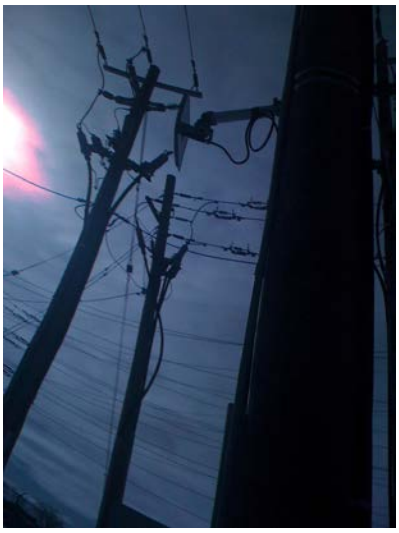


Teletics Application Note

Using the MoNet in Electrical Revenue / Interval Metering Applications

Rev 1.1 – Jan 2016

Most Electric Utilities in North America operate a meter data gathering system called MV90.

MV90 uses a dial out modem pool to call out to thousands of electrical meters located throughout their service area of substations and large client locations.

Many utilities also have large numbers of meters that use dial up phone lines to communicate with their MV90 system.

Customers may be looking for a way to adapt their dial up meters to newer communications methods including wired internet, cellular, or their own private IP networks, either to reduce cost, or to simplify servicing these meter locations.

The Teletics MoNet product is specifically designed to allow customers with dial up meters to easily transition these meters to *any* IP based communications system, including:

- Cellular
- Wired Internet
- Fiber
- DSL
- Cable
- Satellite

Customer Benefits / Cost Savings

The MoNet accomplishes this transition without any changes to the meter and is completely compatible (and fully tested) with MV90. Customers do not have to make any changes or install any upgrades to their existing MV90 system either, such as adding IP networking option, since MV90 still "thinks" it is just dialing a phone number. This can provide all the cost benefits of using an IP network to obtain meter data, without any MV90 upgrades required. Keeping MV90 dial up only can save the customer up to tens of thousands of dollars in software upgrade costs, as well as keep existing dial up meters and the way MV90 dials them exactly as they are today, if the customer wants. The customer can upgrade 1 meter, or some or all of their fleet, whenever they please.

The MoNet will eliminate the need for a phone line at the meter site, also without making any change to the meter. It is also compatible with any meter from any manufacturer. All cellular

phone companies can support the MoNet using their standard cellular products, since the MoNet simply requires internet data service. So if a customer has a particular SCADA radio that they use with their preferred cellular phone provider, the same radio and service can be used with the MoNet. So the customer saves the cost of changing to a new meter.

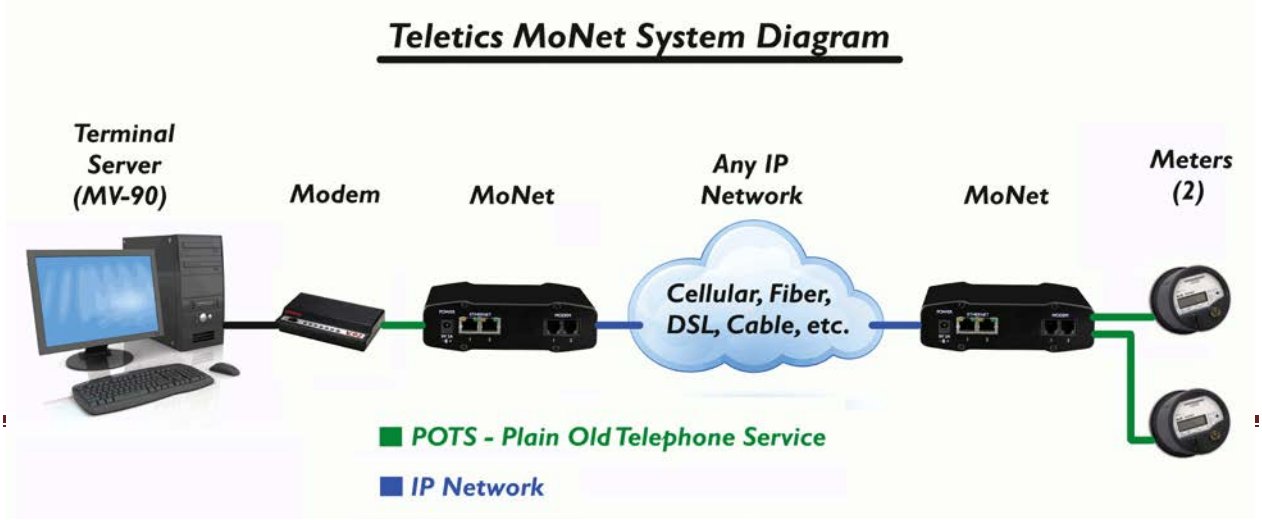
Most Cellular companies have a much lower monthly cost for meter reading with MoNet. Typical cellular plans can be as low as $5 to $10 per month with the MoNet and cellular, versus $50 per month for a dedicated phone line. When an internet connection is available at the metering site, the monthly service charge from the phone company can be entirely eliminated.

Lastly, since the MoNet converts the meter to use a standard RJ-45 network (internet) interface, which can use any type of internet connection, the customers investment in their meters, and in the MoNet is protected against any future service changes the telephone companies perform without ever upgrading the meter itself. This way, when the cellular phone company calls to say that they are phasing out the service you have at some point in the future, you only need to replace the cellular modem, not the MoNet, or the Meter.

How it Works

The MoNet is a Modem to IP converter. Here is a picture of the product, both front and back:

A typical meter site often contains two meters, a primary and an alternate. The MoNet has two Modem jacks, so to convert a two meter site to MoNet, you plug in the phone connections on BOTH meters into ONE MoNet, as below:



The blue cloud in the picture above refers to the internet. At the metering site, you can use any internet connection available, including cellular, DSL, cable, satellite, or any internet connection available.

You can also have multiple MoNets sharing the one internet connection. The two Ethernet ports on the MoNet allow you to "Daisy Chain" multiple MoNets to one cellular radio, or Ethernet connection.

The modem(s) that are used to dial meters using a MoNet have to be used only for dialing other MoNet sites. MV90 supports this. You simply tell it to dial a specific meter using a specific modem, or group of modems. Also, one MoNet at the MV90 location can dial hundreds or thousands of MoNets located in field locations, the same way one regular modem can dial many dial up meters.

MoNet Operating Modes

MoNets have two operating modes. The only difference between these modes is how the MoNets dial each other, and ongoing operating cost. Customer can choose whichever mode is easiest for them to implement, in balance with their budgetary requirements.

"Client Mode" is absolutely identical to having a phone line at the site. Each of the MoNet RJ11 jacks is assigned a phone number, and any other MoNet in the world simply dials the number of the destination MoNet that they want to reach, absolutely identical to today's public telephone network. Teletics can even program the MoNet at a particular site to have the same phone number as before, meaning that absolutely no changes are required to use the new MoNet system.

The advantage of "Client Mode" is speed of deployment. All "Client Mode" MoNets are centrally configured by a Teletics server, and the MoNets simply connect to this server over any internet connection. All administration is centrally managed by Teletics. For this reason, "Client Mode" has a monthly operating cost, similar to a monthly fixed phone bill, for each MoNet. Due to the ease of deployment, our first time our customers generally test "Client Mode" MoNets for their applications. They leave our factory with phone numbers assigned, and all that the customer has to do is plug them in to the internet to work. However, if our customers wish to move to the "Peer to Peer" mode at a later date, they can do so without changing hardware. A firmware update over the internet is all that is required.

"Peer to Peer Mode" differs in that it requires that the dialing modem "calls" the IP address of the destination MoNet, instead of a phone number. For example,iIf you have a MoNet that you want to dial at an IP address of 68.55.29.42, you would tell MV90 to make the dial string 66*55*29*42*1 to reach the primary meter, and 66*55*29*42*2 to reach the alternate meter on the second RJ11 port. The MV90 system needs a MoNet at the MV90 end. (The MoNets only talk to other MoNets).

The MoNet supports * delimited IP addresses, the dial string can be "zero padded". Using our example above, you could dial 0660550290421 or 0660550290422.

In the “Peer to Peer Mode”, there are no monthly charges. There is only the capital cost of the MoNet devices. “Peer to Peer Mode” is easily done on a private network, but implementation gets more complicated if there are firewalls that have to be traversed over the network connection.

Other Considerations / Applications

Any customer who has a metering site where the phone system is being converted to VoIP will discover that their VoIP system is incompatible with any kind of modem communications. The MoNet can fix this issue for the customer by allowing proper modem operation over an IP network. By providing this functionality, the customer will have the ability to completely transition the site away from older telephone services.

Very remote metering sites that can only be reached with satellite communications can also benefit from the MoNet. Since most current satellite providers can provide a simple internet connection to the site, the MoNet takes care of all the necessary Modem conversion required, simplifying the installation of this type of location considerably. Also, the MoNet is not sensitive to the latency or jitter that is typical with satellite (or poor quality) internet connections. Satellite connections with relatively low baud rates will also benefit, since the data rate required is similar to the modem speed, unlike most VoIP systems, which require dedicated bandwidth to achieve reasonable voice quality.

Cellular / Internet Service Requirements

When using a cellular radio with the MoNet, the customer should specify that they need standard internet access, if using a MoNet in “Client Mode”, or a static IP address on a private network if using the MoNets in “Peer to Peer” mode. Usually, the cellular company also has to specify an APN, which is programmed into the cellular radio. This fixed IP address is what MV90 will dial in order to fetch the data at that meter site if in “Peer to Peer” mode, or the MoNet will have a standard phone number in “Client Mode”.

MV90 Additional information

Keep in mind that you need a MoNet at both ends of the communications link.

Additionally, line sharing devices, such as the Stick and ACP from Multi-link, also are supported. For example, if you have a Stick on the first MoNet port, and you want to dial through to the 3rd port on the Stick, your dial string would be 66*55*29*42*1**3. The additional * character is required, since the Stick also needs a * character to indicate the port you wish to select.

Similar Products, and Differences

The MoNet has few competitors, and many have discontinued manufacturing, primarily due to their incompatibilities with newer cellular networks that create higher data speeds, but introduce more jitter and sometimes, delays. Designs that use a simple transmit and receive of modem tones by converting sound to data, similar to a sound card in a PC, will generally fail with newer cellular networks.

The MoNet is a complete Modem and Mini-PC at each end. The data only data that gets transmitted over the IP connection is the serial data.Examples include:

- Sierra Wireless (AirLink Communications) had a product called an RJ-11 IP Gateway.
  - Discontinued by the manufacturer.

- Telular SX5T PhoneCell
  - 14.4 kbps maximum data rate
  - Circuit switched data approach, versus true modem to IP conversion which can use much less expensive “data only” cellular plans.
  - Specific setup required for each modem type
  - Dependent on 1XRTT CDMA service, which is deprecated and soon to be discontinued.

Physical and Environment

The MoNet measures 5.5” x 4.25” x 1.625”.
Its operational temperature range is -40C (-40F) to +70C (+155F).
Brackets are included for both panel mount and DIN mounting.

For further information on the MoNet, please contact your Teletics distributor.