S2C Link Accessory Kit
User Manual

Part Number: NL-S2CK

NimbeLink Corp

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1. Overview

This document is the User Manual for the S2C Link Accessory kit, a serial to cellular adapter for the Skywire™ cellular modem.

1.1 Product Description

The S2C Link Accessory Kit provides a convenient way to use the NimbeLink Skywire cellular modems with RS232 serial or USB devices. Inside the S2C Link is a Skywire™-ready XBee™ socket connected to the necessary DB9 and mini-USB ports on the housing. The kit's simple pass through interface and robust housing makes it easy for existing devices to interface to any of the family of Skywire™ cellular modems through an AT command interface.

Orderable part numbers are available to support multiple cellular technologies, carriers, and geographies including 2G, 3G, 4G LTE, and LTE CAT1 cellular networks. **Antennas, power supply, and Skywire™ modem sold separately**. Recommended antennas are in section 1.3.

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1.2 Orderable Part Numbers

Orderable Device	Description
NL-S2CK	S2C Link Accessory Kit

Compatible Skywires and SIMs	Description	Carrier	Network Type
NL-SW-1xRTT-A	2G 1xRTT	Aeris	CDMA
NL-SW-1xRTT-S	2G 1xRTT	Sprint	CDMA
NL-SW-1xRTT-V	2G 1xRTT	Verizon	CDMA
NL-SW-GPRS	2G GPRS	Any GSM (AT&T, T-Mobile, etc.)	GSM
NL-SW-EVDO-A	3G EVDO, GPS, GLONASS	Aeris	CDMA
NL-SW-EVDO-V	3G EVDO, GPS, GLONASS	Verizon	CDMA
NL-SW-HSPA	3G HSPA+, GPS, GLONASS, GLOBAL BANDS	Any GSM (AT&T, T-Mobile, etc.)	HSPA/GSM
NL-SW-HSPAP	3G HSPA+	Any GSM (AT&T, T-Mobile, etc.)	HSPA/GSM
NL-SW-HSPAPE	3G HSPA+, European Version	Any EU GSM	HSPA/GSM
NL-SW-HSPAPG	3G HSPA+, GPS, GLONASS	Any GSM (AT&T, T-Mobile, etc.)	GSM
NL-SW-LTE-TSVG	LTE without Fallback, GPS, GLONASS	Verizon	LTE
NL-SW-LTE-TNAG	LTE with HSPA+ Fallback, GPS, GLONASS	Any GSM (AT&T, T-Mobile, etc.)	LTE/HSPA
NL-SW-LTE-TEUG	LTE with HSPA+ Fallback, GPS, GLONASS, EU	Any EU GSM	LTE/HSPA
NL-SW-LTE-GELS3	LTE CAT1, Verizon	Verizon	LTE
NL-SW-LTE-S7588-V	LTE CAT4, Verizon	Verizon	LTE
NL-SW-LTE-S7588-T	LTE CAT4	Any GSM (AT&T, T-Mobile, etc.)	LTE
NL-SIM-COM	3FF Commercial Temp range SIM card	Verizon	LTE
NL-SIM-ATT	KORE Telematics 3FF Commercial Temp Range SIM card	AT&T	LTE/HSPA
NL-SIM-TMO	KORE Telematics 3FF Commercial Temp Range SIM card	T-Mobile	LTE/HSPA
NL-SIM-VOD	KORE Telematics 3FF Commercial Temp Range SIM card	Vodafone	LTE/HSPA

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1.3 Recommended Antennas

The following antennas are recommended for use with the S2C Link Accessory Kit.

Manufacturer	Part Number	Antenna Type
Taoglas	TG.30.8113	Dipole, Wide Band Cellular Antenna
PowerTech Antennas	MAG-212-12-SMA-M	Omni directional, high gain cellular antenna

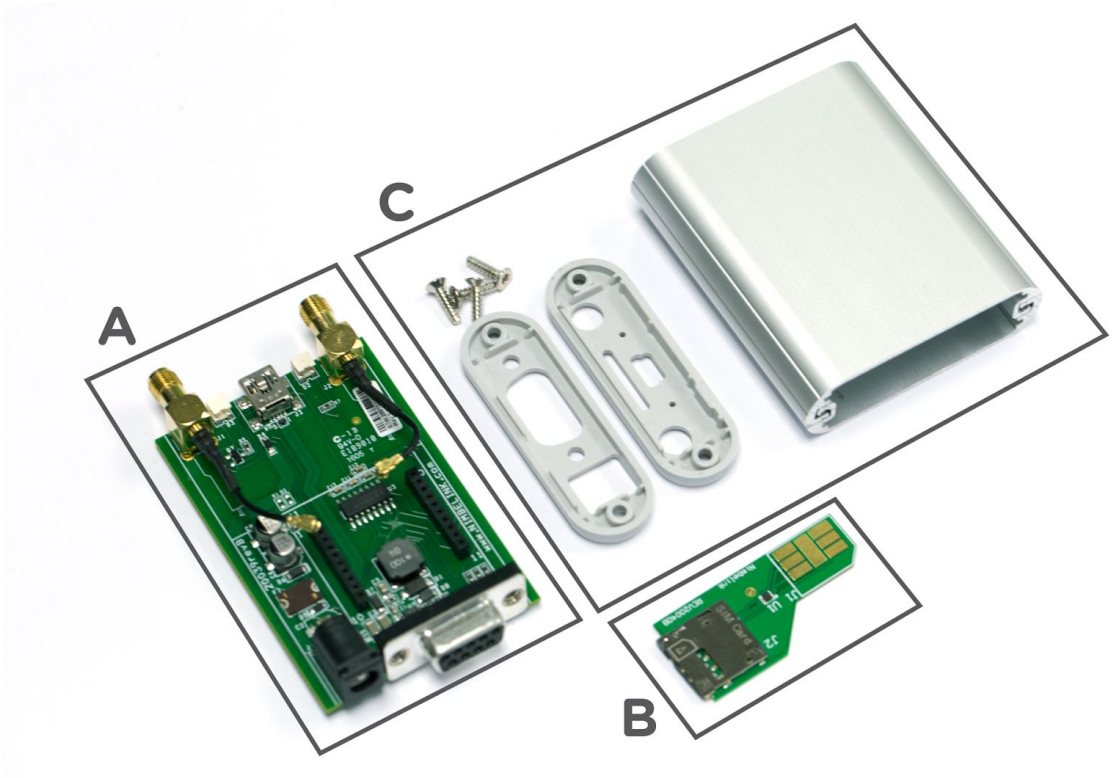
1.4 Additional Resources

- Nimbelink's Skywire™ S2C Link Accessory Kit
- Nimbelink's Skywire™ Cellular Modems

1.5 Kit Contents

The S2C Link Accessory Kit contains the following:

A. One S2C Link Base Board
B. One SIM Card Extender (for GSM/LTE Skywires)
C. One S2C Link Enclosure



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2. Get Connected

NimbeLink's Skywire™ cellular modems help speed up product development and integration of cellular connectivity, and our cellular data plans help eliminate one more step in getting your customers up and running and connected to the cellular network.

Tiered data plans from NimbeLink can support any application from a few text messages a month to gigabytes of streaming data, and competitive pricing and automatic billing will appeal to both you and your customers.

Please visit go.nimbelink.com to set up a plan for your device.

Data plans from NimbeLink provide access to all of the cellular technologies supported by Skywire™ modems including LTE, EVDO, and 1xRTT. Simplify product development and rollout, save time and money, and streamline installation and access for your customers with NimbeLink's bundled data plans.

2.1 SIM Cards

All LTE, HSPA, and GSM modems require a SIM card in order to activate a data plan. The S2C Link requires a "Micro-SIM" size 3FF. Orderable SIM cards are listed in section 1.2.

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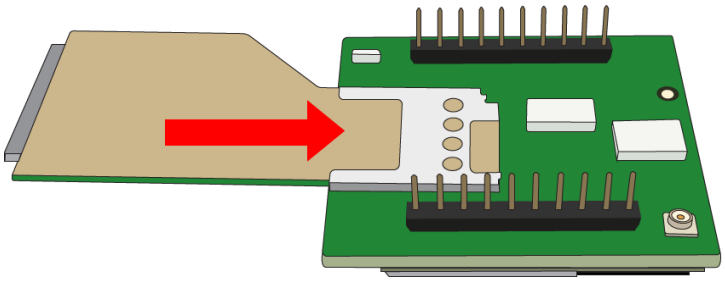
3. Assembly Instructions

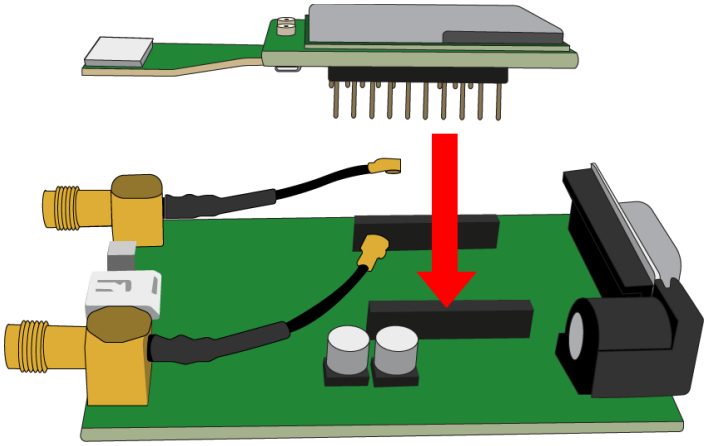
The S2C Link Accessory Kit contains the enclosure, S2C Base Board, and the SIM Extender for GSM/LTE devices. Users will need to purchase a Skywire™ Modem, antennas, and power supply separately.

3.1 Device Assembly Guide

3.1.1 Step 1: Insert the SIM Extender into the micro SIM Card socket on the Skywire™ modem. If your modem does not use a SIM then skip this step.



3.1.2 Step 2: Insert the Skywire™ into the base board. The antenna ports on the Skywire™ should be facing the SMA ports on the base board.



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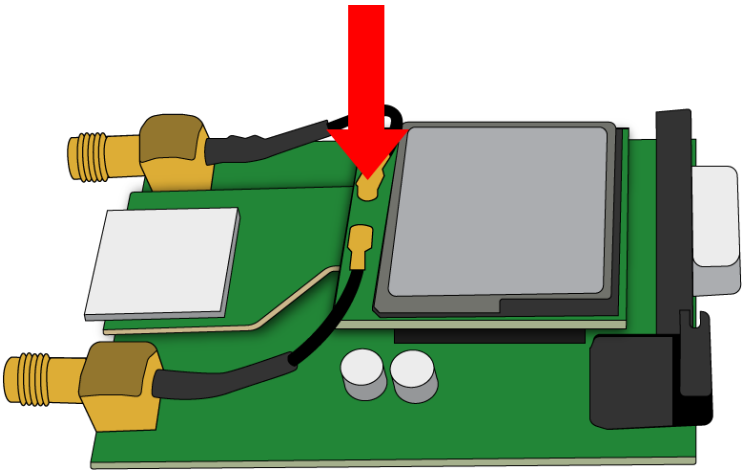
3.1.3 Step 3: Attach the U.FL connectors to the Skywire™. To prevent damaging the U.FL connectors a U.FL extractor tool should be used.



3.1.4 Step 4: Attach the DB9 faceplate to the enclosure (T8 screwdriver required). Slide the two halves of the case so their edges align, then screw on the DB9 faceplate.

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3.1.5 Step 5: Insert the PCB assembly into the enclosure. The side of the PCB with the DB9 should be inserted first. Make sure it is not inserted upside down. **Be sure to copy the MEID/IMEI/SIM ID from the Skywire so it is easily accessible after the device has been assembled.**

3.1.6 Step 6: Attach the RF face plate to the enclosure. Make sure that the SIM extender is aligned to the slot in the middle of the face plate for the SIM card.

3.1.7 Step 7: Insert the SIM card (if applicable).

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4. Mounting

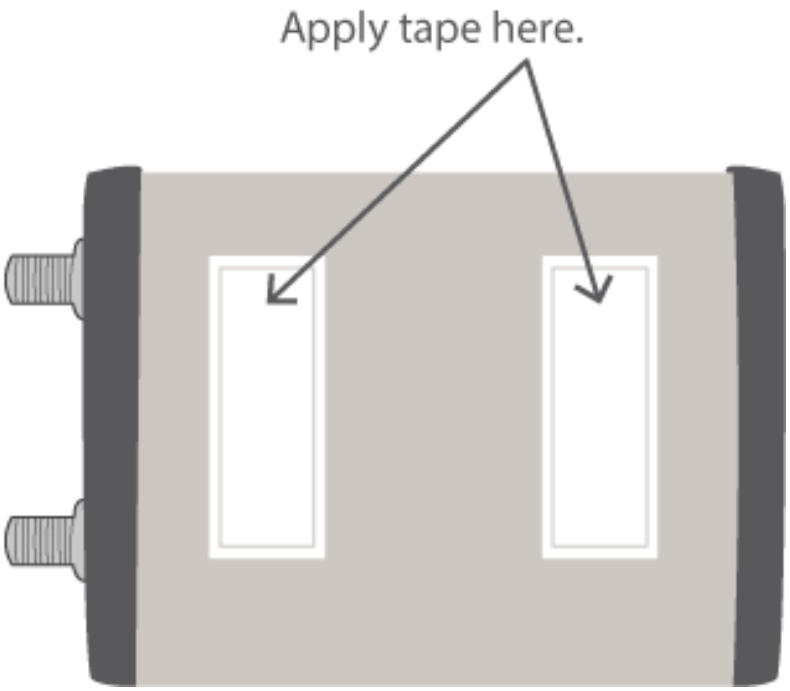
The S2C Link is a rugged product that can be attached to equipment in numerous ways. The retail packaging includes two methods to adhere the S2C Link in the end application.

4.1 Adhesive Tape

The retail packaged product includes two pieces of weather-resistant, double sided polyurethane foam adhesive which can be applied to the enclosure to adhere the product to a surface. The adhesive attaches well to rigid surfaces.

1) Wipe dust from the surface of the S2C Link and apply double sided tape as shown.

2) Wipe dust from surface of the equipment and press the S2C Link firmly to the mounting surface for 30 seconds.



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4.2 Reusable Strap

The retail package includes one re-usable strap that can attach to many surfaces and provide an installation option that allows you to later remove the product if necessary.

1) Screw strap to desired surface using screw or bolt appropriate for the surface type.

2) Wrap strap around S2C Link and tighten strap to secure the product.

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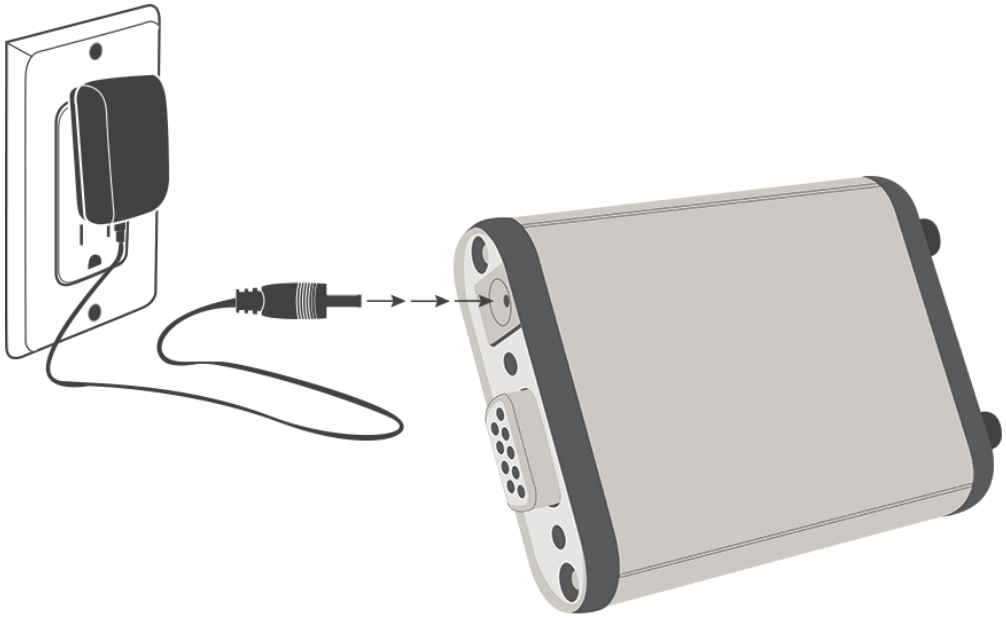
5. Powering the Modem

5.1 Barrel Jack Power

While using the DB9 port for serial communications, the modem can be powered by the barrel jack input. It is also possible to use the USB connection to power the modem, assuming the upstream USB Host port can handle the current requirements for the specific modem type. Users will need to check the specifications on the USB port they plug the S2C Link Accessory kit into to ensure there is enough power available.



5.2 USB Power

The USB port can power the modem assuming the upstream USB Host port can handle the current requirements for the specific modem type. Users will need to check the specifications on the USB port they plug the S2C Link Accessory kit into to ensure there is enough power available. If the USB Host power is insufficient, then supplemental power must be provided via the barrel jack input.

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6. Serial Connections

6.1 USB Port

The USB port is a type Mini-AB and acts as a client interface.

6.1.1 Connecting to Microsoft Windows 7 or 8 devices

While there are no drivers necessary for the S2C Link Accessory Kit itself, a Windows USB device driver is required in order to recognize the Skywire modem being used with the S2C Link. The Windows driver files are available on the NimbeLink product page for each Skywire™ modem being used in the S2C Link Accessory Kit.

After the driver has been installed, the modem can be plugged into the PC via a USB cable and the operating system will recognize the device and instantiate multiple COM ports that are available for use to communicate with the modem.

6.1.2 Connecting to Linux devices

Some Linux distributions recognize the unique modem USB IDs and will instantiate serial communication ports. If the modem is not recognized, then the USB device IDs must be added to the system.

After the COM ports are established, there are multiple ways the modem can be used:

1) Send AT commands directly to the modem. See modem-specific AT command manual for more details.

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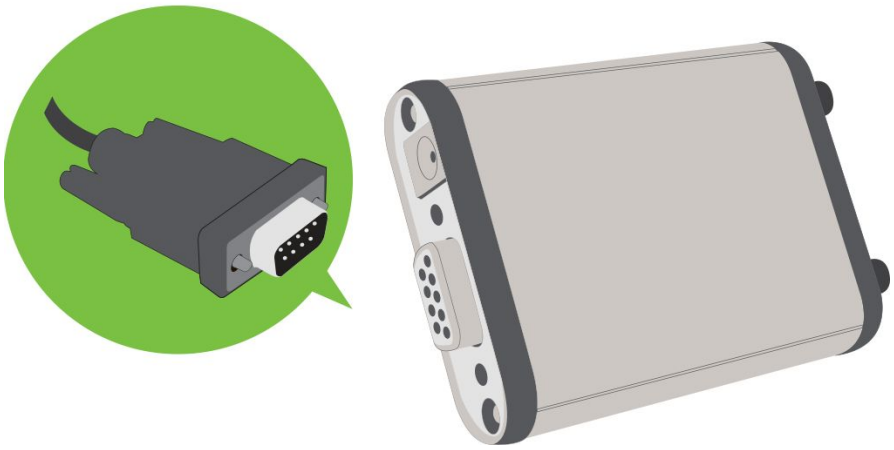
2) Establish a PPP link. See modem-specific PPP link application note for more details.
3) Establish a QMI, NCM, or CDC_ETHER modem-specific communications link. See modem-specific application notes for more details.

6.2 RS232 DB9 Port

The DB9 connector interface provides an RS232 communications port.



6.2.1 Serial Settings

Default Baud Rate: 115.2Kbps

Default Format: 8 bits, no parity bit, 1 stop bit

Most modems support auto-baud rate setting; however, you can explicitly set the target baud rate using the AT+IPR command. For more details see the AT command manual specific to the modem.

6.2.2 Connecting to devices

Connecting the RS232 port to a compatible device will allow the device to communicate directly with the Skywire's™ AT command interpreter.

The device must drive CTS and RTS signals to proper state or the modem will not respond.

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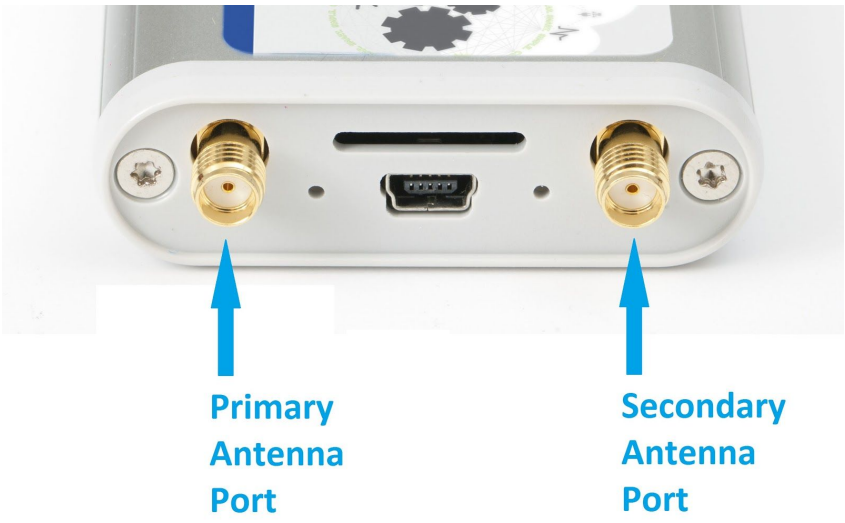
7. Antennas

The S2C Link can accommodate two external antennas. The Primary antenna port must always have an antenna connected and the diversity antenna should be connected on all Skywires™ that support a diversity antenna. Please refer to section 1.3 to view the recommended antennas.



Note: The 2G 1xRTT, 2G GPRS, and 3G HSPA modems does not use the diversity connection.

When the modem is placed inside another metal cabinet or deep inside a building, it is advantageous to use a remote-mount antenna. The modems use a standard SMA port and can accommodate many aftermarket externally mounted antennas.

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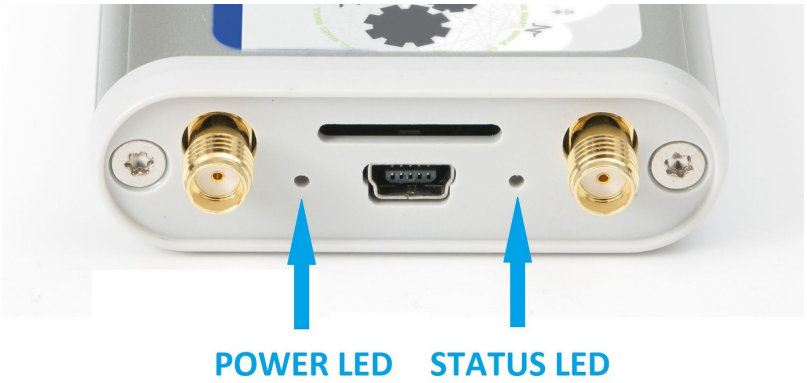
8. LEDs



8.1 Power LED

When power is applied to the modem, the Power LED will light green.

8.2 Status LED

The STATUS LED is a flexible use LED that is often used as a status indicator by the Skywire™ modem to indicate the current operating mode of the Skywire™. It is driven by pin 13 from the Skywire and can also be manually configured by sending AT commands to the modem. Please refer to the user manual and AT command manual for the specific modem being used.

9. AT Commands

Each modem uses a unique set of AT commands. Please refer to the appropriate AT command manual for each underlying Skywire™ modem to learn more.

- Nimbelink's Skywire™ Cellular Modems

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