

Intelligent Buildings

Emerging IP network based building management systems can help to increase energy efficiency, improve security and reduce operational costs, find Shivani Mody and Sujit John



The Forum Mall on Hosur Road has a built-in automated and intelligent building management system (BMS) to take care of its lighting, heating, ventilation and air conditioning. The lighting changes as per the amount of natural light available. If there's more natural light, the bulbs and tubelights dim or switch off.

The BMS measures the AC, light and water usage separately for each area. The details are measured and recorded after which each shop gets its own bill (pay per use) through mail.

The mall also uses a video-based system to count the number of people entering and leaving the mall. The video takes images of people and converts them into numbers, sending the information into the building management system. With this data, the mall operator can tell the 75 shop owners in the mall the number of people entering their stores and the conversion rates (people actually buying). It can even find the increase or decrease in number of people during promotional events or festivals, to gauge what works and what does not.

"We are now looking to changing our backbone network from a cable network to an IP (internet protocol) network. We want to create a remote access, management and control capability for additional safety reasons," says Neeraj Duggal, VP of retail development in the Prestige Group, the builder and operator of the Forum Mall.

Duggal may be interested in more safety at the moment, but if he puts in place an IP network, it may enable him to provide a whole host of applications over it that not only

could improve the mall's revenues, but also reduce its costs, increase energy efficiencies and improve customer experience. In fact, IP networks for building management looks to be the future.

"Any building will have 30-35 sub-systems, from heating and lighting to CCTVs, access card readers. An IP system will allow all them to talk to each other, which will substantially increase the capabilities of the system," says Suprabhat Chatterjee, VP of networking major Cisco Systems India.

Talking systems

In the event of a fire in a building, normally you would have a recorded system saying 'Fire' and would ask people to evacuate. With an intelligent IP network, however, you could have sensors identifying exactly where the fire is, and PA systems announcing the location. The announcements on different floors could be different based on where the fire is, so that everyone does not panic and cause a stampede. Your office video phones could be enabled to show you the best exit routes. "And the moment a fire is detected, the system can be programmed to shut down the HVAC (heating, ventilating and AC) system and disable the access control system, so that people can easily move in and out," says Chatterjee.

You could have sensors in a parking lot to measure carbon dioxide or monoxide levels, and in the event they find the level excessive, they could send an alert or automatically signal another system to pump in more oxygen. When there are 6 elevators and not too much up and down movement of people, the system can remotely shut down some lifts and start them later on.

You could have sensors in rooms to detect temperatures or occupancy levels so that lights and air conditioning systems can be adjusted as per requirement. ConnectM, a spin-off from Sasken, has developed an energy management solution based on conversion of the electrical network into an IP network, sensors that detect infra-red emissions from human bodies and the assignment of an IP address to each control point, such as a tubelight or bulb. If the sensor detects no human body, it alerts the network to switch off the lights in the area. "It can even control a single tubelight since each has a unique address," says Vivek Khemani, one of the co-leaders of the company.

The system also has a self learning algorithm that helps to further improve energy efficiencies: if the sensor is set to a 3-minute sensitivity, that is, it is programmed to switch off a light three minutes after it finds no infra-red emissions, and if over a period of time it finds that every day between, say, 4 pm and 4.30 pm the person at the workspace is not there (say he goes for tea during that time), then it would automatically reduce the sensitivity during that part of the day — to 1 minute or 30 seconds.

"You can even have the security system talking to the lighting and AC systems," says Nitya Ramakrishnan, manager for workspace resources in Cisco Systems. If you come into work on a holiday, as soon as you show your access card to the reader at the entrance, the lighting along the pathway to your room could come on, and so also the AC and lighting in your room. All of the other lights and ACs could still be off.

Such systems help substantially in reducing the power consumption in buildings and help conserve non-renewable energy and reduce the carbon footprint. At Cisco's office on the outer ring road in Bangalore, where many of its systems are being demonstrated, we were shown how weekly reports of power consumption in different wings of the campus were being generated to understand usage patterns. Higher loads mean higher rates. So if the system finds loads going high at a particular time, the company could phase out work to reduce peak loads.

Wires vs wireless

The IP system can run either

on a copper or optical fibre network or on a wireless network. Here, the trade off is between speed and cost. The copper and optical fibre networks are costly but give more speed. They can also be deployed over long distances.

"But when it is inside a building, a wireless network is much better. It costs one-third less than the cable installation," says Dhananjay Ganjoo, VP of enterprise solutions in Nortel.

The copper or optical fibre can provide speeds of 1000 mbps but in a wireless network it can be no more than 10 to 100 mbps. "Deploying the wireless mesh or WiMax is better for small and medium businesses as costs are lower. Also, pulling wires to add more offices and areas onto the network is not possible all the time," says Ganjoo. One can create an IP network from the data centre itself by deploying a core switch, an edge switch and floor switches.

Currently, it is mostly MNCs that are seen to ask for such smart buildings. "They realise that it helps them in getting information about potential problems before they actually happen. The systems also cut energy costs by at least 15%," says Arjun Yadav, executive GM in property development company DivyaSree Developers. Clients, he says, want to see and manage the data, as also want more control. "Using a mobile phone, laptop or a PDA, even the security heads want to make changes in the network in cases of emergencies," says Yadav.

"It is important to consider the size of the building while installing these systems," says M C Muthanna, COO of Firepro Systems, a company that provides solutions for the safety and protection of buildings. "Optimum efficiency and comfort level are achieved if the system is appropriate for the size. And it is best if such systems are built in when the building is being constructed. If it is done later, it could obstruct regular work."

With three-quarters of the total expense of a building estimated to occur during the maintenance and operations period (as against the construction period), you may do well to have these systems built in before you move in. Besides, they may help to strengthen your 'green' image.

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