



Remote Monitoring And Control of Energy

**ENERGY STAR Monthly Partner
Web Conference**

September 20, 2006

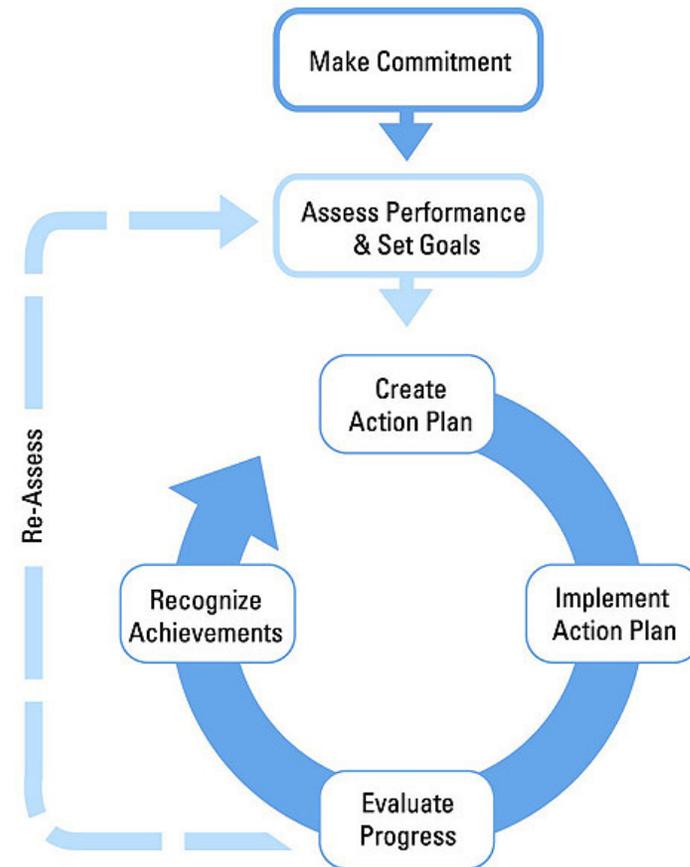
Call-in Number: 1-866-299-3188

Conference Code: 202 343 9965

About The Web Conferences



- **Monthly**
- **Topics are structured on a strategic approach to energy management**
- **Opportunity to share ideas with others**
- **Slides are a starting point for discussion**
- **Open & Interactive**
- **Supports the **ENERGY STAR Challenge** to build a better world, 10% at time**



Web Conference Tips



- Mute phone when listening! Improves sound quality for everyone.
Use * 6 – to mute and # 6 to un-mute
- Hold & Music – If your phone system has music-on-hold, please don't put the web conference on hold!
- Presentation slides will be sent by email to all participants following the web conference.

Today's Web Conference



Integrated monitoring & control systems

- Advances in technology and software combined with lower cost are creating new management options.
- Monitoring & Controls systems are creating new opportunities for energy programs – better dialogistic, planning, and demand management

Today's Web Conference



Presenters:

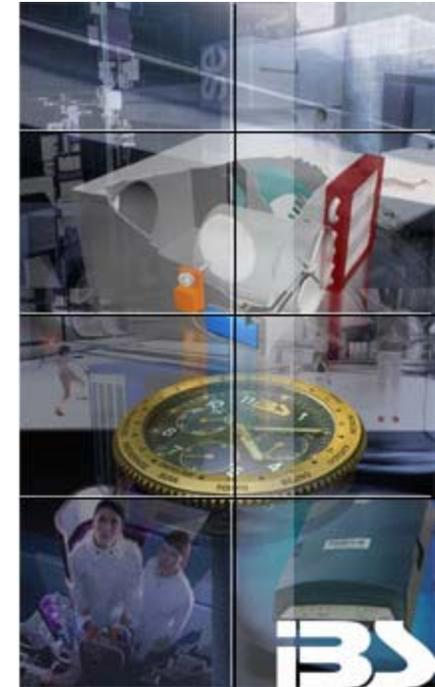
- George Denise, Cushman & Wakefield
- Eugene Gutkin, Integrated Building Solutions
- James Greif, Boeing Company



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SNMP

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Email: contact@ibs-cal.com
www.ibs-cal.com

Modbus



Agenda

- Background on technology
- Example – Adobe Towers
- How these systems can and are being used

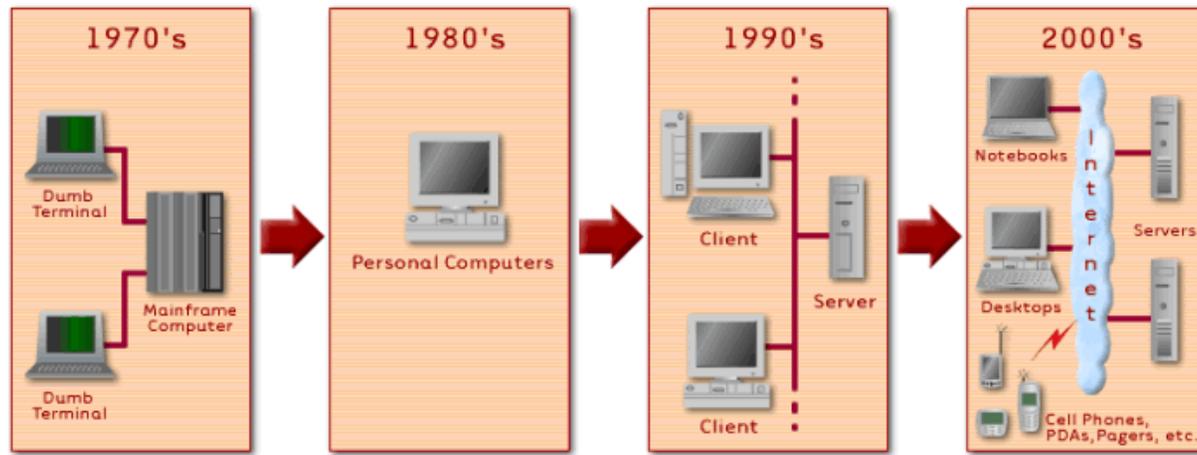
Technology Trends Outlook

- Frost & Sullivan report on the past 5 years technology activity:
 - Growth of open protocol as baseline architecture
 - LonWorks
 - BACnet
 - MODBUS, OPC, etc.
 - Proliferation of Web based system usage
- Frost & Sullivan projections through 2010 include:
 - Continued growth of Web use
 - Wireless sensors, monitoring & communication will increase in use
 - Increased of LEED certified projects
 - Advances in self tuning applications, equipment diagnostics and tool technology

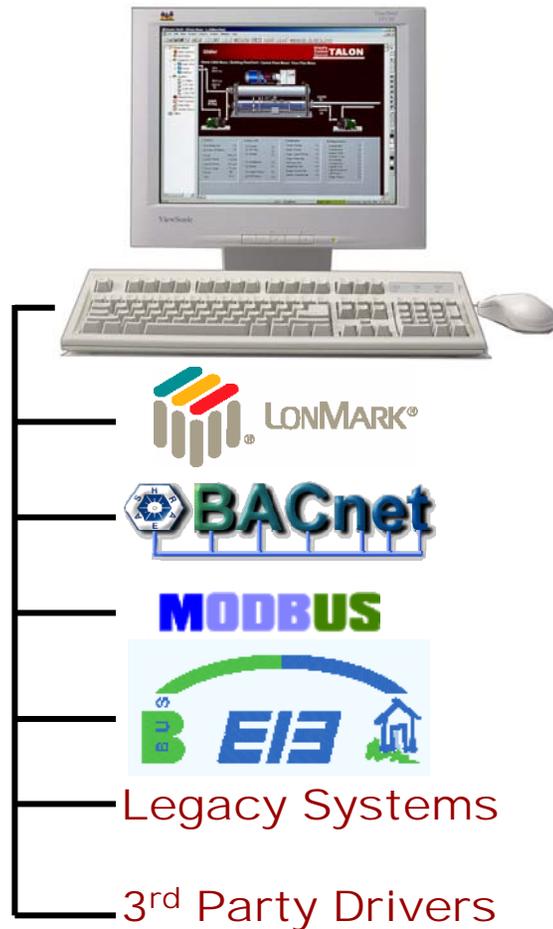
Growth of Internet Use

- Web Browser as primary user interface
 - Control staff can work from any location in real time
 - No unique software needed on PCs
 - No SW licenses for new seats of operation ... \$\$ advantage

Information Technology Evolution



Open System Technology Benefits



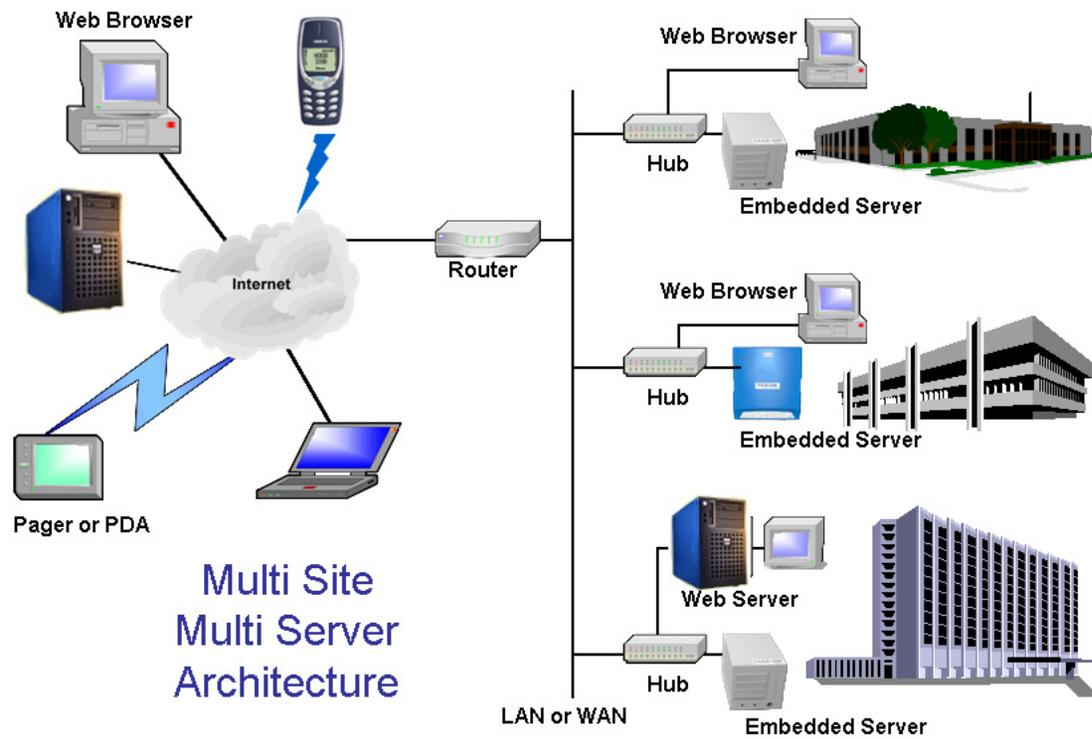
- Modular architecture based on open system technology
- Provides a common application environment
- System is not locked into a single communication protocol
 - Build or Expand with LonWorks, BACnet, Modbus, etc.
- New technology can be incorporated as it emerges ... from many sources
 - Not limited to “invented here”
 - Identify best technology and implement into best customer solutions

Open System Framework

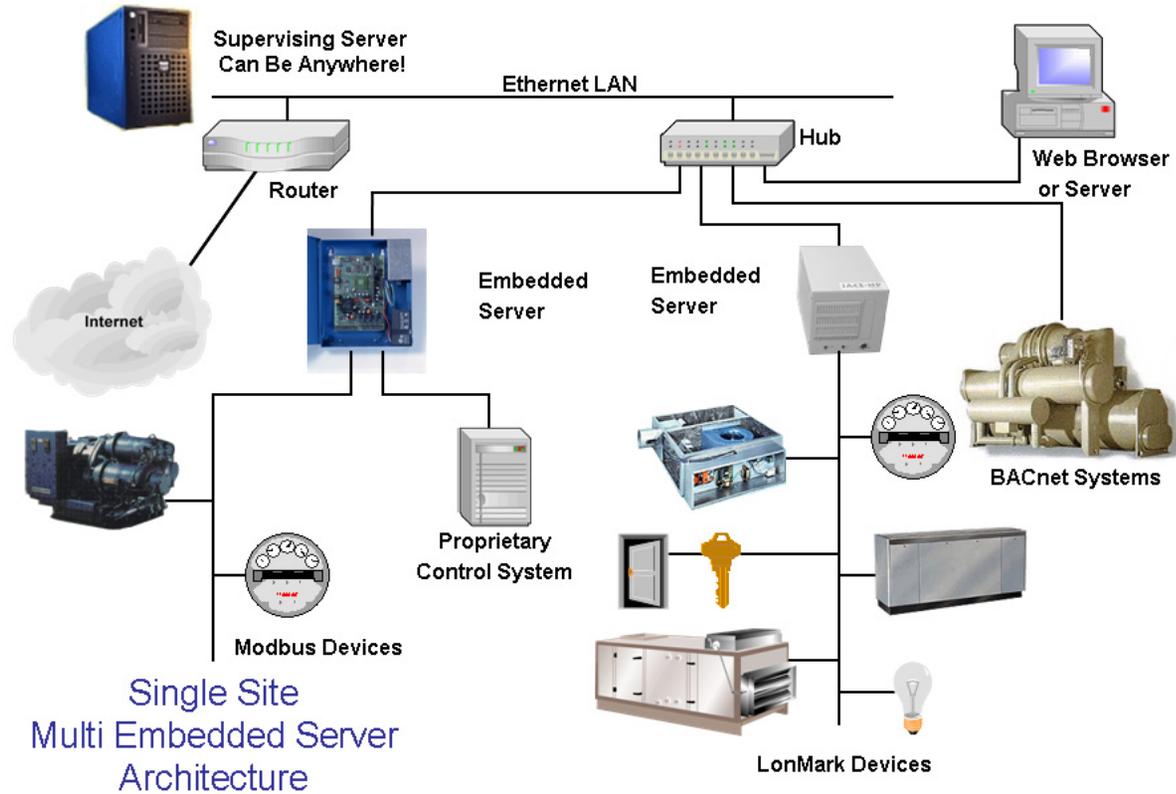


- Distributed System
 - Redundant Servers
 - Web Access
 - Real-Time logging capability
 - Integration platform for multiple protocols
 - Enterprise Integration
 - Document Management
 - User Interface via thin clients and web browsers

Open System Framework



Open System Framework



Wireless

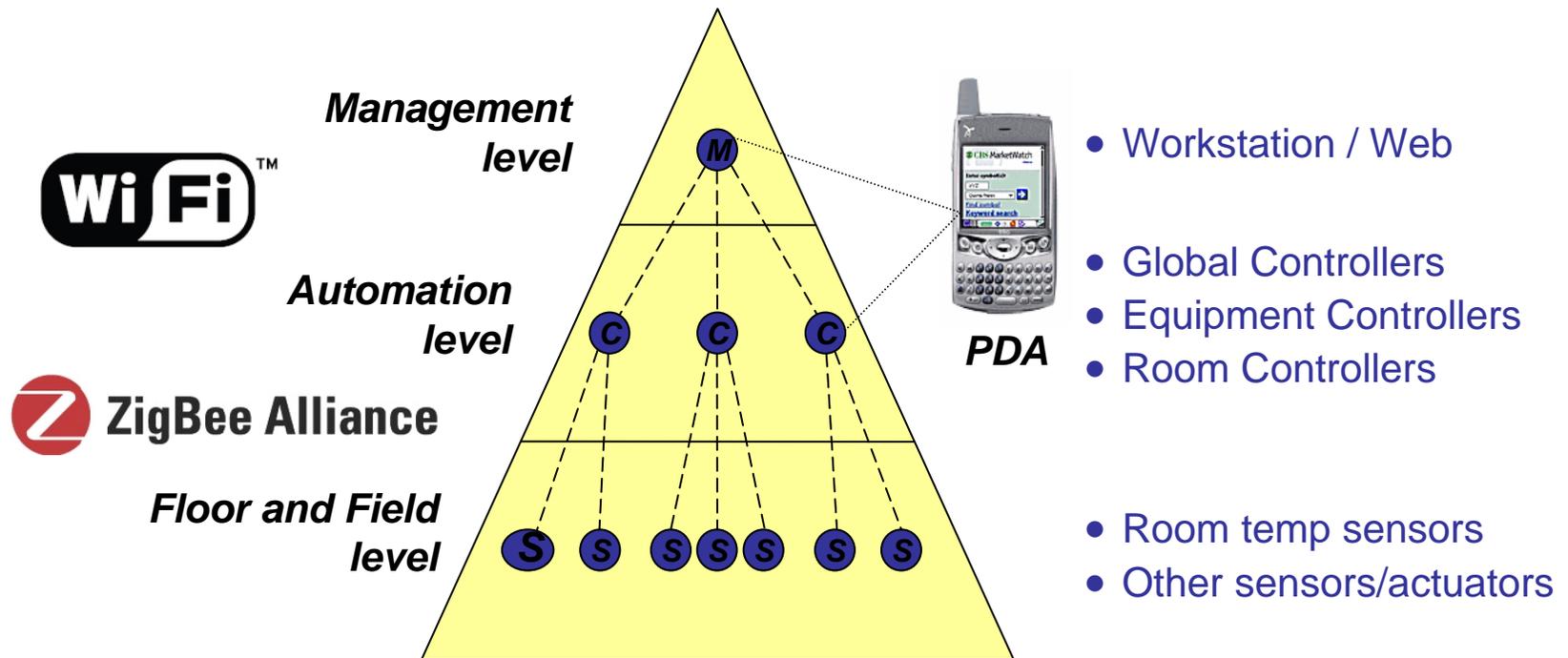
Wireless technology application in BAS systems

- Wireless applications are in testing throughout the controls industry
- Simplify design while increasing flexibility
 - Wireless environments easily adapt to changing occupant needs
- Offers the potential to dramatically reduce installations costs (30% - 50% of project cost)
 - New technology coming available in the next few years will make this possible
- Install or retrofit building automation systems faster, easier and with less disruption to occupants, operations & facility structure
- Reducing first costs and constraints associated with re-wiring and maintenance every time spaces are reconfigured

Wireless will become a game changer

Wireless

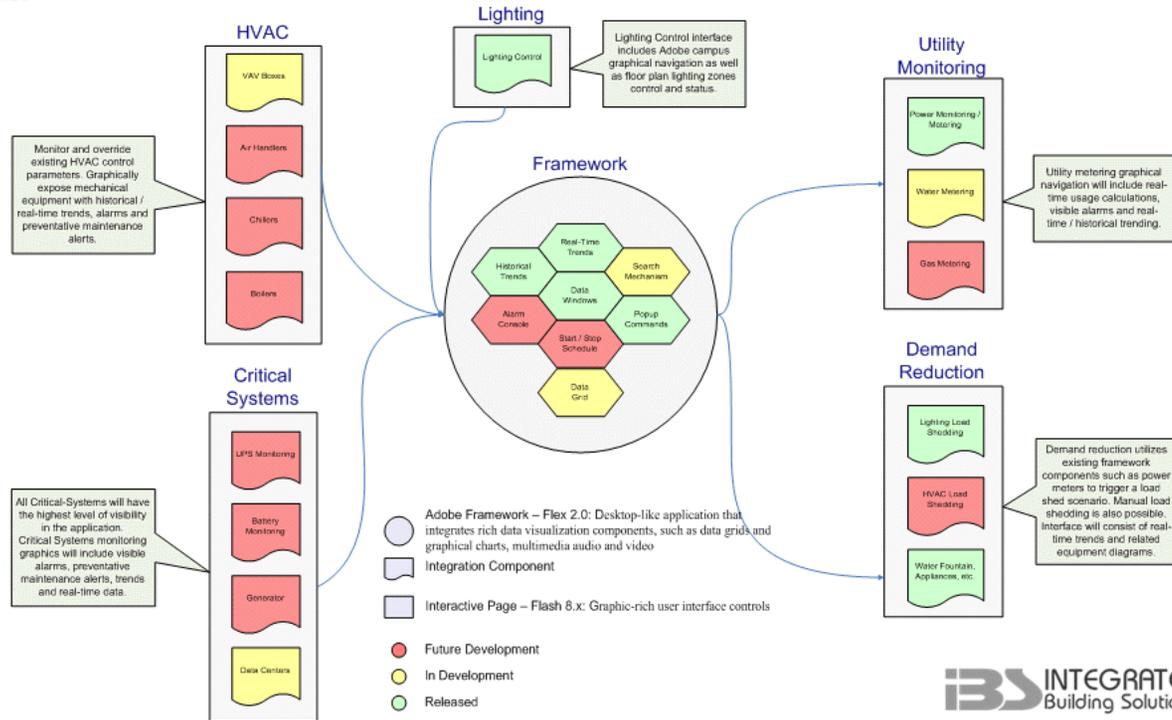
- 3 levels of wireless in buildings to explore



Wireless technology application in BAS systems

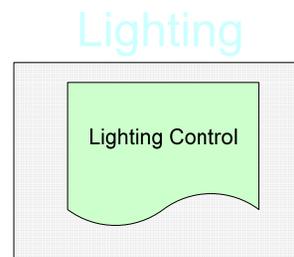


Adobe Facilities Integration Framework



Lighting Control

- Floor level control of lighting zones
- Automatic scheduling
- Web Control / Access





Critical Systems HVAC

Lighting

Utility

Search

Search

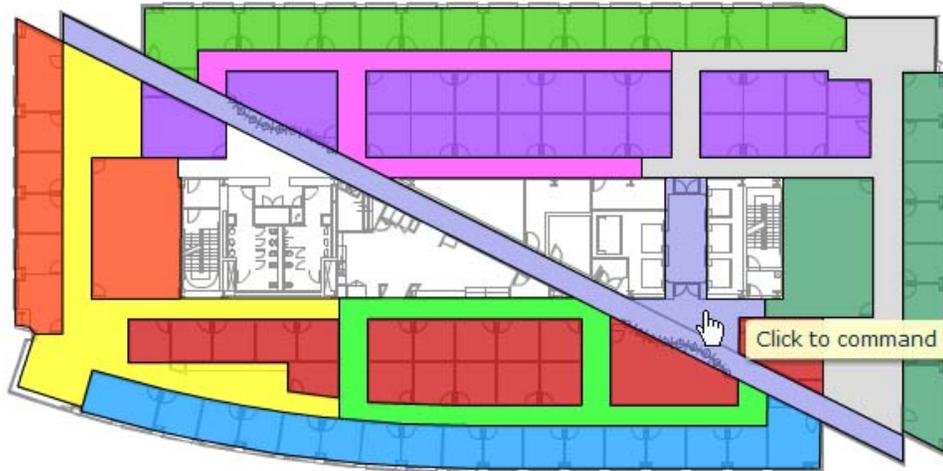
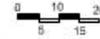
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East Tower - 8th Floor Buildings



East Tower Floor 8

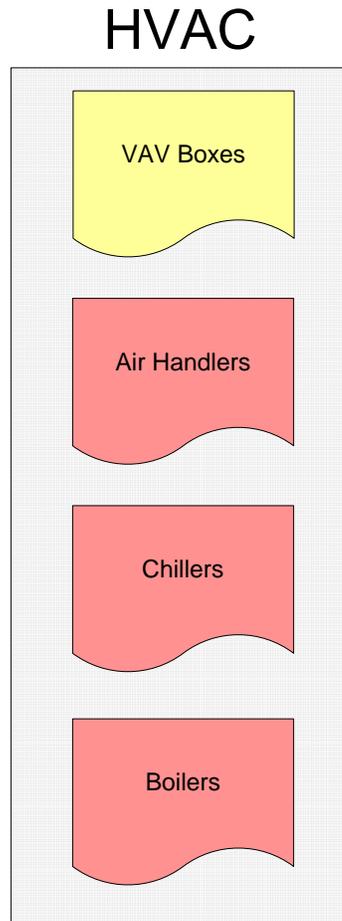


Click to command relay 4

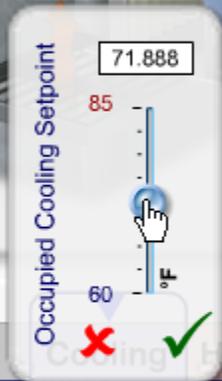
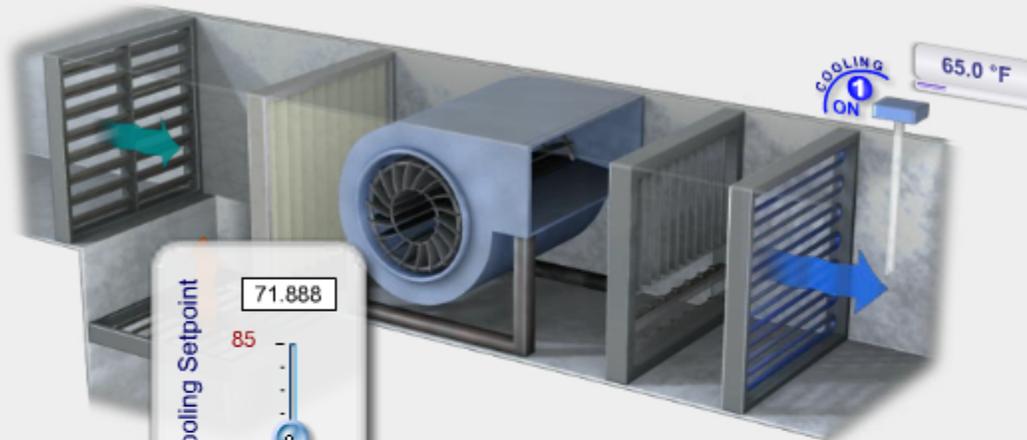
Navigation



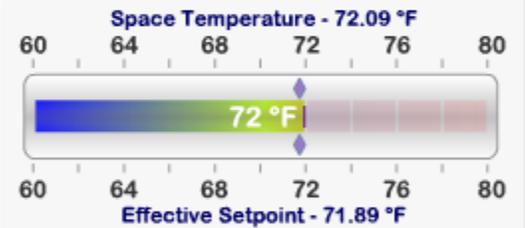
HVAC Integration



- VAV Boxes
 - West Tower: 30 per floor
 - East Tower: 26 per floor
 - Almaden Tower: 59 per floor
- Air Handling Units
 - West Tower: 30 units
 - East Tower: 45 units
 - Almaden Tower: 53 units
- Chillers
 - West Tower: 3 units
 - East Tower: 2 units
 - Almaden Tower: 2 units
- Boilers
 - 2 Boilers Per Tower



	Occupied	Unoccupied
Cooling Setpoint	71.9°F	81.5°F
Heating Setpoint	67.9°F	64.4°F



Display

Space Temperature	72.1 °F
Effective Set-Point	71.9 °F
Discharge Air	65.0 °F
Outside Air	72.1 °F

Commands

Occupancy Mode	Occupied
Unit Mode	Cooling
Fan Status	On
Cooling Output	92 %
Heating Output	0 %



Critical Systems

HVAC

Lighting

Utility

Search

Search

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VAV-101



Navigation

online

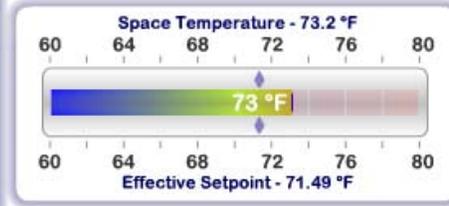
517.0 CFM

71.0%

59.0°F



<i>Set Points</i>	Cooling	Heating
Occupied	73.5°F	71.5°F
Unoccupied	82.4°F	61.0°F
Stand-By	77.0°F	66.2°F



Chart



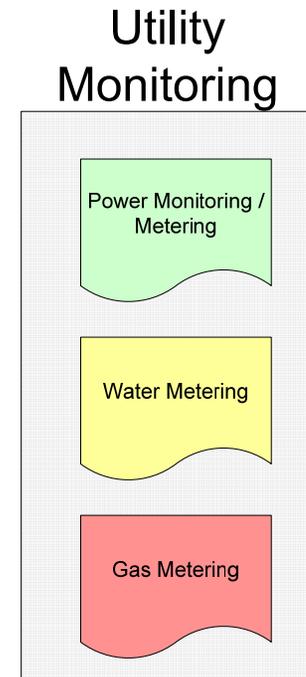
Mon May 8 2006 05:28:43 AM Mon May 8 2006 08:28:43 AM Mon May 8 2006 11:28:43 AM

Data



Utility Monitoring Integration

- Power Monitoring
 - 3 Main Meters
- Water Metering
 - 2 Landscape Meters
 - 1 Café Meter
 - 1 Meter per Cooling Tower
- Gas Metering
 - 3 Main Meters





Critical Systems HVAC

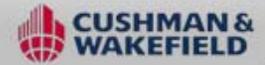
Lighting

Utility

Search

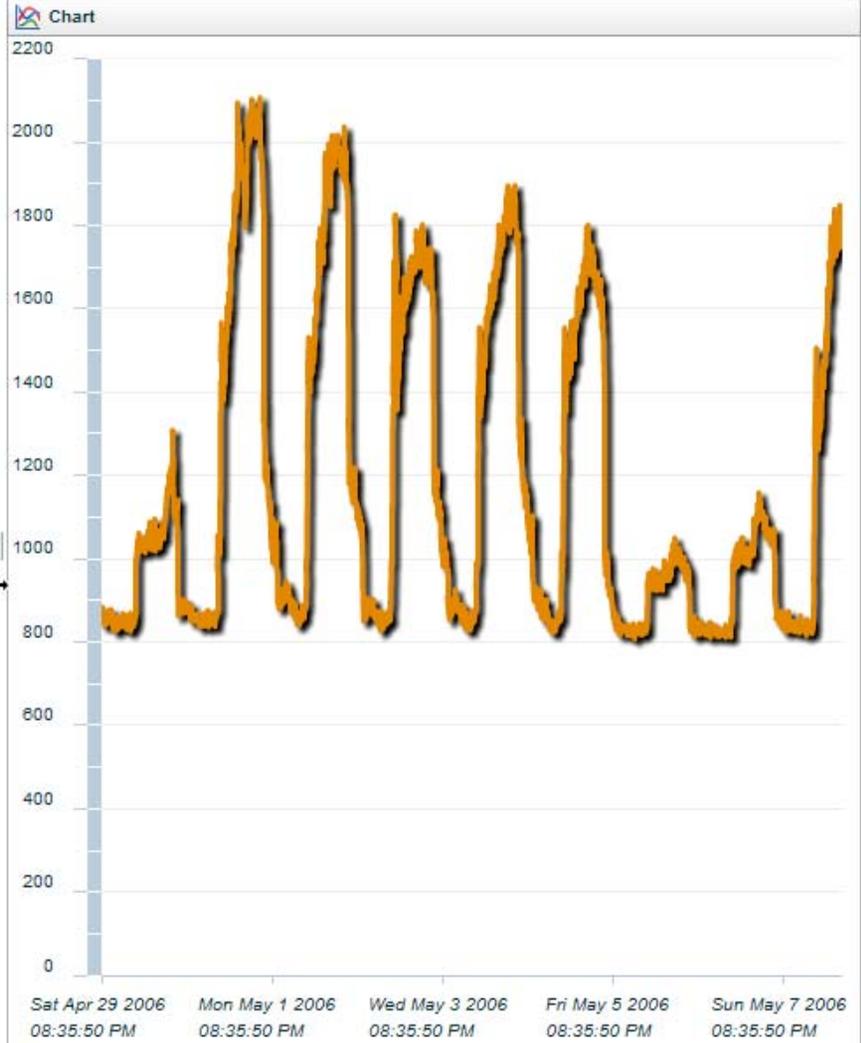
Search

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West Tower Meter

Navigation



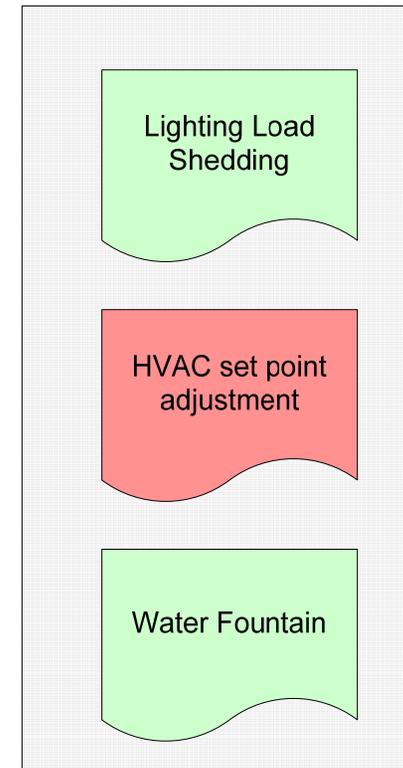
Data



Automatic Demand Reduction

- Automatic and Manual Load Shedding of non-critical systems
- Centralized system monitoring and demand control
- Multi-level Curtailment

Demand Reduction





Critical Systems HVAC

Lighting

Utility

Search

Search

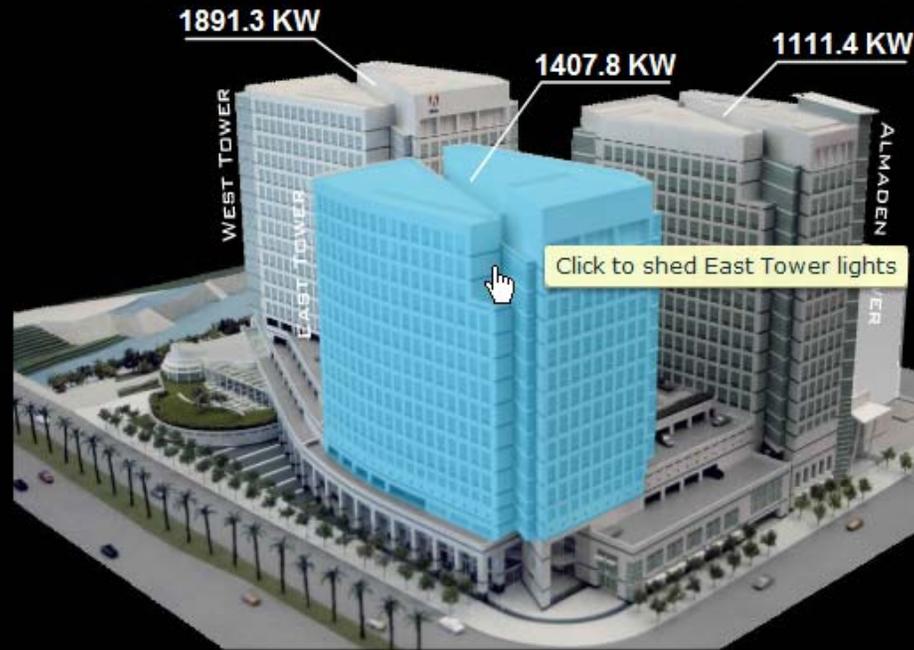
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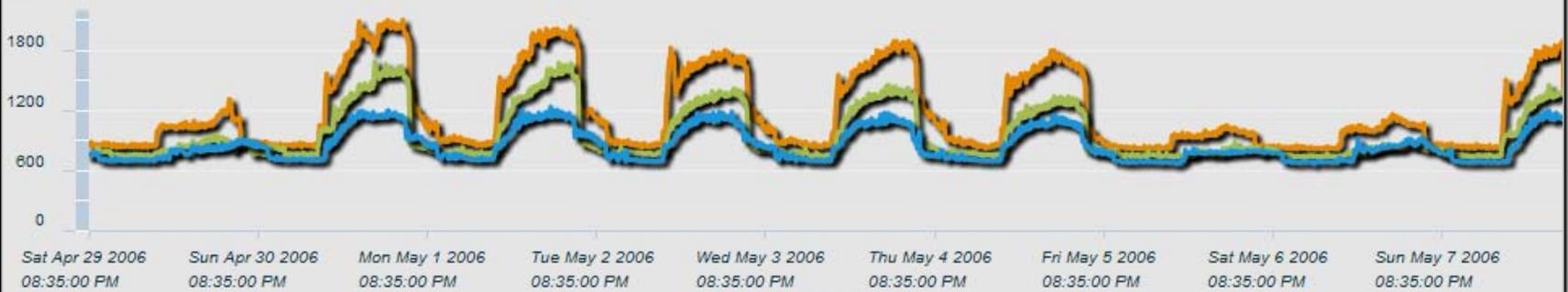
Load Shedding



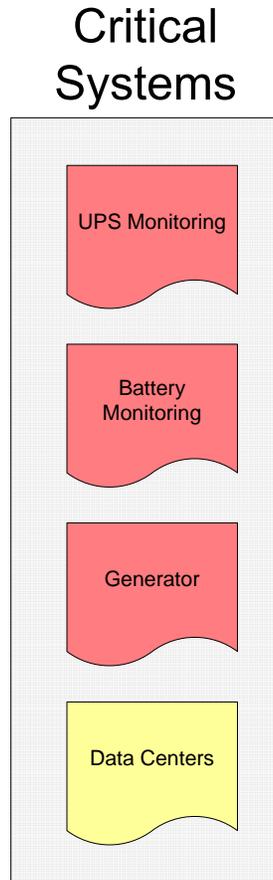
Navigation



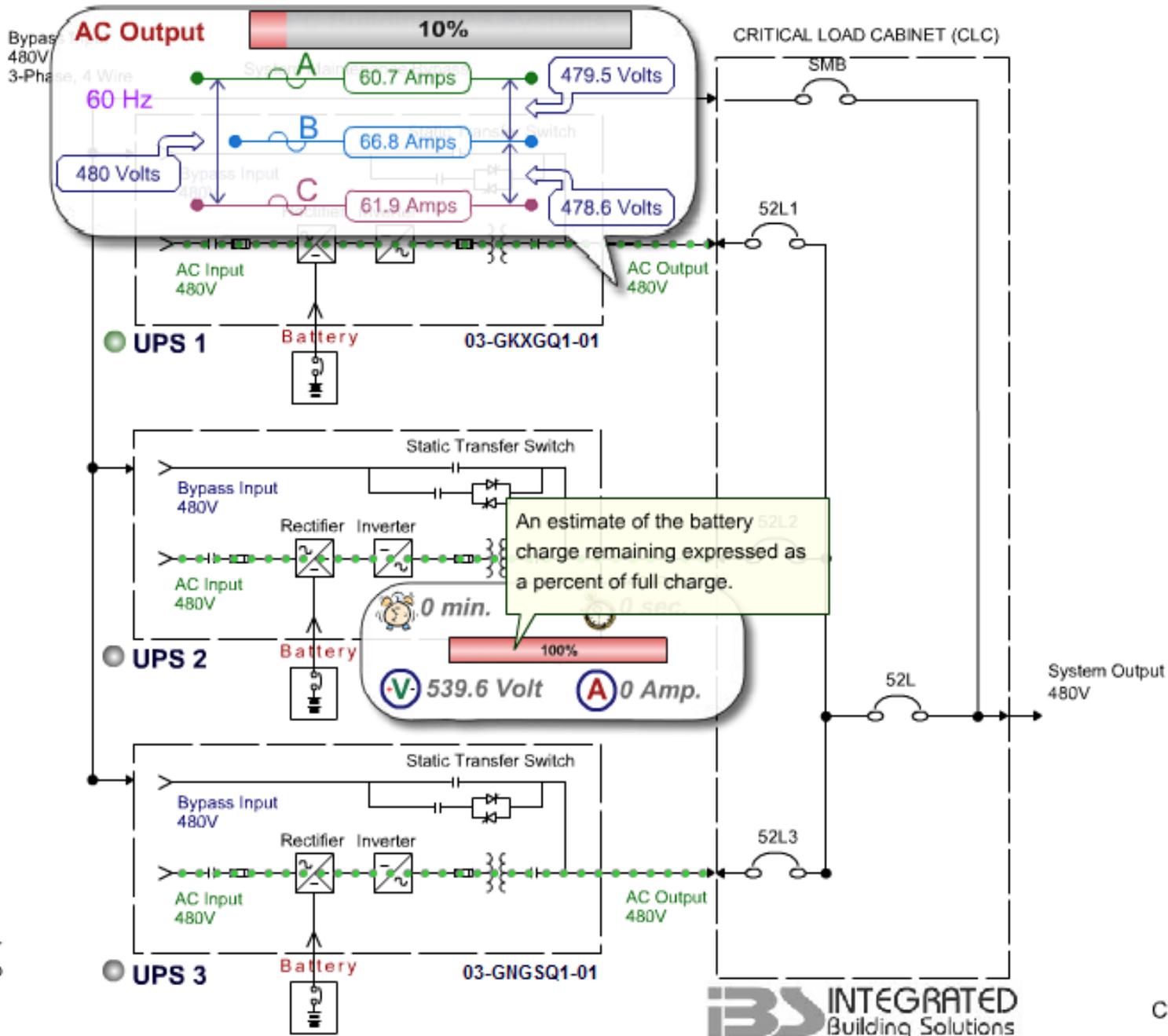
Chart



Critical Systems Integration



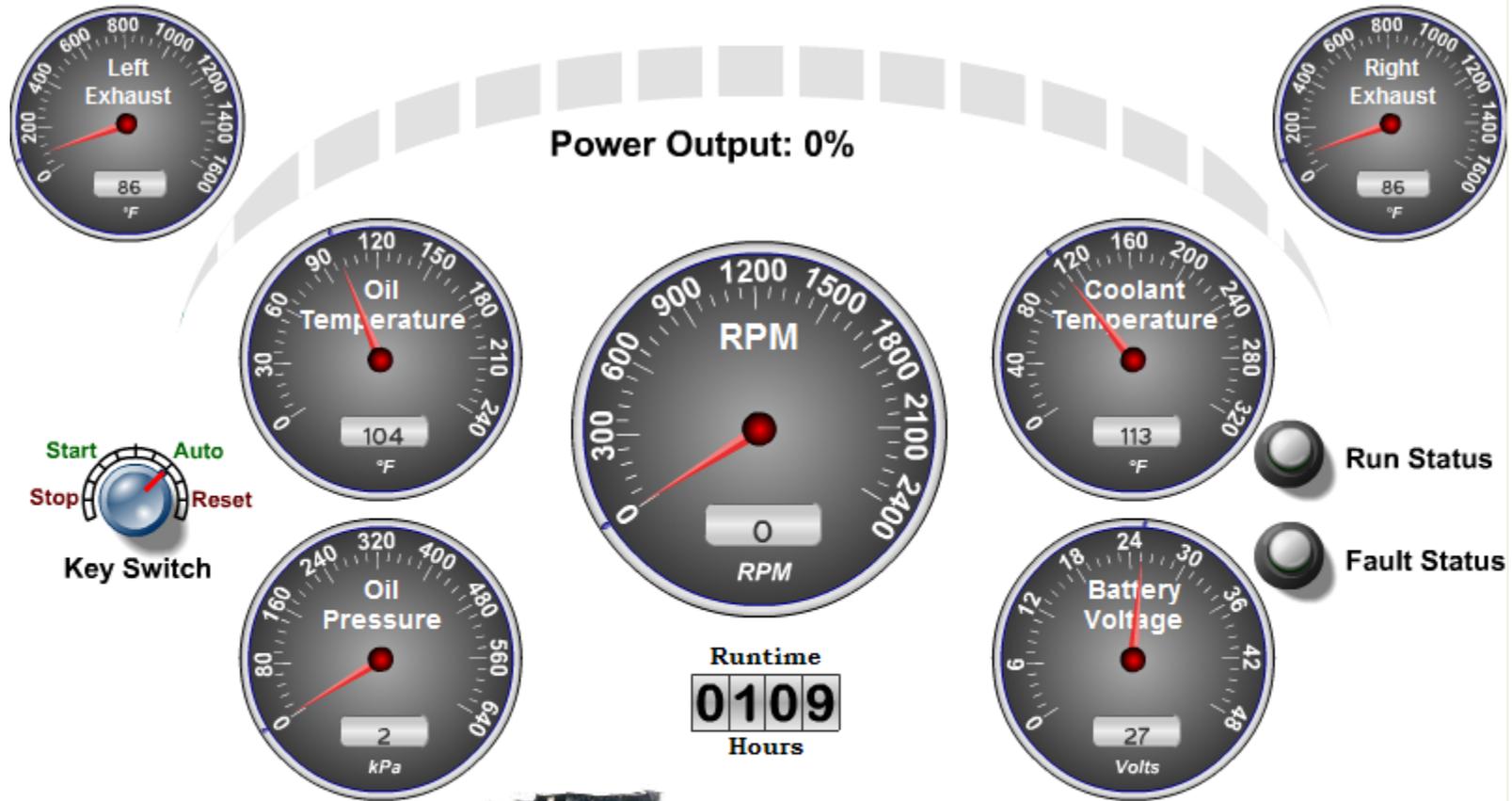
- UPS Systems
 - 1 Primary and 1 Secondary per Building (SNMP)
- Battery Monitoring
 - Integration with existing ALBER system
- Generators
 - 1 Per Tower
- Data Centers
 - Power Monitoring
 - Temperature & Humidity Monitoring
 - Trending Dashboard



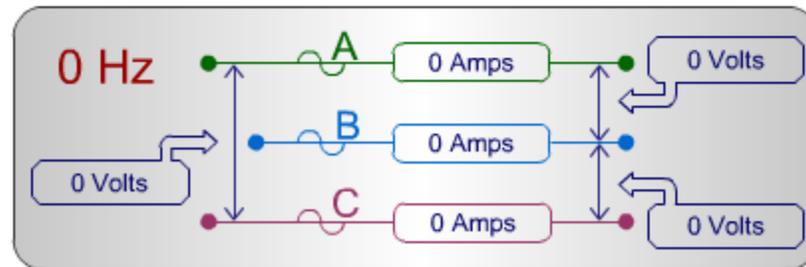
Polling Speed

Mitsubishi Alarms (877) 887-7830

Generator



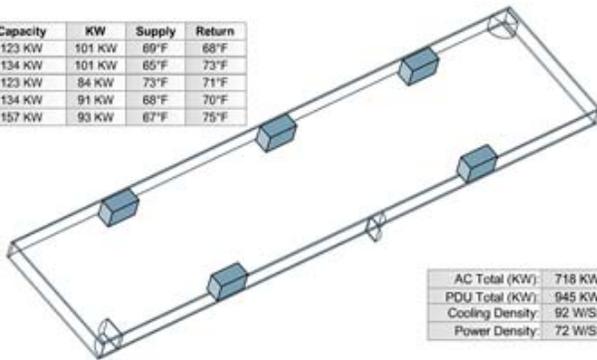
S/N: ECMC00127 Model: 3512



Data Center

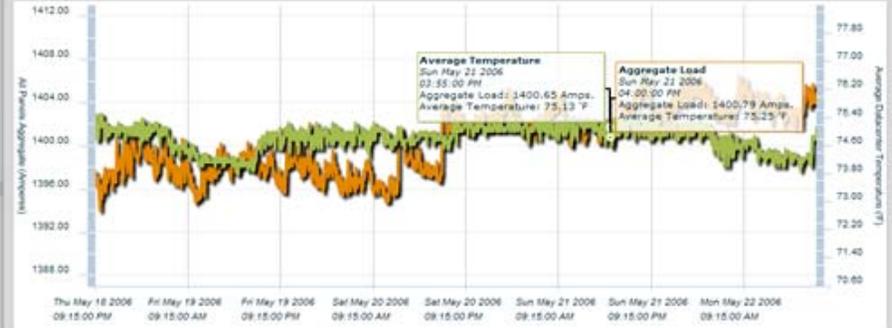
ACs

Unit	Capacity	KW	Supply	Return
AC 1	123 KW	101 KW	69°F	68°F
AC 2	134 KW	101 KW	65°F	73°F
AC 3	123 KW	84 KW	73°F	71°F
AC 4	134 KW	91 KW	68°F	70°F
AC 5	157 KW	93 KW	67°F	75°F



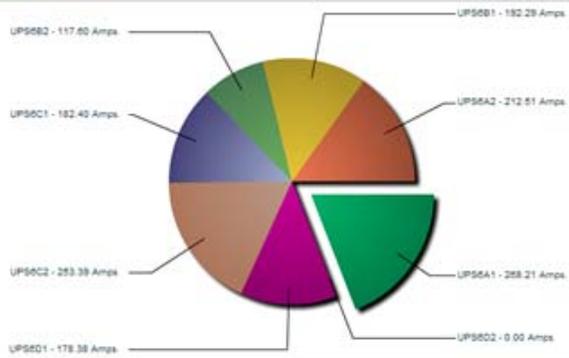
AC Total (KW):	718 KW
PDU Total (KW):	945 KW
Cooling Density:	92 W/SF
Power Density:	72 W/SF

Data Center Aggregate Load / Average Temperature Timeline

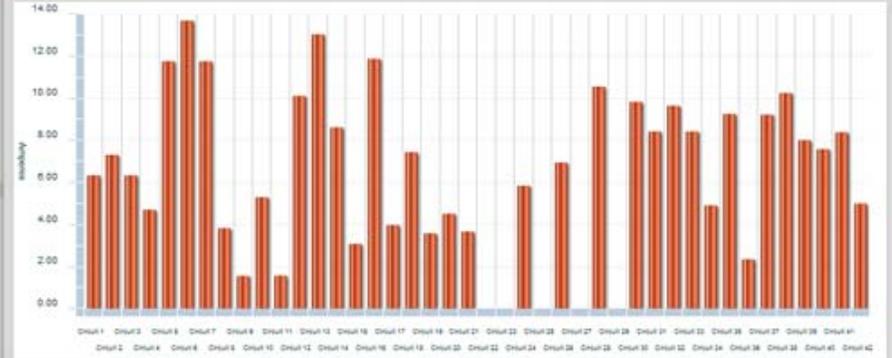


Aggregate Load
Average Temperature

Load Breakdown [05/22/2006 06:40:00 PM]



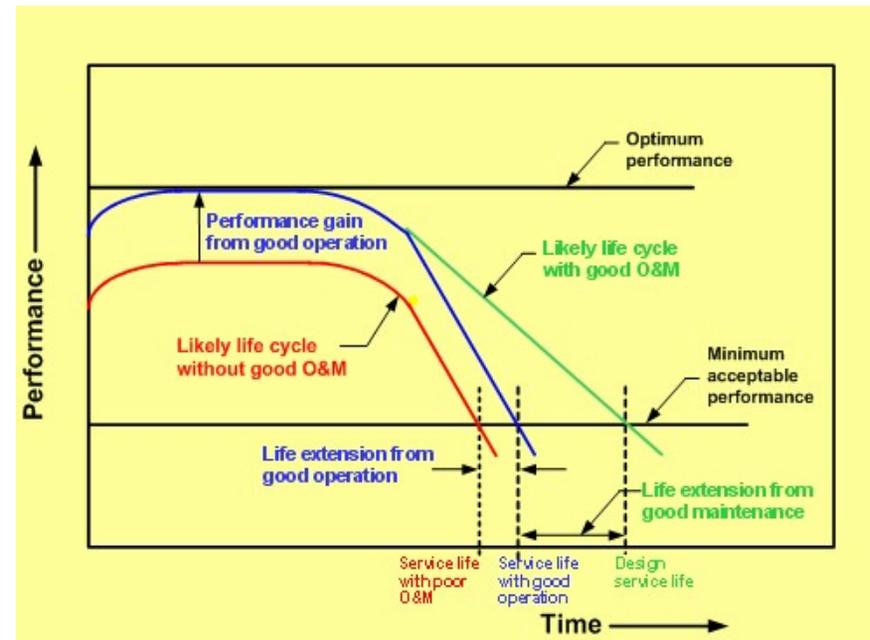
Distribution Panel Details



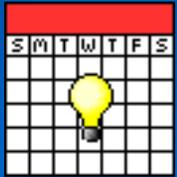
Using Integrated Systems

Fault Detection & Diagnostics in BAS systems

- Innovating buildings through the use of Fault Detection & Diagnostics
 - Performs automatic and continuous building equipment diagnostics
 - Identifies specific operational performance problems
 - Improved indoor environmental quality, reduce energy usage
 - Reduced peak demand
 - At least 10% of energy wasted due to time and equipment and controls
- Future generations of BAS will have embedded FDD reporting



Energy Management Control Systems Boeing Renton Plant



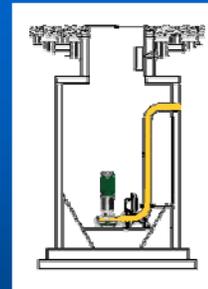
Lighting



Compressed Air



Plant Steam



Lift Stations

Renton, Washington

Jim Greif

425-234-5272



- 
- A horizontal decorative bar with a light blue grid pattern.
- Details contained in James Greif / Boeing's Presentations are not available for public distribution.



Questions & Discussion

Upcoming Web Conferences



October 19 – Energy and Climate Risk
Management

November 15 – Energy Management Diagnostics

Download past web conference presentations at:
www.energystar.gov/networking

Questions or comments? Contact: tunnessen.walt@epa.gov



Thank You!