

Smart Grids Need Smart Homes

Advanced metering infrastructure, smart meters and home area networking are all boring terms to describe what is actually an exciting technological effect—the smart home! Give consumers something like the intelligent in-home device that Intel showcased at the Consumer Electronics Show this year, and they will probably feel more compelled to participate in the smart grid revolution

The full benefits of a smart grid can be reaped only with the cooperation of the consumers. However, consumers are not going to do anything unless they get something in return. New technologies in the space promise to bridge this gap, with 'smart' products that will please both the consumer and the utility.

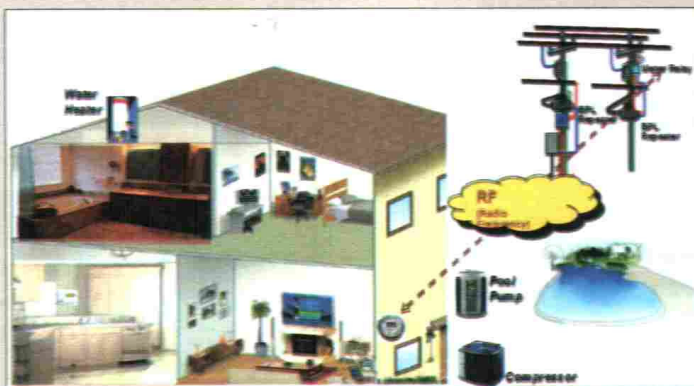
As we have discussed before, the smart grid is actually like a giant supply chain management system for the power sector—it links up the small and large suppliers, the distribution and transmission system, the utility and the consumers. Of these, proactive and cooperative consumers are very important for the success of this whole system. This is because managing technical faults and optimising stuff at the supplier and distributor end is only part of the story. Optimal power supply depends on optimal power consumption, that is, optimisation on the demand side—and this can be done only if the consumers are involved in the process.

Several methods are adopted by utilities in various countries (not many consumer-side measures exist in India, though) to manage the demand—differential pricing, smart meters and so on.

"Even whilst living in the arena of information, we only get to know about our energy consumption after we get the bill in our hands. We still have to place a phone call to the utility if a power failure or outage occurs, and it takes hours to identify and rectify the problem. What if we can govern our electricity bill just by changing the work hours of our appliance, or placing a networked sensor along wires which could locate and report a fault or prevent it from happening in the first place?" asks Priyanka Singh Panwar, senior hardware engineer, Powertech Automation Solutions, which manufactures remote monitoring and control systems.

For all this to happen, the smart grid should manifest in people's homes too. Panwar explains that in people's homes, the smart grid should mean detailed information through home energy-monitoring tools. These can be small displays or Web-based programs that give a real-time view of how much energy you are using, which appliances consume the most and how your home compares to others. Such information will give people ideas on how to cut energy bills.

What is needed to start is a smart meter with two-way communications. A smart meter would give detailed information on usage, and also enable differential pricing—where the consumer would be billed less for power consumed in lean periods and more in peak hours. This is one of the simplest ways of



Home area network (HAN) example (courtesy: Rajeev Shara)

encouraging the consumer to use energy-guzzling appliances like clothes dryers and dishwashers during non-peak hours.

At another level, with home networking and smart appliances, it is possible for the smart meter to automatically switch appliances on or off depending on the load and corresponding instructions from the utility. This helps the utility in peak load management. Additionally, the utility saves the many man-days spent in meter readings, line connection and disconnection, etc, as these can be done through the smart meters. Losses due to theft, wrong meter readings, technical errors and so on can also be avoided.

"In total, we can say that AT&C losses could be reduced to a great extent, with improvement in reliability and quality of power supply and reduction of establishment charges and repair and maintenance expenses. With these improvements, there may be a reduction in tariff structure," says Ramesh.

It is very important that such benefits are passed on effectively to the consumers in order to encourage them to implement home area networking and buy smart appliances—which are auxiliary technologies needed to ensure the effectiveness and evolution of smart grids. A smart meter alone is not enough.

For this to happen, Grid Net's CEO Ray Bel quips that the innovation has to sync with the "gotta see, gotta have" attitude of customers and not happen at the thoughtful, careful speed of utility-side innovation. Consumers need to be tempted with killer apps, including home appliance control, home security systems, video communications, home energy consumption and pricing, home multimedia system controls and more. "With these goodies, consumers will have a plethora of incentives to check in frequently with their Smart Home centre – to