3.5 – Cascade-IoT Modem Power Draw

The modem is designed to run on an input power source from 7V to 30V. Typically, when installed in a traffic counter like the Omega X3, the power comes from a set of 8 D-Cell batteries which vary from 7V to 13V (depending on how much power is left in the batteries). Once the battery voltage drops too low, the modem will become erratic and may not respond to links (either outgoing or incoming). This does not affect data collection by the counter.

It is important to remember that when using D-Cell batteries the measured voltage when the batteries are under load is often lower than when the batteries are measured under very low load. For example, if you install 8 new D-Cell batteries into the Omega X3 and then check the "Secondary" voltage level with Show Status, it may read something like "12.8V".

However, the moment you turn on the modem (putting the batteries under load), that voltage may immediately drop down to something like "11.6V". This is normal with D-Cell batteries, because their measured voltage is highly dependent on the load they are under.

One additional thing to consider is that the amount of power that is drained out of the batteries varies directly with the voltage they are currently at. The chart below shows this:

8 D-Cell Battery Pack Voltage (when under load)	Current Draw when modem on, but not transmitting	Current Draw when modem on and actively transmitting.
13.0V	24mA - 27mA	78mA - 80mA
12.0V	27mA - 31mA	85mA - 89mA
11.0V	29mA - 31mA	89mA - 93mA
10.0V	32mA - 35mA	98mA - 101mA
9.0V	36mA - 39mA	107mA - 112mA
8.0V	39mA - 44mA	122mA - 127mA
7.0V	45mA - 50mA	139mA - 144mA

Using the chart above, and knowing that an Alkaline Long Life D Battery has typically 17AHrs of current (with 7.1AHrs drained before pack drops below 7.0V), then the following life expectancy can be determined for the two major methods of using the Cascade-IoT Modem:

<u>Cascade-IoT Modem used to upload its collected data each night:</u>

Modem turns on, immediately connects to Diamond Data Server, uploads file, and then turns off. It's assumed to be actively transmitting all the time it is on. With an average upload time of 15 minutes, the 8 D-Cell battery pack will last approximately 9 months.

<u>Cascade-IoT Modem put into "Listen" mode and is on all the time:</u>

In this situation, the modem is turned on and immediately links to the cellular service provider. From there, power draw depends on how much communication goes back and forth between it and the host connecting computer.

Modem in "Listen" mode but never linked to: Power draw will average 35mA over life of battery pack, which gives a useful life for 8 D-Cell battery pack of ~8 days.

Modem in "Listen" mode, linked to, and constantly transmitting: Power draw will average 100mA over life of battery pack, which gives a useful life for 8 D-Cell battery pack of ~2.9 days.

Modem in "Listen" mode, linked to, and transmitting 50% of the time: Power draw will average 67.5mA over life of battery pack, which gives a useful life for 8 D-Cell battery pack of ~4.3 days.

NOTE: The above assumes batteries operating in ideal conditions. Extreme cold, heat, age of battery, and type of battery can all affect operation. It is best to count on no more than 2/3 of the estimated time for critical data collections, and to always use high quality batteries.