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Introducing the

A brief introduction to the most advanced web-enabled open controls technology available today

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Tridium Ltd

Company Facts

- Operating globally from offices in the USA, UK, Singapore, Australia and Japan. HQ in Richmond, Virginia
- Clear global market leader in the supply of open integration software for building applications
- 1st generation Niagara Framework launched in ‘98, 3rd generation in 2005
- Originally VC backed
- Purchased by Honeywell Group in Nov 2005

Richmond Head Office

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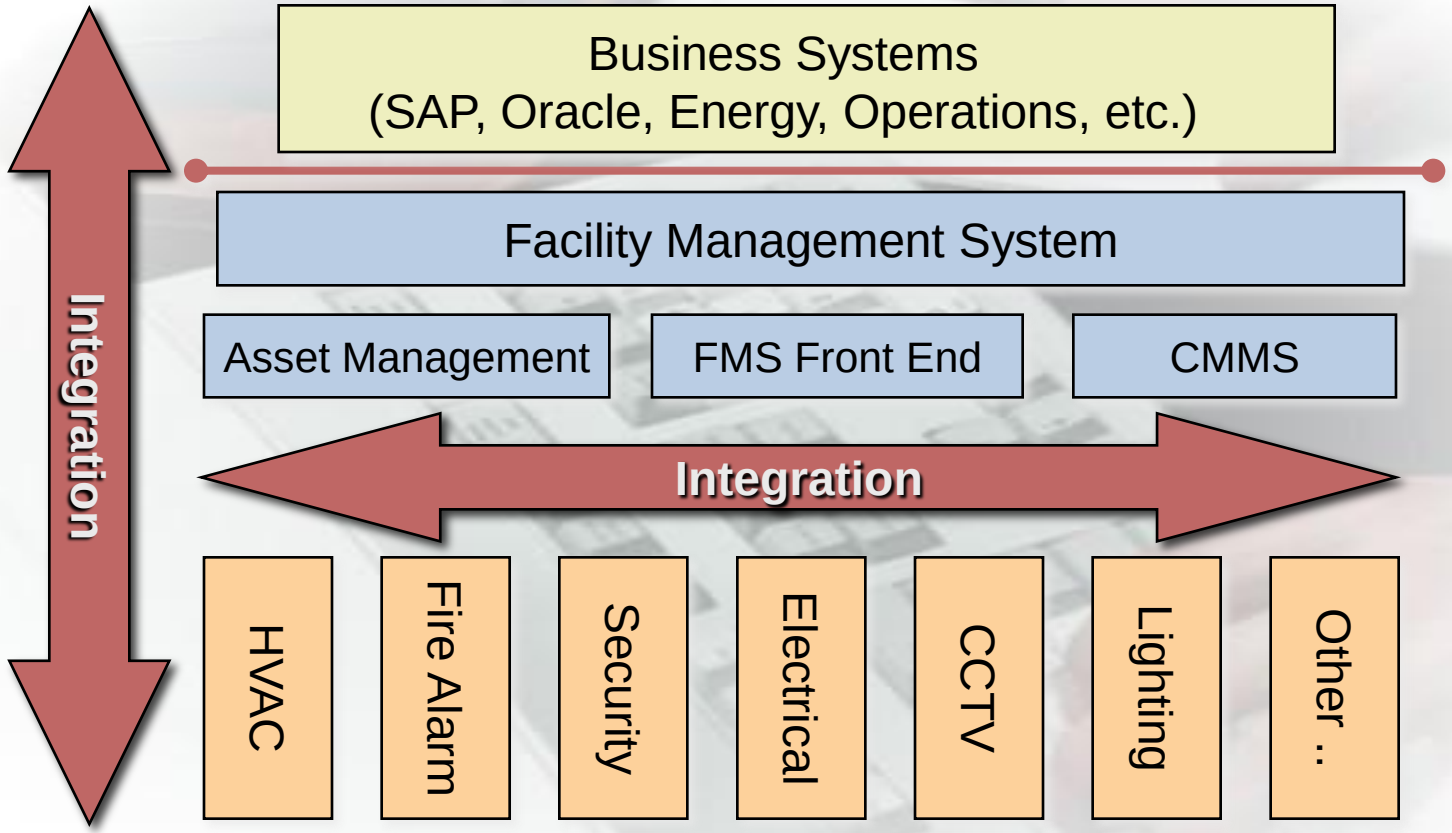
Niagara FRAMEWORK™

adopted by a growing number of equipment and control systems providers

Integration, Convergence and Smart Services

The issues and Tridium's part in the solutions

Dimensions of Integration



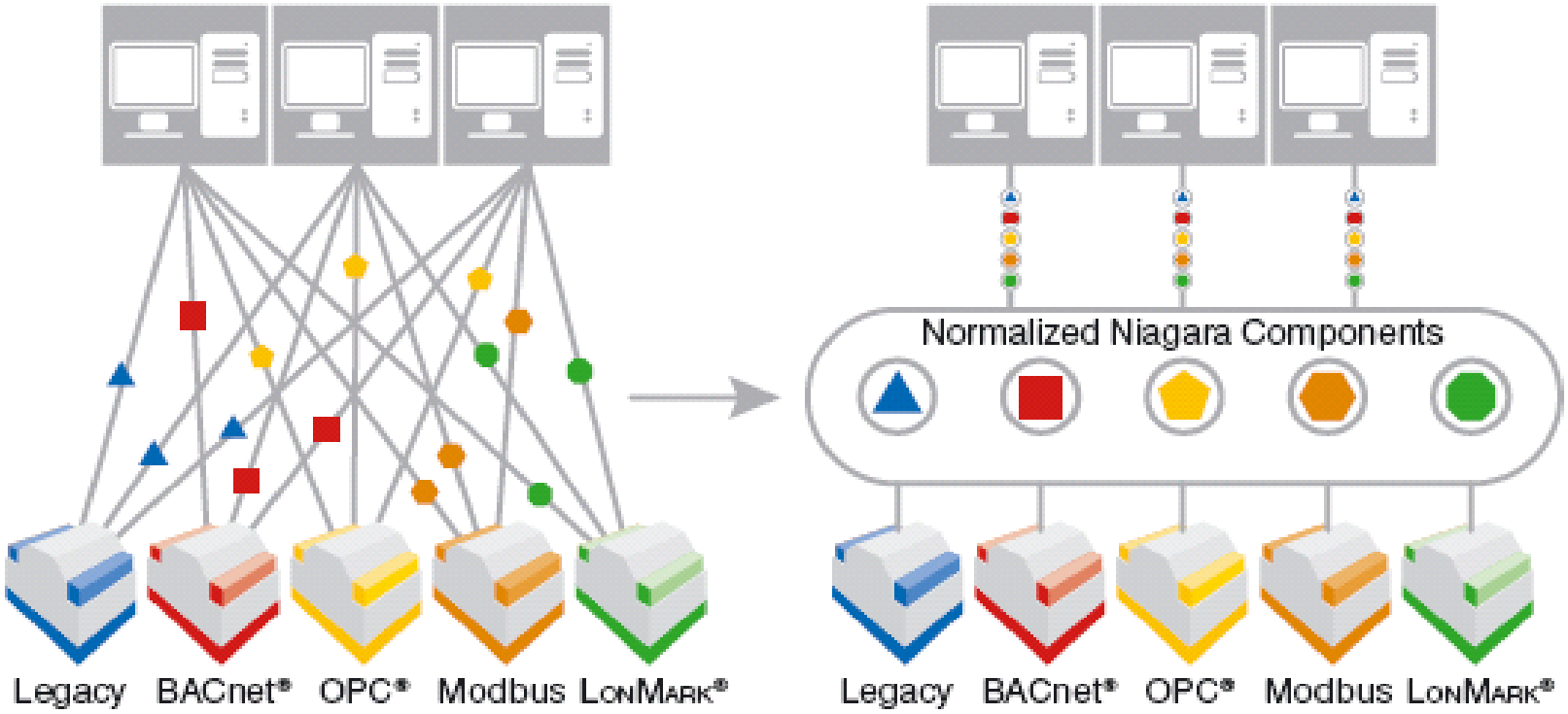
The Problem and the Solution

N to N

Lots of Connections, Complexity and Cost
Creates a Barrier to Deployment of Solutions

N to 1

Information representation
is normalised



What is the Niagara Framework?

A Java-based automation framework enabling real-time, bi-directional control over TCP/IP networks

A *universal software infrastructure* **that allows businesses to** *easily build* **software applications for** *accessing, automating* **and** *controlling* **smart devices over the** *Internet.*

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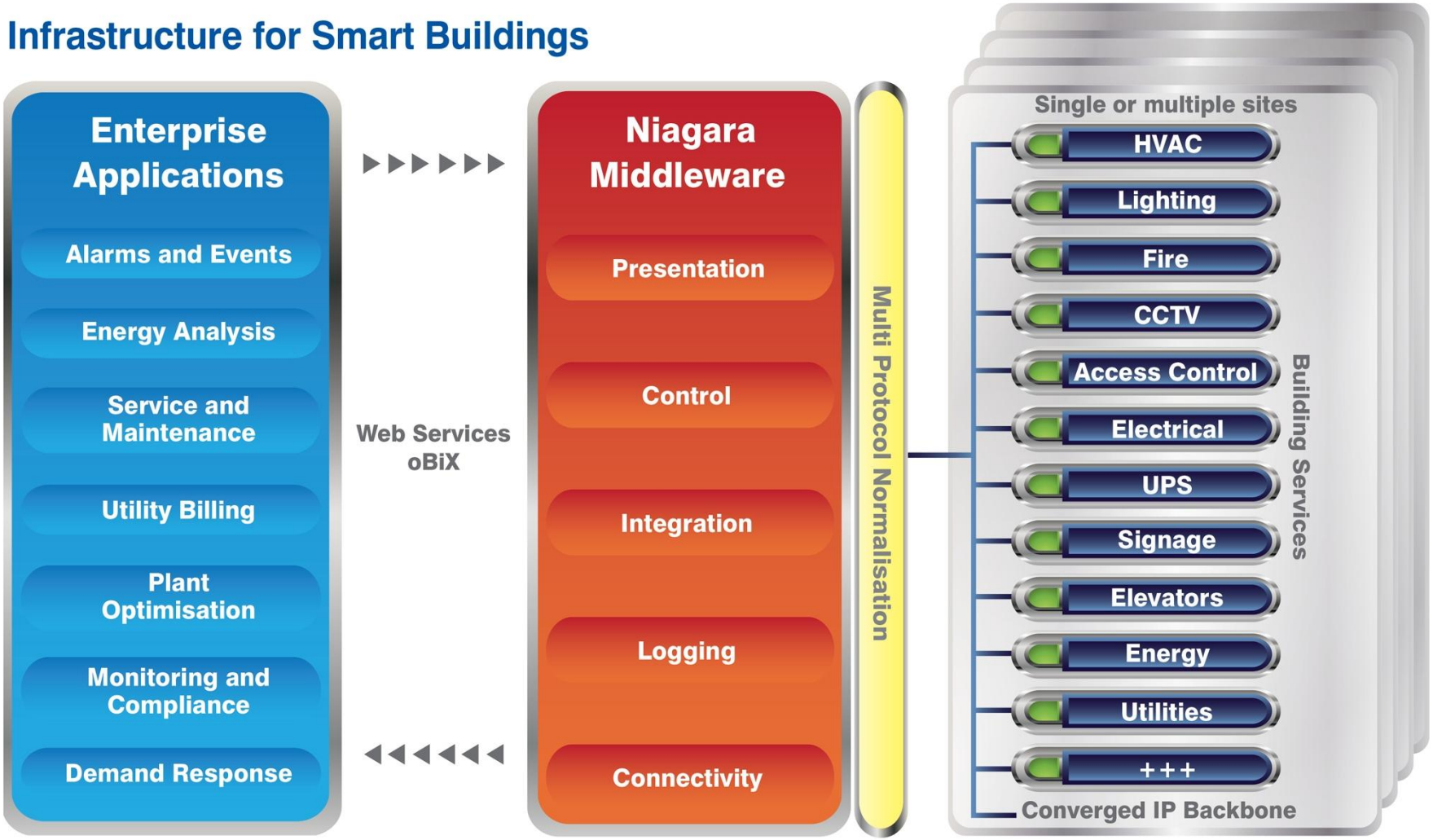
Infrastructure for Smart Buildings



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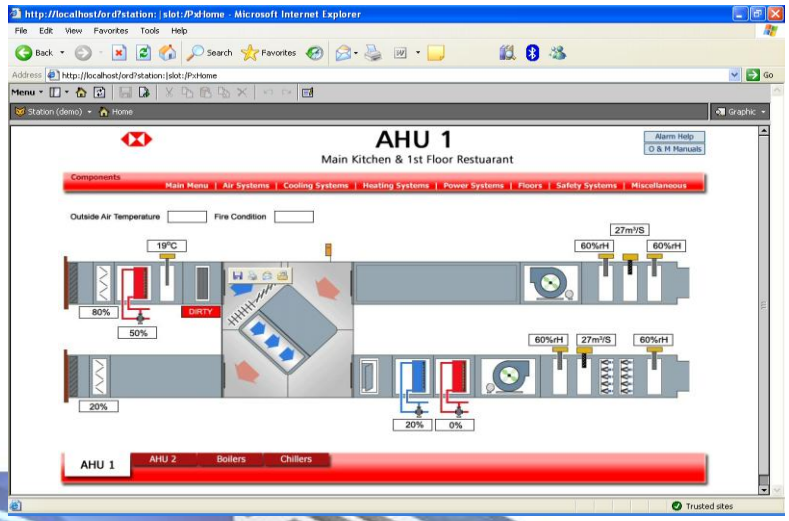
niagara AX FRAMEWORK™

- IP connected
- Web-enabled
- All open standards
- Open for developers
- Web services support
- Multi-protocol
- Integrates all systems

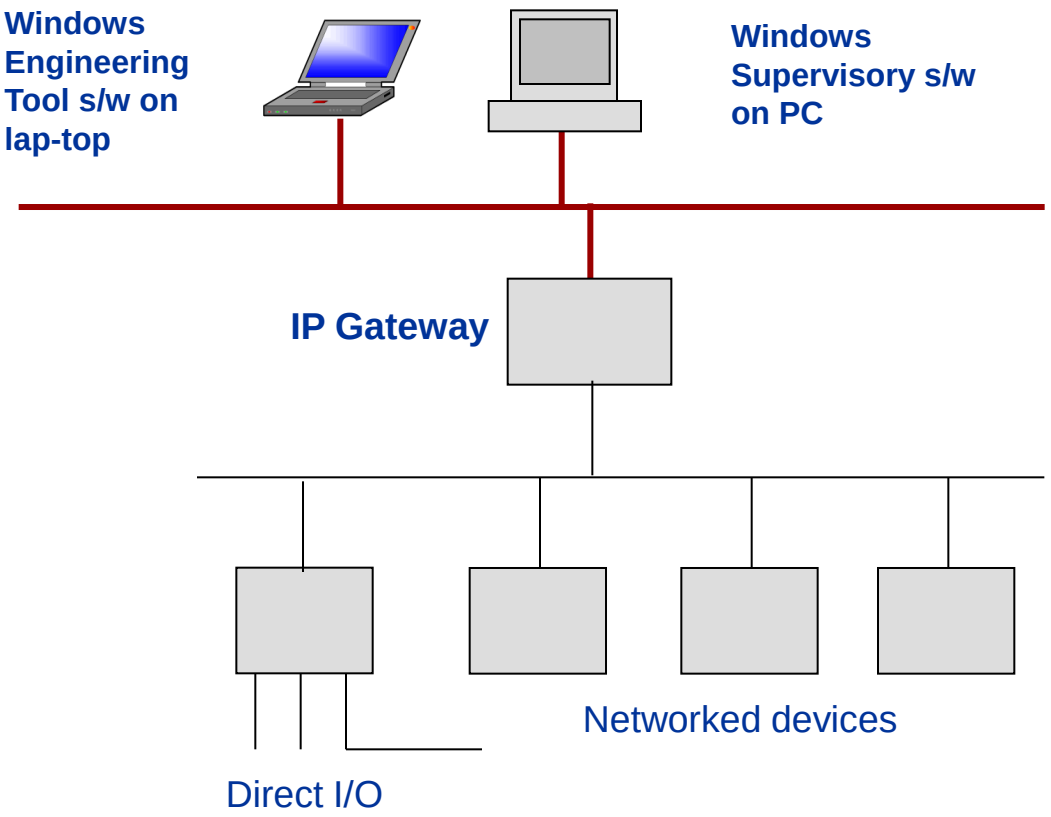
Hardware Platforms

- Embedded controllers called JACEs – Java Application Control Engine
  - Direct control + serial and IP network interfaces
  - GPRS modem option
- Windows, Linux or Solaris servers



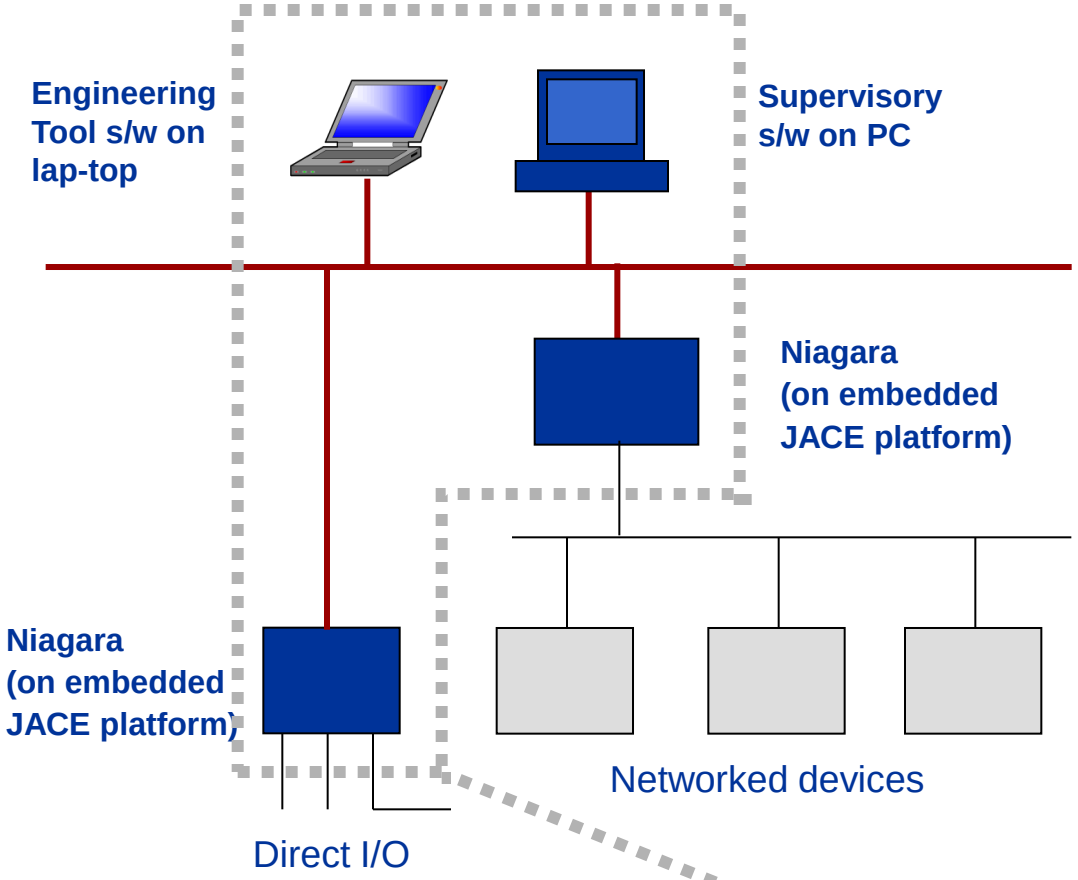
Compact JACE 2 platform with I/O options

Conventional BMS architecture



- Supervisor s/w (Windows based)
- IP network
- BMS IP bridge/gateway
- Field network
- (usually proprietary or maybe open LON)
- BMS controllers

Niagara architecture



Niagara (on Windows, Linux or Solaris)

IP network

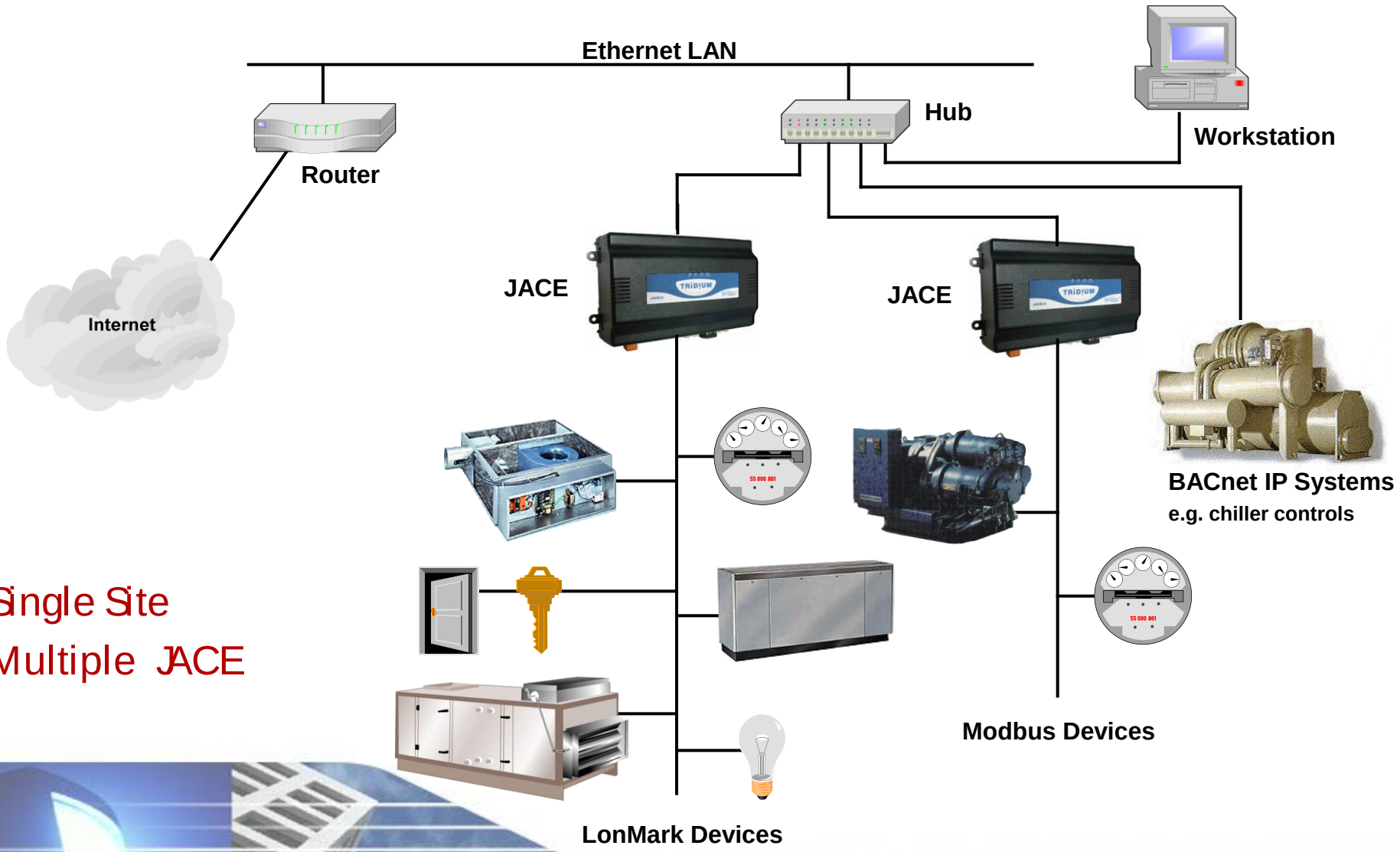
Niagara area controller (on embedded JACE platform)

Field network (proprietary or open LON)

Third party controllers (integrating legacy systems)

The Niagara Framework can be used in all three places in the architecture, and in some cases, can be deployed to fulfill all functions in one box

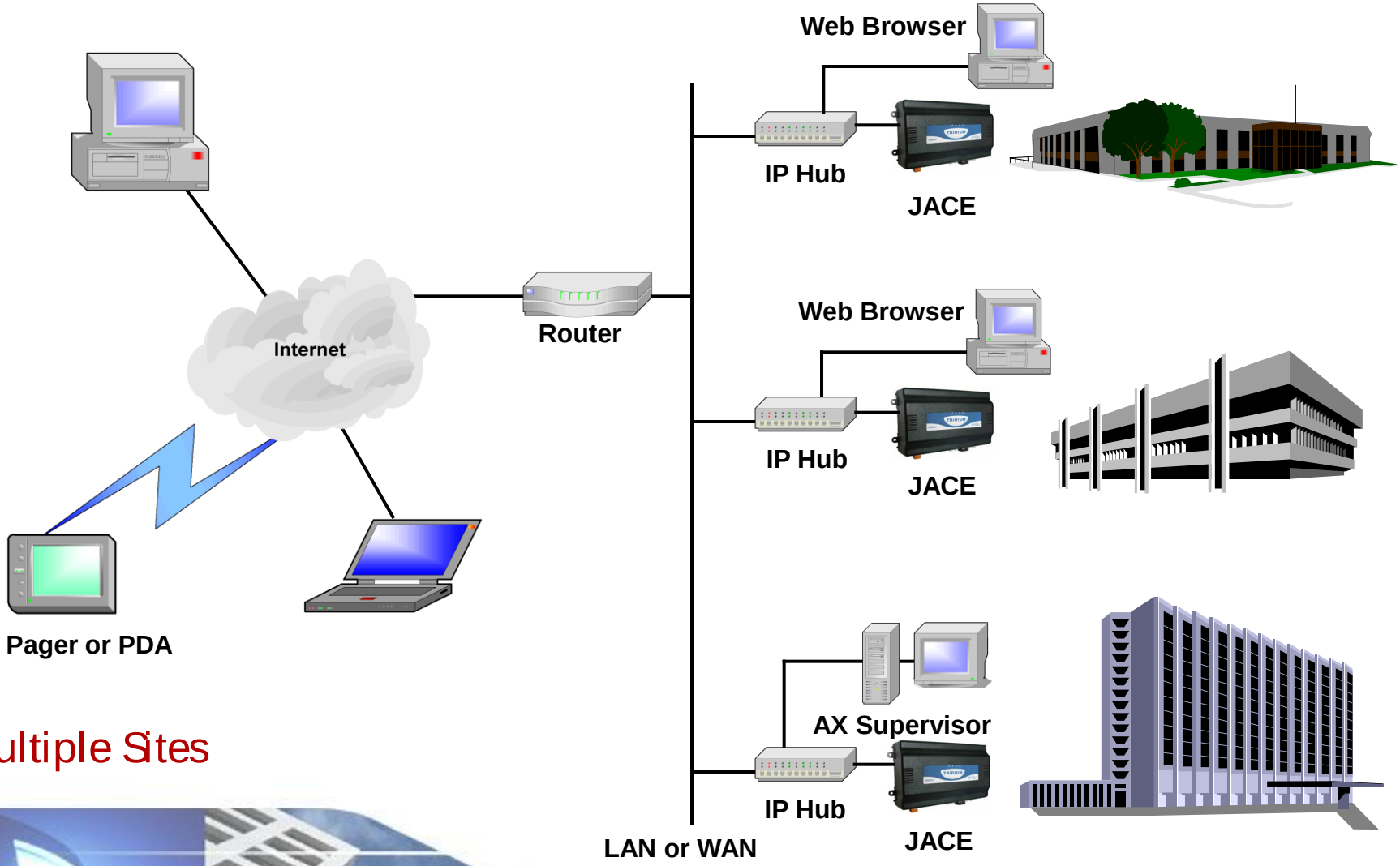
Typical Architectures



Single Site

Multiple JACE

Typical Architectures



Multiple Sites

Why use Niagara?

- Provides an open, future ready solution for integrating all building systems
- Can be used for full control of HVAC, lighting and access control using direct connected or networked I/O
- Saves cost on new buildings – CAPEX reductions
- Improves building functionality
- Enables flexible remote management of all systems
- Allows business access to building related data
- Reduces OPEX by simplifying training and maintenance regimes

Integrates all building systems on the IP infrastructure

Value Propositions

- Easier to use and engineer – browser based
- Flexible access locally and remotely
- Gives freedom of choice in future system upgrades
- Lower total cost of ownership
- Real time information – better business decisions
- Opportunity to improve business processes

supporting multiple open standards:

BACnet™

M-Bus

Modbus®

SNMP

LONWORKS™

OPC® FOUNDATION

XML

KNX®

ZigBee™

oBIX
Open Building Information Xchange

Z-wave

Plus many legacy systems

…. and Enterprise Databases

ORACLE

IBM DB2

IBM WEBSPHERE™

MySQL

Comprehensive IT support

- control devices use embedded operating systems, not Windows, so more secure
- full SNMP support
  - can both receive and generate SNMP traps
  - can integrate with HP OpenView for IT system management
- full port control for safe communications through firewalls and security devices
- supports SSL (Secure Sockets Layer)
  - provides secure communications between browser and NiagaraAX station
- supports LDAP, so can inherit user privileges set by IT management

Web Server Advantages

- Data is in one place not in two
- One database means fewer errors in engineering
- Simpler and quicker to set up
- Much easier to update
- More flexible in use
  - Access from anywhere without special s/w
- The source code is in the operating machine
- Not off-line generated and downloaded
  - so the original set-up is always available for update
- Reduces the cost of changes and maintenance

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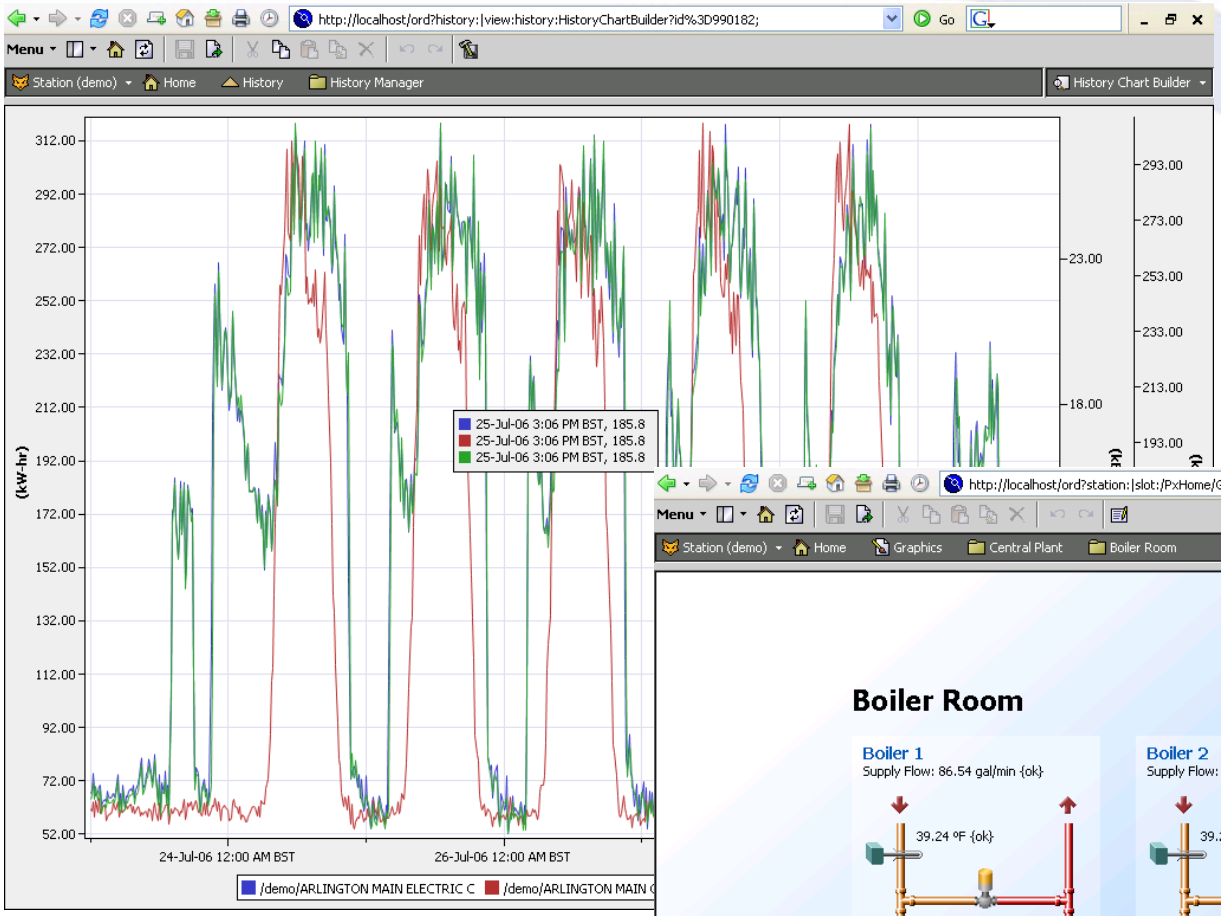
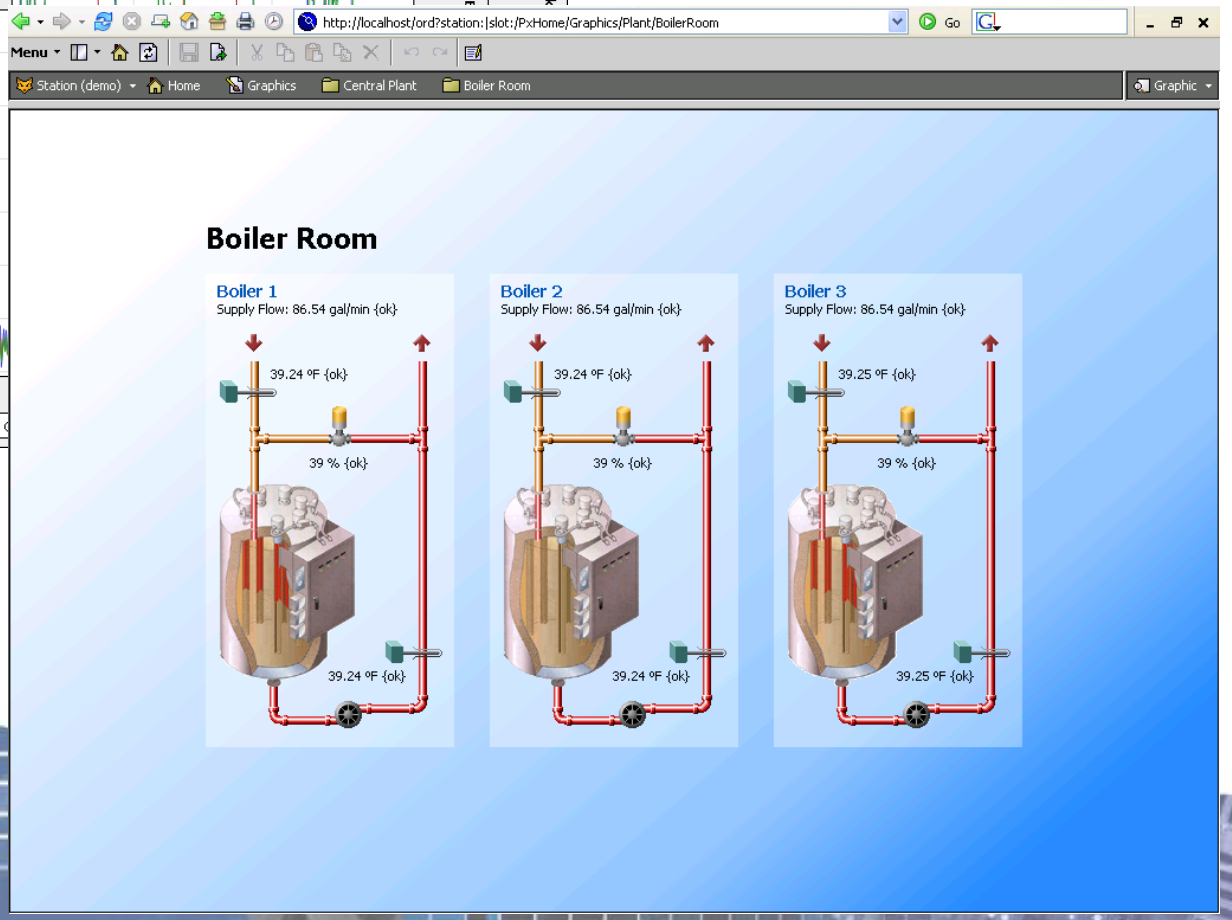
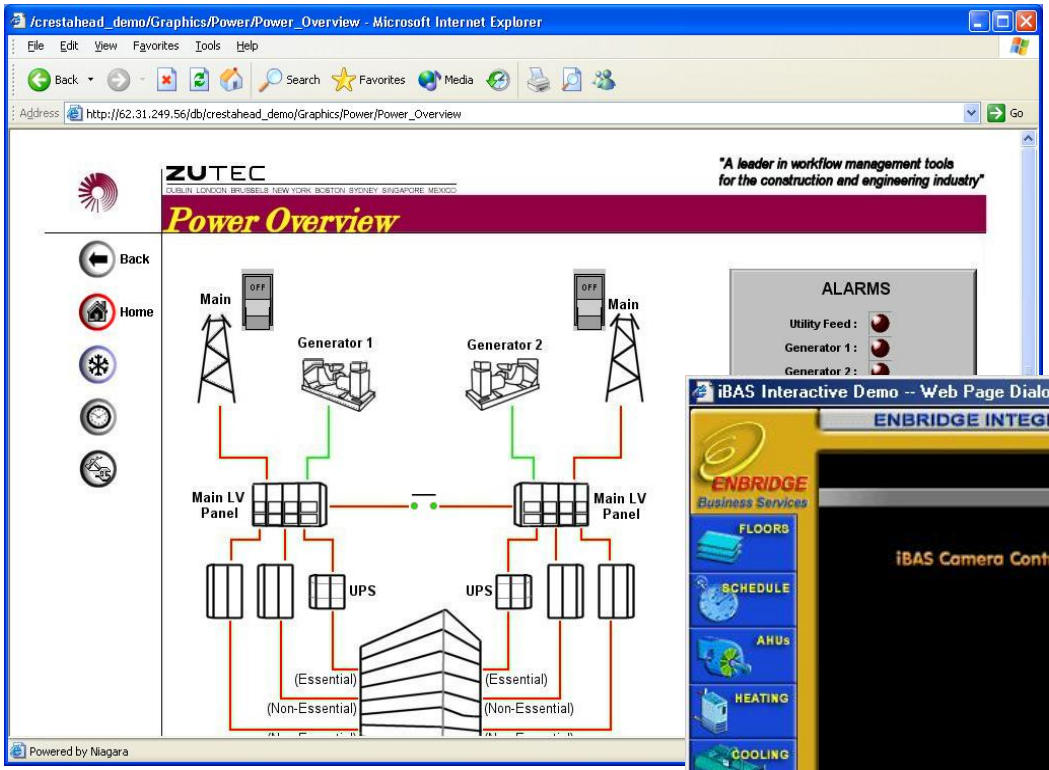
Graphing task with zoom feature

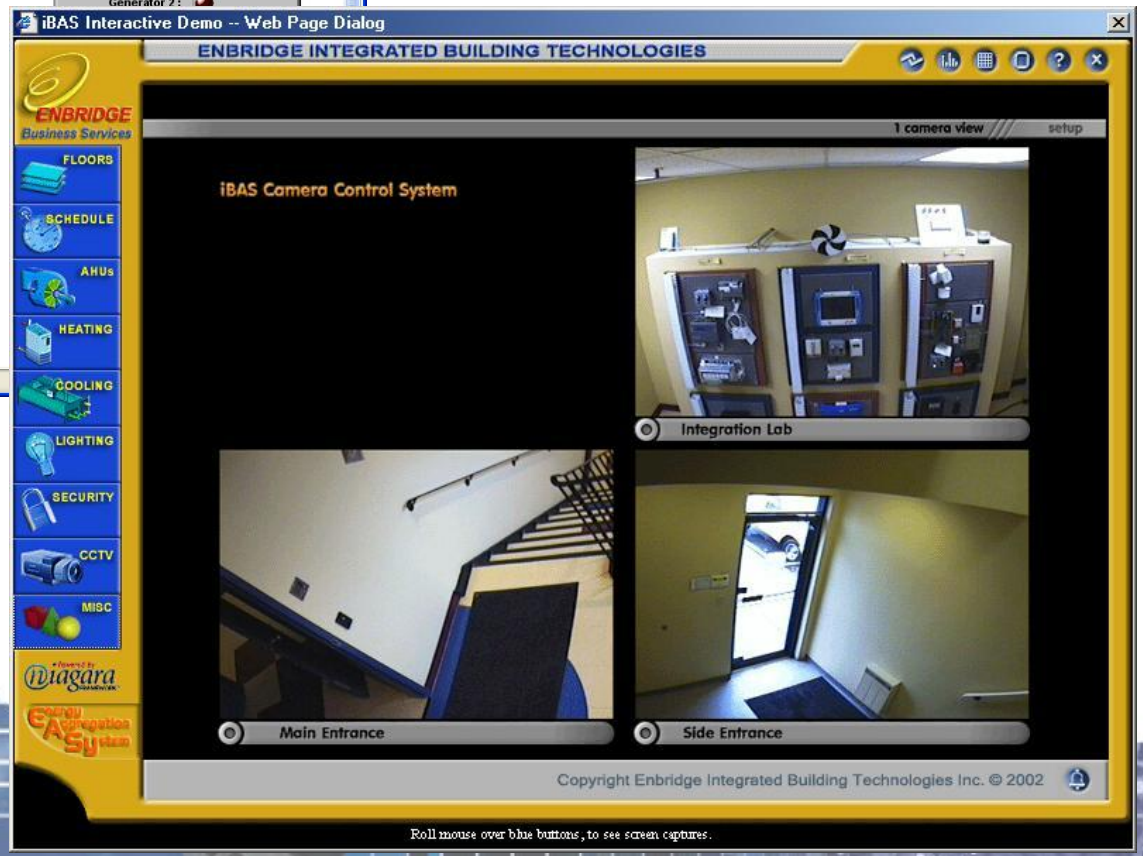


Sample graphics



Examples of graphics in a browser





Integrated CCTV video

Current Products
- JACE 2 platform with I/O

- Compact DIN rail mounted
- Upto 66 directly connected points
- RS232 and RS485 interfaces
- LON and other transceivers optional
- 2 x Ethernet ports
- 128MB RAM
- Four licensed versions for a range of applications

JACE 6

- Same package as JACE-2
- 524MHz, higher performance with Maths coprocessor
- More memory for logging – 256 MB
- Two versions - 650E has 48Mb of heap memory
  - 660E has 96MB of heap memory

M2M JACE

- Low cost wall-mounting, designed for remote monitoring & control applications via GPRS
- 8 inputs + 8 outputs
- 1 x RS232, 1 x RS485, 2 x Ethernet ports
- Status LEDs visible externally
- Strain relief for all cables
- Support for remote IO
- Option card slots for wireless/LON/serial
- 230V supply

Effectively = JACE 220 + IO-16 + GPRS modem + 230V PSU
all in a compact wall-mounting plastic enclosure

All this and Security too!

Security Industry - Trends

- Closed Proprietary
  - Similar to the state of the BAS industry in early 90s
- IP Movement
  - Recent migration from serial based communications to IP
  - Network topology flattening, systems becoming more distributed
  - POE solutions becoming reality
- Industry Push to Open Systems
  - IP movement results in many like devices that need to integrate
  - No open standards…Wiegand is the one exception
  - Establishment of Physical Security Interoperability Alliance. (www.physicalalliance.org)

Security Industry - Trends

- Increasing Role of IT Departments / Systems
  - Global permissions through corporate IT security policy (ie. Active Directory, LDAP)
  - Network utilisation issues associated with IP video
- Web Based Solutions Becoming More Accepted
  - No special PC software required, standard web browser access
  - Remote access integrity improved
- Smart Card / Multi-technology Credentials
  - Single card for access control, POS, ID verification
  - Driven by federal govt regulations (FIPS 201, HSPD 12)
  - Biometrics being used for stronger authentication

Security Industry - Trends

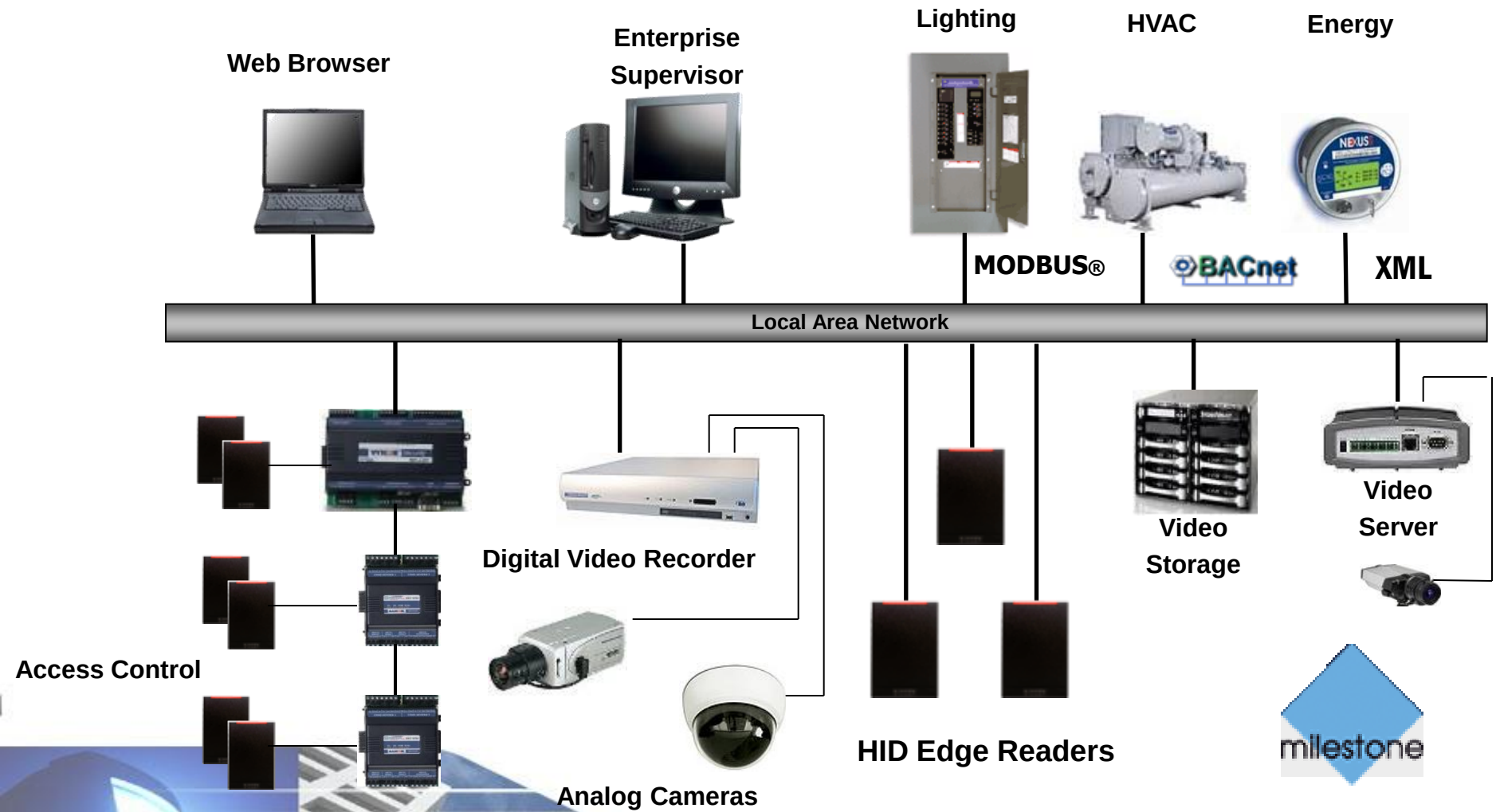
- Video Analytics (Smart Video)
  - Uses algorithms to analyse video streams for certain types of activity
  - Video motion detection, suspect packages, number plate recognition etc.

- Facilities Seeking Integration with Rest of Building
  - Access control integrated with HVAC for energy management
  - Common user interface for all building systems

Video Integration – Key Features

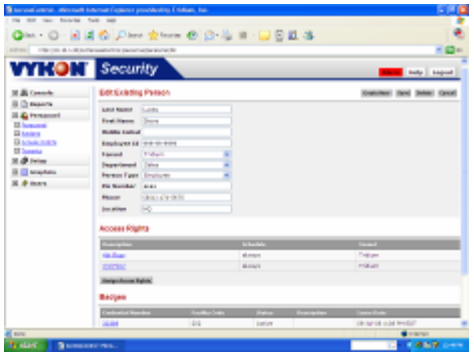
- Bi-directional alarm interface from Niagara to video products
  - Alarms from security system can initiate events in video system
    - Start recording at specified frame rate with camera presets
    - Create DVR event record and protects alarm recording
  - Video product events (pixel motion detection, loss of video, etc) as AX alarms
    - Alarm console processing
    - Initiate control logic sequences
- Standard Niagara widgets for video support
  - View live video
  - Pan / tilt / zoom control
  - Query and playback stored video
  - DVR video display management
- Driver Available on Security and BMS Platforms
  - Video drivers can be sold independently from security product

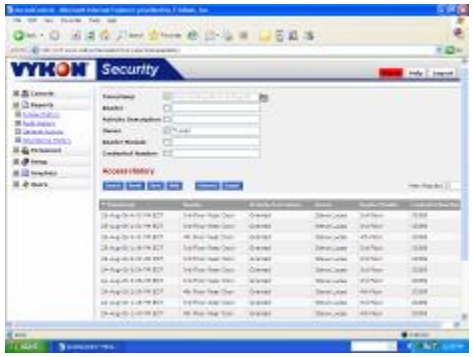
Integrated Architecture

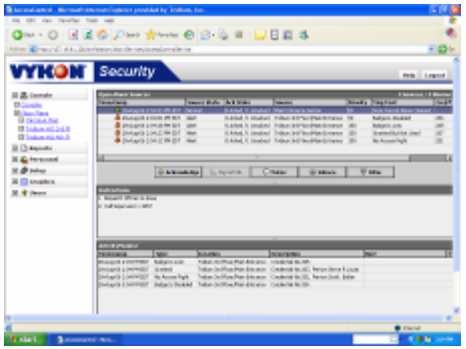


Security Appliance Features

- Intuitive guided setup wizard
- Alarm / system activity monitoring
- Email alarm notification
- Pre-defined custom reports
  - On screen or exported
- Tenant management
- Access zone occupancy restriction
- Time and attendance
- Intrusion zones
- Elevator control
- BAS zone identifier
- User definable Wiegand formats
- Custom graphic floor plans







Security JACE

- Built on Tridium's JACE 2/6 product design
  - Uses JACE 2/6 base board reference design
- Contains web-server & Security Appliance
- Supports the following Security I/O
  - 2 card readers
  - 6 supervised inputs (SIs)
  - 4 relay outputs (ROs)
  - 3 digital inputs (DIs)

Remote Modules

- RS 485 communications between Security JACE, Remote Reader, and I/O modules
  - Din rail connector or remote wired
  - Can be powered from JACE
  - 4000 ft (1.2kM) max RS485 cable distance
  - Wired using daisy chain topology

Remote Modules

- Remote Reader Module
  - 2 Card Readers, 4 SIs, 2 ROs, 2 DIs
  - 1 or 2 door expansion module
- Remote I/O Module
  - 8 SIs, 8 ROs, 2 DIs
  - Used for intrusion zone points, elevator control, etc.

Resource Capacities

	Security JACE-201	Security JACE-601
Reader Modules	up to 7	up to 15[1]
I/O Modules	up to 8	up to 15[1]
Total Readers	16	32[2]
Intrusion Arming Keypad	up to 2	up to 10
Total I/O	64/64	120[2]/120[2]
Personnel Records	2,500	10,000
History Records	5,000	50,000

[1] Max of 15 modules (combined reader and I/O) per JACE-601;

[2] Up to 32 readers or 120 I/O points, depending on module combination

Planned Enhancements

- HID Edge
- Photo ID Badging
  - Partner with badging supplier
- Multi-Tier Servers (Regional Supervisors)
- FIPS (Federal Information Processing Standards)
- HSPD (Homeland Security Presidential Directive)
- H-264 Video Decoder

Thank you for listening.

Any questions?