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Tech note

Submetering? Don't Take the Hardware for Granted

Introduction

Submetering is also know as automatic meter reading, or AMR, and is the most accurate option available for multifamily housing utility billing.

As a property owner or manager, there are cases where ratio utility billing systems, or RUBS, make sense and cases where a submetering system is a better fit. For those properties where you choose submetering, it's important to remember that the system has to be properly installed, maintained and eventually, replaced. For this reason property managers can't take the hardware for granted. This tech note provides guidance on what to consider to make sure you get the most out of your submetering system.

Submetering Hardware

A submetering system typically includes the following hardware components: Utility meters, transmitters, repeaters, a gateway, and billing software, operating as shown in Figure 1.
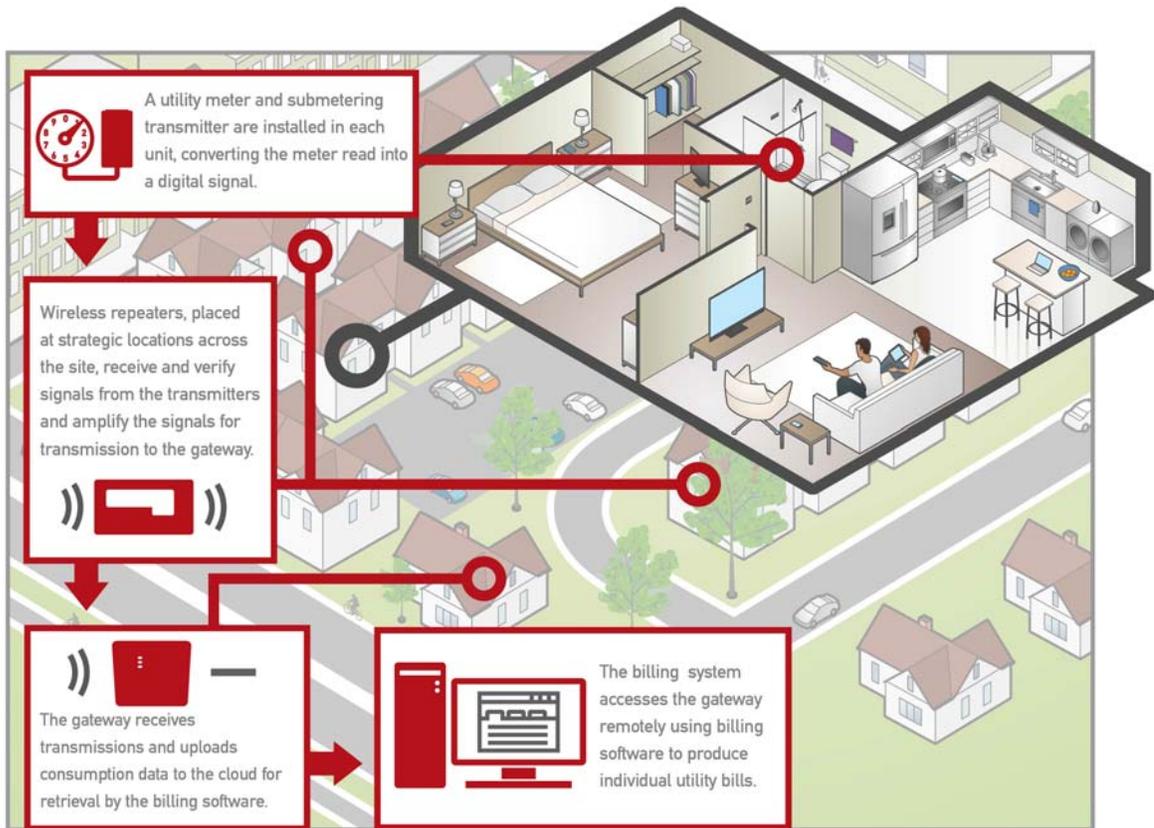

A utility meter and submetering transmitter are installed in each unit, converting the meter read into a digital signal.

Wireless repeaters, placed at strategic locations across the site, receive and verify signals from the transmitters and amplify the signals for transmission to the gateway.

The gateway receives transmissions and uploads consumption data to the cloud for retrieval by the billing software.

The billing system accesses the gateway remotely using billing software to produce individual utility bills.

Figure 1 Hardware components of a submetering system

Submetering Hardware Considerations

The submetering hardware itself is the core of a submetering system. Following are some of the things to keep in mind when weighing different submetering systems to get the most out of your hardware.

Installation

Does your submetering provider professionally install your wireless hardware with a certified technician? The wireless technology used for submetering systems, typically 900 MHz frequency hopping spread spectrum, is the ideal radio frequency (RF) protocol for this application. It was developed to send small packets of information across long distances, with a signal that can effectively cover commercial construction environments. But the system must be installed with some care to ensure effective operation.

For more information about about RF signal propagation, see the "Characteristics of RF Wireless in Commercial Applications" white paper; for more information about installation see the "Inovonics Device Installation Recommendations" tech note. Both are available at www.inovonics.com.

Certified technicians understand installation best practices. For example, transmitters must be placed away from metal, protected from the elements and properly connected to compatible meters. Likewise, because repeaters hear a transmitter's signal and boost it to ensure the message reaches the gateway, many assume that more repeaters are always better. But overpopulating a site with repeaters can lead to too many messages bouncing back and forth, ultimately resulting in dropped messages. Gateways also require careful placement, again avoiding metal and other RF-emitting hardware.

The best way to make sure your system is installed in a way that provides the best results is to ensure hardware is installed by a certified technician. If the hardware manufacturer does not offer a certification program, you should ask your submetering provider to find one that does.

Life Expectancy

At Inovonics, some of our submetering systems have been in place for decades and still function. But the reality is that messaging technology is advancing faster than it takes for the hardware to wear out. Meaning that a property owner may end up with a system reliant upon underlying technology that's not as efficient and effective as it could be.

The most visible example lies in submetering systems that rely on modem rather than IP connectivity. Back in 1997, when Inovonics launched its first submetering system, a modem was cutting edge. Today submetering systems that still rely on modems are slow and inflexible when compared to IP-based systems.

Make sure to understand your hardware's life expectancy and how the manufacturer supports updates. Further, plan your budgets accordingly to account for ongoing hardware refreshes across your portfolio. You'll continue to benefit from what submetering systems have to offer when not get locked into technological dead ends.

Accuracy

The submetetering system you deploy is only as accurate as the meters to which the transmitters are connected. The transmitters will continue to do their job of counting pulses regardless of whether the meter is providing accurate data or not. So while considering life expectancy for the submetering hardware, it's also a good idea to think about meter life expectancy. As the meter ages, you might not recover all the utility costs you should. Which, after all, is what a submetering system is supposed to do.

Simplicity

The hardware devices that compose a submetering system are all comprised of electrical components. The more complicated the hardware, the more things that can go wrong. The good news is that the job a submetering system performs is pretty simple: It provides water, electrical, and gas usage data for a billing system to generate a utility bill. The best submetering systems will focus on what's required to perform the job. Be wary of bells and whistles which will do little more than increase the price and introduce new points of failure.

IP Connectivity

We live in the age of the cloud. For a submetering system, this means that reads data can now be aggregated at the portfolio level and accessed anywhere there is a reliable Internet connection. The operative word though is reliable. To illustrate the point, consider a high-performance sports car that can't find the highway on-ramp, or better yet, is stuck in a parking lot. Similarly, an IP-based submetering system that can't reliably connect to the Internet is of little value when you need to bill your tenants.

Ensuring a professional installation will alleviate this issue. A certified installer will be familiar with the minimum requirements needed for reliable IP connectivity.

Battery Requirements

Inovonics offers a transmitter with a ten-year, non-replaceable battery, which is a good option where more frequent battery replacement battery replacement is problematic. For instance, when transmitters are installed in hard-to-reach locations.

Even the highest performing wireless transmitter will need new batteries once in a while. But because you want to disrupt tenants as infrequently as possible, long battery life is a key requirement. For that reason, here are some questions to ask your submetering provider:

- How do you know when batteries are running low?
- Will they take care of it as part of a maintenance agreement or is it something you're responsible for?
- If they're responsible, how will they gain access to a tenant's apartment?
- If you're responsible, what's the battery life and how much do they cost to replace?

- Will they install the batteries the manufacturer specifies or just get the cheapest they can find? This is critical because it can impact battery live, and in some cases, if the wrong battery is installed, damage the transmitter.

Battery Backup

Power outages are a fact of life, and while submetering transmitters are typically battery powered, repeaters and gateways require line power. Moreover, IP connectivity may not be available during a power outage.

To ensure that customers can be billed for utility usage during a power outage, make sure you understand the back-up capabilities of your hardware. Is there a back-up battery? If so, how long will it last? If IP connectivity is interrupted during a power outage, can cellular be deployed as a back-up connectivity option?

Extensibility

A multifamily submetering system relies upon a wireless platform. If you've decided to invest in the wireless platform for submetering, it's a good idea to ask yourself what else you might want to monitor across your properties that could run on the same platform. Examples include:

- Detecting standing water from leaking hot water heaters, appliances or sinks.
- Monitoring vacant units for mold conditions or excessively high/low temperatures.
- Safeguarding air conditioning units from copper theft.
- Receiving pipe freeze warnings.

Once the wireless platform is in place, make sure the hardware your submetering provider recommends can do more than just support submetering. In this way you'll maximize the return you get on your hardware investment.

Summary

For those multifamily properties where submetering is a good fit, take the following under consideration to ensure you're getting the most out of the hardware:

- **Installation.** Ensure it's done by professionally trained, certified technicians.
- **Life expectancy.** Know how long the hardware is expected to last, how it can be updated to extend the useful life, and budget for hardware refreshes accordingly.
- **Accuracy.** Understand the typical performance of the water meters to ensure they are providing accurate data to the transmitter
- **Simplicity.** Be wary of extras that you don't really need.
- **IP connectivity.** Make sure your submetering provider understands the system's minimum connectivity requirements, recognizing a property may require dedicated cellular or WiFi connectivity if Ethernet is not a viable option.
- **Battery requirements.** Know how often they need to be changed and how your provider supports battery replacement.
- **Battery backup:** Understand how your submetering hardware will fare in a power outage, taking steps to ensure your ability to bill customers for utility usage is not compromised.
- **Extensibility.** Consider other conditions you may want to monitor on your property and how the platform deployed for submetering might be able to support these other applications.