Consumers benefit from smart grid implementation

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As we look forward to a new year, the Smart Grid and the technologies that enable energy efficiency within the grid will become a part of our daily lexicon as consumers begin to benefit from the grid's implementation. According to some reports about 21 million smart meters have already been deployed in the U.S. with about 58 million more approved. Driving the growth of Smart Grid technology is software, electronics and materials.

In the electronics area, communications in particular is a key application driving implementation. Today most wireless technology in the smart meter is for the meter's connection to the utilities' communication network. Many are also fitted with separate two-way radios enabling connectivity into the home or enterprise. Of the many protocols adopted in North America, the most common are 900MHz band mesh and 2.4GHz ZigBee mesh for utility infrastructure and HAN connectivity, respectively.

Aside from the smart-meter, demand-response (DR) equipment offers near real-time response to energy demands to the providers, and uses the same communications technologies as in smart meters. Within the Grid's infrastructure cell relays, data collectors, routers etc., help the data flow between the utility and the meter.

On the consumer side, ZigBee in-home-displays (IHD), smart thermostats and other appliances complete the connection to the ZigBee radio feature within the smart meter and DR equipment. Via these networks usage information may be collected and analyzed by the utilities to forecast and manage energy demands in order to minimize costs. Likewise consumers may be able to monitor and control their demand in the time domain to lower their own usage costs.

Sensing technologies too are key to driving smart meter/Smart Grid growth.

For example, tamper-detect sensors can immediately transmit signs of tampering to the utility provider allowing quick corrective action and mitigating potential cost rises. “Hidden switch” sensors provide maintenance crews with the ability to toggle the meter’s display modes from the standard “operation” mode to “diagnostic” modes, allowing on-site maintenance capabilities without the need for physically removing the meter. Temperature sensing components help manage the electronic circuitry within the meter ensuring proper operation and function. Sensors also provide service utilities real-time conditions of power lines on the grid. Inside the home or enterprise, sensors convey information on ambient temperature, light, humidity and other conditions to help the consumers manage their environment and energy usage.

The Smart Grid also ties in with other “green” systems within the home such as solar energy and home automation. For example, photovoltaic (PV) solar systems, may allow owners to potentially reduce their electricity cost to zero via “net-metering”. This is essentially the ability of the consumer to sell their PV-solar – generated energy upstream to the utility in the form of a credit to their energy bill. This feature is augmented by the ability of the utility to monitor the user’s energy usage via the Smart Grid so that the appropriate credit may be applied.

Also, home automation (HA) systems have been around for quite a long time. But the surge in Smart Grid technologies have given added vigor to HA applications by introducing features such as home-energy and environmental conditions monitoring

and management. Enabled by the connectivity of smart meters, utilities are offering expanded service packages that include high-load equipment monitoring and control such as HVAC, swimming pool and hot-tub pump systems. Many third parties too are contributing solutions for consumers to take control of their energy usage via power sensing products and communications devices and software. As these solutions proliferate it is easy to see how home automation systems and the Smart Grid are beginning to form a natural association that can be beneficial to consumers, utilities and HA systems providers.

The future of the Smart Grid provides endless possibilities. Once the Grid is in place other technologies, new feature sets, and capabilities will inevitably spring forth. There is no limit to the functionality that might emerge from this platform once the implementation and adoption is widespread.

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