BUILDING AUTOMATION & CONTROLS, WHAT'S NEW & WHAT WILL THE FUTURE BRING?

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1. **Brief history of HVAC Controls & Building Automation Systems *(BAS)***
2. **Current *BAS* issues and trends**
3. **What does the *BAS* future look like?**

Control Systems During the 1950's & 1960's

1950's:

- **Reasonably Accurate Pneumatic Sensors & Controllers**
- **Fairly Comfortable Environmental Conditions**

1960's:

- **Improved System Design & Performance (VAV)**
- **Proliferation of Sensor/Receiver-Controller Concept**
- **Pneumatic Control Systems Are Industry "Norm."**

Control Systems During the 1970's

1970's:

- **Micro-Chip Analog Electronic Control & Computerized Energy Management Systems**
- **Initial Computer Based Systems Were Costly & Performed Minimal Control Functions; Typically Only Monitored Pneumatic Control Systems**

Control Systems During the 1980's

1980's:

- **Pneumatic systems continue**
- **Microprocessor based panels with high density inputs & outputs**
- **Introduction of "Smart" Controllers**
- **Proliferation of Application-Specific DDC Control Modules**
- **Higher System Capability Per $ Investment**

Control Systems During the 1990's

1990's:

- **Electronic systems replace pneumatics**
- **Open Protocols Introduced**
  - **BACnet**
  - **LON**
- **World Wide Web Becomes Popular**

Control Systems 2000 & Beyond

2000's:

- **Internet Dominates BAS systems**
- **Wireless Technologies proliferate**
- **Smart Building Systems**
- **Full Building integration**
- **Future ????**

CURRENT *BAS* ISSUES & TRENDS:

- *Proprietary and open protocols.*

Protocol - properties

- Proprietary – individually controlled
- Shared – Strategic alliances
- Open – General use
- Defacto Standard – Industry accepted
  (e.g. Ethernet, Modbus, IP, etc.)
- Standard – Agency/Association Approved
  (e.g. Lontalk, Bacnet, Arcnet, etc.)

Why Open Protocol?

That's Why !

Levels of Interoperability

- Coexistance
  - Systems don't interfere nor they cooperate
- Solution Specific
  - Requires Joint development & Engineering
- Plug & Play
  - Effortless integration of various manufacturing components
- Interchangeability
  - Products are functionally identical

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- Proprietary and open protocols.
- *DDC control hardware is becoming a commodity*
  - *This follows the drop in the cost of electronics in general*

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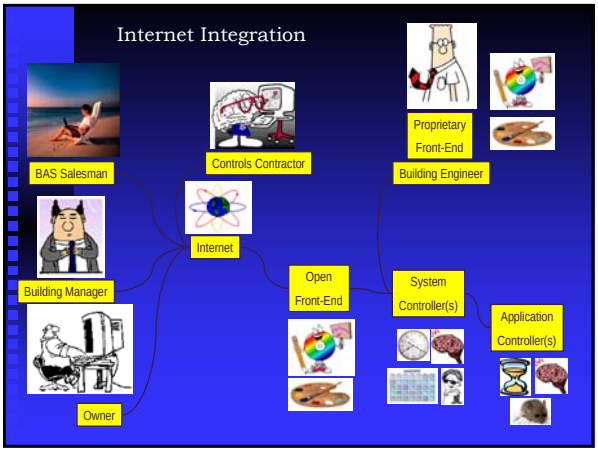

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- *Software not hardware is the heart of today's BAS systems.*

CURRENT *BAS* ISSUES AND TRENDS CONT'D:

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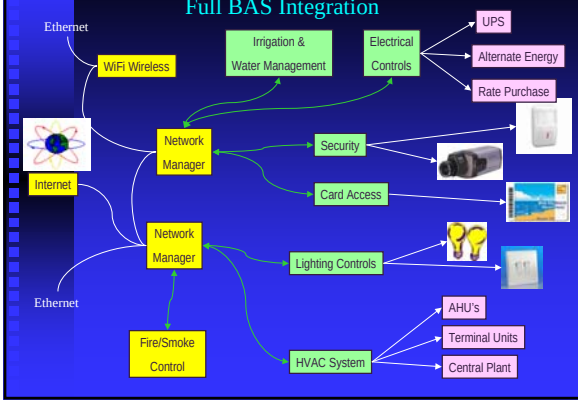
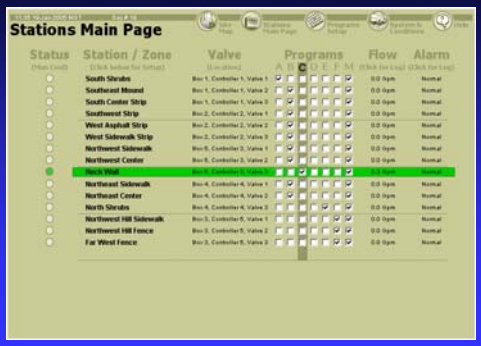
Full BAS Integration



LANDSCAPE IRRIGATION



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Wireless *BAS* Integrations:

- Point to Point (sensor to VAV box)
- WIFI for using a laptop for commissioning
- MESH wireless networks
- Cellular modems on BAS equipment
- ZIGBEE, RFID, etc.

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Same-Wire Power & Control

- Simple 120VAC light switching
- Powerline data communication
- 24VAC power & network traffic for HVAC actuators and sensors
- Utility metering & add-on services
- Home automation

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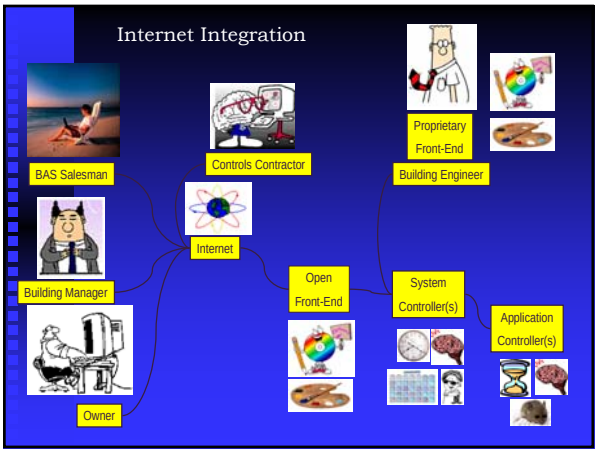
- *BAS must integrate with user's management computer systems, there are many users, not just the building engineers*



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Smart Building *BAS*

- Knowledge based software for maintenance & re-commissioning
- Self-tuning control systems are becoming more common-besides trial & error PID tuning
- Control device manufacturer libraries replace O&M manuals
- Fuzzy logic & other techniques optimize building operations

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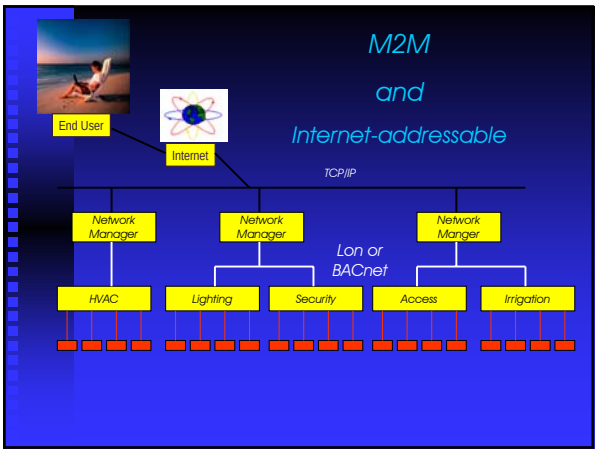
- *M2M networking driving every connected component to being internet addressable*



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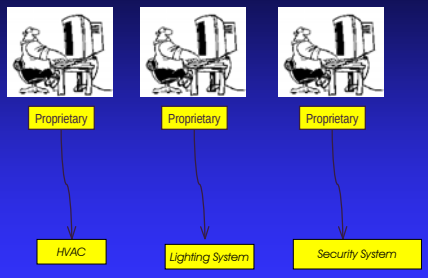
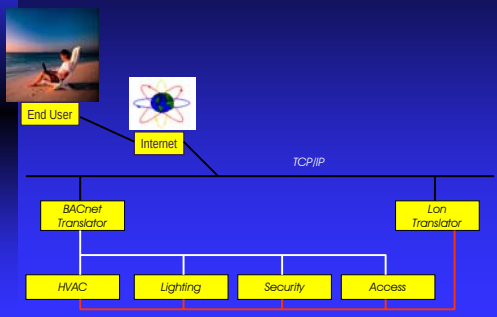
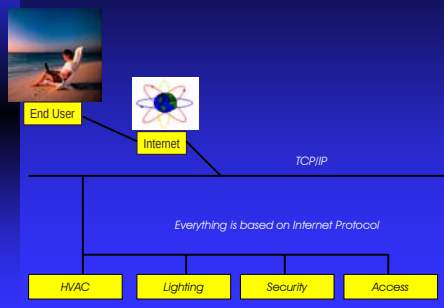
Old Co-existent Buildings



Current Technology



Future Technology ???



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- Much more HVAC equipment will come complete with a control system
- *Self commissioning and auto tuning systems will become the norm*

Links for More Information

- www.**automatedbuildings**.com
- **www.bacnet**.org
- www.lonmark.org
- www.betterbricks.com
- www.caba.org
- www.ashrae.org

- www.atkinsonelectronics.com
- www.**johnsoncontrols**.com
- www.**honeywell**.com
- www.**invensys**.com
- www.sbt.siemens.com
- www.echelon.com
- www.tridium.com