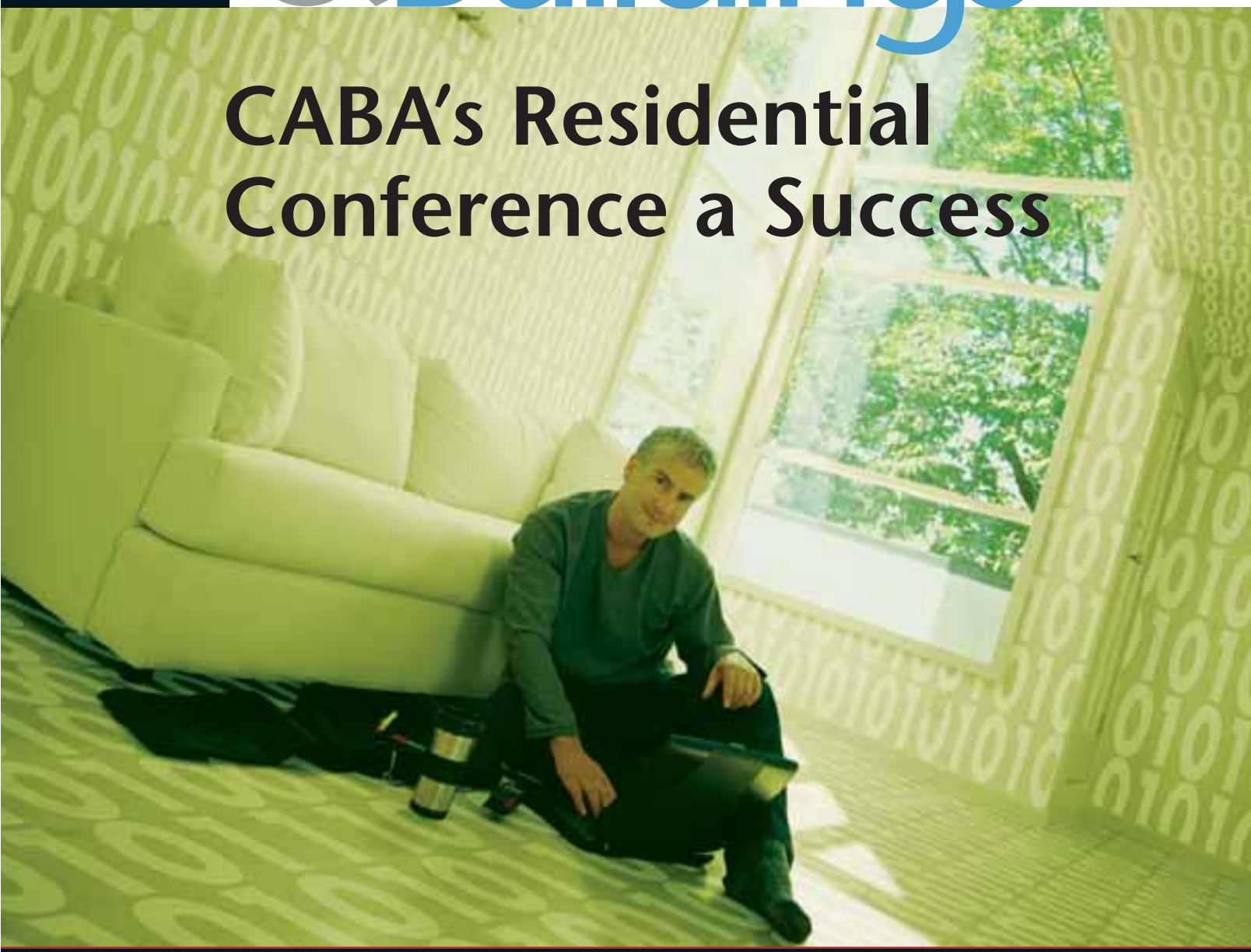
Winter 2005

THE MAGAZINE OF THE CONTINENTAL AUTOMATED BUILDINGS ASSOCIATION

CABA

iHomes & Buildings



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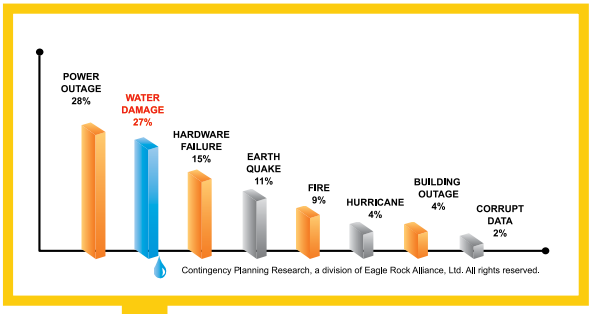
Undetected water leak disrupts business costing $ thousands



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THE MAGAZINE OF THE CONTINENTAL AUTOMATED BUILDINGS ASSOCIATION

CABA

iHomes & Buildings

iHomes & Buildings is published four times per year by Naylor Publications for the Continental Automated Buildings Association (CABA). CABA is a not-for-profit industry association that promotes advanced technologies for the automation of homes and buildings in North America. Our mission is to encourage the development, promotion, pursuit and understanding of integrated systems and automation in homes and buildings.

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CABA President & CEO's Message

Ron Zimmer

CABA IS SOMETIMES seen either as a "large building" organization or a "residential based" organization. The truth is that CABA over the last 16 years has tried to stay focused on its mission, which is: "To encourage the development, promotion, pursuit, and understanding of integrated systems and automation in homes and buildings."

To illustrate the myth of "either-or", when CABA recently embarked on our major research project, the Connected Home Roadmap, Gerry Meade, the Project Leader, heard a number of people indicate that they were surprised to see CABA undertaking this activity, because CABA was a large building organization. The recent announcement that Ipsos-Reid, a major international research firm, has been contracted to undertake the majority of the research so the Roadmap can be launched in Q1 – 2006, will help dispel this myth.

If there was any doubt that CABA is here to stay in the residential space, CABA's Connected@Home Conference & Expo was a watershed mark for the organization. By collocating on Oct. 3-6 in Las Vegas with the Fiber to the Home Council, Internet Home Alliance, Multimedia over Coax Alliance, ZigBee Alliance and 1394ta, CABA, with the support of these organizations, was able to bring together over 2,000 industry professionals all focused on understanding, developing and promoting truly connected homes!

The results and achievements of this unique industry gathering were too many to list here, but worthy of mention are that there were over 80 speakers, including keynotes from Matthew Theall – Intel Corporation; David Grubb – Motorola Connected Home Solutions and Noel Lee – Monster. The Connected@Home event also featured over 10 major research houses sharing leading-edge primary research. The collocated CABA and FTTH Expo Hall showcased over 160 exhibits and sponsors.

In addition to the many industry meetings and networking opportunities, CABA for the first time honored a number of companies and individuals with prestigious Connected@Home Awards. Thanks go out to those CABA Board members, Connected@Home Advisory Board, speakers, sponsors, exhibitors, staff and the many volunteers for their great support. Plans are already underway for Connected@Home 2006.

Watch this space in the next issue, as the focus will be on the great work of CABA's Intelligent & Integrated Buildings Council and their developments of the Building Intelligent Quotient Project, Life-Cycle Costs Analysis Tool and the High Performance/Intelligent Building...as we don't want to create the perception that CABA is only a "residentially based" organization!

New Members

CABA members benefit from timely, competitive, intelligence on the integrated systems industry. CABA continues to grow and is near the 400-member threshold. Here is a sampling of our new members. The complete list is available on CABA's Web site at www.caba.org.

Alcatel

Alcatel provides communications solutions to telecommunication carriers, Internet service providers and enterprises for delivery of voice, data and video applications to their customers or employees. Alcatel brings its leading position in fixed and mobile broadband networks; applications and services, to help its partners and customers build a user-centric broadband world. The firm is organized in three business groups: fixed communications, mobile communications and private communications. Alcatel operates in more than 130 countries. More information is available at www.alcatel.com.

The Bosch Group

The Bosch Group is a leading global manufacturer of building technology products. Bosch's multiple operating units bring trusted and innovative consumer goods, including home appliances, security systems, power tools and water heaters to homes and businesses throughout North America and Europe. Additional information about the Bosch Group is available at www.bosch.us.

DuPont

Operating in more than 70 countries, Dupont offers a wide range of innovative products and services from markets including agriculture, nutrition, electronics, communications, safety and protection, transportation, and home and construction. For over 50 years, the company has been a leader in insulation and jacketing materials to the cabling industry. DuPont's cabling products help to avoid: network downtime and ensure business continuity; protect IT infrastructure and data investments; ensure building safety; comply with current and future NEC requirements; and reduce environmental footprint with easy to recycle cabling and recycling services. More information is available at www.dupont.com.

Global Inventures, Inc.

Global Inventures, Inc. provide consulting and operational management services to leading high-tech associations, technology consortia and organizations developing information and communications (ICT) technology standards. The firm's consulting and management services support the successful implementation and lifecycle of professional associations, while helping them accelerate results through collaboration. Since 1993, Global Inventures has been instrumental in building and managing day-to-day operations for key technology alliances, designed to meet the particular requirements of an emerging product or market category. The industry focus of its clients includes networking and communications infrastructure and protocols, broadband, mobility and wireless, consumer electronics and enterprise software. Additional information is available at www.inventures.com.

Organization for the Advancement of Structured Information Standards (OASIS)

OASIS brings together people from around the world to agree on standard ways of organizing and exchanging information on the Internet and within their businesses. Founded in 1993, OASIS has more than 4,000 participants representing over 600 organizations and individual members in 100 countries. OASIS members define requirements, develop specifications, advocate best practices, and promote adoption by collaborating with an open, democratic process that ensures all those affected by standards have a voice in their creation. The consortium produces more Web services specifications than any other organization, and is home to the OASIS Open Building Information Xchange (oBIX) Technical Committee, which enables mechanical and electrical control systems in buildings to communicate with enterprise applications. Information about membership is available at www.oasis-open.org.

ZigBee Alliance

The ZigBee Alliance is an association of companies working together to enable reliable, cost-effective, low-power, wirelessly networked, monitoring and control products based on an open global standard. The goal of the ZigBee Alliance is to provide the consumer with ultimate flexibility, mobility, and ease of use by building wireless intelligence and capabilities into every day devices. ZigBee technology will be embedded in a wide range of products and applications across consumer, commercial, industrial and government markets worldwide. For the first time, companies will have a standards-based wireless platform optimized for the unique needs of remote monitoring and control applications, including simplicity, reliability, low-cost and low power. Information about the Alliance is available at www.zigbee.org.

CABA Research Briefs provide a condensed synopsis of specific research papers available in the organization's Information Series. The CABA Information Series provides industry intelligence to the home/large building automation and integrated systems sector.

DEVELOPMENT AND EVALUATION OF FULLY AUTOMATED DEMAND RESPONSE IN LARGE FACILITIES

The Public Interest Energy Research (PIER) Program, managed by the California Energy Commission, commissioned Lawrence Berkeley National Laboratory (LBNL) to conduct trials of technologies for businesses to reduce electricity consumption in response to automatically issued requests in the form of price signals from an electric utility. The full version of this survey was published as a CABA Information Series and is available in CABA's Research Library at www.caba.org.

The study reveals that the building controls industry, like other industries, is undergoing a series of dramatic changes, resulting in the development of new features that take advantage of advanced computing and communication systems. Recent research by LBNL and others has evaluated the capabilities, features and cost-effectiveness of new technologies (Web-based energy information systems) for building energy efficiency and demand response.

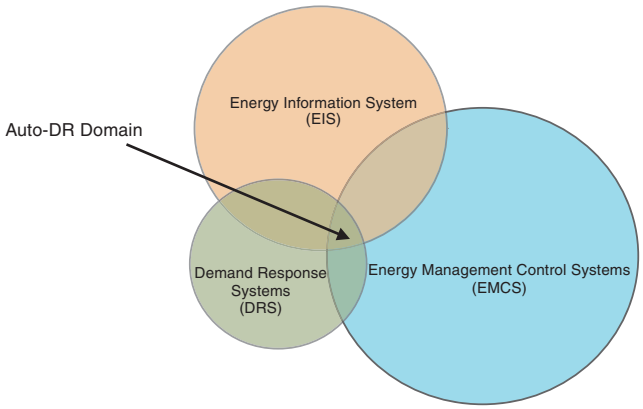
This report describes the results of a research project to develop and evaluate the performance of new automated demand response hardware and software in large facilities. Demand response is a set of activities to reduce or shift electricity use to improve electric grid reliability, manage electricity costs, and ensure that customers receive signals that encourage load reduction during times when the electric grid is near its capacity. The two main drivers for widespread demand responsiveness are the prevention of future electricity crises and the reduction of electronic prices. Additional goals for price responsiveness include equity through costs of service pricing, and customer control of electricity usage and bills.

A significant goal of the research project was to perform a two-week test of fully automated demand response at four to six facilities. The test consisted to providing a single fictitious, continuous electric price signal to each facility. The technology used for the communications is known as extensible markup language (XML) with Web services. Control and communications systems at each site were programmed to check the latest electricity price published by the utility. The report established that automated demand response achieved savings, especially during periods of high-price.

The study demonstrated a number of key issues that related to automated demand response, including that:

- fully automated demand response is technically feasible with minor enhancements to current state-of-the-art technology;
- new Internet technology enhanced the capabilities of existing building systems to enable demand response;
- automation enhances demand response programs;
- large facilities can support the objectives of demand response; and
- new knowledge is needed to procure and operate technology and strategies for demand response.

Types of Web-Based Energy Information Systems (EIS)



THE FUTURE SUCCESS OF VOIP - IT'S ALL ABOUT TIMING

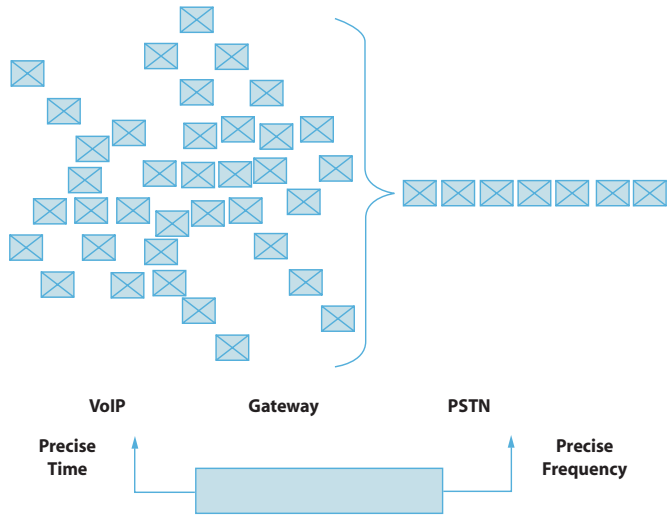
The paper from Symmetricom presents a technical comparison of conventional circuit switched telephone service and packet switched voice telephony. Technical issues include timing errors due to transmission delays through the Internet and buffering at network routers. Methods for measuring time delays and establishing synchronization across the Internet are discussed. The full version of this survey was published as a CABA Information Series and is available in CABA's Research Library at www.caba.org.

When Voice over Internet Protocol (VoIP) was introduced years ago it offered the promise of very cheap (in some cases "free") telephony, but the combination of the quality of its service and the timing of its introduction doomed it to the periphery of telephone communication.

To begin with, the voice quality of VoIP was significantly inferior to the public switch telephone network (PSTN) systems. VoIP's only chance of being a viable alternative rested on its "price" advantage. However, it entered the market just as the cellular phone boom was beginning to peak worldwide. Furthermore the cellular phone revolution was causing telephone pricing to drop, not only within the cellular market but also with the more traditional PSTN systems. The consumer has perceived that the telephone marketplace was becoming cheaper by the minute with no compromise on quality.

Today, VoIP is back in the news. The mainstream media is touting its future in the consumer marketplace. But the only way that VoIP will succeed is if it gets its timing right. Only this time, we are not talking about market timing. What we are talking about is synchronized timing, for without a well synchronized VoIP network there is little chance that VoIP will be able to compete with the low price and high standard of voice quality set by PSTN.

Time synchronization across network servers, routers and network devices is not a difficult endeavor. Using the well-established network time protocol (NTP), and a reliable time source, such as a dedicated network time server that references a global positioning system (GPS), synchronization of servers and network devices can be easily maintained. In fact, many operating systems and network devices already incorporate support for NTP.



F10.3 Precise time is required for VoIP; precise frequency is required for PSTN

Network time servers should always be referenced to a reliable source of time. NTP uses coordinated universal time (UTC) which is the same worldwide. The GPS satellite system is the most readily available source for UTC time in the world. By synchronizing your network to UTC you remove one more source of interoperability problems between your network and others. Network time servers today are quintessential network appliances that facilitate troubleshooting and identify root cause problems in complex VoIP networks. Many servers have atomic clock accuracy from embedded GPS receivers and can synchronize thousands of clients on a network.

CCHT STUDY ON PROGRAMMABLE THERMOSTATS

By Marianne Manning

HOUSE TEMPERATURES ARE typically set by the occupants to ensure their personal comfort. When occupants are away from home or asleep, the house temperature requirements are different. For this reason, many thermostats are equipped with an automatic programming device, a simple and efficient way to reduce energy consumption at certain times of the week.

The National Research Council, in partnership with Canada Mortgage and Housing Corporation and Natural Resources Canada, conducted a research project in the twin houses of the Canadian Centre for Housing Technology (CCHT) in Ottawa to evaluate the effect of thermostat setback and setforward strategies on energy consumption, the recovery period to reach the desired temperature, and the surface temperature of windows and exterior walls. The study took place in the winter of 2002/03 and the summer of 2003.

Parameters of the Study

Since the two identical CCHT houses were built to R-2000 standards, it is possible to make comparisons by using one of them as a control house while modifying the other according to a project's objectives. In this study of programmable thermostats, the control house was maintained at 22°C all day and the other house was subjected to three temperature adjustment strategies during the winter of 2002/03:

1. night setback to 18°C (from 11 p.m. to 6 a.m.).
2. night and day setback to 18°C (from 11 p.m. to 6 a.m. and from 9 a.m. to 4 p.m.).
3. night and day setback to 16°C.

During the summer of 2003, two strategies were studied: a higher temperature setting (24°C, 24 hours per day), and daytime set-forward to 25°C (from 9 a.m. to 4 p.m.).

Results and Discussion

The results of the winter trials revealed that thermostat setback presents interesting energy saving possibilities, even in a high energy performance house. By extrapolating the results, it is predicted that winter natural gas savings could be around 6.5, 10 and 13 per cent, respectively, for the three strategies set out above.

Apart from saving energy, this temperature setback can affect occupant comfort and the durability of the building envelope. For example, if the recovery period (the time required for the temperature in the house to return to the original temperature) is very long, the occupants will not have the comfort level sought at the scheduled time, unless they adjust the programming hours according to these delays. In the study in the CCHT houses, the winter recovery period was relatively short at two hours.

Moreover, if the temperature of the interior finishes, the exterior walls or the windows is too low, condensation may occur, to the extent of damaging the materials and encouraging the growth of mould. The window components were monitored continuously during the study and the results showed that condensation or frost should be expected in the lower part of the window in

very cold weather unless the relative humidity rate is below 19 per cent at 22°C. In these houses, the window ledge surface temperature fell below 0°C, even in the control house maintained at 22°C.

The savings from the setback strategy manifested themselves mostly in colder weather (say below 0°C). Because the twin houses were built to the R-2000 standard, they don't cool off fast enough in milder weather to achieve appreciable savings due to the setback strategy. So if the identical houses were built in Vancouver, for example, we would expect greatly reduced savings.

The results of the summer trials indicate that daytime temperature setforward is not necessarily the most effective strategy for air conditioning. Fan and air conditioner electrical consumption depend on solar radiation. Indeed, if every summer day were sunny, the daytime setforward from 22°C to 25°C would produce electrical energy savings of 13.2 per cent. However, if every day were cloudy, these seasonal savings would be reduced to 2.9 per cent. In addition, the recovery times resulting from the temperature setforward strategy turned out to be much longer: up to seven hours on the hottest days, the same length of time as the setforward itself. This can have a negative influence on occupant comfort in the evenings. i

This article, which also appeared in *Solplan Review*, the independent Canadian journal of energy conservation, building science and construction practice for residential construction, is based on the final project report, which can be downloaded from the Internet at http://irc.nrc-cnrc.gc.ca/fulltext/rr191/.

For more information on projects and publications related to the research of the Canadian Centre for Home Technology (CCHT), visit www.ccht-cctr.gc.ca.

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ORGANIZING A HOME SYSTEM

IN THE SPRING and summer 2005 issues of *iHomes & Buildings* I explored the theme of interoperability. Most products we buy for our homes are stand-alone devices, such as kitchen appliances, TVs, lamps, etc. In an integrated home system, these devices work together to provide new features.

For example, you have invited friends over to enjoy a favorite DVD in your new home theater. As you start the movie, the lights are gradually dimmed, the drapes close, the air-conditioner is adjusted to keep your guests comfortable, and all calls are routed to your answering service so you are not disturbed. Such an automated system requires coordination among many devices from different manufacturers. This article examines progress toward creating home systems from heterogeneous devices.

Interoperability

Interoperability is the lynchpin of home systems, where devices are linked via an electronic network. This article explores the practical issue of how manufacturers make products that can interoperate even when these companies may be competitors or in unrelated fields.

Various standards committees and consortia have defined specifications for a network and a communications protocol for the devices connected to that network. Unfortunately, the industry has not adopted one communications method. Network routers and gateways can overcome these differences. However, interoperability requires that devices not only understand the messages exchanged, but also cooperate to provide services. This is accomplished with interoperability procedures that enable devices to learn the capabilities of related devices.

The Challenges of Networking Devices

We have been living with interconnected devices that form home systems for heating and cooling, for home security, and for audio/video entertainment. A common characteristic of these systems is a dedicated link between components. For example, a traditional thermostat connects to a furnace or air-conditioning (AC) controller via analog wires that carry signals at specified voltages. The control mechanism is usually limited to turning-on and turning-off the heating or cooling equipment.

With a home network, the components are all connected to a common communications bus, either wired or wirelessly and use the same digital signaling method. Figures 1 and 2 highlight the differences between traditional heating/cooling equipment and a possible network-based system. The additional components would

Figure 1

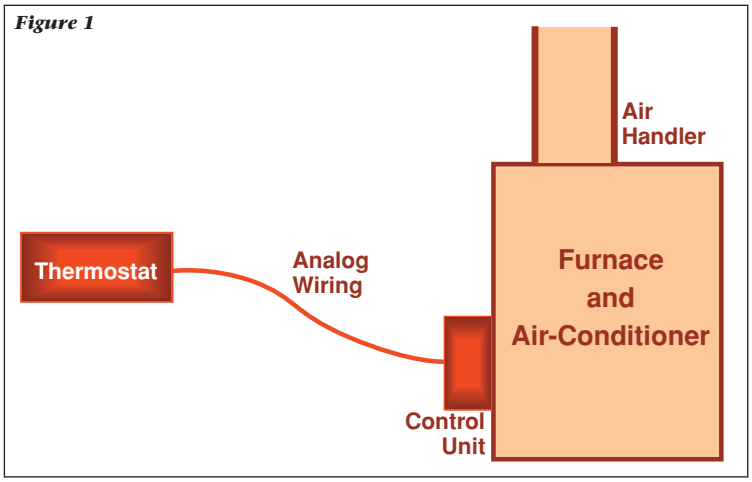
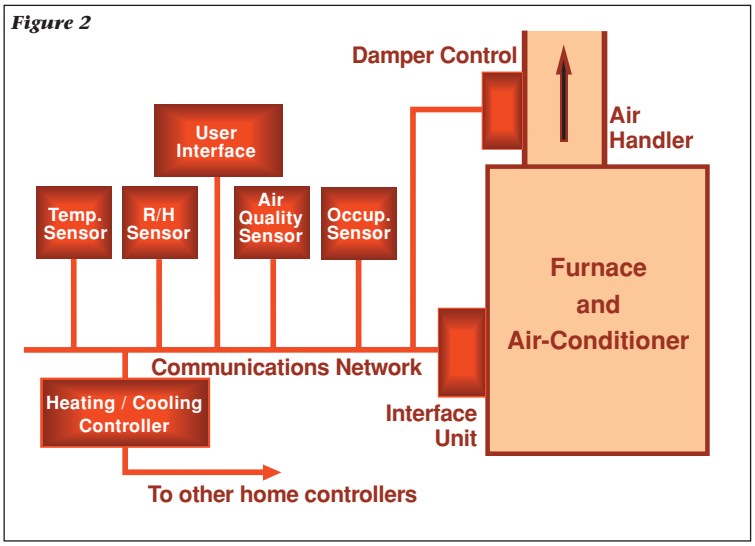


Figure 2



support more accurate climate control with such features as humidity regulation, air-quality management, multiple zones, and enhanced energy conservation. The control strategies can extend beyond on/off to accommodate variable speed compressors and fans.

In a competitive market, the components shown in Figure 2 might not all be supplied by the same company. Therefore, there must be agreement on a common network interface. Furthermore, the controller must adapt as new components are added. Ideally, this adaptation should occur automatically as the user plugs in each component. In computer jargon, this feature is called plug and play. The challenges of plug and play grow as diverse systems, such as heating, lighting, and entertainment, are interconnected.

Organizing a Network

A good analogy for organizing devices on a network is managing people in a company. As the following table illustrates, cooperation among devices extends beyond sharing a common communications protocol.

In a company, speaking and writing the same language is usually assumed.

CREATING AN ORGANIZATION	
People in a Company	**Devices on a Network**
Use same language	Use same protocol
Assigned an office	Assigned an address
Have a name	Assigned a name
Given a job title	Summarize capabilities
Given a job description	Describe functions
People work together	Devices interoperate

The organizational issues revolve around the capabilities and interactions among the people as they fulfill the corporate goals. On a network where devices may be added and removed over time, devices need to adapt functionality to other devices and perform as a system.

For example, in Figure 2, if a humidity sensor were added to a system that had already been running, the controller would need to recognize that the new humidity sensor had been installed, adapt the control algorithm to this new sensor, process the data sent from the sensor, and regulate the equipment accordingly. Automatic adaptation is the essence of plug and play.

Organizational Strategies

Standards committees and consortia of manufacturers have been developing home network specifications for more than 20 years. Much of the focus has been on defining communications protocols: the signaling methods and language for device-to-device messages. About five years ago, manufacturers turned to the issues of network organization discussed in this article. Two

important specifications for network organization have been developed: *Bonjour* and *UPnP*.

Bonjour™ was invented by Dr. Stuart Cheshire, now at Apple Computer, and has been adopted by many makers of computer peripherals, such as printers. Apple computers use Bonjour to share directories of iTunes™ and to find instant messaging buddies with iChat™.

The UPnP™ Device Architecture is a network architecture created by Microsoft Corporation as Universal Plug and Play to enable communications among appliances, devices, and personal computers. The UPnP specification is now managed by the UPnP Forum comprised of more than 700 member companies.

Bonjour and UPnP have overlapping features. Therefore, both will be explained in the next section, with distinctions noted.

Bonjour and UPnP

Bonjour and UPnP facilitate networking among devices that are usually located near each other, such as in a house. This local network is different from a public network like the Internet, where dedicated computers (routers and servers) move data and manage the network. A home network requires simple automatic methods for consumers to add and remove devices. The devices need to join a network and learn about other devices on the network so collectively they can provide services for the home occupants.

The key features required for organizing a local network in a home are network configuration and association control.

Network Configuration

A device acquires a network address in the form of an IP address (Internet Protocol address). Bonjour and UPnP have adopted similar mechanisms.

Once a numeric IP address has been acquired, it may be translated into a familiar name such as the "Living-room TV" for user-to-device control. Bonjour has adapted the naming system of the World Wide Web based on English-like URLs (Universal Resource Locators, such as www.caba.org) in place of numeric IP addresses for accessing Web pages.

The Internet supports names with special computers (servers) forming the Domain Name System (DNS). On a typical network without a DNS server, a newly installed Bonjour device picks and announces a proposed name to the other devices. If no other device is using the same name, the proposer assumes that name.

Association Control

The purpose of association control is to inform a device of the functional capabilities of other network devices so these devices can cooperate to provide services. Association control in UPnP includes discovery, description, and presentation. Association in UPnP occurs between devices and control points, such as a lighting controller.

Devices seek control points and control points seek devices. A device newly connected to a network advertises the type of control point sought, any embedded devices it might contain, the services offered, and a URL where additional information about the device may be found.

Upon acquisition by a control point, a device must provide further details about the device type and services offered. The device information is provided by the formal mechanism of description, which consists of manufacturer information and data about each service supported.

Bonjour uses a mechanism of service announcement and discovery. Devices advertise their capabilities through messages sent throughout the local network. For example, a device needing a color printer can check the list of service messages received to determine quickly if any networked device can offer this service.

Bonjour vs. UPnP

As noted, Bonjour and UPnP share the same goals and are very similar in functionality. Both help organize networks of devices to facilitate home networking. Both are being offered to standards bodies. Bonjour has been proposed to the Internet Engineering Task Force (IETF), while UPnP is being offered to the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

Some makers of network products such as routers have incorporated UPnP, while some computer peripherals include Bonjour. The Consumer Electronics Association is considering both for various U.S. home systems standards. It is possible for a device to embed firmware for both interoperbility schemes.

This competitive environment is likely to be resolved by practical issues of adoption rates and interface costs for chips and firmware. Eventually, manufacturers will adopt a standard interoperability scheme so they can focus their resources on inventing applications that will drive and grow the home systems industry. i

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Dr. Kenneth Wacks has been a pioneer in establishing the home systems industry. He advises manufacturers and utilities worldwide on business opportunities, network alternatives, and product development in home and building systems. For further information, please contact Ken at 781.662-6211; fax 781.665.4311; kenn@alum.mit.edu; www.kenwacks.com.

WHAT IS AN INTELLIGENT BUILDING?

The definition of an intelligent building may not be immediately clear, but the benefits of creating these structures are quite evident.

By Paul Ehrlich

OVER THE LAST 20 years, there has been a lot of discussion and debate about the concept of an "intelligent building". Work has gone on in many forums to define and quantify what the term really means. The end result of all of these efforts is that an intelligent building is not just one thing. My definition of intelligent buildings is as follows:

"Use of technology and process to create a building that is safer and more productive for its occupants and more operationally efficient for its owners."

The results from implementing these technologies and processes are buildings that cost less to operate and are worth more to their occupants. For projects that are owner-occupied, such as corporate, government and institutions, the benefits of an intelligent building provide an immediate ROI in terms of higher employee productivity and reduced operating expenses. For commercial developments, these projects are expected to result in above market rents, improved retention, higher occupancy rates and lower operating expenses. All around this is a win-win situation.

So what are the technologies and processes that are required to create such a project? There is a long list, starting with design and going through long-term operations, retrofit and eventual decommissioning. (Please refer to the sidebar for a brief summary of the attributes).

Let's start by looking at the design process for intelligent buildings. The decision to make a project "intelligent" needs to come early in the design process. Making the decision to create a new, or retrofit an existing project, to make it intelligent is similar to what goes into creating a LEED certified project. There needs to be a commitment from the owner and their design team to invest in a project with superior performance and value. Once this occurs, the design process can continue as usual. But it is important to keep the focus on creating a superior project and avoid the temptation to "value engineer" out the intelligent components.

Project Scope and Purpose

One of the first attributes in an intelligent design is to carefully evaluate the current and future use of the project. This starts by clearly identifying the purpose and needs of the targeted building occupants. This process will vary depending on whether it will be an owner occupied or a commercial development. For an owner occupied building, surveys and focus groups can be held with the building occupants, analyzing and prioritizing their needs to select proper project features. For a commercial development, the project target market needs to be identified and attributes designed to suit. For example, an office building might target technology companies that would benefit from an urban environment, high-speed network access and 24/7 availability.

It is important to realize, however, that few projects are used as originally envisioned. A good intelligent design should incorporate flexibility to allow for easy change. Examples of this type of design characteristic include CLA (communications, life safety, automation) structured cabling design and open space with movable or demountable partitions. An intelligent building needs to be designed to meet the needs of initial occupants and be flexible to meet the needs of future occupants.

Concept and Budget

When setting initial project budgets, intelligent attributes must be included. Creating an intelligent building does require an investment in advanced technology, processes, and solutions. An upfront investment is required to realize a significant return later on. It is unrealistic to expect to make a project intelligent unless there is early buy in on investment. Again, these decisions need to happen prior to the start of design work. One of the challenges is to edu-

Intelligent Buildings mean many things depending on your perspective and role. The following list is one summary of these attributes.

Process:

- Design
- Flexibility - designed to change
- Energy efficient design (LEED)
- Complete building modeling
- Focus on building circulation and Feng Shui and common spaces for networking
- Integration with transportation and surrounding community
- Construction
- Sustainable construction practices
- Electronic project documentation
- Modeling extended into construction
- Operations
- Integration of all systems
- Remote operations and optimization
- Tenant portals
- After hours operation
- Maintenance management and dispatch
- Energy information and management systems
- Real time energy response
- Continuous comfort monitoring and feedback

Technology:

- General
- Tenant amenities
- Concierge
- Shopping
- Restaurants
- Lodging
- Parking
- Restrooms
- Optimized vertical transport
- Personal comfort control
- Temperature
- Humidity
- IAQ
- Lighting
- Acoustic
- Networking/Telecom
- Common network infrastructure
- Structured – maintainable cabling
- Wi-Fi
- VoIP
- Digital signage
- Security/Life Safety
- Digital video monitoring
- Access control and monitoring
- Automatic fire suppression
- Fire detection and alarm
- Egress support (lighting, signage, smoke control, etc.)
- Contaminant monitoring and containment
- Proximate security/guard services
- Mechanical
- Energy efficient equipment
- Thermal storage
- Combined heat and power
- Controls optimization
- Extensive sensing
- Energy efficiency
- Indoor air quality
- Comfort monitoring
- Internet enabled controls
- Enterprise integration
- Water and gas metering/ sub-metering
- Electrical
- Energy efficient lighting
- Lighting control
- Distributed generation
- Dual power feeds/emergency power
- Power quality monitoring
- Sub-metering/billing

cate owners on the benefits of an intelligent building design. Waiting until the MEP is brought on to the design team may be too late. This makes education of both owners and architects as to the benefits of intelligent solutions critical for success.

Site Selection and Integration

An intelligent design begins by looking at the site as it integrates with the community. Is this a location that is a new "green-field" location or a reuse of an existing "brown-field" site? Can the project be sited for maximum solar efficiency? How will it fit in with community land and space planning? Does it integrate with existing (or planned) public transportation? Site integration and impact are critical for environmental impact, and strongly impacts how the building occupants interact with the building. At a macro scale, community integration is determined by community space planning and zoning regulations. An intelligent building should go beyond that with consideration as to how this fits in with community needs, transportation and amenities. The combination of the two makes the building more marketable with a lower impact on the environment.

Environmental Design

An intelligent building starts with an environmentally friendly design. Creating a project that is environmentally friendly and energy efficient ties in closely with many of the intelligent attributes. Intelligent buildings are designed for long-term sustainability and minimal environmental impact through the selection of recycled and recyclable materials, construction, maintenance and operations procedures. They provide the ability to integrate building controls, optimize operations and enterprise level management, resulting in a significant enhancement in energy efficiency; lowering both cost and energy usage compared to non-intelligent projects.

Intelligent buildings are intended to be the preferred environment for occupants. This requires focused attention to environmental factors that affect occupants' perception, comfort and productivity. An intelligent design finds the balance providing a superior indoor environment and minimizing energy usage and operating labor. This is where the technology becomes valuable. Using integration and automation, we are able to implement solutions that

both provide a superior environment and minimize energy. Examples include:

Feature	Benefit
Dimmable fluorescents lighting integrated with sun blind control.	Optimal lighting level and quality can be determined by the occupants.
Lighting control with motion sensors integrated with security.	Only provide lighting as needed. Reduces energy use and increases security.
Natural and displacement ventilation.	More efficient and effective distribution of ventilation.
Use of economizers for free cooling.	Energy efficiency.
Individual temperature and lighting control.	Improved comfort is shown to improve productivity. Addresses the number 1 concern of tenants as found in BOMA surveys.
Radiant heating and cooling.	Improved comfort, reduced energy use.
Optimized control algorithms.	Reduce energy use with little or no impact on comfort.
Combined heat and power plants.	Improved energy efficiency and sustainability.
After hours control of lights and HVAC integrated with security.	Improved security while reducing energy use.
Monitoring of IAQ and contaminants.	Improved comfort, safety and productivity.

USGBC/LEED

The US Green Building Council – Leadership in Energy and Environmental Design (USGBC – LEED) program provides an excellent mechanism to promote, measure and quantify environmental and energy efficiency in both new and existing projects. There is a very strong synergy between intelligent building design and a LEED certified design. Intelligent buildings demand reduced energy usage through optimization, system integration and enterprise applications. LEED certification requires energy efficiency, monitoring, validation and control of all building systems. The goals and benefits of LEED and intelligent building design go together arm and arm. An intelligent building program should start with LEED certification and work to improve the building beyond that.

Building Modeling

An intelligent design needs to start with a complete model. This modeling begins early on with CAD designs that evolve into project renderings. Using new standards such as AEC-XML and GB-XML, this information can readily be shared with HVAC and other system models. Modeling of an intelligent building will be used not just in design, but will continue through into construction and operation. In the past, building modeling has been widely used as a design tool and often for construction as well. In an intelligent building we would expect that this model will be used by new sophisticated tools that will actually be able to use the original modeling information to make decisions about optimization and continuous re-commissioning of critical building systems. Ideally, the model will follow through the life span of the building, be updated as necessary and serve as a digital document of the building.

Building Circulation and Networking

Buildings exist to enable collaboration, allowing occupants to be productive, efficient and creative. Intelligent buildings provide for improved occupant circulation, interaction and collaboration. From a design perspective this means attention to how the occupants will circulate through the building. How will they enter the space? How will they move efficiently vertically and horizontally through the space? Can we incorporate digital signage to improve navigation and circulation?

Collaboration can also be improved through the use of design elements to encourage networking in both formal and informal spaces. Formal collaboration spaces are conference rooms, break rooms, classrooms and seminar rooms. Informal collaboration spaces include niches and seating spaces in corridors, coffee shops, outdoor seating areas, and other places where building occupants can get together for brief planned or unplanned interactions.

Conclusion

The goal of having an intelligent building only starts with early planning in the design stage. In many ways this mirrors the design and fulfillment of many green or LEED projects today, but uses technology to provide for a superior space. There are enormous benefits to be gained by creating intelligent buildings. We need to continue to work as an industry to quantify these benefits, educate owners and consultants and to deliver a superior product to the market. i

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CONNECTED@HOME CONFERENCE & EXPO A SUCCESS

CABA's inaugural event highlighted innovative connected home technologies.

By Rawlson O'Neil King

LAST AUTUMN, THE Continental Automated Buildings Association held its inaugural Connected@Home 2005 Conference & Expo, an event that highlighted innovative connected home technologies that provide entertainment, data, voice communications, and home management systems over broadband and other infrastructures. The event, held October 3-6, 2005 at the Mandalay Bay Resort & Casino in Las Vegas, NV, was an unqualified success, bringing together approximately 400 delegates, along with the 1,500 other delegates that attended the Fiber-to-the-Home (FTTH) 2005 Conference & Expo.

The event's collocation with the FTTH Conference allowed CABA to offer an end-to-end experience that demonstrated how the broadband pipe gets to the house, and the opportunities and challenges available once it entered the home.

The collocated conferences featured three shared keynote speakers: Curtis Anderson, Acting Administrator of the USDA Rural Development's Rural Utilities Program, who opened the conference; Joey Durel, Mayor of Lafayette Parish, LA; and broadband legal expert Jim Baller. The conferences also featured a shared exhibit hall, but also offered independent speaker sessions and panels.

Connected@Home featured over 80 key industry visionaries who examined such topics as the evolving connected consumer and revenue opportunities in the connected home.

"Definitively, speakers at the conference indicated that the direction of the industry is driven by a desire to get products and services to market that are easy-to-use," stated Guy Millaire, CABA's Technical Director. "The event also demonstrated that products and services brought to market at the lowest cost would dominate the industry."

Key industry visionaries who participated in CABA's plenary sessions included Martin Cullum, General Manager of Video Networks for Bell Canada and Chair of the CABA Board of Directors; David Grubb, Vice President, Motorola Connected Home Solutions; Matthew Theall, Powerline Initiative Manager, Intel Corporation; and Noel Lee, founder of Monster Cable.

The conference also featured the first annual Connected@Home Awards. The awards were presented to individuals and companies that utilized their skills and talents over the past year to advance and enhance the connected home sector.

Due to the positive response received for the 2005 event, CABA is pleased to announce that it will be producing Connected@Home in 2006. For more information please visit www.caba.org or www.connectedathome2006.com. For more information on attending, sponsoring, advertising or exhibiting, please contact Steve Harvey at 972.335.2529; steve@globalresearchadvisors.com or Fred Bryson at 613.993.7232; bryson@caba.org. i

Rawlson O'Neil King is CABA's Communications Director.

CABA ANNOUNCES CONNECTED@HOME AWARD WINNERS

Awards recognize leaders in the connected home sector.

THE CONTINENTAL AUTOMATED Buildings Association announced the recipients of its 2005 Connected@Home awards. The awards were presented on October 6 to individuals and innovative, progressive companies who are leaders in the connected home sector at CABA's Connected@Home 2005 Conference & Expo, held at the Mandalay Bay Resort & Casino in Las Vegas, NV.

"The award winners represented a brilliant group of professionals who have taken immense steps in furthering the industry," stated Ronald J. Zimmer, CABA President & CEO. "They each have listened to market demands and developed a wide array of technologies to deliver what can certainly be considered state-of-the-art products and services. These award winners were very difficult to narrow down, but all represent highly successful industry visionaries. This sends a strong message to our industry that the connected home is not only becoming a reality but a norm." CABA's awards recognized the top companies that provide entertainment, data, voice communications and home management systems over broadband and other infrastructures. Award categories include the CABA Chairman Pinnacle Award recognizing both an outstanding industry visionary and company, Innovative Product of the Year, Best Enabling Technology of the Year, and the CABA's Volunteer of the Year Award.

The awards were chosen by an independent panel of industry judges from a wide roster of nominees.

The CABA Chairman Pinnacle Award presented to an individual was given to Gary Shapiro, President and CEO of the Consumer Electronics Association. Shapiro heads up a trade association representing some 2,000 consumer electronic companies and which owns and produces the continent's largest annual trade show, the International CES.

The Pinnacle Award for Outstanding Company was presented to Home Automation, Inc., known as HAI. Since 1985, HAI has been a leader in integrated security and automation products, providing comfort, convenience, and safety for homeowners and businesses around the world. HAI has developed a full-line of award-winning automation products that are sold through its worldwide network of distribution partners and installed by over 1,000 dealers. The firm's product lines includes automation controllers, consoles and touch screens, lighting control switches, software to control automation systems (including Internet access), a full line of communicating thermostats, and an expanding line of accessories.

The Most Innovative Product of the Year Award was presented to Mediabolic, Inc. for its digital media player and server software that enables OEM customers to ship connected entertainment products. Mediabolic's technologies can be embedded in products like televisions, set-top boxes, and network-attached storage devices, allowing consumer electronics and PC manufacturers to extend and differentiate their products.

The Best Enabling Technology of the Year Award was presented both to Z-Wave and ZigBee. Z-Wave is a wireless RF-based communications technology designed for residential and light commercial control and status reading applications such as meter reading, lighting and appliance control, HVAC, access control, and intruder and fire detection. ZigBee is a published specification set of high-level communication protocols designed to use small, low power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs). The ZigBee technology can be used to define general purpose, inexpensive, self-organizing mesh networks that can be shared by industrial controls, medical devices, smoke and intruder alarms, building automation and home automation applications.

CABA's Volunteer of the Year Award was presented to Dr. Ken Wacks. Dr. Wacks has been a pioneer in establishing the home systems industry and a management advisor to more than 100 clients worldwide. For commercial buildings, Dr. Wacks has focused on the integration of building automation systems. Dr. Wacks is a featured contributor to the CABA magazine, *iHomes & Buildings*, under the byline "Ken Wacks' Perspectives." He also currently serves as chair of both the CABA Information Council and CABA Editorial Advisory Board. He also authored the book *Home Automation and Utility Customer Services*, distributed by Aspen Publishers and various CABA reports such as the *Best-Practices Guide for Evaluating Intelligent Buildings Technologies*. Dr. Wacks draws upon his business experience as an entrepreneur (founded a venture-backed startup) and a corporate manager of engineering and software teams. He received his Ph.D. from MIT as a Hertz fellow and studied at the MIT Sloan School of Management. i

DSL FORUM ADVANCES HOME NETWORKING AND IP ARCHITECTURE

By Michael Brusca

AS WE STRIVE to advance the deployment of broadband digital subscriber line (DSL), we are committed to working collaboratively with organizations such as CABA – which the DSL Forum looks to as a key source for information relating to home and building automation. We recognize that CABA is a key organization for building connected homes and communities in North America, helping create greater consumer awareness of the benefits and joys of broadband, and to continually meeting the intelligent home demand. The DSL Forum welcomes the opportunity to engage in the CABA Connected Home Council, and will do our part to provide insight into the direction and evolution of broadband DSL.

Established in 1994, the DSL Forum is a non-profit industry consortium dedicated to empowering DSL deployment and multi-media support in the online home and workplace. Our work focuses on technical innovation in the areas of customer premises equipment (CPE) interoperability and automated flow through provisioning, expanding the footprint of DSL deeper into hard to reach areas, and expanding DSL capabilities to meet the needs of the continuously evolving intelligent home.

The DSL Forum's DSLHome program has been a tremendous success and quite clearly demonstrated a few of the many services and applications that can be delivered through DSL. On a technical level, work is underway to help manage residential gateways and other CPE within an overall management framework and integrate them into service providers' operational support systems. This will make it easier for service providers to troubleshoot various devices, and have CPE automatically discovered by the management systems whenever a new device comes online. Engaging consumer electronics companies is a priority as manufacturers continue to develop products to Technical Report (TR)-069 "CPE WAN Management Protocol," which builds on CPE auto-configuration and introduces secure connections for setting CPE management functions using a common set of parameters. This enables a variety of service offerings including image management, firewall, virus protection, anti-spam, and parental control associated with home network security.

Our challenge moving forward, is to build on this success, strengthen the evolving DSL architecture while satisfying demands for more bandwidth and quality to support newer IP based services, such as IP video and voice. These services will depend on the bandwidth enabled by ADSL2plus and VDSL/2 and quality parameters at the higher layers. The "Triple Play", whereby data, voice and video are integrated over the DSL platform, is at a critical juncture and depends on DSL Forum's teamwork to enable advanced services worldwide and continue to exponentially grow DSL's market. i

Figure 1 - Technical Report 69: Positioning in the Auto-Configuration Architecture

Michael Brusca is Chairman of the DSL Forum. He can be reached at 510.608.5905; fax 510.608.5917; info@dslforum.org.

Upcoming Events

2006 International CES
January 5-8, 2006
Las Vegas, NV
www.cesweb.org

International Builders Show
January 11-14, 2006
Orlando, FL
www.buildersshow.com

2006 BICSI Winter Conference
January 23-26, 2006
Orlando, FL
www.bicsi.org

ASHRAE/AHR Expo
January 23-26, 2006
Chicago, IL
www.ahrexpo.com

Integrated Systems Europe
February 1-3, 2006
Brussels, Belgium
www.iseurope.org

Electric West 2006
March 1-3, 2006
Las Vegas, NV
west.electricshow.com

Systems Integration Expo
March 14-18, 2006
Las Vegas, NV
www.nscaexpo.org

EHX Spring 2006
March 28-April 1, 2006
Orlando, FL
www.ehxweb.com

Integrated Systems China 2006
April 12-14, 2006
Shanghai, China
www.iseurope.org

CONNECTIONS 2006
May 2-4, 2006
Santa Clara, CA
www.connectionsconference.com

More events are listed at www.caba.org

Index to Advertisers

WHY ARE OUR BUILDINGS SO DUMB?

Taking Charge of Building Technology

By Tom Lohner, P.E.

MANY ENABLING TECHNOLOGIES, open control and data network standards form the foundation for a highly integrated and intelligent building. So why haven't open control protocols such as LonTalk, BACnet, and Modbus not overwhelmed the building industry?

The method and manner by which our industry designs and builds buildings has not changed much over the last three decades. Before the advent of digital communication systems, electrical and mechanical engineers were required to develop point-to-point construction documents of the hard-wired analog electric systems and pneumatic automatic temperature control systems. Ma Bell took care of telephones and building technology was simple and straightforward.

With the introduction of digital communication networks, pneumatic automatic temperature control systems evolved to electronic systems and Ma Bell was deregulated, which led to the building owner/manager being responsible for the horizontal and vertical telecommunications cabling in buildings. Almost overnight electrical and mechanical engineers were required to become experts in low-voltage cabling and digital communication networks. The gap between the technology providers and the building design professional has and is continuing to increase.

Our industry is stuck in a paradigm where building technology is basically ignored. The owners and developers of buildings do not pay for expanded professional services to cover building technology, nor do the design professionals have the technical expertise to provide these expanded services, thus we are in a vicious cycle where even if the design money were made available by a new building developer to employ a design professional to supervise and engineer the building technologies, who would they hire?

Intuitively, most building owners and developers will agree with the concept that accurate and timely information regarding their building subsystems would be a valuable asset. Heck, everything else in the building is organized and engineered to be flexible, expandable, and to service the building until the system components become worn out. Designing integrated and intelligent buildings can be justified by understanding how construction costs are allocated in our conventional construction process.

It is easy to overlook the fact that when performance-based specifications are used to procure building technologies, the successful contractor must include considerable engineering fees in his bid to engineer his specific product line to suit the performance specification requirements and the building constraints. The more detailed the construction document design is, the overall solution approaches a design-build approach. BICSI, the organization that is dedicated to the telecommunication cabling industry, claims that based on various pricing studies, integrated and structured cabling systems can save 25-30 per cent on the total cost of the low-voltage cabling plans. These cost savings can be attributed primarily to the huge labor savings involved with having a single bid package being developed for the collective low-voltage cabling systems, resulting in a single low-voltage installation contract.

It is time to get our industry to step up to the plate and quit losing our edge to our foreign neighbors, this is not rocket science but the application of common sense with good design and construction practices, albeit, different than our current standard practices. We have found the need for a chief technology officer in our internal businesses; it is time to secure the services of a professional that can serve in this capacity for our buildings. i

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Tom Lohner, P.E. is Vice President of TENG Solutions and Chair of the CABA Intelligent & Integrated Buildings Council. He can be contacted at 804.474.4550; fax 804.474.4555; lohnertj@teng.com; www.teng.com.

partner of choice

SunRiver St. George Chooses Honeywell.

A true visionary, builder/developer Darcy Stewart created SunRiver St. George, a fiber-optic ready, connected adult community in Southern Utah. To help realize his dream, Darcy selected Honeywell as his partner of choice. When Darcy was looking for a way to provide home buyers with affordable and seamlessly integrated security, HVAC, lighting and structured wiring – only Honeywell had the solution he needed. Because Honeywell shared his commitment to innovative technology, Darcy was able to provide his residents with a better way of life.

Honeywell

For your free DVD on the SunRiver St. George story and Honeywell's solution, please call **1-800-573-0154** or visit **www.security.honeywell.com/sunriver**

Pictured from right to left: Darcy Stewart, SunRiver; Clint Brower, Triaxis; Kevin Marquess, Honeywell; Brooks Gibbs, Visual Imagery.