

M2M 3G Modem Installations:

Which Carrier Has the Best Coverage For You?



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Growth in the machine to machine market has been driven by lower cost 3G modems that are multi-band and have become relatively straightforward to integrate into everything from Electric Vehicle Chargers, ATM's, Kiosks, smart meters, and used in numerous other remote monitoring applications. Several estimates have predicted that there will be over \$1.5 billion M2M connections within the next ten years. The soaring demand to install 3G modem poses a challenge when deciding on which cellular technology provides the best signal coverage at a given location. Costs are certainly important, but signal coverage, antenna placement and data thru-put are also important factors to consider when installing a 3G modem.



Sprint



Electrical contractors need to decide which 3G modems they will install (Telit, Sierra Wireless, etc.) and which carrier they will commit to. (Sprint 's CDMA & PCS or AT&T's UMTS, GSM, GPRS, etc.) Carriers offer numerous plans, many of which can be as affordable as \$10 per month for data only. The average 3G modem does not experience the industry's typical 'churn' that a mobile phone carrier faces. It is common for consumers to "carrier hop" every two years, enticed by the latest mobile phones. In contrast, a typical 3G modem installation will not change carriers for at least five years.

3G modem installations are lucrative for carriers if there are minimal customer service issues once the modem is

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installed properly at a fixed location. Carriers do not need to spend millions on advertising to gain and retain customers as with mobile phones. When carriers sell a phone plan they typically do this one at a time, which is costly because it requires a sales person and store front. When a 3G modem and carrier are selected, this typically involves larger install contracts where there might be thousands and/or tens of thousands of low cost data plans that are put in place typically for five years or more. M2M is ideal for carriers in that it does not eat up bandwidth as the modern 3G/4G smart-phones do where users have an insatiable appetite for downloading apps, movies, songs and surfing the internet. For instance, AT&T faced numerous challenges when Apple's iPhone sold beyond many predictions and choked the pipeline with millions of users downloading apps. This unprecedented bandwidth demand drove the carrier to address the hardware/base station equipment to maintain capacity expansion.

There are no effective methods to determine the best carrier short of depending upon the five bars on a cell phone. In order to accurately assess various carriers' coverage, you'd need to be like an octopus, holding a half dozen different phones (one for each band/carrier that has a service plan) and visually comparing all the bars simultaneously for coverage. All of the carriers put out color-coded coverage maps to give consumers an idea of how well they cover a given area. While comparing carriers one quickly learns that they establish geographic competitive advantages by strategically placing cell towers

along densely populated stretches, cities and areas that will maximize customer coverage. They also tend to focus build-out in markets where their competition does not have coverage. All of this leaves one with the same question when installing a 3G modem. How do I know which carrier has the best coverage at a given location? Even more important is the question if the carrier that you are committed to has a signal sufficient for a reliable connection at this location.

“Designing a simple to use tool that can measure multiple technologies (CDMA, UMTS, GSM and GPRS) and bands was a challenge, but has paid off in an effective and affordable product for installers.”

James A. Bush, Ph.D., BVS Sr. DSP Design Engineer

Installers of M2M 3G modems often face a daunting task that requires not only the physical and electrical connection of their charger/vending machine/ATM, but also the RF-Radio Frequency decision of determining which carrier at a given spot has the best signal strength coverage. Traditional drive-studies do not allow the time nor precision required to maximize coverage and revenue on cell towers serving M2M clients. Furthermore, with M2M installs the antenna placement is often critical to ensure that the communication link is optimum to neighboring cell towers. In some instances there may be other considerations such as physical constraints where the installation requires placement of gear on a concrete pad or perhaps a necessary electrical drop.

Another challenge that needs to be addressed is the maintenance. Radio signal parameters and RF propagation conditions frequently change. New towers are erected, carriers change the power and geometry of the antennas, new buildings are built that can cause shadowing of a signal at the particular location, etc. Periodic signal strength measurement or, at least, the ability to troubleshoot a problem due to the changing conditions is a necessity.

“Throughout the design cycle we have focused in on a niche product that addresses our customers needs of measuring the signal strength of several carriers in a single handheld tool. With the cellular M2M market exploding I am excited to see this product launched.”

Boris Sheyer, Ph.D., BVS Sr. Digital Design Engineer

To address these challenges, Berkeley Varitronics Systems, Inc. of Metuchen, New Jersey developed an advanced tool called The Squid Cell Tower Tester. The Squid effectively simplifies the process of determining signal strength coverage by scanning multiple carrier bands and determining which carrier has the top coverage. The bright OLED display lists the top three carriers in order of their respective signal strength measured from the cell tower at a precise location. This is extremely valuable in saving time and money. Should the installer simply choose the cheapest service plan with a carrier and that carrier does not have adequate coverage, they will risk losing revenue when the 3G modems cannot communicate the transaction. Eventually, there will be complaints relayed back that require an on-site technician to troubleshoot the problem.



Network	Type	RSSI
SPRINT	CDMA	-98
T-Mobile	GSM	-56
AT&T	WCDMA	-82
AT&T	GSM	--

Squid's OLED display shows the top carrier signal by RSSI

The Squid also has an integrated GPS navigation receiver that can provide precise latitude/longitude so one has positional information that is correlated to signal strength. This is useful when contractors document the install. There is also an integrated mini USB on The Squid that allows for the downloading of collected parameters that can be printed out for installation reports that are useful for contractor billing purposes. The unit is hand-held, ruggedized, and powered by the supplied car adaptor or internal Li-Ion battery system.

With The Squid™, installers will not need to guesstimate which carrier has the best coverage but rather quickly measure actual signal strength at each independent site to provide the answer to the question at the onset. Which carrier has the best coverage? At the end of the day only The Squid can answer that question.

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