

THE SUMMIT AT COTTONWOOD

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INTELLIGENT BUILDING SOLUTIONS

An Albuquerque office property earned the first Buildy Award for best integration project. The Buildy Awards were designed to increase awareness of the benefits to whole building integration, and to honor North American facilities that demonstrate the vision of networked building systems and strategies. This means effectively integrating a wide array of building systems and enabling operations over corporate IT infrastructures. The Summit Office Building system reveals how what used to be only discussed is now in place: integrating legacy and new equipment with controls, unifying oversight of HVAC and life safety, along with security, data networking, IT, and even wireless access for streaming audio and video. The original intent was not to install a facility automation system to optimize energy consumption. Energy Control proposed installing an automation system and guaranteed that energy costs for the new facility could be reduced enough to pay for the technology from savings. After careful analysis, the Wrangler Properties team approved an energy efficiency system for the building that paid for itself in 5 years.

The Summit's integration features DDC to the zone level, access control, and a diverse set of special systems. ECI integrated BACnet technology from Delta Controls with a legacy system from TAC. ECI had implemented DDC technology for this water source heat pump building at construction before BACnet was introduced. An opportunity to complete the Delta Controls BACnet portion of this integration occurred when tenant improvements required renovation of HVAC systems. ECI sold the idea of a BACnet system including seamless integration to legacy DDC with Delta's Orca software as a building interface. The sophisticated system applied DDC at the boiler, cooling tower, and every heat pump.

Access was the first security technology integrated; yet the task was simplified by using the DDC systems' capability for access control of exterior and interior doors. The next step was to add 24/7 video surveillance for security, with pan/tilt/zoom cameras and virtual tripwire software technology. The cameras offer auto iris control along with the ability to switch from color to black and white for better nighttime imaging. This was a major enhancement in building functionality. Adding access control was straightforward because most DDC manufacturers have added that functionality to their base systems. This means the same programming tools and data protocols can be used to simplify design and installation. Adding this video security system offered much more value for the owner, but was more technically complex.

Previously, integration of DDC and security targeted burglar alarm technology but not video surveillance systems. Burglar systems are critical for safety, but they are technically simple when compared to DDC. In essence these systems have many digital inputs. If an input opens, signaling an intrusion, the system initiates an alarm dial-out and that is it. The evolution of video security, particularly digital video, dramatically complicated security systems and integration with DDC. Summit's architecture diagram shows that digital video recorders (DVR) were integrated to allow for migration of data up to a corporate LAN and over the Internet. The term DVR is a fallback to analog video security, when such devices were no more than a video recorder. The latest generation of DVR is really a server with ports for 16 cameras, a 480-gigabyte hard drive for video archival, and on-board read/write compact disk drives to offload important data. These servers can also upload data to secondary storage via the LAN and the Internet.

This level of security integration goes far beyond analog video by integrating intrusion detection. The DVRs can detect motion in the camera view and trigger alarms but, like all motion detection, this functionality is limited and prone to false alarms. To significantly

improve intrusion detection, ECI integrated sophisticated MATE security software, which was developed in Israel, and is capable of creating virtual tripwires. A virtual tripwire is a software line drawn across the camera's field of vision to identify, for example, a property boundary. This software can also establish protected areas, track rate of speed or direction, and perform facial recognition scans that can be integrated with access control. Such integration allows systems to verify that the face of the person using the access device matches the image on file. With tripwires, if one pixel changes along a property boundary indicating an intrusion, an alarm is triggered. With the technology, buildings can be monitored 24/7 for intrusion. With digital data and integration of Web services, it is possible to both capture and transmit images of an intruder over the Internet. ECI has developed an integration that allows for camera images to be streamed via wireless high-speed Internet to tablet PCs in a police officer's or a security guard's car. This allows officers to be mobile and still receive alarms. Further, they can see intruders and track their movements, making it possible to choose the ideal moment for apprehension. With the pan/tilt/zoom function, cameras can track intruders and zoom in for close-ups that can be streamed to another location for identification.

The fire technology is a tri-water system using the condenser water loop to the heat pumps for sprinklers. The fire system is not true data integration. It is a proprietary fire network protocol used when multiple panels are installed. There is a modem dial out to notify a monitoring center in the event of alarm, and there is limited data sharing via physical DDC point interface to monitor water temperature, pressure, and other conditions. FieldServer Technologies and other companies have begun to implement gateways for further integration of fire systems including expanded monitoring of duct smoke detectors, fire dampers, etc. The challenge is to walk the fine line between fire code and control functions that truly bring value to customers. This combination of security and fire with DDC represents state-of-the-art building integration, but again Summit goes far beyond by incorporating networking and IT.

The building Ethernet LAN is the backbone for all data communications, but the Internet is the key to integration. Internet communications are implemented via T1 physical data communication lines, as well as via Wireless Fidelity (WI-FI) high-speed Internet. At Summit, Internet communication utilizes ".NET" a Microsoft solution for Web services. .NET technology enables the creation and use of XML-based applications, processes, and websites as services that share and combine information and functionality with each other by design, on any platform or smart device, to provide tailored solutions. .Net can be used to achieve such Web services as a building Internet portal. XML and SOAP services can be tailored to building managers' needs, and can be fed into a single, integrated experience.

One of the key challenges with interface to the myriad of systems; DDC, access, security, etc., is that users must support five or more software packages on any one computer to interface with all of these. To overcome that problem, ECI created a building portal or Real-time Enterprise Dashboard™. This is a central building home page with hypertext markup language (HTML) hot links to launch software for interface with all critical systems. The software can be Web-hosted on one Internet server rather than numerous individual machines. A dashboard provides a fully functional interface to all building systems via Web-hosted software.

The Summit also made use of WI-FI for individual user interface via access points or hot spots for dashboard interface. WI-FI was used for point-to-point Internet protocol tunneling between The Summit and other sites. This allows Energy Control, a building tenant, to monitor, access, and assist customers with control attributes or troubleshooting. Video and

data were streamed to sites over 12 miles away with a high-speed Internet connection. ECI offers Web-hosted services for customers, and is also the ISP for building tenants.

Data security is important for an integration of Summit's scale, and it required a significant effort to address facility data protection. IPSEC or Internet Protocol Security technology with 3-DES data encryption is deployed to ensure that all interactions between the system, the dashboard, and the Web are secure.

Combining Buildy-quality technology with the smart grid will create a completely new building automation industry – and an extra benefit, lessen building operation and utility costs for owners.