



LONMARK Open Solutions Programs and Industry Update

Ron Bernstein
LonMark International

**a non-profit industry trade
and standards development association
supporting the open buildings control market**

A graphic on the right side of the slide consisting of several interlocking puzzle pieces in red, yellow, and teal, arranged in a vertical line. Below them is a larger, light gray puzzle piece that contains the LONMARK logo and the text "Total Facility Control".

Total Facility Control



Agenda

- Trend Towards Open Systems
- Elements of an Open Control Platform
- Top 10 Questions to Open Systems
- Brief History of Open Control System Implementations
- 7 Short Open Implementation Case Studies
- LonMark Programs and Resources
- Summary and Q/A



The Trend Towards Open, Integrated Control Systems

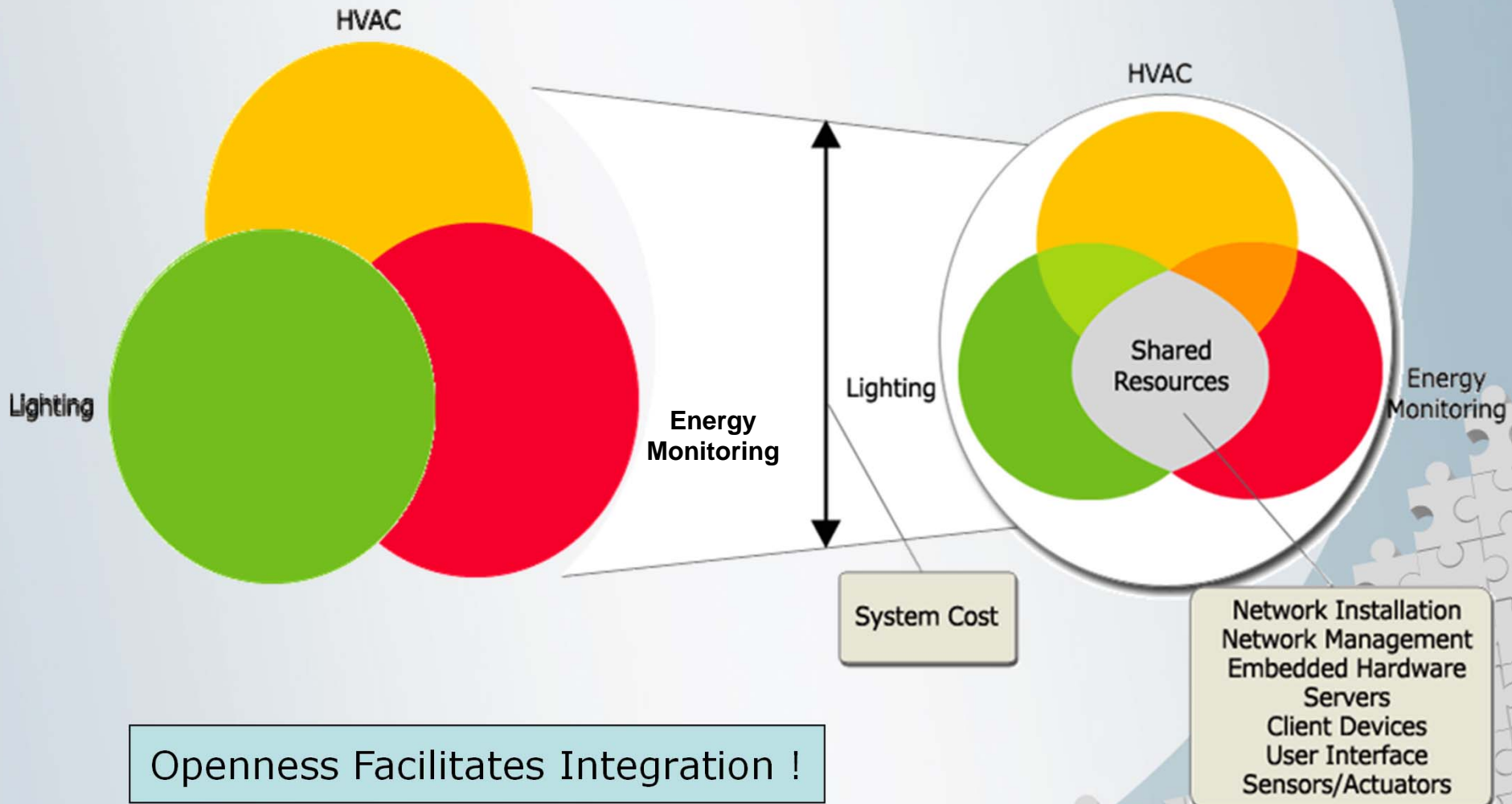


Open Systems Defined

- Open building systems are created using the products and systems from multiple vendors that in the end offer greater flexibility, easier management, higher levels of scalability, and lower life cycle costs.
- Fully Open Systems Will Deliver
 - **Greater choices in vendors and suppliers**
 - **Lower energy costs**
 - **Lower install and life cycle costs**
 - **Easier add, moves, and changes**
 - **Greater system scalability**
 - **Better access to information**
 - **Greater control over the facility**



Leveraging Costs of Multiple Integrated Building Systems



Source: TAC.



Building Automation Market Trends

- Industry preference for open systems
- Expectation for better energy efficiency
- Demanding lower operating expenses
- Growing requirement for integration
- Enterprise access via web – leverage growing IT infrastructures
- Do more for less



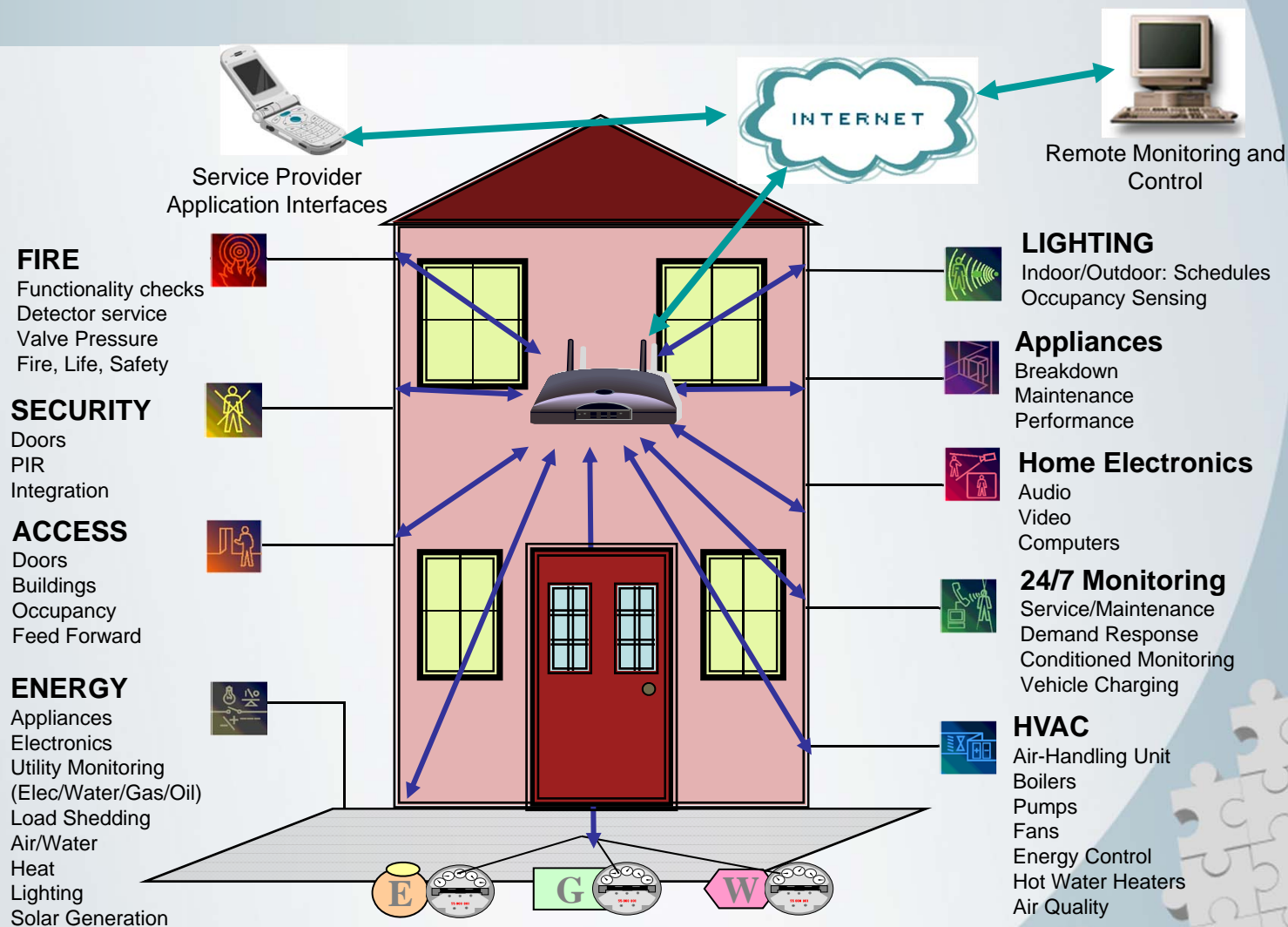


Foundation of a True Open System

- Products from multiple vendors interoperate
 - Common physical interface - transceiver
- Tools from multiple vendors interoperate
 - Common network management model - LNS
- Opens up for fair competitive bidding
 - Unbundling hardware from software from engineering
- Enables owners to “own” their systems
- Removes the “Locks”
- Open specs: Reduces costs, improves efficiency
- International standard – worldwide adoption
- Proven with approaching 100 Million installed devices
- Hundreds of thousands of systems



System Integration





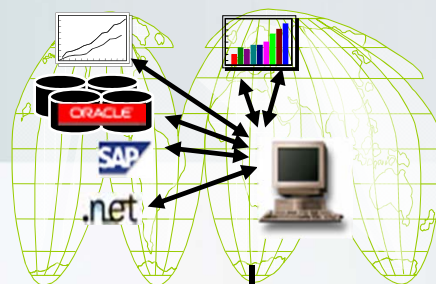
Product Interoperability

- Define interoperability requirements
- Control network protocol
 - Field level device interoperability
 - Ensure/enforce compliance
- Network media type(s)
 - Installation reliability and cost issues
 - Free topology wire, Powerline, IP, WiFi
- Functional interoperability
 - Devices tested to meet strict certification requirements
 - Functional profile compliance
- Define enforcement vs. exception rules
 - What are you willing to live with/without?





Enterprise Applications
Building Operations Center
Cal/Dispatch Center
Reporting/Scheduling



Remote Access
Email Alarms
Browser Based Monitoring
and Control



WAN

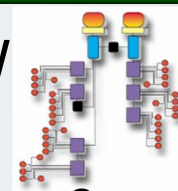


Graphical User Interface
Network Tools
Diagnostics
Web Interface

Internet/VPN/Frame Relay

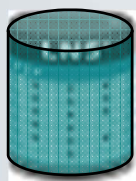


Firewall



Gateway to proprietary systems

LAN



IP-852 Router or
oBIX XML Server or
Web Server

IP/Ethernet



LON



Device Network

Standard Network Variables
Exchanged Between Devices
and to PC, Web, Remote Access





The Elements of an Open Controls Platform



Elements of an Open Control Networking Platform

- Networking Protocol for Device Level Communication
- Low Cost
 - Solutions on a chip (multiple solutions/sources available)
- Peer-to-Peer
 - No master needed – no vendor lock in
- Interoperable
 - Devices from hundreds of suppliers work together
- Open – ISO Standard
 - Open Interoperable standards for control communication
 - Certify devices for standards compliance
 - Certify industry professionals for technical proficiency
 - Certify System Integrators – provide high level of competence
 - Simplify specifications, installation, and integration



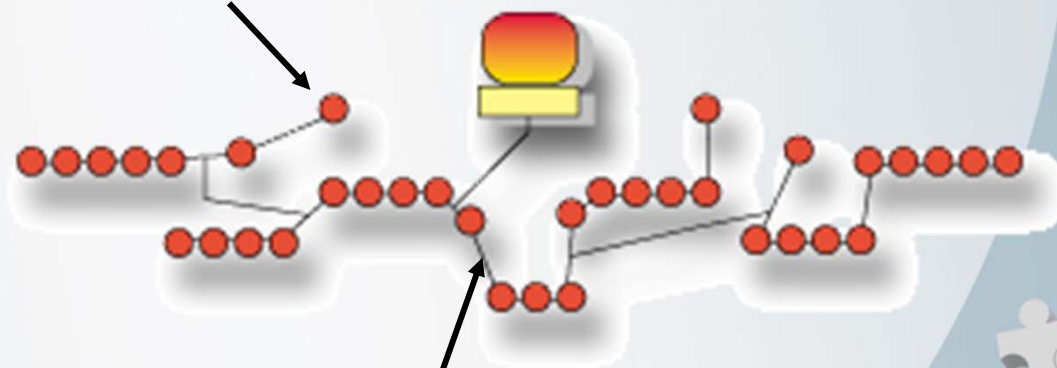
Primary System Elements



Device



Network Tool

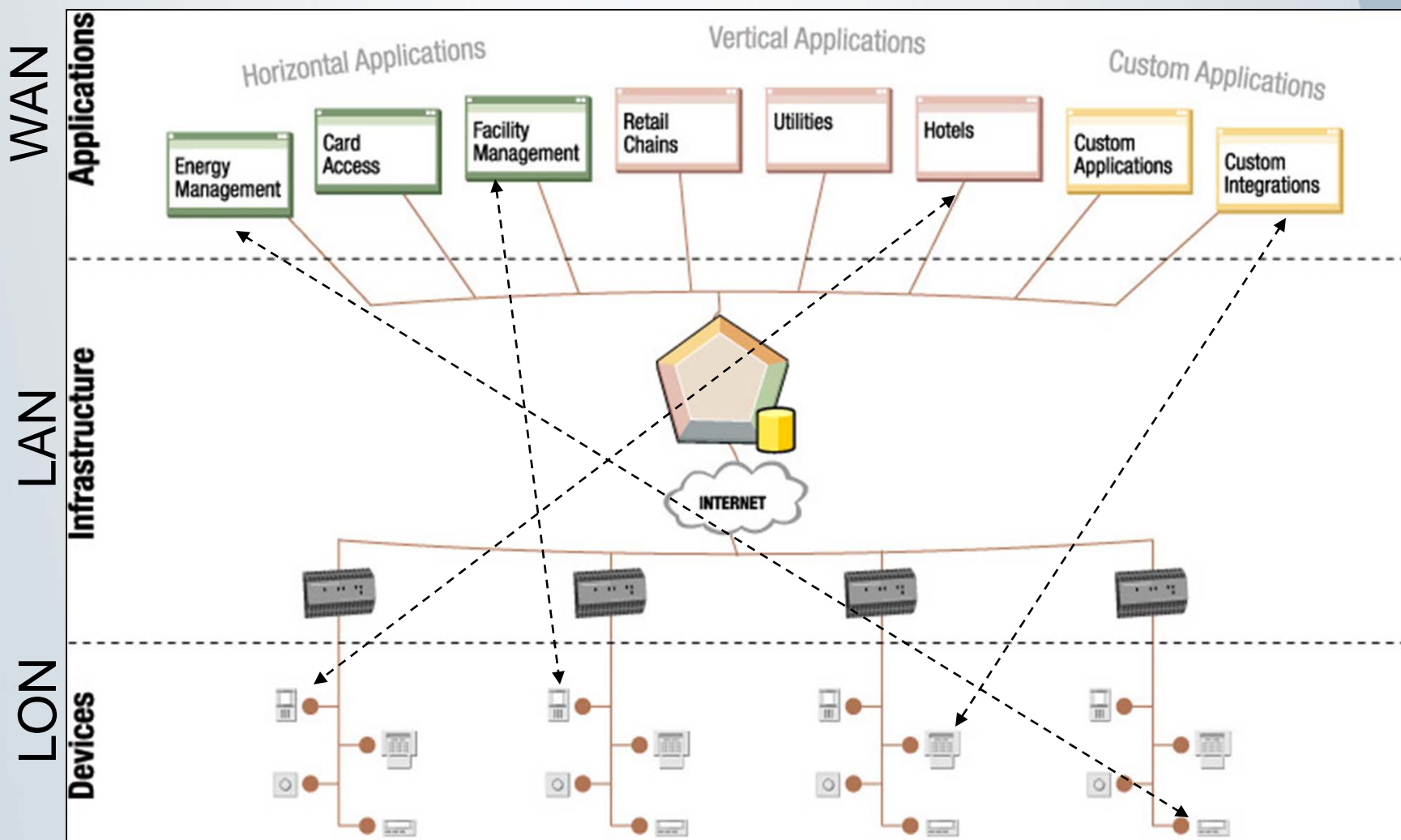


Channel





Total Facility Control The Need for Higher Level Connectivity





Essential Elements of an Open System

- **Devices**
 - The controllers on the network
 - Applications specific devices
 - Programmable devices
 - Packaged equipment
 - Scheduling, Alarming, Data logging
- **Infrastructure**
 - The wire the nodes connect to
 - The routers that pass the data
 - Termination
 - Traffic/bandwidth issues
 - Systems architecture
 - IT Routing
 - When are gateways necessary?
- **Host Interface**
 - PC Based
 - Web Based
 - Integrated Graphics
- **Tools**
 - Design Tools
 - Commissioning Tools
 - Database issues
 - Configuration Plugins
 - Scheduling, Alarming, Data logging, Overrides
- **Enterprise Connectivity**
 - IT Interface
 - Large project architecture
 - Design for the future
 - Scalability issues
- **Life Cycle**
 - Long term service contract
 - Staff training
 - Sustainable design

Don't get locked in!



The Top 10 Questions: Submittal Compliance



Top 10 List to Open Systems

1. Open Communication Protocol
2. Device Interoperability
3. Infrastructure Standard
4. Open Tool Sets
5. Graphical Interface Interoperability
6. Integrator Proficiency
7. Contracting Requirements
8. IT Integration
9. Vender Selection Criteria
10. System Performance Standards
11. Bonus Issue - Specification Compliance





The Questions

1. Can devices from different manufacturers be installed and commissioned on the same physical wire and be capable of true peer-to-peer communication?
2. Have devices been tested for interoperable compliance; and are there any closed aspects of these products inhibiting an open system?
3. Is the network infrastructure adequate and correctly installed?
4. Are network management and commissioning tools capable of completely installing **all** nodes in the system?
5. Are the front-end tools truly open and non-proprietary?
6. Are the people doing the work qualified, certified, credentialed?
7. Do you have control over your building and access to **all** data points, tools, and databases?
8. Is the connection to your data network based on open standards?
9. Are the controls and products openly available from multiple sources?
10. Is there proof your network was designed and installed correctly?

**BONUS QUESTION: Are you about to undermine all of your efforts?
No Alternates Will Be Accepted.**



The Questions

1. Can the devices from different manufacturers be installed and commissioned on the same physical wire and be capable of true peer-to-peer communication?

"All devices on the network shall be capable of true peer-to-peer communication, without requiring a host or zone controllers. Logical layer 3 routers shall be used to logically isolate channels of devices."

2. Have the devices been tested for interoperable compliance? Are the manufactures of the device level product adhering to interoperable standards when designing and delivering their products? And are there any closed aspects of these products that would inhibit and open system in which they are intended to be used?

"All devices shall implement the ANSI/EIA 709.1 protocol standard and shall do so using standard mechanisms for sharing data as defined by LonMark International. Applications specific devices shall be LonMark Certified only. Closed or non-standard communications protocol implementations will not be accepted. All devices (nodes) on the network shall conform to the LonMark International Interoperability Guidelines and be tested for compliance on the open systems network."



The Questions

3. Is the integrator meeting the requirements for the network infrastructure?

"The network infrastructure shall conform to the published guidelines for wire type, length, number of nodes per channel, termination, and other relevant wiring and infrastructure criteria as published (see reference documentation)."

4. Are there network management and commissioning tools available from multiple sources that can completely install all the nodes in the system?

"All devices (nodes) on the network shall be able to be installed and configured using a standard network management tool as defined by the LonMark System Definition. No closed or partially closed tool set for installation or configuration will be accepted. All tools must be generally available for purchase to any integrator from multiple sources. Complex devices shall be configured with a vendor supplied LNS plug-in."



The Questions

5. Are the front-end tools open?

"Any host PC GUI interface shall use openly available software packages that are non-exclusive. No closed software will be accepted. Software must be generally available on the market from multiple sources. Devices must communicate to the GUI workstation using Standard Network Variable Types (SNVT) Standard Configuration Property Types (SCPTs) as defined by LonMark. No non-standard communication to devices will be allowed."

6. Who is doing the work on your building?

"Integration of the controls network shall be performed by a qualified network integrator. A qualified network integrator must have technical staff members who have attended at least 80 hours of LonWorks network design and network management tool training and have passed the LonMark Certified Professional exam. It is also recommended that the integrator have staff members competent in IT connectivity and advanced troubleshooting of LonWorks networks. The integrator shall provide references of prior successful LonWorks open systems jobs experience. The Network Integrator must demonstrate their ability and intent to design, architect, and install a open, flat,, LonWorks system and have on staff at a minimum two technically trained members."



The Questions

7. Do you have control over your building?

“All configuration tools, installation tools, Plugins, databases, software shall remain with the job and be owned by the property. All software tools shall be properly licensed and conveyed at contract sign-off. No exclusive or non-open integration tools, devices, or host software shall be used as part of this open system”

8. How are you connecting to your data network?

“If Internet or IP connectivity is specified, all devices connecting to the LAN shall use the TCP/IP protocol stack. Any LAN to LON routers shall use the ANSI/EIA-852 standard layer 3 transparent routing protocol. Specific IP interconnectivity shall follow IT standards for security, firewalls, address, etc. published in separate documents (if appropriate).”



The Questions

9. What controls are you using?

“The control system shall be installed using the best available products from the currently available suppliers that meet the system specification. Controllers from multiple manufactures are encouraged.”

10. Are you certain your network was designed and installed correctly?

“The system integrator shall provide a protocol analyzer log summary for each channel for a minimum of 24 hours showing system performance. The statistical summary shall show that all bandwidth utilization and error limits are within acceptable ranges and that there are no network traffic problems, node communication problems, or system sizing problems.”



Bonus Question

11. Are you about to undermine all of your efforts?

No Alternates Will Be Accepted.

Submittal documents and drawings must adhere to both the scope and details of this specification.

Bidders must prove they will deliver the open system specified and provide a complete, working, serviceable system.

Bidders must include service contract costs for 5 years as a separate cost, not included in the initial installation. Annual costs shall be identified for each successive year.



Large Projects Using Open LON: A brief history

- 1999 **State of Florida, Osceola County Schools** – The First Big System – Campus project
- 2001 **NASA** – First to adopt “unbundling” – controls from head end
- 2002 **NYC Schools** – First fully specified two-tier project
- 2003 **State of Louisiana** - State level mandate – Open LON
- 2004 **US Army Corps** – First major adopter of two-tier, influencer
- 2008 **Government of Kuwait** – First government country wide project
- 2009 **City of San Jose** – City wide spec using two-tier model
- 2010 **California State Courts** – First enterprise based “top down” Open System design
- 2010 **GSA** – Largest user of energy in buildings in the US – Regional usage only (Southeast)
- Common themes
 - Multi-phase, competitive bid
 - Single seat front end, not tied to hardware controls
 - Long term relationship with end user
 - **OPEN LON Specification**



NASA

- Scope
 - Kennedy Space Center - Florida
 - Upgrades to existing control systems built in the 70s
 - Historically significant
- Application/Need
 - Multi-year, multi-phase project
 - Need open system bidding process
- Impact
 - Calls for LNS, LONMARK, and IT connectivity into existing Citect SCADA front end
 - Requires qualified integrators
- Status
 - Several projects underway using spec
 - Multiple bidders winning jobs
 - LonMark Certified Products Required
 - Ensures Interoperability





NYC Schools



- **Scope**
 - 1200 buildings – Improve Energy Usage
 - Upgrades to existing pneumatic systems
- **Application/Need**
 - Better access to facility control – centralized enterprise access
 - Fair competitive bidding
 - Two-Tier Spec
 - Building level
 - Enterprise connectivity
 - Bidders on the buildings cannot bid on the enterprise and vice versa
 - Open platform
- **Impact**
 - Key project used as benchmark for success worldwide
- **Status**
 - Specs released in January 2004
 - ~100 buildings bid and won by multiple controls contractors
 - Master Systems Integrator (MSI) contract awarded, multi-year contract
 - Requires LonMark Certified Professionals, LonMark certified products



Army Corps of Engineers



- Scope
 - All US Army Installations, some Air Force, Navy
- Application/Need
 - Competitive bidding, open standards
 - Open LONMARK certified devices, LNS[®] network management and LNS plug-ins for all devices
 - Identifies building and integration requirements in different spec docs
- Impact
 - Thousand of buildings installed worldwide
 - Foundation of two level specification
 - Spec being used by other government agencies: GSA, States, cities
- Status
 - Released Sept 2004
 - Ft Hood, Ft Bragg, Ft Bliss first adopters
 - Many others using UMCS/UFGS model





California State Office of the Courts – State GSA

CALIFORNIA COURTS
THE JUDICIAL BRANCH OF CALIFORNIA



JUDICIAL COUNCIL
OF CALIFORNIA
ADMINISTRATIVE OFFICE
OF THE COURTS

- **Scope**
 - 550 building management systems statewide
 - Court Houses
 - Office facilities
 - Multi-story, multi-use facilities
- **Application/Need**
 - Focus on Energy Savings, Operational Efficiency (COST SAVINGS)
 - One common front end access for ALL facilities
 - Network access using web browser and IT tools
 - Separate building controls contract from front end contract
 - Revenue: \$500-600K over 2-3 years
- **Impact**
 - 20 new construction buildings in 2011
 - 6 “Dumpster Retrofits”
 - Ongoing for next 5-7 years
- **Status**
 - Directed by state engineers
 - Educated on needs, technology, and spec development
 - Enforcing state needs
 - Following LonMark Guidelines, Specs, Certifications



The logo for the U.S. General Services Administration (GSA), consisting of the letters "GSA" in white on a dark blue square background.

U.S. General Services Administration

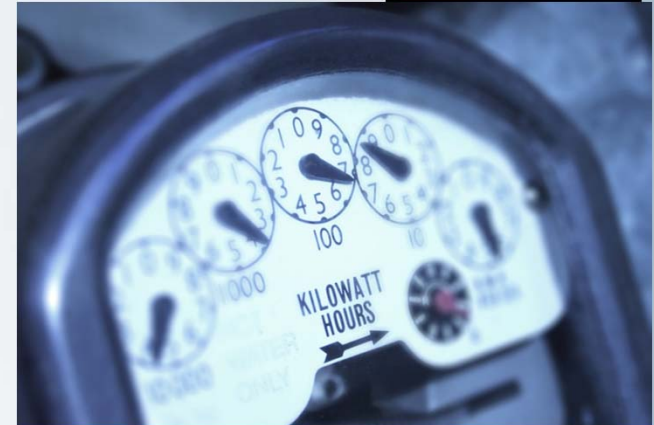
- **Scope**
 - US non-military installation nation wide
 - Building management systems
 - Energy metering systems
- **Application/Need**
 - Energy reduction,
 - Open standard specifications
- **Impact**
 - Largest US property management organization
 - Tens of thousands of buildings
- **Status**
 - Support via integrator and vendor network
 - Proven open systems model works for the GSA
 - Large number of installations using LON – Southeast Region
 - Specification standardization
 - Now looking at metering/sub-metering standards



Army Corps of Engineers Metering



- Scope
 - Sub-metering for military energy reduction
 - Enterprise access to building meter data
 - 400-500 buildings identified (this phase)
- Application/Need
 - Competitive bidding, open standards
 - Meters implementing LonMark Profile
 - Standard XML/SOAP interface to enterprise software
- Impact
 - Smart Server as “gateway” to enterprise
 - May influence other specs – GSA, state gov.
- Status
 - Engineering evaluation in process
 - Security issues
 - Architecture modeling
 - Standardization of enterprise data model





LONMARK Update, Programs, And Resources

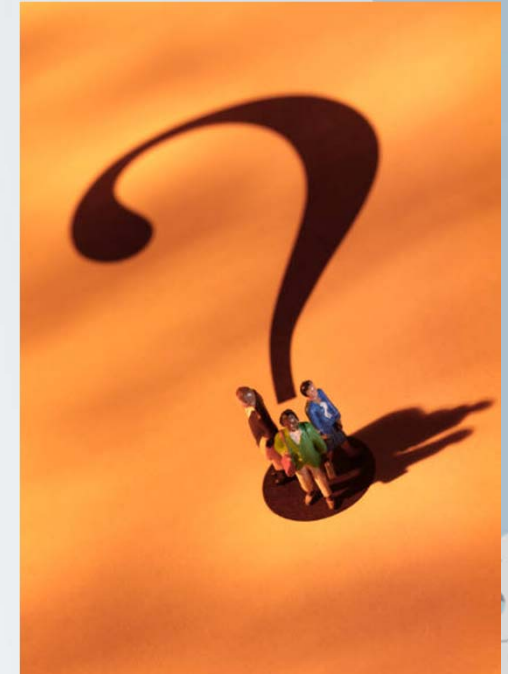


Who is LONMARK International?

- Independent, non-profit member supported organization
 - Product Manufacturers
 - System Integrators
 - Engineers
 - End Users

Vision

- LONMARK is the recognized industry authority for certification, education, and promotion of interoperable standards for the benefit of manufacturers, integrators, and end users
- 400 Members worldwide





LONMARK MEMBERS AROUND THE WORLD

Shikoku Instrumentation Co. Ltd. LS Industrial Systems Co Ltd.

warema **McQuay International** **IDEC** **BELIMÓ** Hitachi **VaCom Technologies** **TREND** **AUTOMATED LOGIC CORPORATION**

Wondersware Tsuken Advanced Systems Corporation **FE** Fuji Electric Mitsubishi Electric Corp.

Software Solutions for Real-Time Success™

somfy **Danfoss** **sitenco** **DISTECH CONTROLS™** **Nico Technology** **ROMlight INTERNATIONAL INC.** **voyant solutions™**

Swegon **QA America** **CAPELON** record automatic doors **JOHNSON CONTROLS** Vacon Plc.

ENERMET PentaControl AG **DCI Co., LTD.** Distributed Control Intelligence **Honeywell** **ONICON INCORPORATED** **acelia**

VICONICS Panasonic Electric Works Co. Ltd. **RIEKEN** Rieken Keiki Co. Ltd. Watanabe Electric Industry Co. Ltd.

Carrier **PIC Electronics** **SAUTER** **XENTI Q** **TRANE** **ISDE**

Secyourit GmbH ULON **thermokon** **YOKOGAWA** **TRONX TECHNIX** Orion C&I Corporation

Santa Clara County Electrical JATC **Functional Devices, Inc.** **Quantum Automation** **PHILIPS** **CONTROL TECHNIQUES**

PCI PARAGON CONTROLS INCORPORATED **ABB** **kieback&peter** **SIEMENS** MST Technology GmbH **HEBEL** Building Automation, Inc.

Gentec Inc. **Schneider Electric** **irTest** **YAMATAKE** ZDANIA Sp zoo Ltd.

Thomas Krutmann **spega** **delmatic** **YASKAWA** US Army Corps of Engineers

FieldServer Technologies Western Allied Corporation **CCS** Continental Control Systems TWS Electrical **Infranet Partners**

aqua metro Total Automation Concepts Inc. **LOYTEC** **PURECHOICE** **t.a.c.** talking buildings

TRIDIUM **FWT** PROGRAMMED WATER TECHNOLOGIES A NOBLE WATER COMPANY Churitsu Electric Corporation

Matrix CONTROLS Samsung Electronics Co. Ltd. **elka elektronik** **GRUNDFOS** **NTT DATA** **CONTROL SOLUTIONS, INC.**

..... are you a member yet?



LONMARK MEMBERS AROUND THE WORLD

Engineered Control Solutions
Energoretea
 LonUsers Finland ry
Control Line Electric
GAMMA Smart House Technology
Adepr SYSTEMS INC
Rockwell Automation
Constellation Energy
ARAS Systems Inc.
Net One Systems Co. Ltd.
armo-group
KMC Northwest APICE
CLASMA
IBT Ing. Büro Brönnimann Thun
OCE
Environmet Systems inc.
FA
Jack Joyner Heating & Air Conditioning Co.
OPTIMUM MANAGEMENT, INC.
NARONIC
LOGYSYNC LLC
MICROSYS COMPUTERS INC.
4HOMEMEDIA
Grand Valley Automation Inc.
AVALON ENGINEERING
Building Automation
cyrus|technologies
DEAVES Industries, Inc.
SVEA Building Control Systems
CONSEIL ENGINEERING
Monterey Bay International Trade Association
HoriZon TECHNOLOGICAL SERVICES
athena engineering inc.
Furukawa Electric Co. Ltd.
System Tech Services, Inc.
Nova Facility Management Systems, Inc.
ISTA Group of Companies
Inteldome
Fuji Electric Systems Co. Ltd.
TS Technical Solutions & Services Incorporated
BC COMFORT
SIENNA SYSTEMS
controlwerks
CHESAPEAKE CONTROLS, INC.
pleXus
ABR CONTROLS
HEC
CHIYODA-Keiso Co. Ltd.
TAC Canada 1985-2008
ACS CONTROLS
GreenLink Conservation Alliance
KENMARK
Luminext
CoMETA
CONTROL TECHNOLOGIES
Gesytec
CABA
FMC
QUARK Communications Inc.
INLON THE CONTROL NETWORK COMPANY
Engineered Solutions Ltd.
HGI mbH
Convergent TECHNOLOGIES
InAccess Networks S.A.
ARC informatique
EGAN Building on Premises Kept
SEWAGE BOYER, Inc.
SPRY OSI Creating Smarter & Safer Buildings
ENE Systems Inc.
Pacific Rim Mechanical
e-controls electronic intelligent control, s.l.
Association of American Railroads
ITC
Osaki Electric Co. Ltd.
SYSMik GmbH Dresden
DAELIM I&S
Engenuity system
M-SYSTEM CO., LTD.
Althoff Industries
MicroTask
HOLIDAY-PARKS, INC.
LUCKINBILL
Economy Air Conditioning & Heating Inc.
CORETECH Co. Ltd.

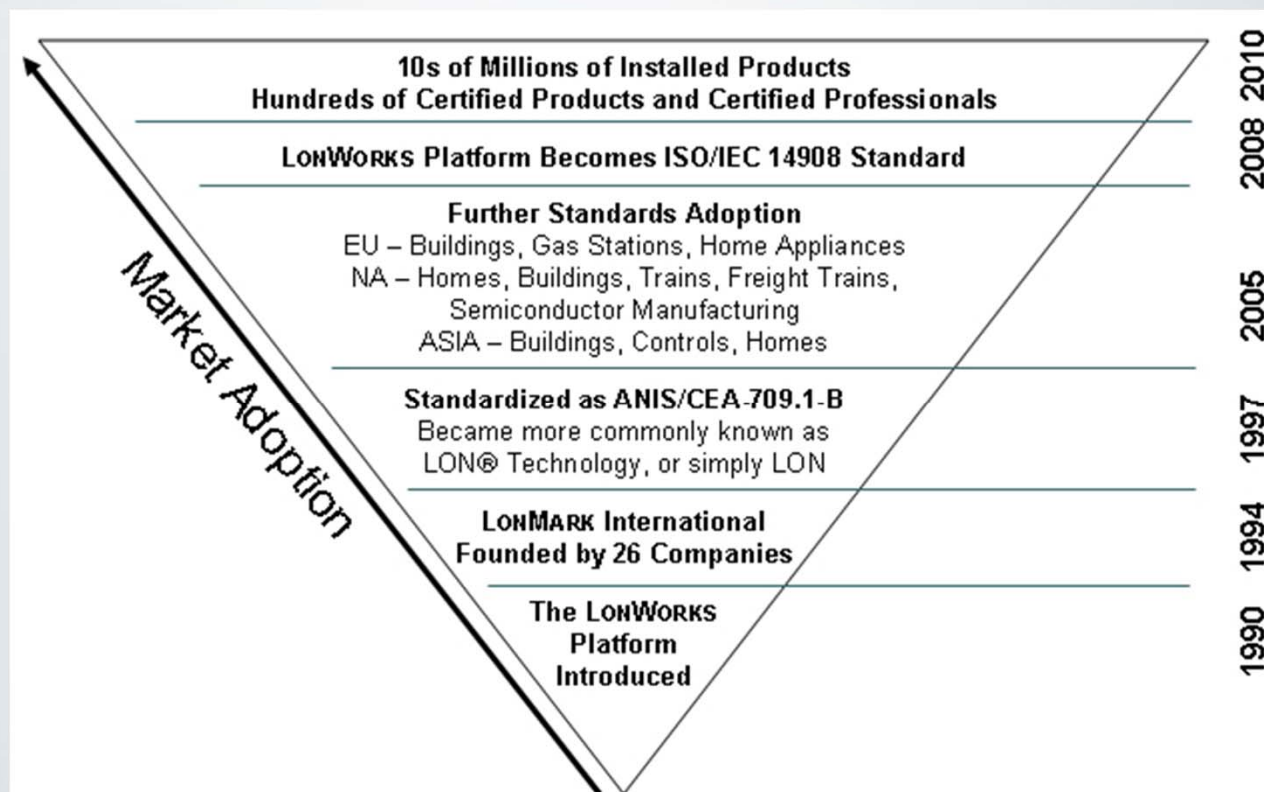
..... are you a member yet?



Driving Standards for Open Control Systems

Mature standard creation, training, testing, and certification programs

- Hundreds of certified products covering all functions within buildings, outdoor lighting, security, irrigation systems, street lighting etc.
- Millions of installed devices in thousands of systems (new and retrofit) worldwide





What's New – Quick Snapshot

- ISO Standards Update
- Task Groups and New Profiles
 - Renewables and Energy Metering
 - Kitchen Equipment
 - Emergency Lighting, Outdoor Streetlighting
- System Services Initiative
 - Alarming, Scheduling, Trending profiles
- Quick Serve Restaurants Initiative
 - Driven by McDonalds
- Certification Programs
 - Certifying Products, People, and Companies
- Standards Roadmap
- Webinar – online education program
- Education Outreach Program

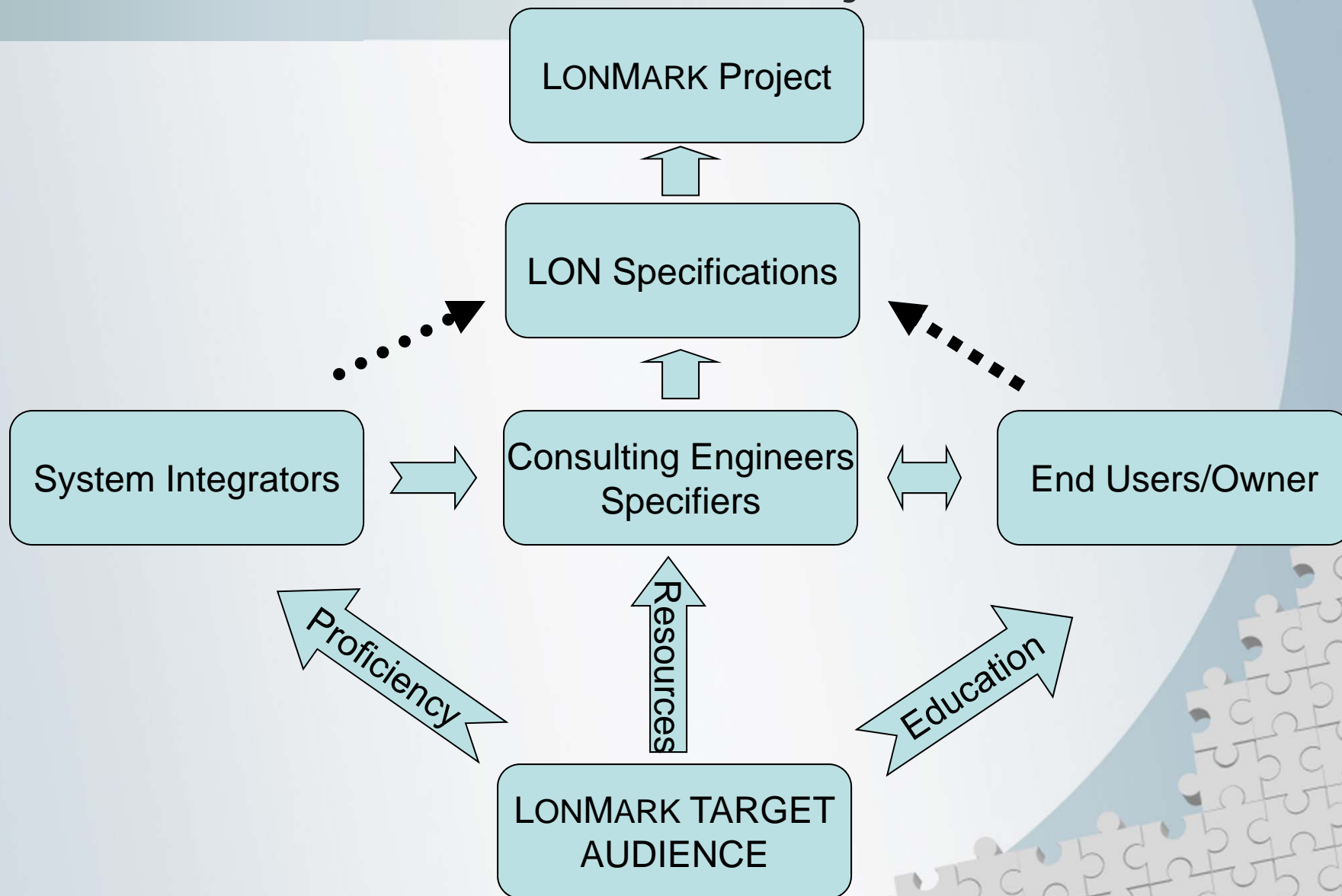


LonWorks System Standards Roadmap

#	Layer	Name	Status
11	Enterprise/Front End API	oBIX or LonMark Web Services, SOAP/XML	In discussion
10	Self Installation	ISI	ANSI in-process – needs 9
9	Open Management API	OpenLNS	Echelon to propose an API - TBD
8	Guide Specification	Two-tier system specification	Working w/ASHRAE New work item at CEN
7	System Resources/Services	Scheduling, Alarming, Room, Trending, Overrides, DR,...	New work item LMI Services Task Group
6	Device Resources/Services	Standard Variables, Config. Props, DRFs	EN Approved, awaiting final
5	Implementation Guidelines	LonMark Device Implementation Guidelines	EN Approved Submit to ISO after 1-4
4	IP Connectivity	IP-852 Routing/Tunneling	Awaiting publication
2, 3	Media	Free Topology, Powerline	Awaiting publication
1	Protocol	LonWorks	Awaiting publication

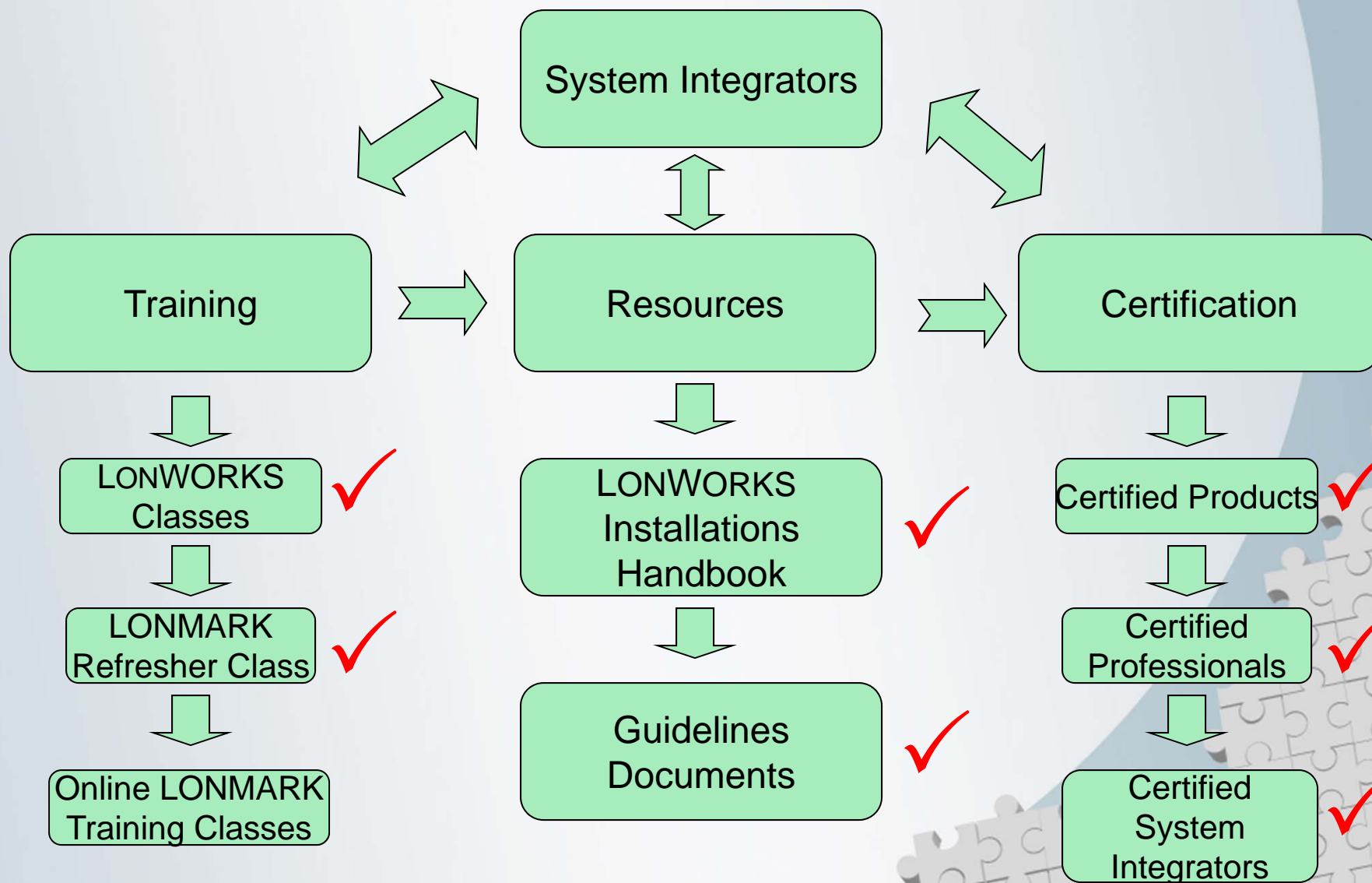


LONMARK Specification and Project Process Flow





LONMARK Integrator Support



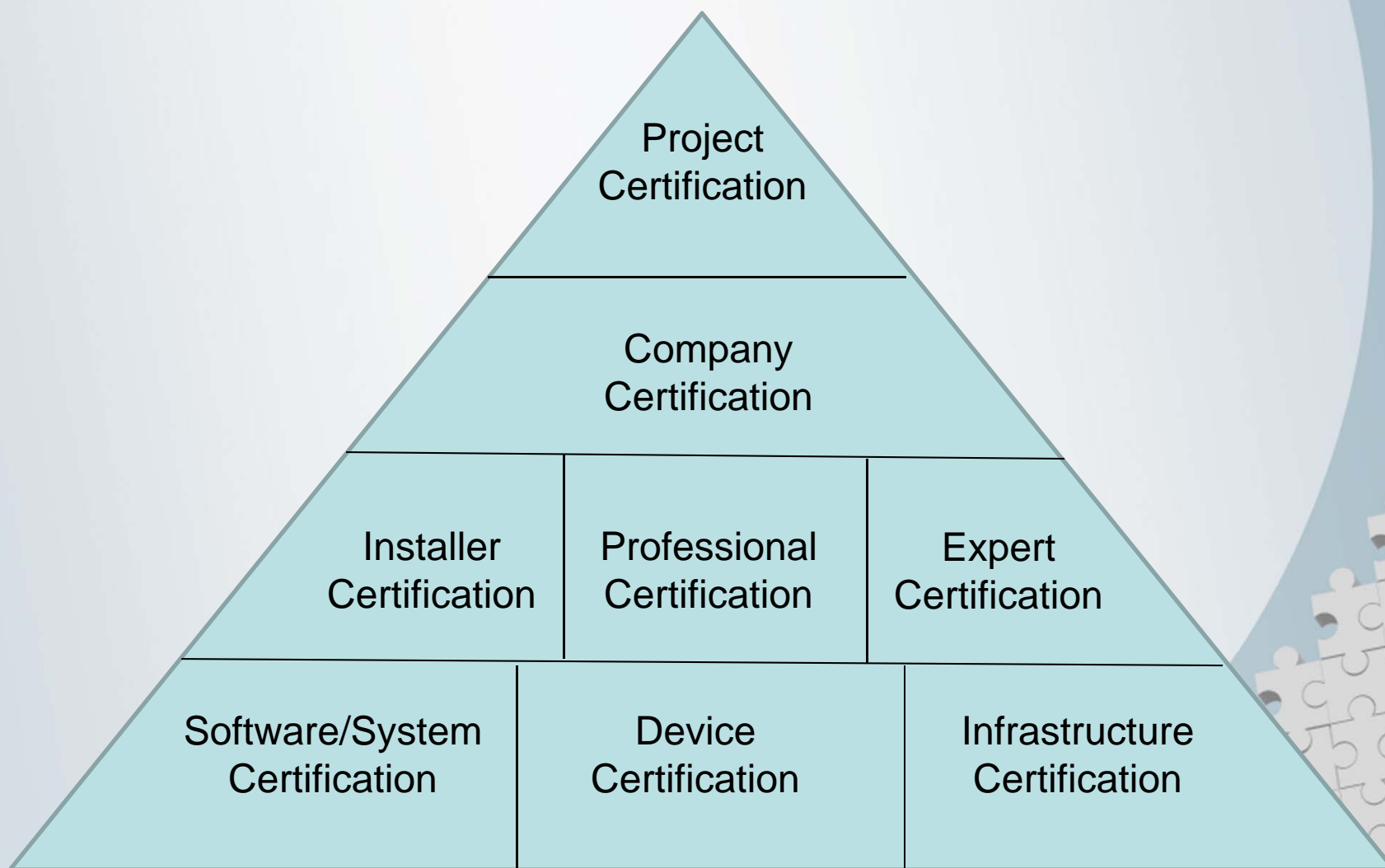


Certification Programs

- **Certified Interoperable Products**
 - Products that have passed rigorous testing to meet LONMARK Interoperability
- **Certified Professional**
 - Individuals with knowledge of system integration
 - Passed a comprehensive test
- **Certified System Integrator**
 - Companies committed to LONMARK Open Systems
 - Pass a Peer-Review process

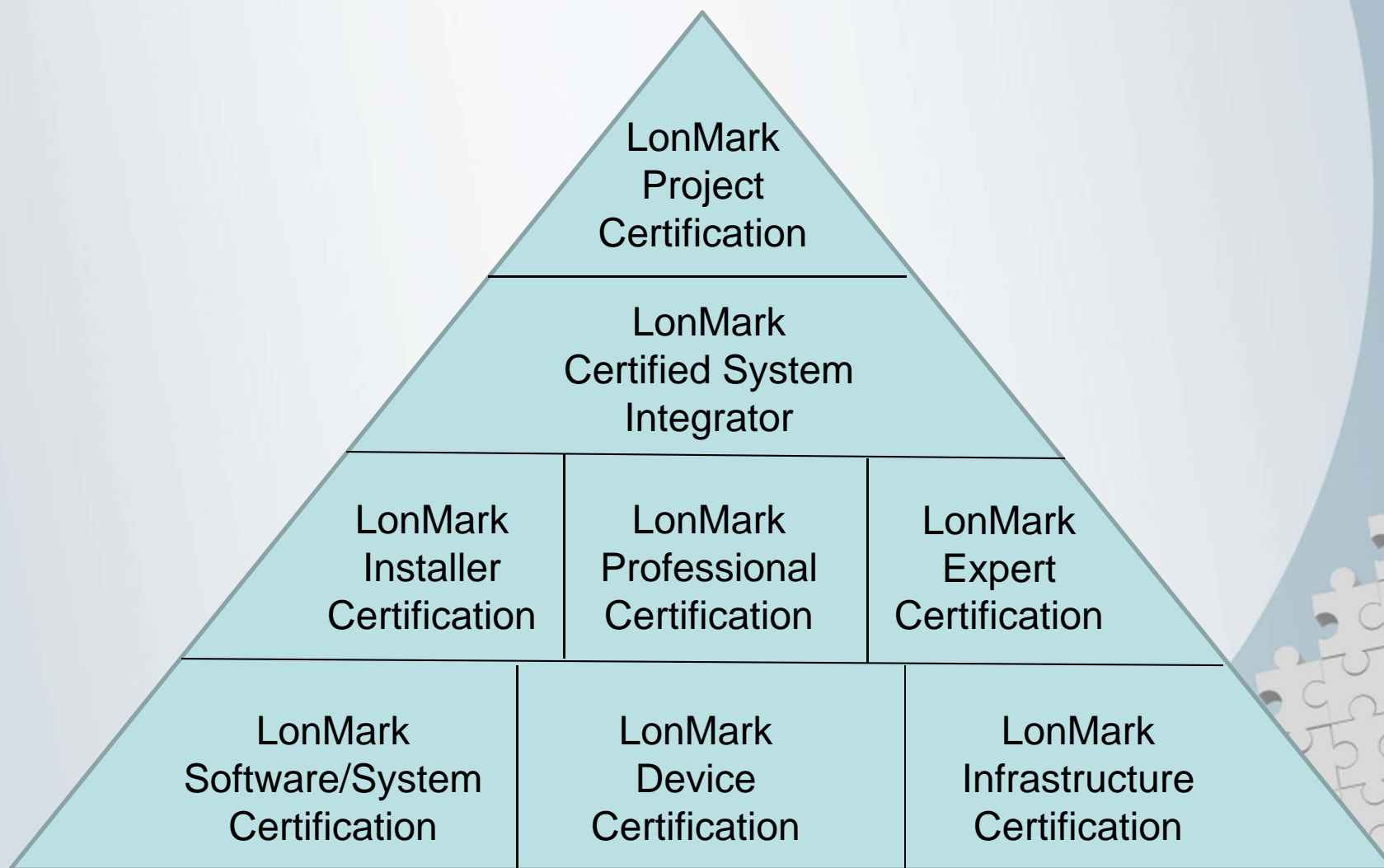


LONMARK Certification Roadmap





LONMARK Certification Roadmap





LONMARK Credentialing Programs

- **LONMARK Certified Professionals (individuals)**
 - Comprehensive testing program for engineers, installers, integrators
 - ~500 LonMark Certified Professionals
 - http://www.lonmark.org/certifications/professional_certification/
 - Available Languages
 - English, German, Spanish – Available Now
 - Polish, Japanese (in 2011)
 - Recertification process (every 5 years)
 - Includes Online Training and Test
 - Ongoing training and education
 - Meets specification requirements for professional proficiency





LONMARK Credentialing Programs

- **LONMARK Certified System Integrator (companies)**
 - Proven proficiency and commitment
 - Employ LM Certified Professionals
 - Strong training and field experience
 - Prior successful projects
 - Peer-review panel
- Establishes high level of proficiency
- Benefits owners/contractors
- Ensures contractor qualification are met



LONMARK Training

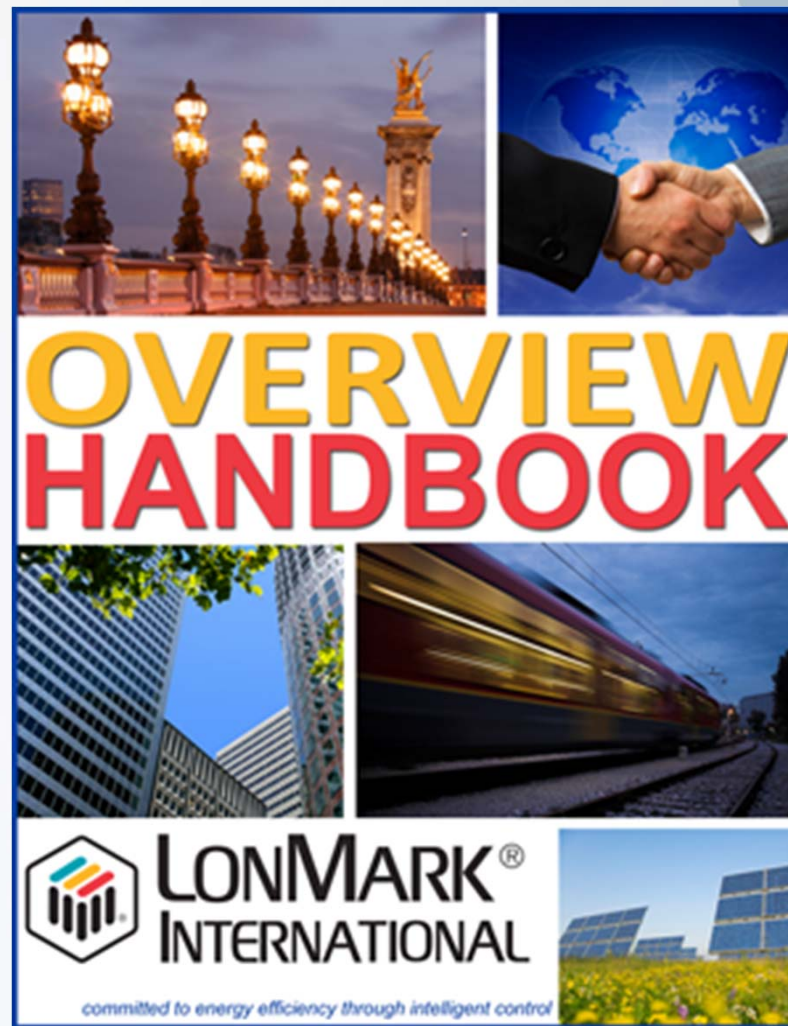
- LMI Training Classes
 - LonMark Professional Certification one day refresher class
 - Followed by testing
 - Available now
 - Contact LMI to schedule local class/test
 - Custom Onsite “Project Specific” training
 - Available now
 - Flexible Agenda – Basics to Advance – Project Guidance
 - Fee based (time and expenses)
 - Online web based interactive training (in development)
 - LON basics and advanced modules
 - Compliment the testing program
 - [Sneak Preview of First Module](#)
 - See www.lonmark.org/training





LONMARK Overview Document

- Compilation of all 'about' documents
- Available
 - Marketing-in-a-Box CD
 - Information CD
 - Printed copy
 - PDF



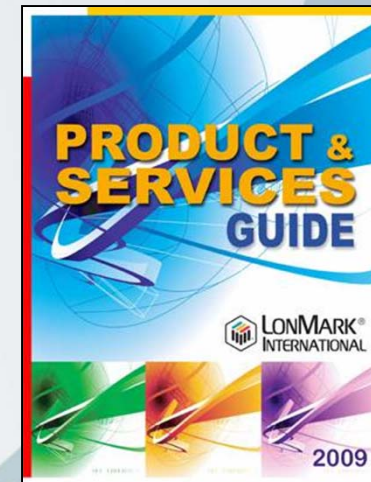
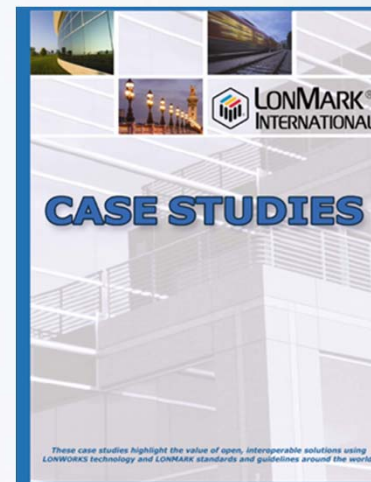
http://www.lonmark.org/about/docs/LonMark_Overview%20Ver4%20May%202009.pdf



Specs, Tools, and Resources

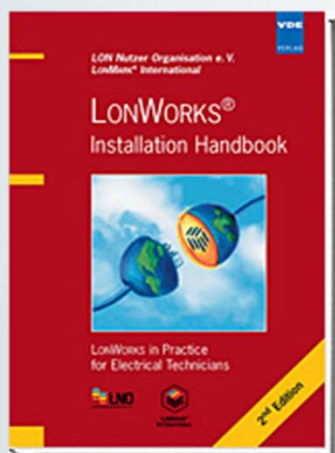
- Sample Specifications
 - [LonMark Master System Specification](#)
 - [Army Corps Specification](#)
 - [Army Corps document library](#)
 - [Functional and Performance Open Spec - NEW 2010](#)
- Tools
 - [Sample Point Schedule Template](#)
- Resources
 - [Product and Services Guide](#)
 - [Case Studies](#)
 - [Product Database](#)
 - [Certified Professional Directory](#)

LonWorks Project Worksheet				Project Name			
System Name		Description		Analog In	Analog Out	Digital In	Digital Out
Point Name							
Substation	Point 1	Device	Point description				
	Point 2	Device	Point description				
	Point 3	Device	Point description				
	Point 4	Device	Point description				
	Point 5	Device	Point description				
	Point 6	Device	Point description				
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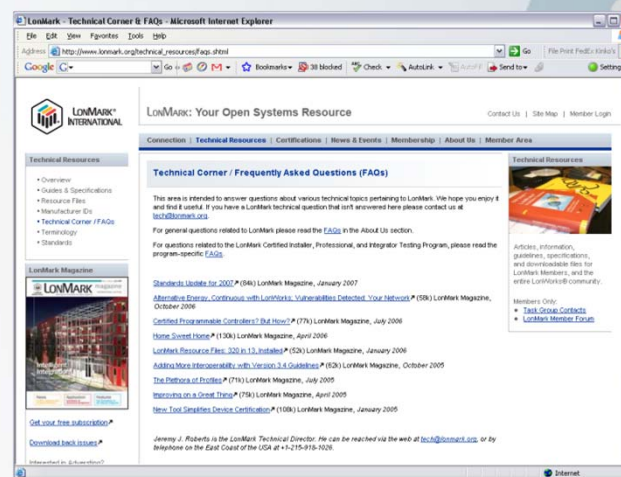
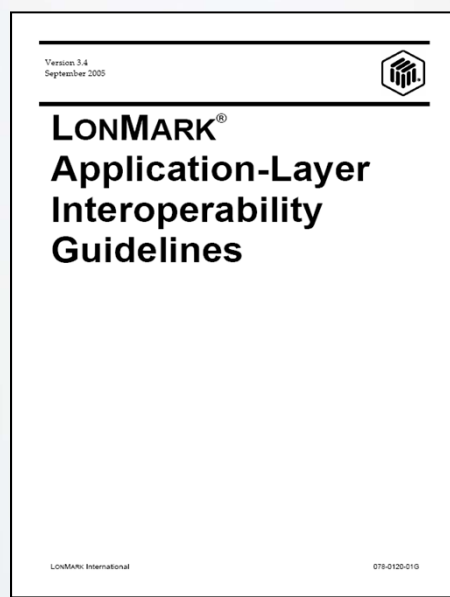
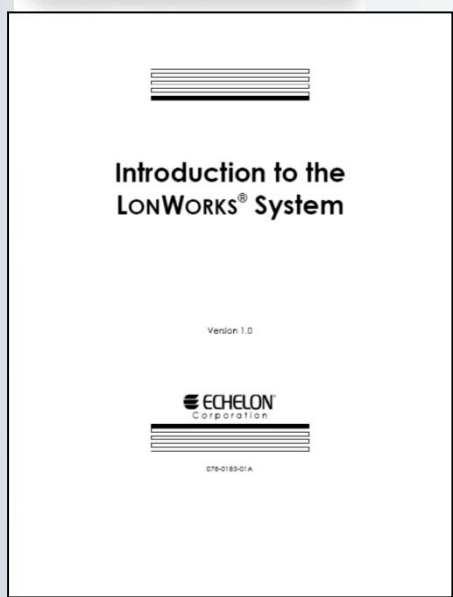
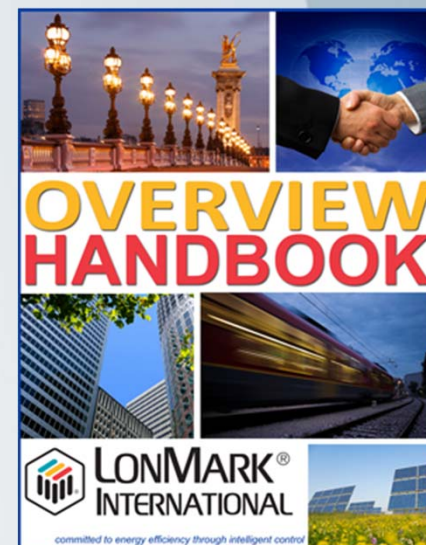




Additional Resources



- [The LonWorks Installation Handbook](#)
- [Overview of LonWorks](#)
- [LonMark Interoperability Guidelines](#)
- [Training and Certification](#)
- www.lonmark.org





LONMARK Helps Large Customers

- Helping Develop Open Specifications
 - LONMARK Training for Writing Good Open Specs
 - Educational Seminars
- Facilitating Vision Setting With Project Teams
 - Green Energy Efficiency Programs
- Help with Master Planning
 - Unified System Architecture Support
- Support for Open Bidding
 - Qualified System Integrators
 - Certified Interoperable Products
- Resources
 - Master Specification Examples
 - Case Studies, Research





LONMARK Helps Large Customers

- LONMARK Specifications – Large Projects
 - New York City Schools
 - US Military - Americas
 - City of San Jose, CA
 - McDonalds - Worldwide
 - GSA - America
 - NASA, FL
 - Military Base; Okinawa, Japan
 - Kuwait Demand Response Project
 - City of Masdar, MIST, UAE
 - Columbus Regional Hospital, IN
 - And many more...





Summary

- Demand is growing for good open specifications
- We are offering our guidance and expertise
- We are committed to
 - Expanding the market for Open Systems and certified products
 - Enhancing the standards as technology advances
 - Increasing the number of certified products
 - Supporting Owners, Integrators, Vendors
- Develop new programs, resources, and tools
- Focus on Education, Training, Certification



Need Help? Questions?



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