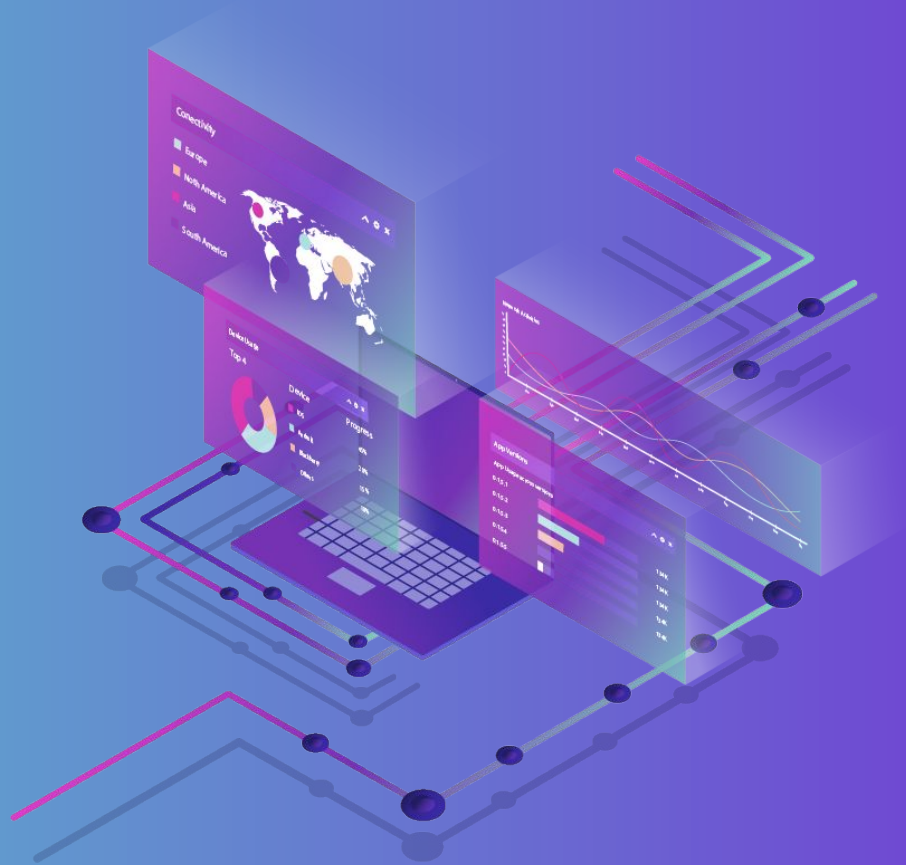


BUS & PROTOCOL RESEARCH

by The HaBA Way



01

BACNET

by BACnet
International

02

LONWORKS

by Echolon
Cooperation

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MODBUS

by Gould-Modicon

Modus

FUNCTIONALITY

usage, domain,
flexibility

EFFORT

cost, implementation

PERFORMANCE

speed, throughput,
latency

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01 BACNET



BACnet™

by BACnet International

What is BACnet?

- Communications protocol for building automation and control networks
- Development began 1987 in US
- Became a ASHREA/ANSI standard in 1995

Markets

- Industrial
- Transportation
- Energy Management
- Building Automation
- Regulatory and health and safety

Domains

- HVAC (heating, ventilating, air-conditioning)
- Lighting control
- Access Control
- Fire detection and alarm
- Security

Features

- Automation devices exchange information, regardless of which building service
- Protocol services for device and object discovery
- Control different applications from one workstation, regardless of manufacturer
- Communication across different networks
 - Ethernet, IP, MS/TP, Zigbee

Pro

&

Con

- Scalability
- Adoption by nearly every major (US) vendor
- Robust internetworking including multiple LAN types

- Limited number of devices that can connect to master (except TCP/IP)
- MT/TP-Wire Length
- New standard is not implemented in all devices
- Devices require BACnet compatible hardware

Performance

- Devices
 - Heating, Refrigerating and Air-Conditioning (core intent by creator)
 - But basically any conforming device
- Flexibility
 - Devices of different manufacturers (as long as BIBBs are defined)
 - wide range of applications



LONWORKS

by Echolon
Cooperation

02

What is LonWorks?

- local operating network (automation system)
- addresses needs of control application
- use IP to connect hardware
- designed for low bandwidth

“What is” - cont’d

- 4 main components
 - LonTalk protocol
 - Neuron Chip
 - LonWork Transceivers
 - Network Management and Application Software (LonMaker)
- No Hardware developed - just Software/Firmware
- SVNT standards (No ANSI standards)

Industries

- building automation
- home automation
- street lighting
- industrial automation
- transport monitoring
- utility monitoring

Domains & area of application

- Security Systems
- Embedded Machine Control
- Building & Street Lighting
- Power generation load control
- Subway train control
- Intelligent electricity metering
- fire detection and suppression
- heating and air conditioning systems

Hard Facts

- Throughput: min. 78 Kbit/sec, max. 1,25 Mbit/sec
- >500 transactions/sec
- 2010 90 million devices installed with LonWorks technology
- web based monitoring

Functionality

- Web based tool
- Low work effort at device level
- control device & variables via control device
- requiring Neuron Chip
- “Plug’n’Play”-Ability

Pro

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Con

- Web based tool
 - Less architecture at device level
 - Several devs of products in market available
- OUTDATED
 - Extensions only by LonMark Consortium
 - NeuronChip required
 - Extra connection to control device required
 - ONLY Hardware specific



MODBUS

by Gould-Modicon

02

Functionality/Implementation

- communication among devices connected to same network
- transmit information over serial lines between electronic devices
- Modbus Master: requests information
- Modbus Slaves: supply information
- lot of configuration and programming required
- no costs to use - no charge for usage or licensing fees

Simplest Setup

- single serial cable
- connecting serial ports on two devices (Master & Slave)
- sent as series of bits
- bits sent as voltage (0 as positive, 1 as negative)
- typical transmission speed 9600 baud (bits per second)

Speed

- if running over internet: no better than typical internet response times
- Ethernet switches with high performance intranet and high-speed faster
- generally rather slow
- throughput: with 10BaseT Ethernet about 360.000 registers per second
- high latency

Length

- uses Ethernet and TCP/IP protocol
- theoretically, no limit because using the TCP/IP protocol grants access to the internet

Flexibility

- interoperability among different vendors' devices
- compatibility with large installed base of Modbus-compatible devices
- not industry specific
- uses standards like Ethernet and TCP/IP
- vendor-independent

Importance

- used to exchange information between devices, and to monitor and program them
- also used to manage distributed I/Os
=> making it the preferred protocol by manufacturers of this type of device
- simple
- low-cost development
- minimal hardware required

Domain

- industrial electronic devices:
transmits signals from instrumentation and control devices back to the main controller or data gathering system
- in multiple master-slave applications to monitor and program devices
- to communicate between intelligent devices and sensors and instruments
- to monitor field devices using PCs and HMIs

Usage Example

- a system that measures temperature and humidity communicates its results to a computer
- send status alarm
- fan schedule

THANKS

Does anyone have any
questions?

~ The HaBA Way

