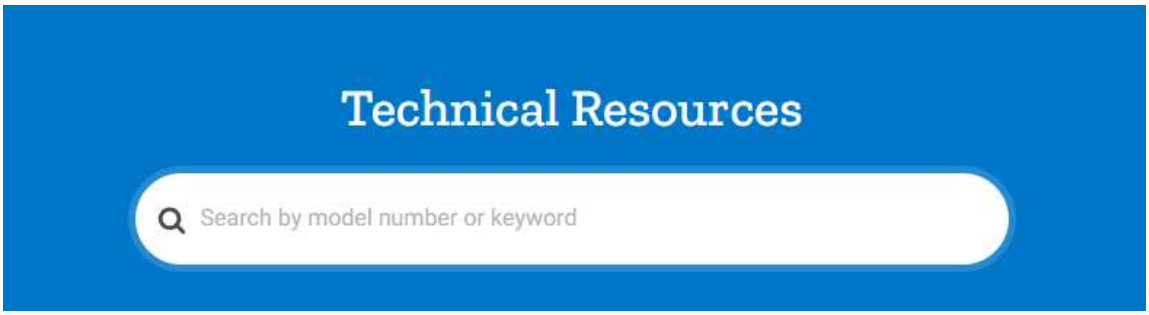
Firmware updates can be downloaded from the Sierra Wireless website linked below.

- Firmware versions are carrier specific. Download the version for your carrier. Use Generic if yours is not listed.
  - You will need to register for a free account to download.
- EM759x Approved FW Packages ↗
- Run the executable and let it complete. Power down and unplug the system from power for 10 seconds. When you power it back up, the new firmware will be active.

Accessing the SIM card

The NWK300 has its own slot on the bottom side. This is the preferred location to install a SIM card. OnLogic installs all SIM cards here by default.

- Locate the technical resources for your specific model using the OnLogic support site ↗
- Use the search box at the top of the site to locate the technical resources page for your model such as "K801", for example.



- Disassemble the PC using the support site instructions to gain access to the modem.
- Once inside locate the NWK300 (Pictured, Note: carrier board color may differ from shown)
- Remove the 1x retaining screw from the center
- The modem will pop up to a 45 degree angle. Gently remove it from the slot.
- The SIM slots are on the top side of the NWK300 carrier board
- Using the M.2 connector as the bottom reference point, insert, or remove the installed, Nano/4FF SIM into the right SIM slot for SIM0 and left slot for SIM1.

    - Note: a SIM card will be pre-installed only if included in your order. You can check the ICCID using the instructions provide in SIM cards and Activation without having to physically access an installed SIM card

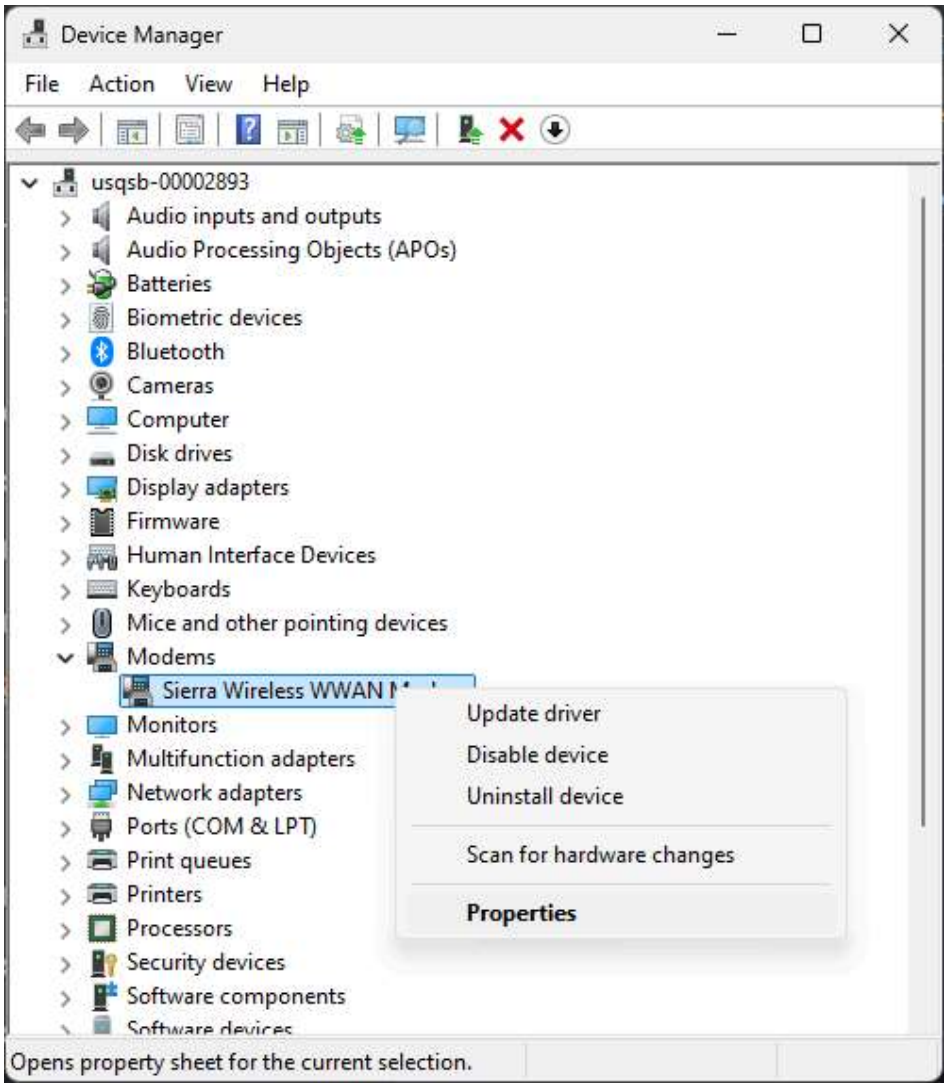
!TODO! Step by step SIM access and installation

Windows Setup Guide

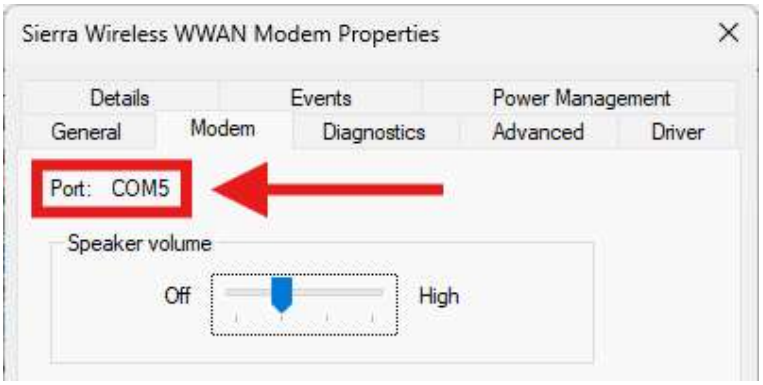
- Ensure you have downloaded and installed drivers
- Ensure you are in an area with good signal coverage
- Connect both antennas and boot up the OnLogic PC
- Allow the PC to sit for a few minutes and see if a 4G connection is established. If not, continue with the steps below.

Opening the AT Command Terminal

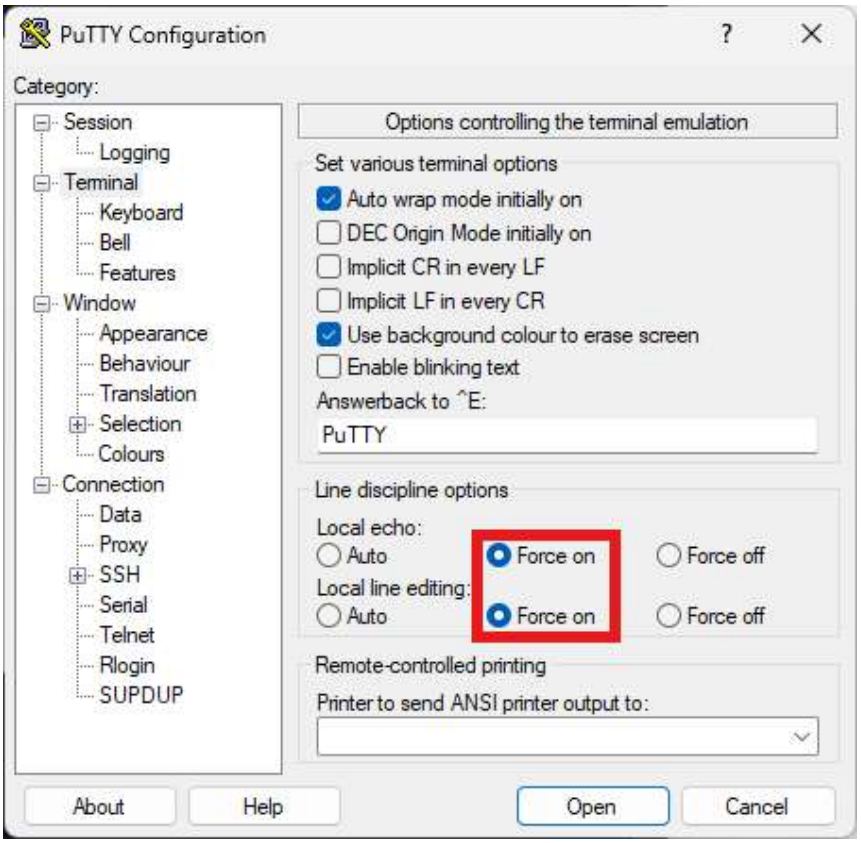
- Download and install the latest version of the PuTTY tool. Download Link ↗
- Open device manager and look for the Sierra modem.
- Right click and open Properties



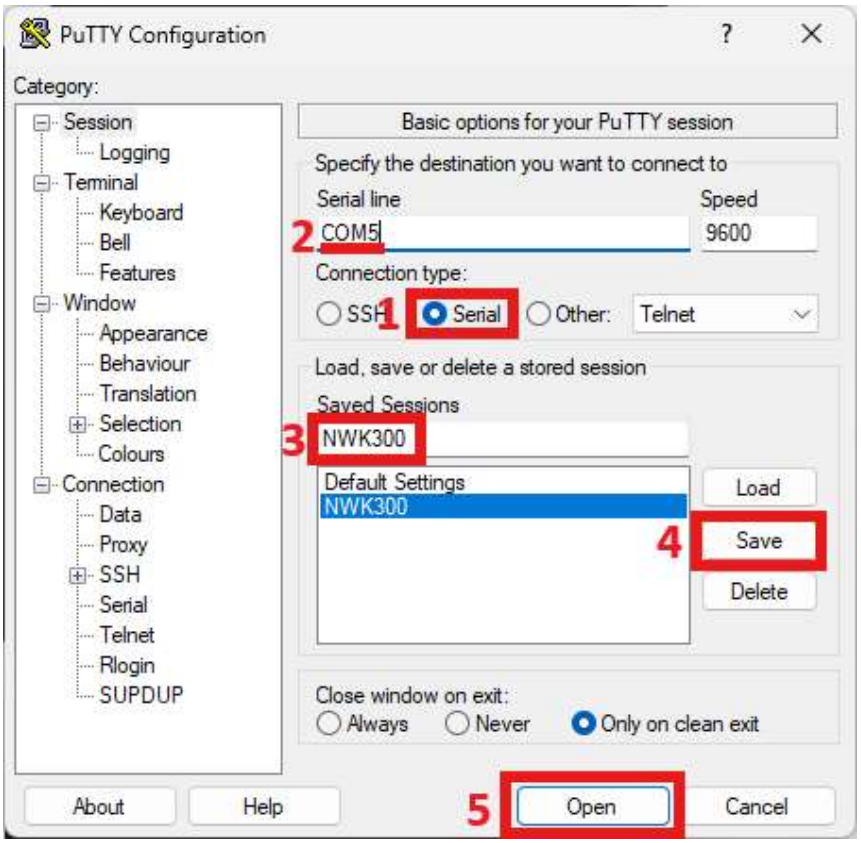
- Go to the Modem tab and note the COM number.



- Open PuTTY and configure these options in the Terminal Category

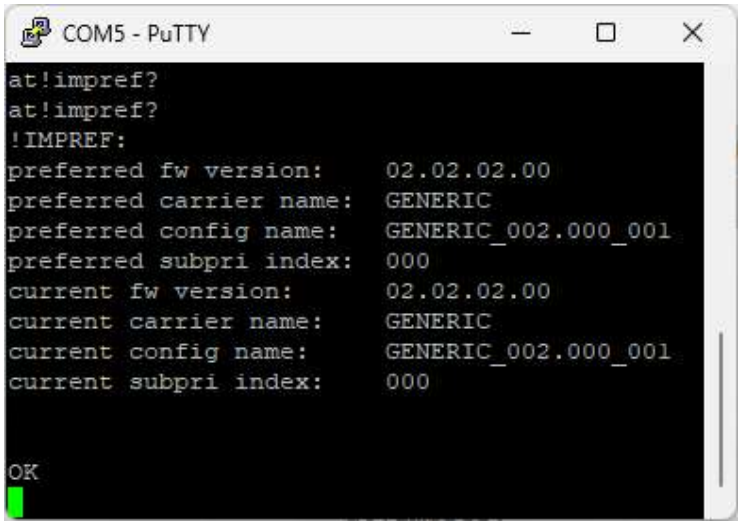


1. Select the 'Serial' option
2. Change the COM number to match device manager
3. Type NWK300 into the Saved Sessions text window
4. Click Save
5. Click Open



- Begin by typing `ate1` and pressing enter. The terminal should respond with OK. This indicates the modem is ready for commands

- Check firmware setting `at!impref?` In this example generic firmware is loaded



- To change to carrier specific firmware run the command `at!impref="<CARRIER>"` where <CARRIER> = ATT, VERIZON, SPRINT
  - Note: If your carrier is not listed you can download and update to the latest firmware from the Updating the Firmware section

- Run `at!reset` and power down the PC

- Give the modem approximately 5 minutes after reboot to establish a connection. If the modem is still not working at this point, go back and ensure all previous steps have been completed. If so, skip to the Troubleshooting section.

Linux Setup Guide

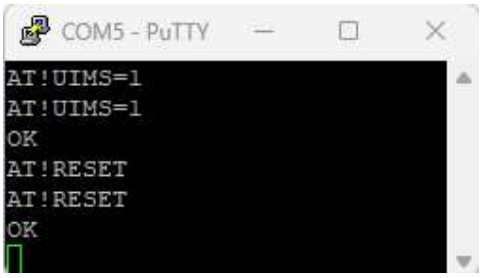
Coming Soon

Using the external SIM slot

The NWK300 comes with two built-in SIM slots. It does not have any provision for automatic SIM switching, so a user must intervene in order to change SIMs. SIM slot 1 on the card connects to UIM0 on the modem. SIM slot 2 on the card, or any motherboard or external slot, connects to UIM1.

- Open an AT command terminal by following the instructions linked for your operating system
  - Windows: Opening the AT Command Terminal
  - Linux: Coming Soon

- Run the following commands in the AT terminal `AT!UIMS=1` and `AT!RESET`



- Reboot the PC, and the correct SIM slot will now be active.

Troubleshooting

- Before performing any troubleshooting, ensure you have completed all steps to configure your modem and have activated your SIM card.

No SIM detected

!TODO!

Diagnostic AT Commands

- Open an AT command terminal by following the instructions linked for your operating system
  - Windows: Opening the AT Command Terminal
  - Linux: Coming Soon

The commands below can help diagnose various modem issues. OnLogic technical support may request screenshots of the output of each of these commands. If you have reached this point and require additional help, please email support@onlogic.com and include a copy of these screenshots as well as your system serial number.

AT!ENTERCND="A710"	Enters the password for certain password protected commands.

At!impref?	Display active firmware version
AT+CSQ	Display signal quality. Scale from 0-31, 31 being best signal. 99= no signal
AT+ICCID	Print SIM card number. If error, SIM is not configured correctly or installed.
At+cgdcont?	Shows the active APN
AT!GSTATUS?	Prints general status info
At+cgact?	Checks if paths to the network are active. Should output 1,1
AT+CGSN	Prints the IMEI of the modem
AT!PCINFO	Return the modem's power control status