

## Lowering the Total Cost of Ownership of a Sub-metering System

by Hugh Lindsay, Schneider Electric

The significant economic benefits of sub-metering energy consumption in large commercial and residential buildings are well documented. Direct and indirect savings can often amount to 20% or more on a typical energy bill, yet many property owners and managers have still not embraced a sub-metering strategy. The primary barrier to implementation is often considered to be cost. The largest component of this is not the hardware, but the labor to install and configure each sub-meter on tenant spaces and other metered areas throughout a facility.

Emerging wireless metering system technology offers a substantially lower total-cost-of-ownership for a complete sub-metering solution. This paper describes how intelligent meters and wireless communications can reduce labor and costs for contractors, manufacturers and systems integrators to install and commission a system.

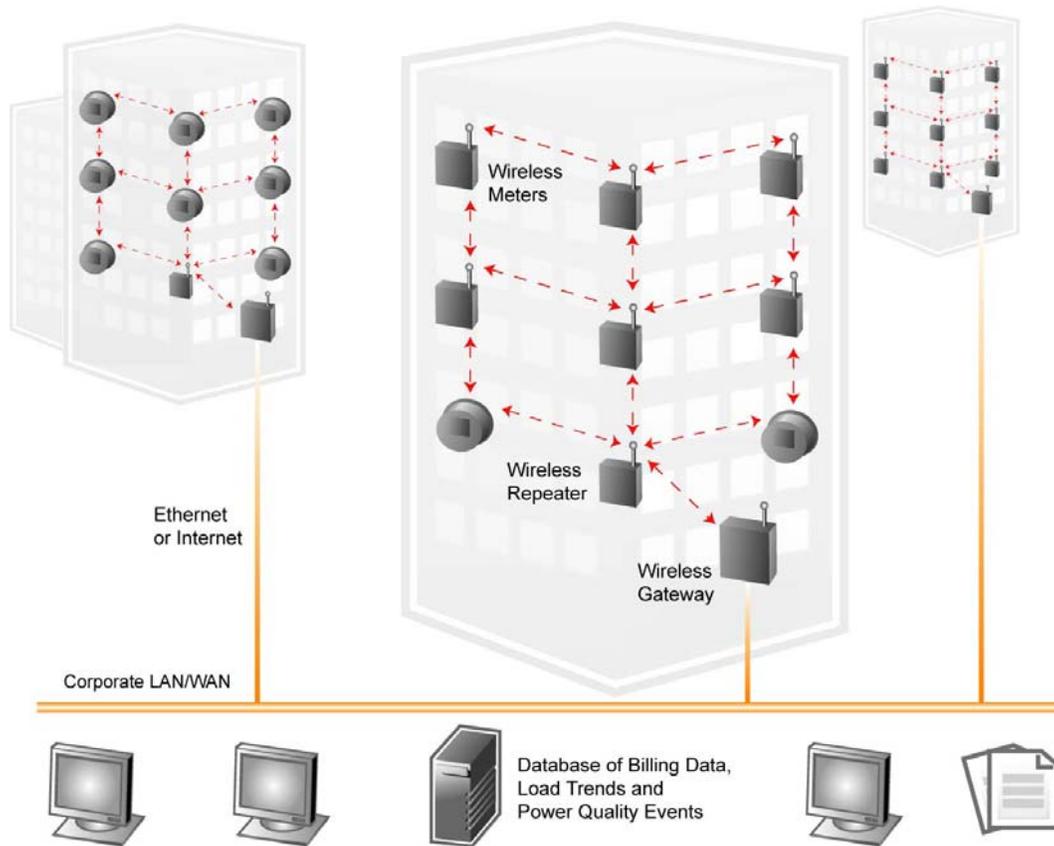


Figure 1 Sub-metering system using intelligent meters and wireless communications

### **The Traditional Barrier to Sub-metering**

Research done by the New York State Energy Research and Development Authority (NYSERDA), a strong advocate of accurate information as a driver of energy efficient behavior in consumers, estimates that “installing sub-meters in master-metered buildings can reduce building-wide electricity consumption by 18-26%”. Yet despite the strong potential for savings, many residential, commercial and retail buildings either:

- have no individual tenant sub-metering, opting instead for flat rate agreements or cost allocation methods that fail to represent actual energy usage
- or
- rely on antiquated technology and inefficient manual data collection processes that often lead to inaccurate readings and additional costs.

The barrier that many of these companies face is cost, not just the cost of the metering devices, but also the costs of installation and setting up automated data collection that can easily double or triple the cost of the meter.

### **New Wireless Sub-Metering Technology**

New intelligent metering devices and wireless communication technologies are helping to eliminate these additional cost barriers, often by as much as 70%. Because actual meter prices are often only a small percentage of the overall cost of the project, new wireless technologies and methodologies focus on lowering installation and commissioning costs to reduce the total cost of ownership (TCO).

Key features of wireless sub-metering systems:

1. Wireless networking eliminates the cost of installing traditionally used RS-485 communications networks, which are typically 20 to 35% of the total installation charges (depending on the site topology)
2. Meter diagnostics alert the installer to common wiring meter and communication wiring on start-up, eliminating the need to return to the meter and correct errors at a later date
3. “Plug-and-play” wireless networking and data collection software automatically detects the meters to minimize the time required for on-site factory personnel system commissioning
4. Remote start-up and system commissioning ensures the system is operating efficiently and that the data gathered is accurate and reliable

The following sections explore these cost advantages in more detail.



*Figure 2* Typical components of a wireless sub-metering system, including solar-powered wireless repeater, wireless gateway, wireless socket-mount meter and wireless panel-mount meter with split-core current transformers

### **Cost Comparison of Traditional Versus Wireless Sub-Metering**

The cost of a turn-key implementation of a sub-metering system can typically be broken down into three key components:

- Cost of metering hardware, communication interfaces and system software
- Costs of installation, including electrical contractor materials and labor
- Costs of system commissioning services, performed either by the manufacturer or a systems integrator

In total, these represent the total-cost-of-ownership (TCO) of a sub-metering solution, along with any training time that might be required on the system. Typically, the costs of installation and commissioning far outweigh the costs of the metering, communication and software products required. Thus, by reducing the labor required to install and set up a system, the overall cost of implementation can be substantially reduced.

New wireless sub-metering technology offers a number of cost advantages in this regard. The following sections focus on each of the key areas of labor and material costs, comparing traditional “hardwired” methods to new wireless methods.

#### **Reduced Materials and Labor Costs for the Electrical Contractor**

During a typical metering system installation in a commercial or residential property, an electrical contractor is required to carry out a number of tasks. For each step, an intelligent wireless system offers specific cost advantages over traditional sub-metering.

By eliminating the requirements for routing cable, a wireless solution eliminates RS-485 network planning/design work, costs for conduit and wire, and in some cases the cost of core drilling through concrete walls or floors. Flush mount wireless meters eliminate the need for an external enclosure and all associated wiring, while socket-based wireless meters can re-use an existing socket infrastructure. Connection of the meters to the circuits using split-core current transformers and insulation-piercing voltage connectors avoids the need to shut down power and to provide CT tie-ins or do load verification due to poor labeling in existing buildings.

Automated configuration features offered by some wireless technologies reduce or eliminate mis-wired communications and the need for pre-commission testing, troubleshooting, and verification. LED pass/fail indicators at the meter can help identify CT and voltage connection problems on installation, while some *smart* meters can internally correct for common configuration errors, avoiding the need for rewiring.

Automated wireless *node discovery* offered with some network technologies minimizes the need to gain access to electrical rooms and tenant spaces. Many new wireless meters are smaller and lighter than traditional sub-meters, helping reduce a variety of ancillary costs, including material handling, shipping and distribution of panels.

### **Reduced On-site Commissioning Costs for the Manufacturer or Integrator**

Once the contractor installs the product, the manufacturer or systems integrator typically sends a start-up and commissioning person on-site for a period of time to test the system and configure the data collection software. New wireless technologies offer a number of ways to reduce costs at this stage also.

By essentially eliminating communications wiring, a wireless system avoids the need to verify RS-485 network communications and to fix any potential grounding problems. Built-in meter diagnostics alert the installer to wiring problems during installation, and many other issues can be corrected for remotely through the wireless network.

Some wireless sub-meters are available pre-configured at the factory prior to shipping to reduce on-site commissioning time associated with configuration of CT and voltage connection ratios, etc. And *plug-and-play* wireless networking allows automatic configuration of data collection gateways and other software as the meters are installed.

### **Conclusions**

Each building and sub-metering system application is unique. In many cases, intelligent wireless sub-metering technology can offer a range of cost advantages over traditional hardwired methods by reducing or eliminating the labor and materials associated with each step in installing and commissioning a system.

The information included in this paper, when combined with the knowledge of a specific building, will help a building owner to better evaluate the cost-effective options available for installing tenant metering.

**Schneider Electric recently exhibited in the West Coast Energy Management Congress (EMC), for more information visit: <http://www.aeecenter.org/shows>**

***Author Biography***

Hugh Lindsay is a marketing manager at Schneider Electric. Hugh holds a degree in Marketing and Communications from Simon Fraser University in British Columbia, Canada. He has worked with Schneider Electric clients throughout world to help them understand and leverage the benefits of accurate, timely and relevant energy information for maximizing system performance and achieving substantive return on investment.

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<sup>i</sup> “Demonstration of New Submetering Technologies”, Report 86-8, #PB88-179262/AS, NYSERDA