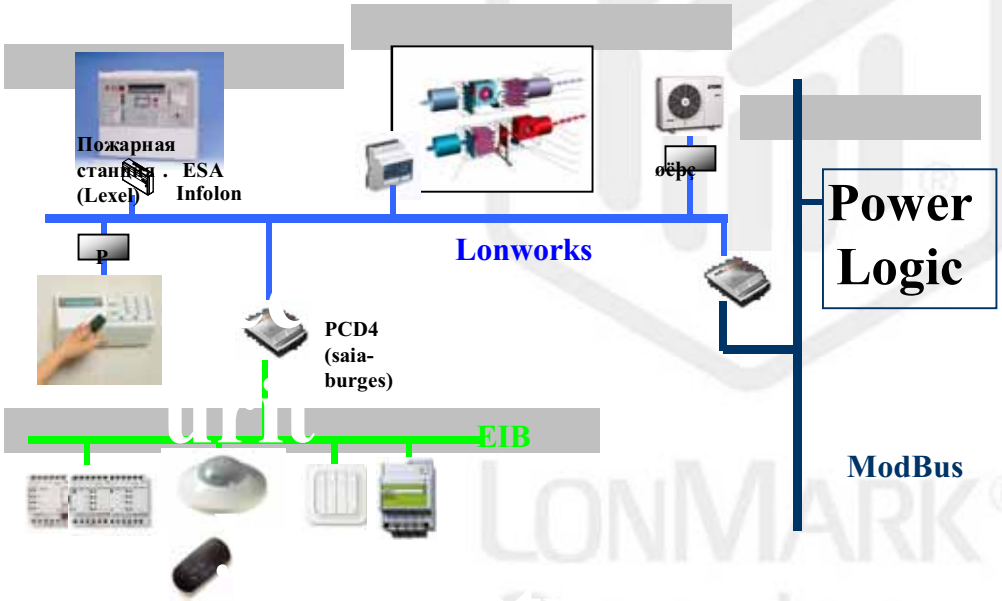
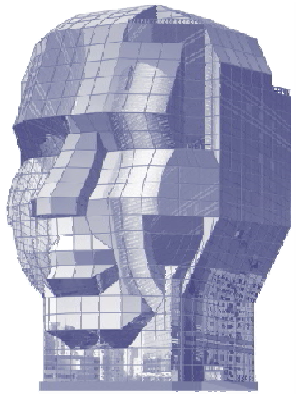
Построение комплексного решения на базе Lon-совместимого оборудования разных производителей





LonMark Sessions

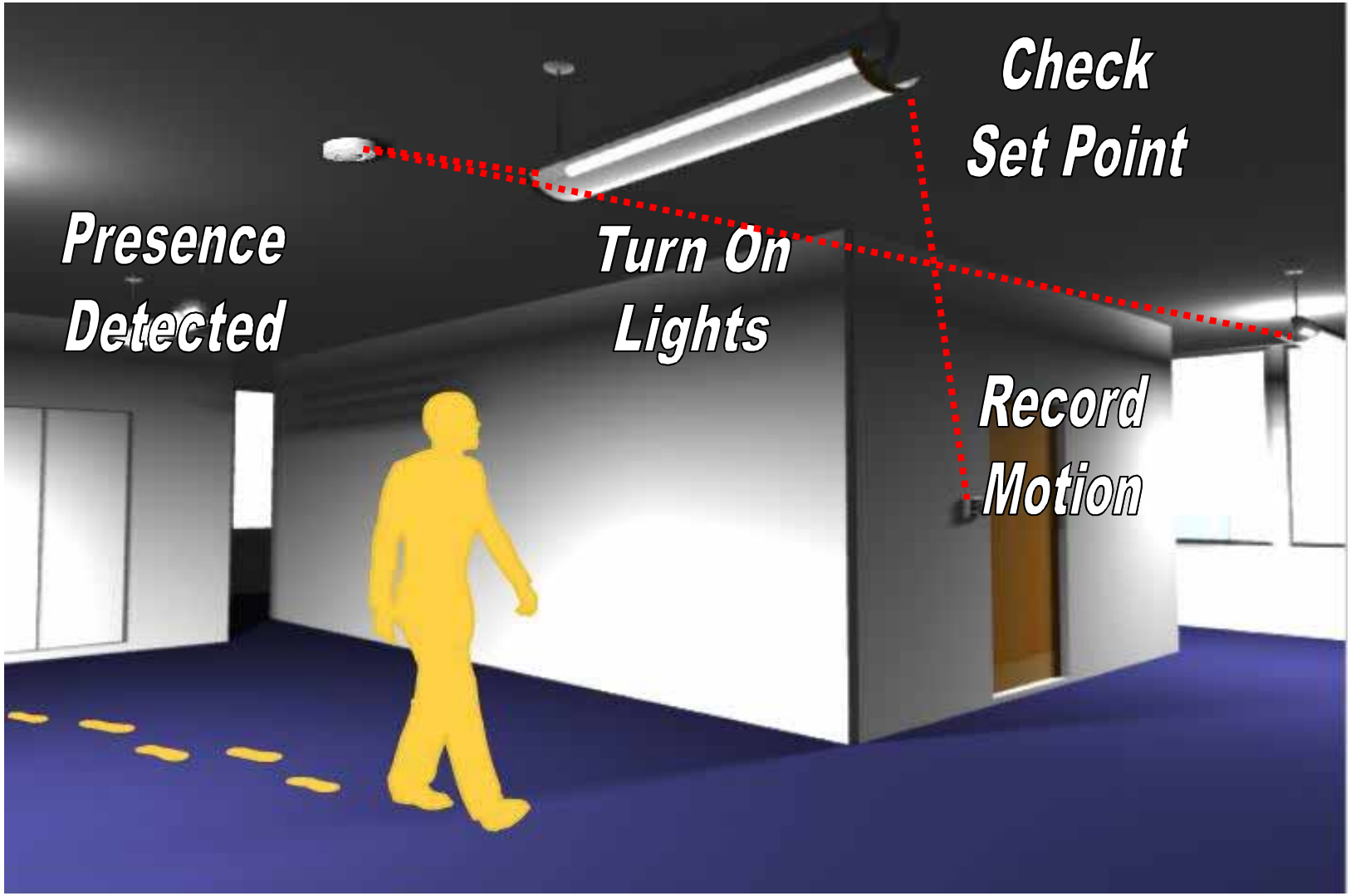
Тематика доклада

- Основные теоретические вопросы
  - Значение интеграции
  - Почему LON? История вопроса
  - Значение LON в современном мире
- Практика применения
  - Оптимальный подход
  - Вернисаж продуктов
  - Примеры проектов
  - Примеры решений
  - Выводы

Что такое интеграция на уровне открытого протокола?

- Возможность инсталлировать в единой системе оборудование разных производителей.

Интегрированная система



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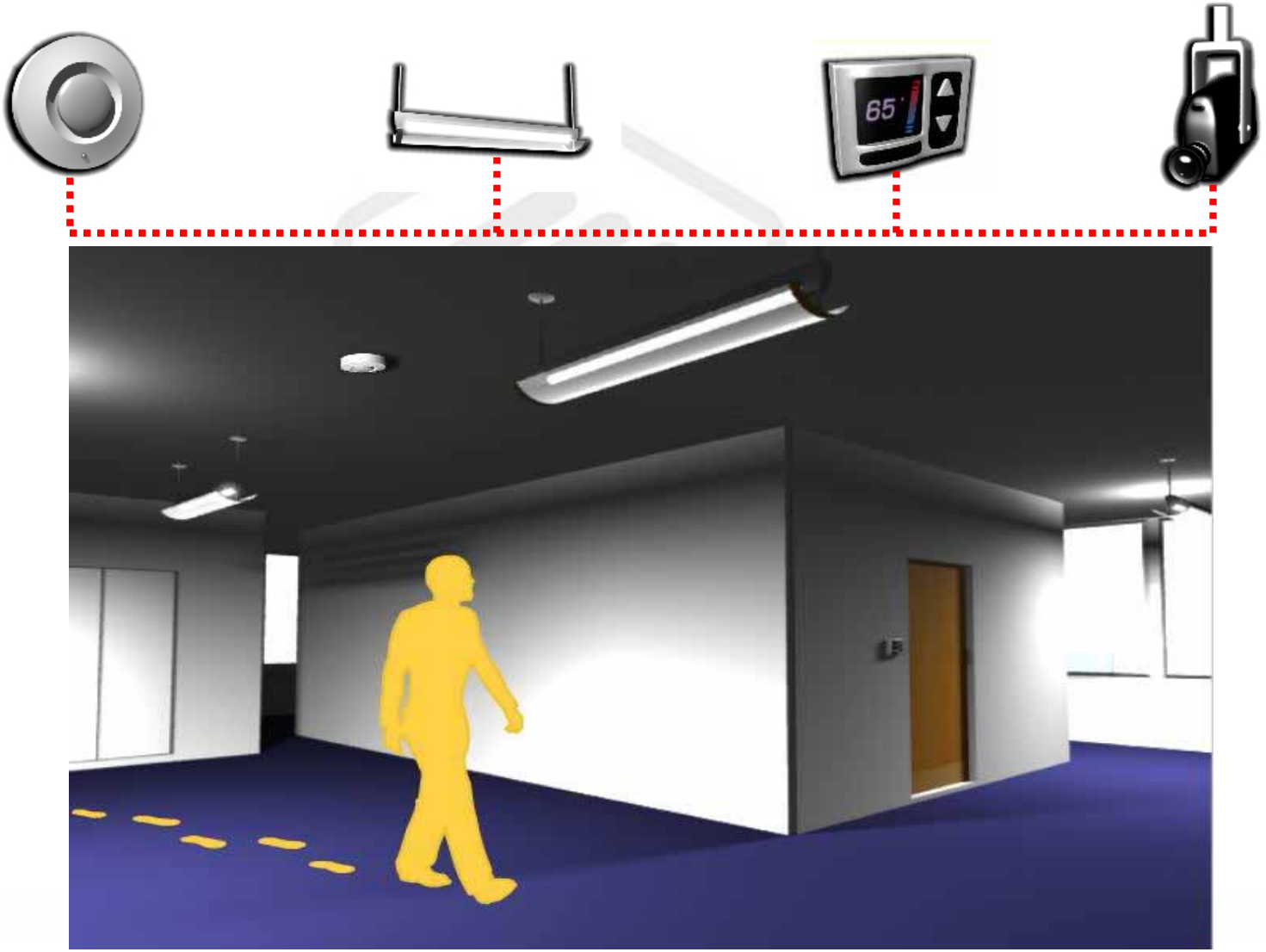
Sessions

Одноуровневая архитектура



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Почему LON? Три основные причины

LonMark® Sessions

Немного истории

Немного истории

- Пневматические системы
- Интегрируемы только по некоторым типам данных
- Сбоит ри утечках воздуха
- Невозможно провести диагностику ошибок сети
- Даже ребенок может щелкать этим оборудованием

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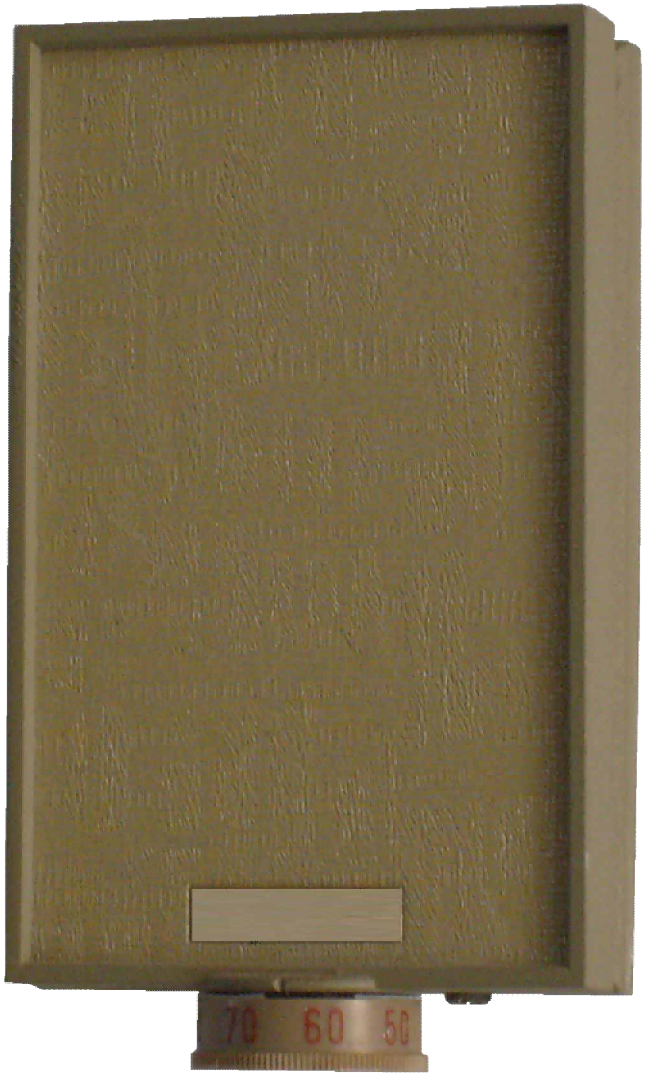
Немного истории



- Панель давления (аналог комнатного термостата)
- Точность зависит от калибровки
- Уставка видна, но нет индикации текущей температуры
- Применима только внутри помещений

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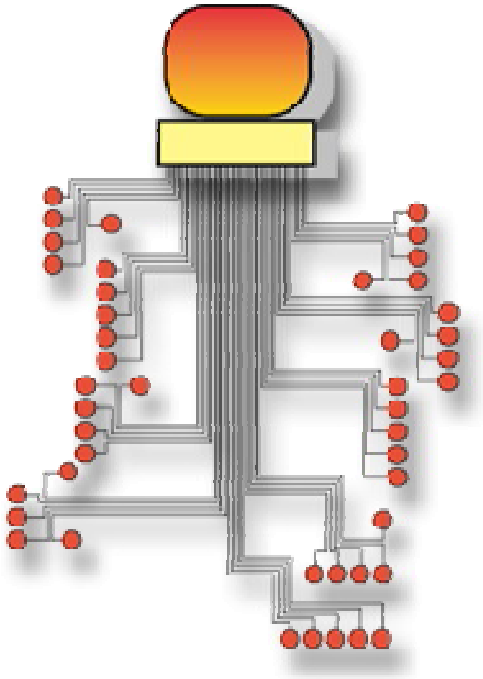
Немного истории

- Простая биметаллическая полоска
- Точность зависит о калибровки
- Видна уставка и текущая температура
- Используется внутри помещений

LonMark® Sessions

Шинные технологии передачи данных

1-ое поколение: централизованные системы

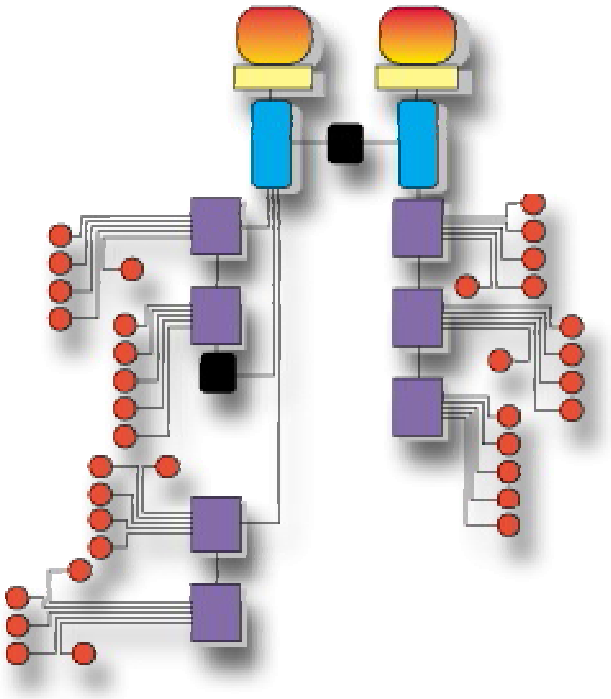


- Дизайн «сверху-вниз»
- Цетрально расположенный процессор
- Неинтегрированный интеллект
- Зависимость от сбоя центра
- Обслуживание сводится к обслуживанию центрального ЦПУ

LonMark® Sessions

Шинные технологии передачи данных

2-ое поколение :
Сетевые ПЛК



- ПЛК дизайн
- Цетральный процессор для приложения
- Распределенные модули ввода-вывода
- Количество критичных к сбою узлов снижено
- Обслуживание сводится к обслуживанию ПЛК

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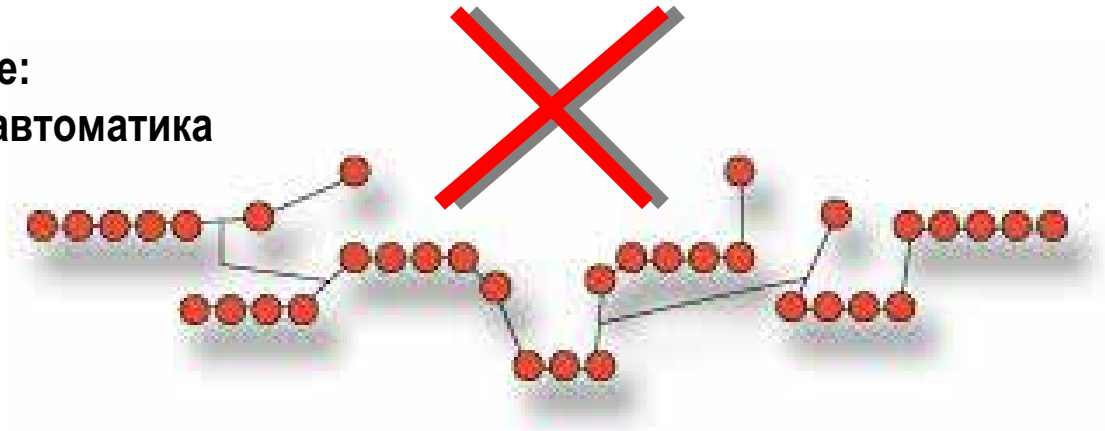
Шинные технологии передачи данных

3-е поколение:
Децентрализованная автоматика



- Дизайн интеллектуализированных узлов
- Нет центрального процессора
- Полностью распределенный интеллект
- Нет критичных к сбою узлов вообще
- Обслуживание не зависит от производителя оборудования

LonMark® Sessions

Требования к современным протоколам автоматики

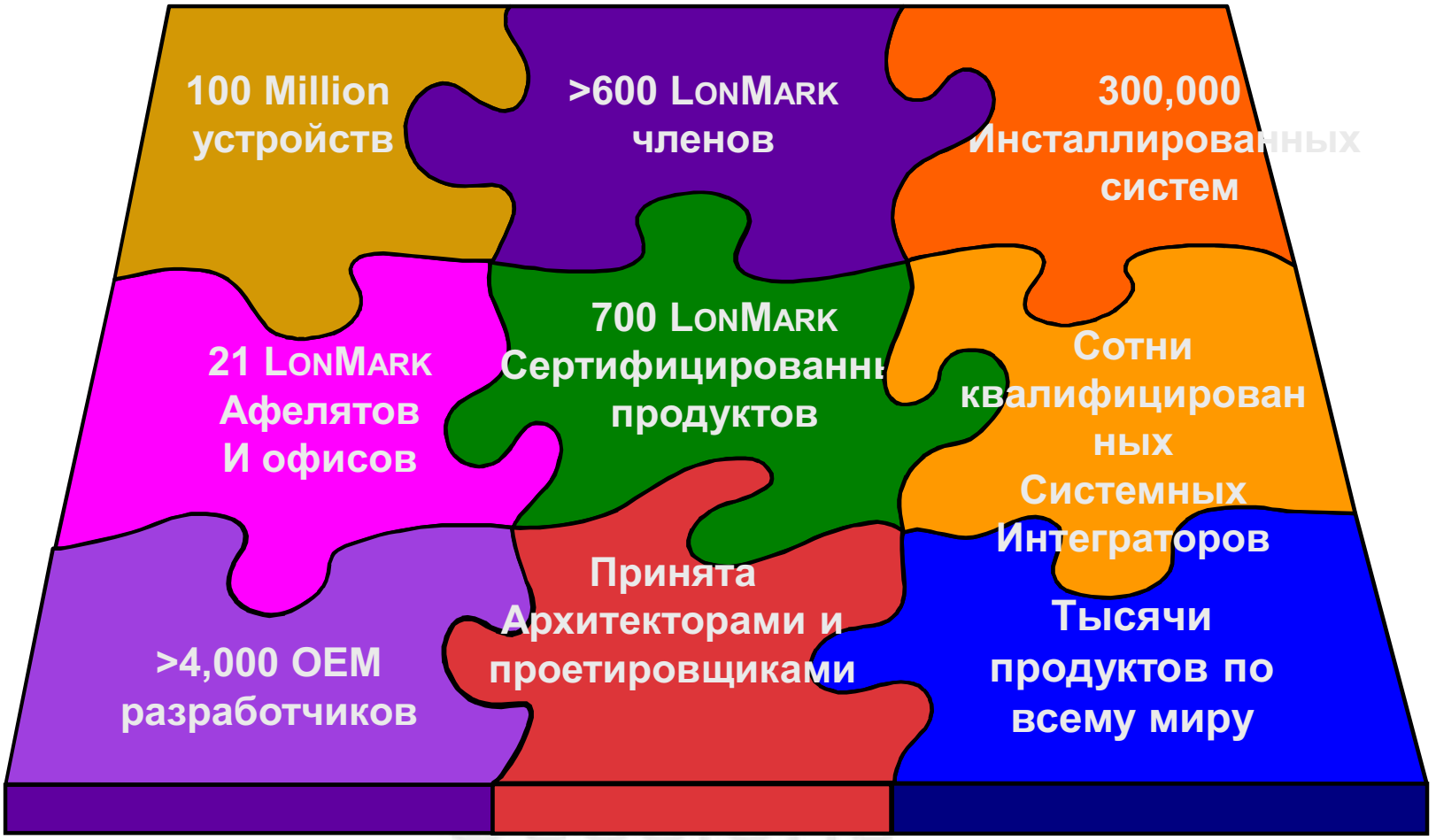
1. Открытость и наличие описания, разбитого на главы по уровням семиуровневой модели OSI/ISO
2. Объем адресного пространства не меньше 12000 адресов
3. Одноуровневый доступ к среде передачи, логическая сегментация
4. Поддержка нескольких сред передачи (в каждой области свои предпочтения: витая пара для BMS, RF для старых зданий и т.д.)
5. Поддержка по-событийного опроса
6. Высокая помехоустойчивость (даже за счет относительного снижения скорости)
7. Поддержка квитирования (одноадресного, многоадресного, циркулярного, без квитирования)
8. Поддержка телеграмм переменной длины
9. Возможность горячего подключения контроллера к сети
10. Высокая прогнозируемость сетевого обмена.
11. Наличие встроенных механизмов сетевой диагностики
12. Возможность удаленного программирования контроллеров
13. Наличие достаточно удобного инструментального программного обеспечения для настройки контроллеров, диагностики и конфигурирования сети.
14. Выделенный прикладной процессор

Торговые марки LON®, LONWORKS®, и LONMARK®

- LonTalk®
- ANSI/CEA-709.1-B
- LONWORKS®
- LON

- Торговая марка Echelon Corporation для протокола ANSI/CEA-709.1-B
- ANSI стандарт для протокола LONWORKS сетей
- Продукты и приложения использующие LON технологию, также обозначение для продукции, использующей Neuron® чип. Например “LONWORKS контроллер клапана”
- “Local Operating Network” – наиболее частое обозначение устройств и сетей, приложений, использующих технологию LONWORKS

Позиция LONWORKS в современном рынке



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Соответствие современным стандартам

ANSI/CEA-709.1-B

EN 14908-1:2005

GB/Z 20177.1-2006

IEEE 1473-L

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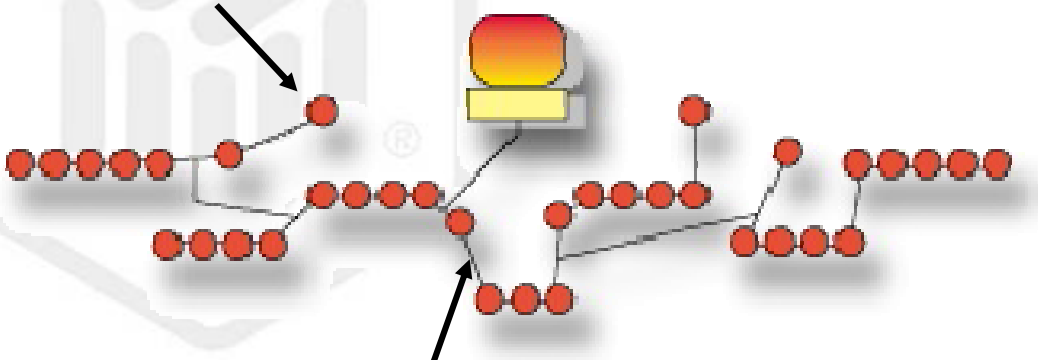
Первичные элементы LON

Device

Network Tool



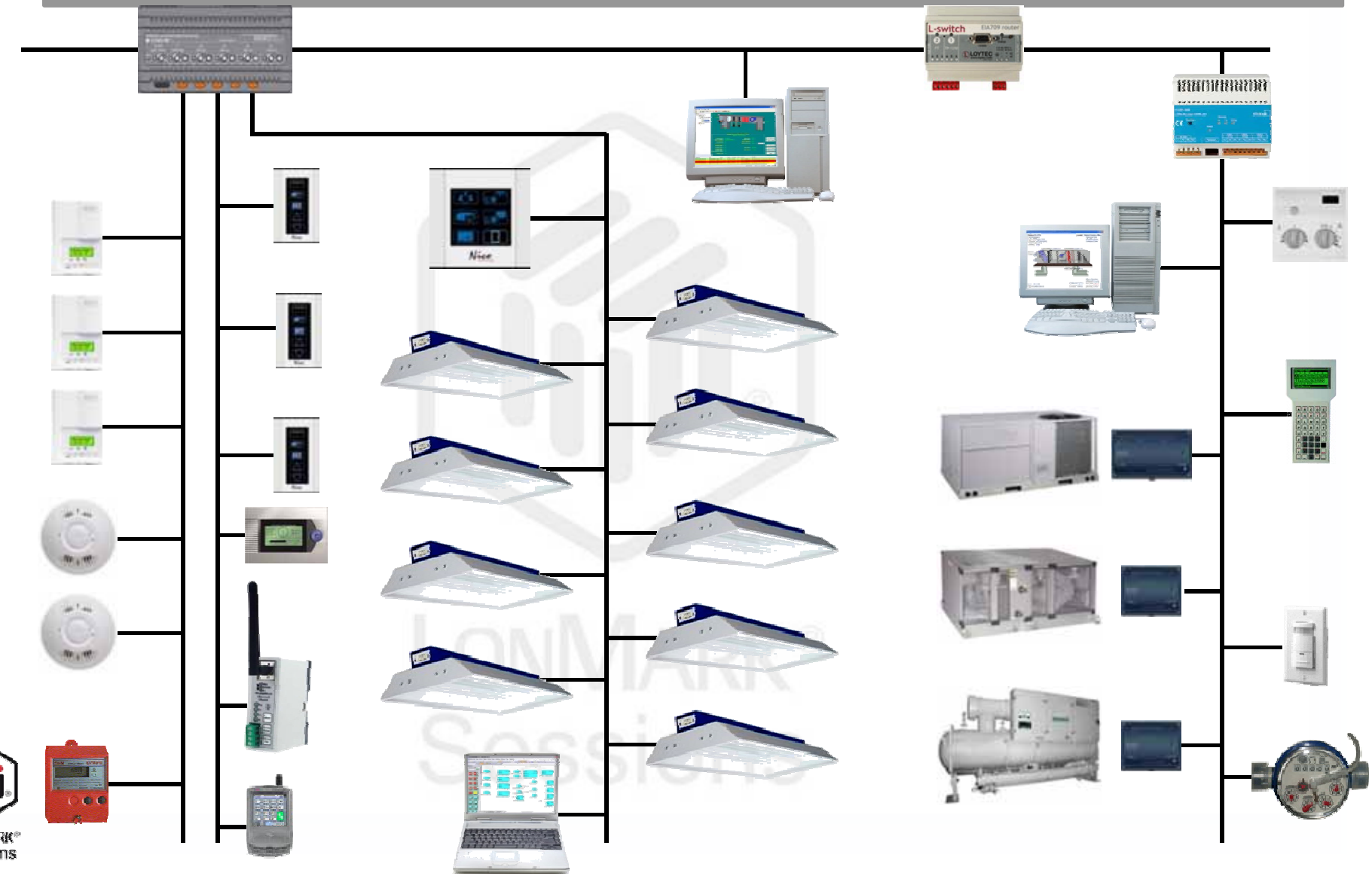
Channel

LonMark Sessions

Среды передачи

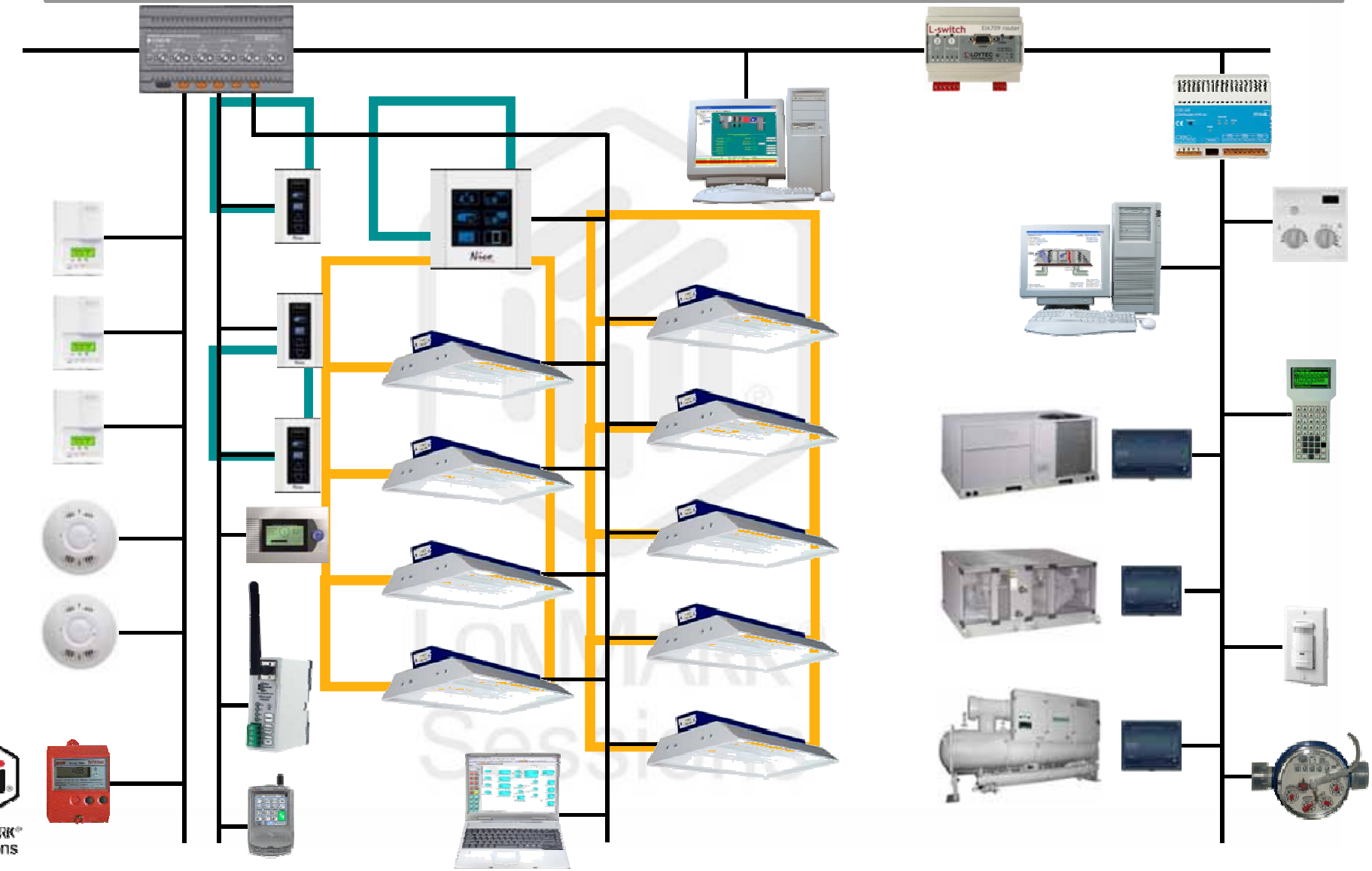
Channel Type	Medium	Bit Rate	Maximum Distance
TP/FT-10	Twisted Pair Free or Bus Topology	78 kbps	500 meters Free Topology 2700 meters Bus Topology
TP/LP-10	Twisted Pair Link Power Free or Bus Topology	78 kbps	500 meters Free Topology 2200 meters Bus Topology
TP/XF-1250	Twisted Pair (Transformer Isolated)	1.25 Mbps	130 meters
TP/XF-78	Twisted Pair (Transformer Isolated)	78 kbps	1400 meters
PL-20	Power Line	5.4 kbps C-Band 3.6 kbps A-Band	Environment Dependant
IP-10	LONWORKS Over IP	10 Mbps 100 Mbps	Determined by IP Network
FO-20	Fiber Optic	1.25 Mbps	30 kilometers
RF-10 RF-100	RF (49 MHz) RF (433 - 472 MHz)	4.88 kbps	~ 2 kilometers (Environment & Transceiver Power Dependant)
IR	Infrared	78.1 kbps	10 - 30 meters

LONWORKS сети



LonMark Sessions

LONWORKS логическая сегментация

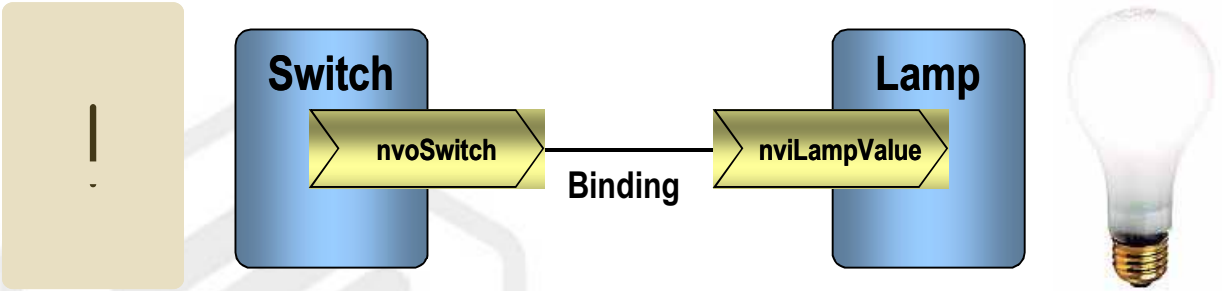


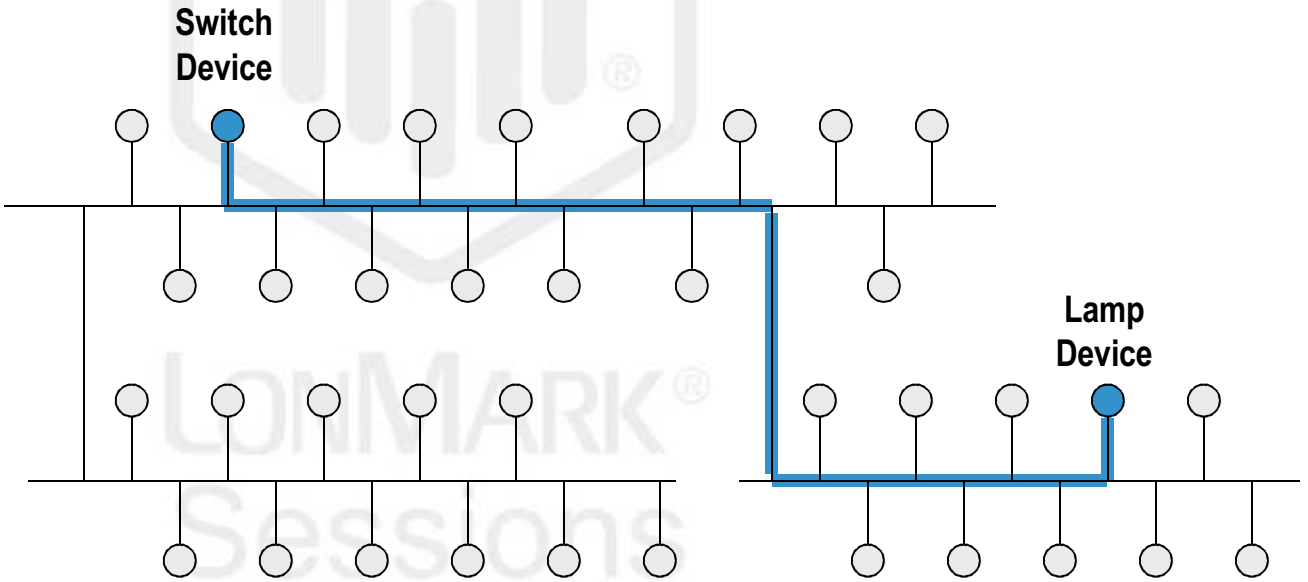
LONMARK Sessions

Сетевые переменные и их типы

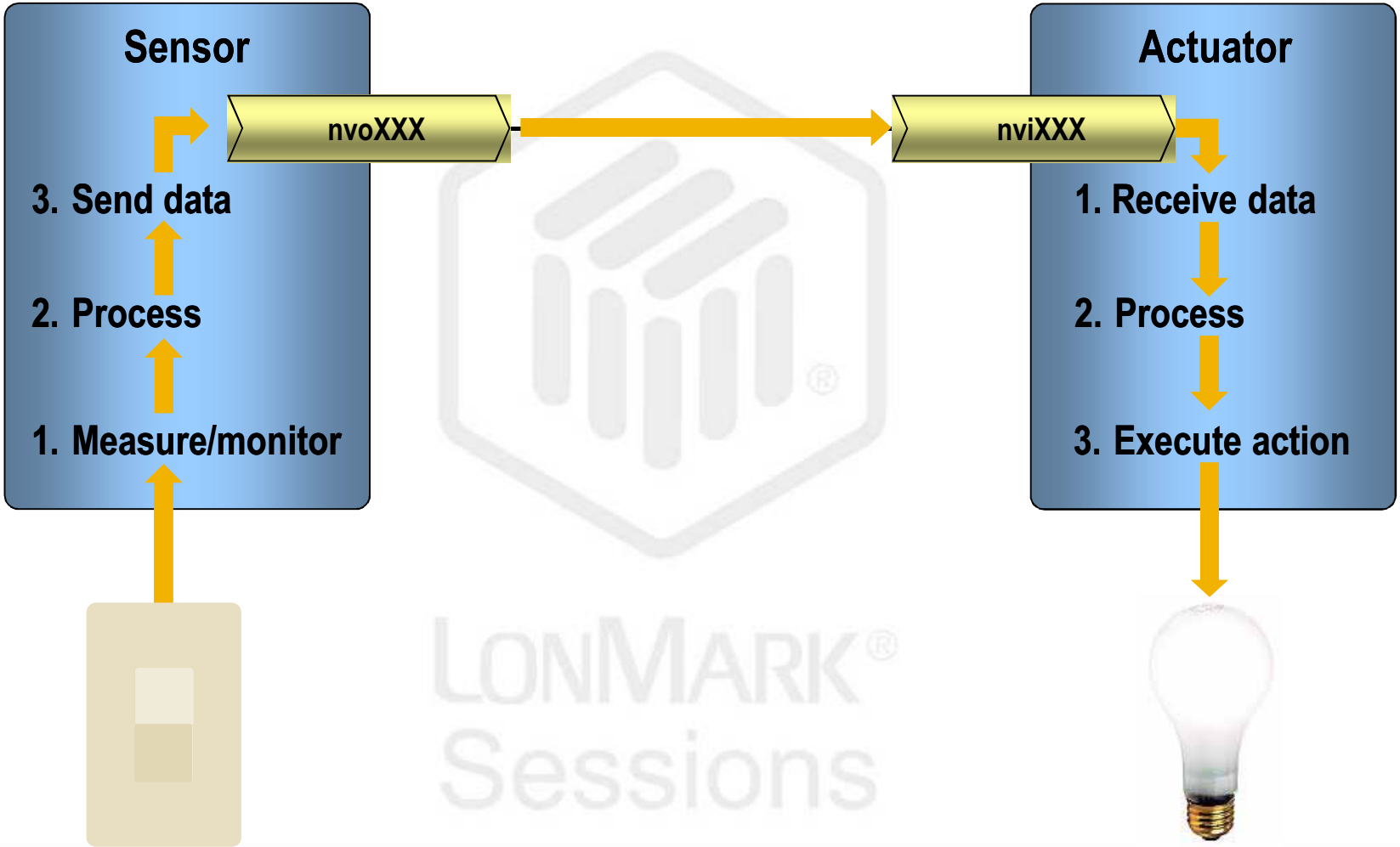
- **Network Variables**
  - Логическая абстракция верхнего уровня модели OSI/ISO. Имеет тип и направление
- **SNVTs**
  - “Standard Network-Variable Types”:
  - Стандартные типы сетевых переменных
- **Configuration Properties**
  - Конфигурационные переменные.
- **SCPTs**
  - “Standard Configuration-Property Types”:
  - Стандатрные конфигурационные типы.

Сетевые переменные

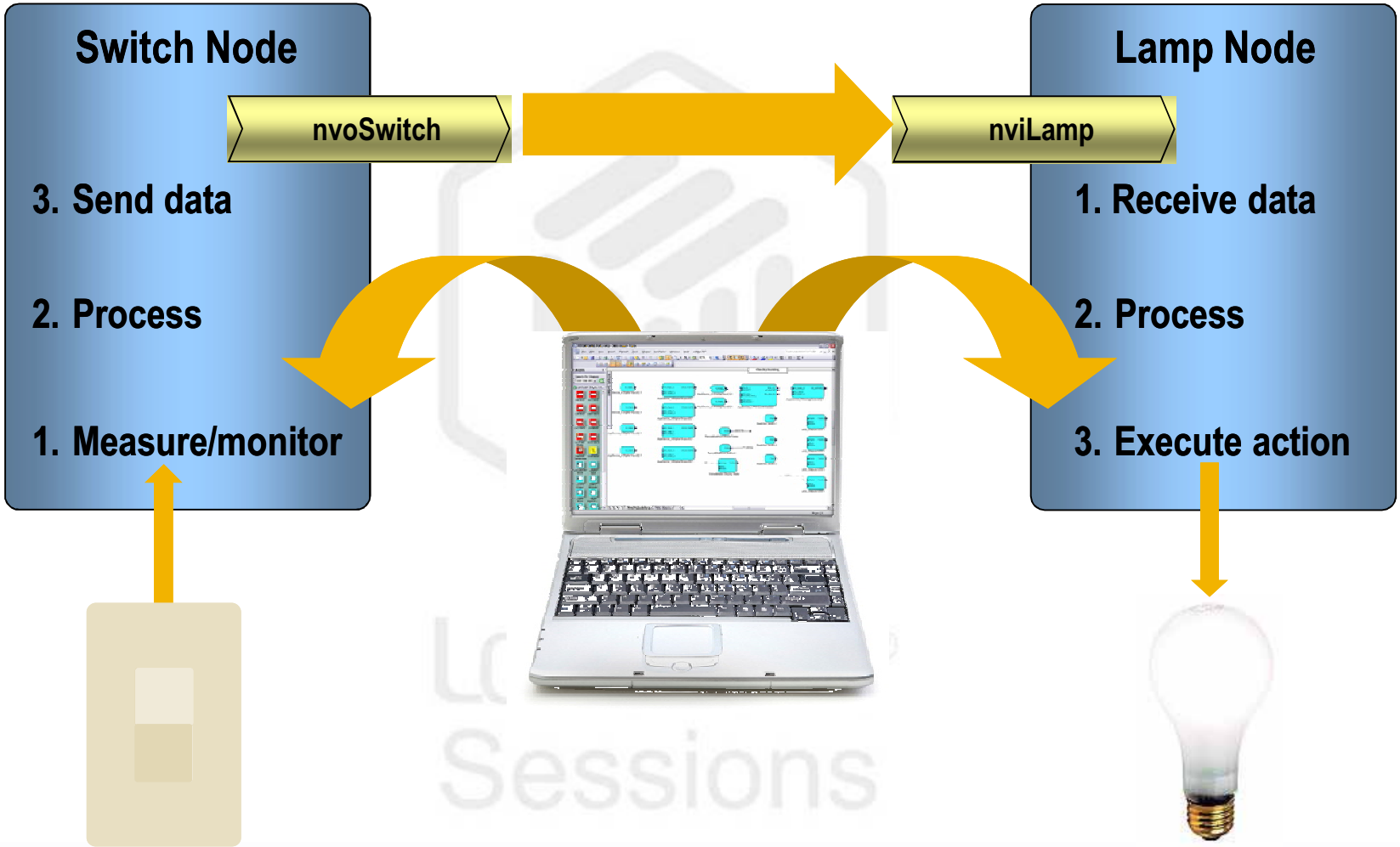




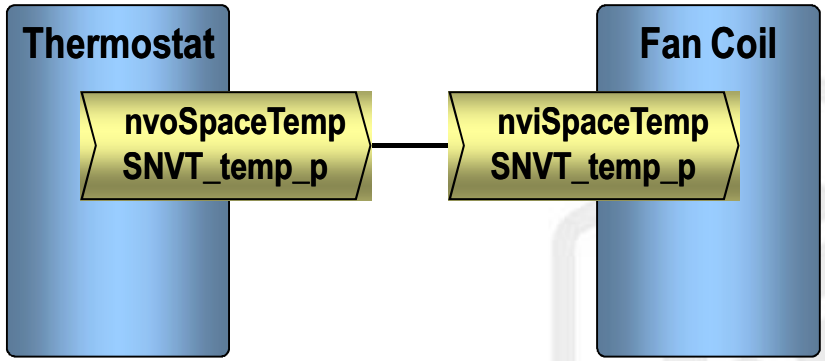
Датчики и приводы

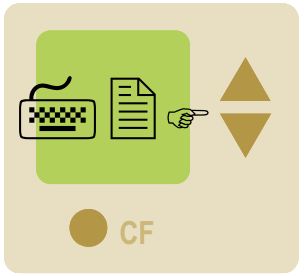


Связывание сетевых переменных

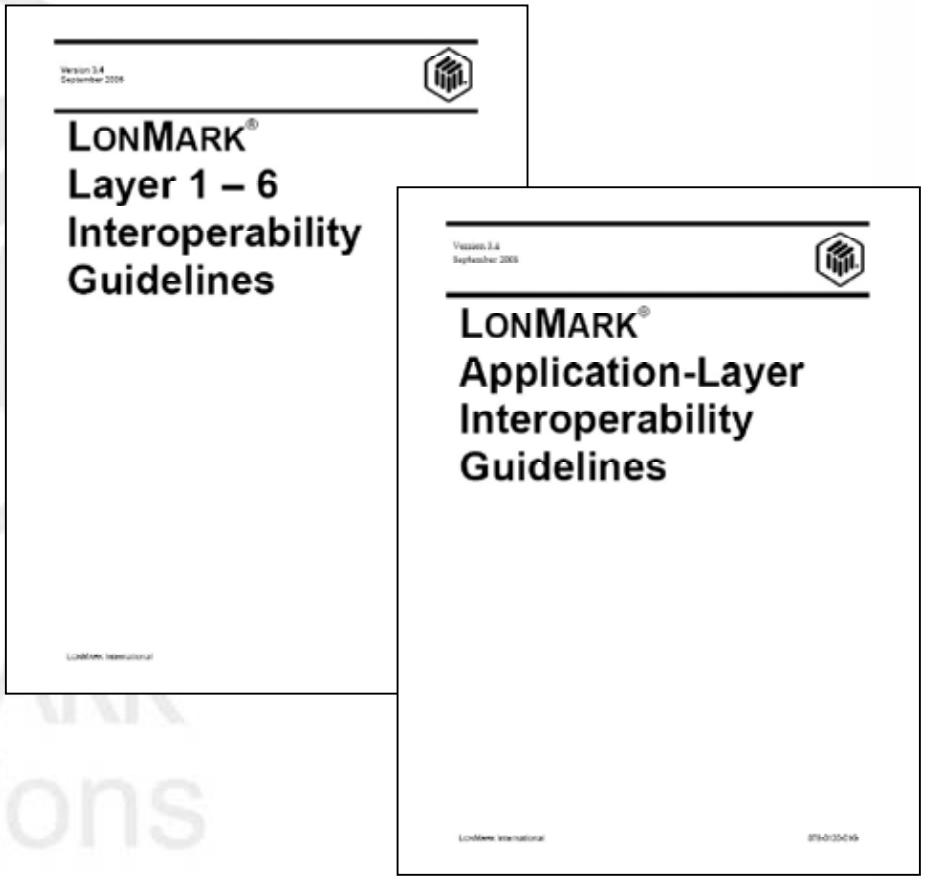


Совместимость сетевых переменных





Standard Network Variable Type



LONMARK® INTERNATIONAL

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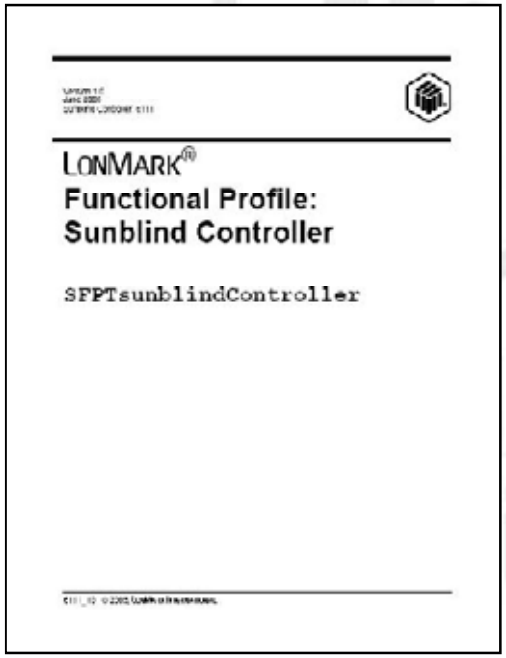
LONMARK функциональные профили


LONMARK®
Functional Profile:
Sunblind Controller

SFPTsunblindController

Sunblind Controller

Mandatory Network Variables

- nvoSblndSetting SNVT_setting

Optional Network Variables

- nviLocalControl SNVT_setting
- nvoGroupControl SNVT_setting
- nvoSblndStates SNVT_sblnd_state

For other possible inputs, refer to Table 1

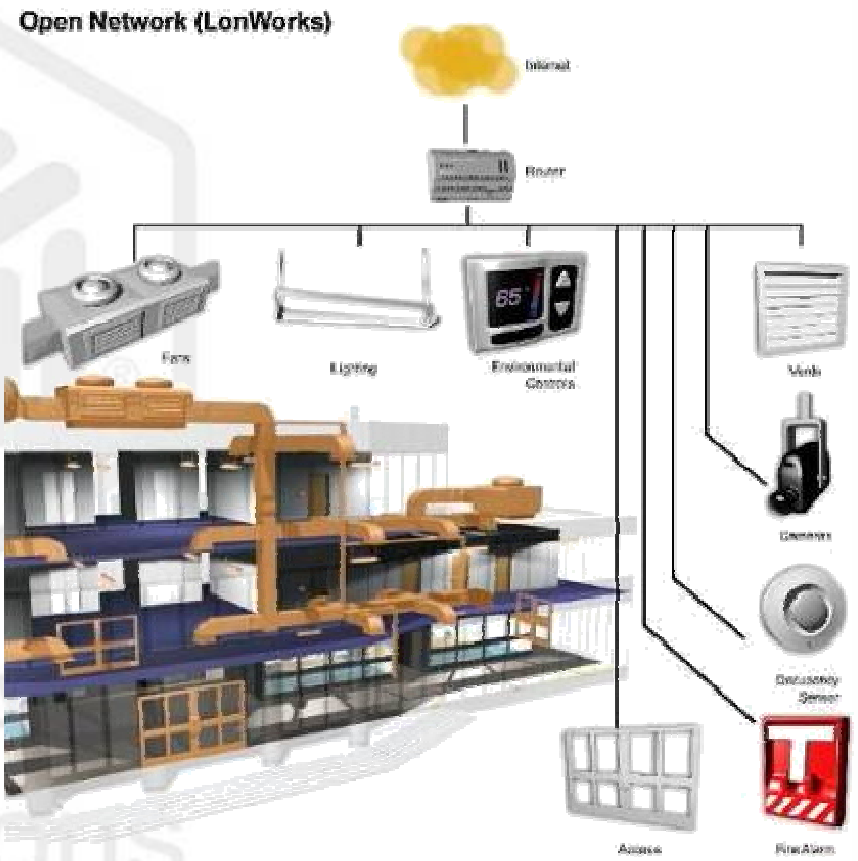
Configuration Proprties

Mandatory:	Send Heartbeat
Optional:	Receive Heartbeat
	Input Priority
	Weather Sensor Fail Default
	Window Sensor Fail Default
	Location Label
	Object Major Version
	Object Minor Version

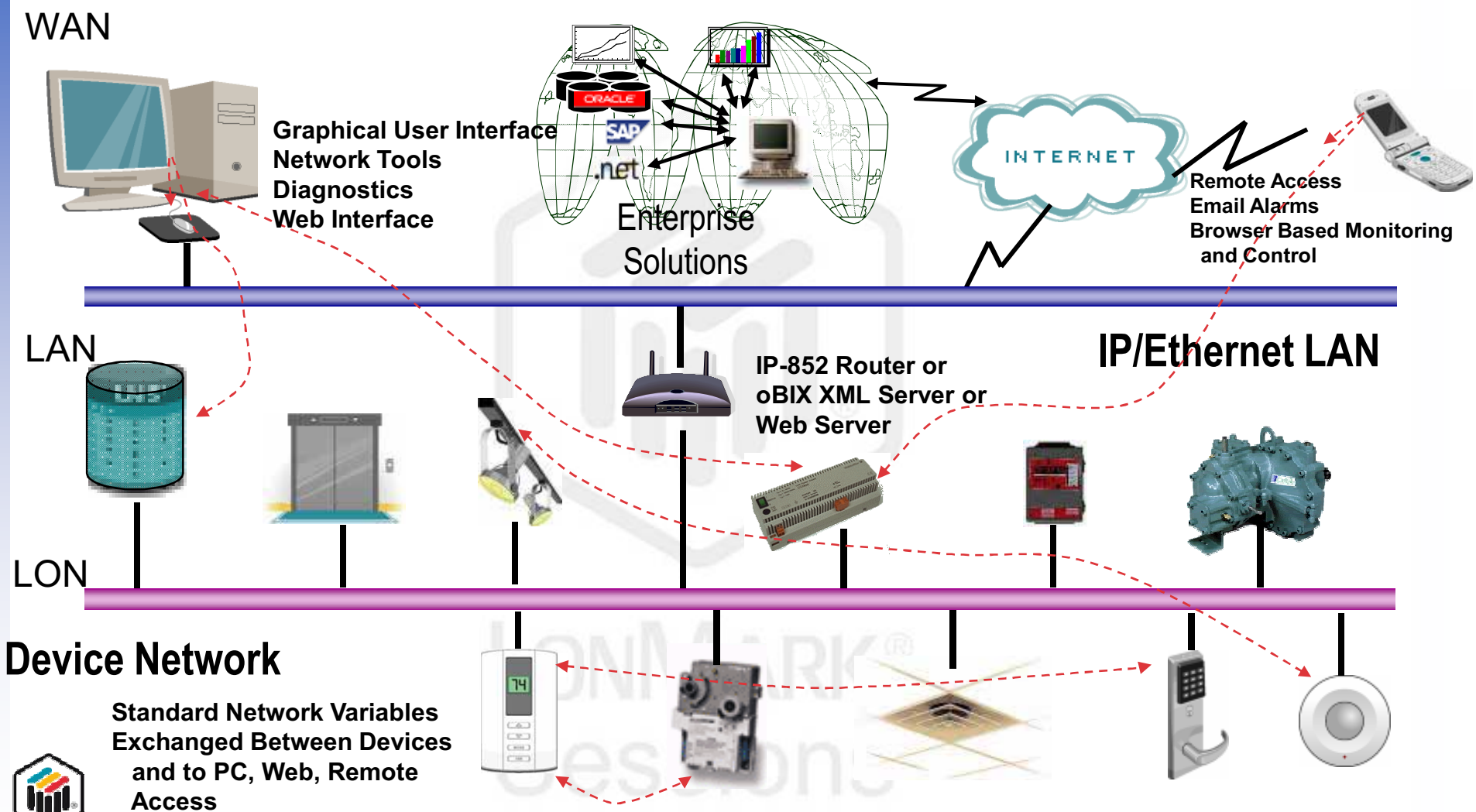
LONMARK® Sessions

Преимущества LON

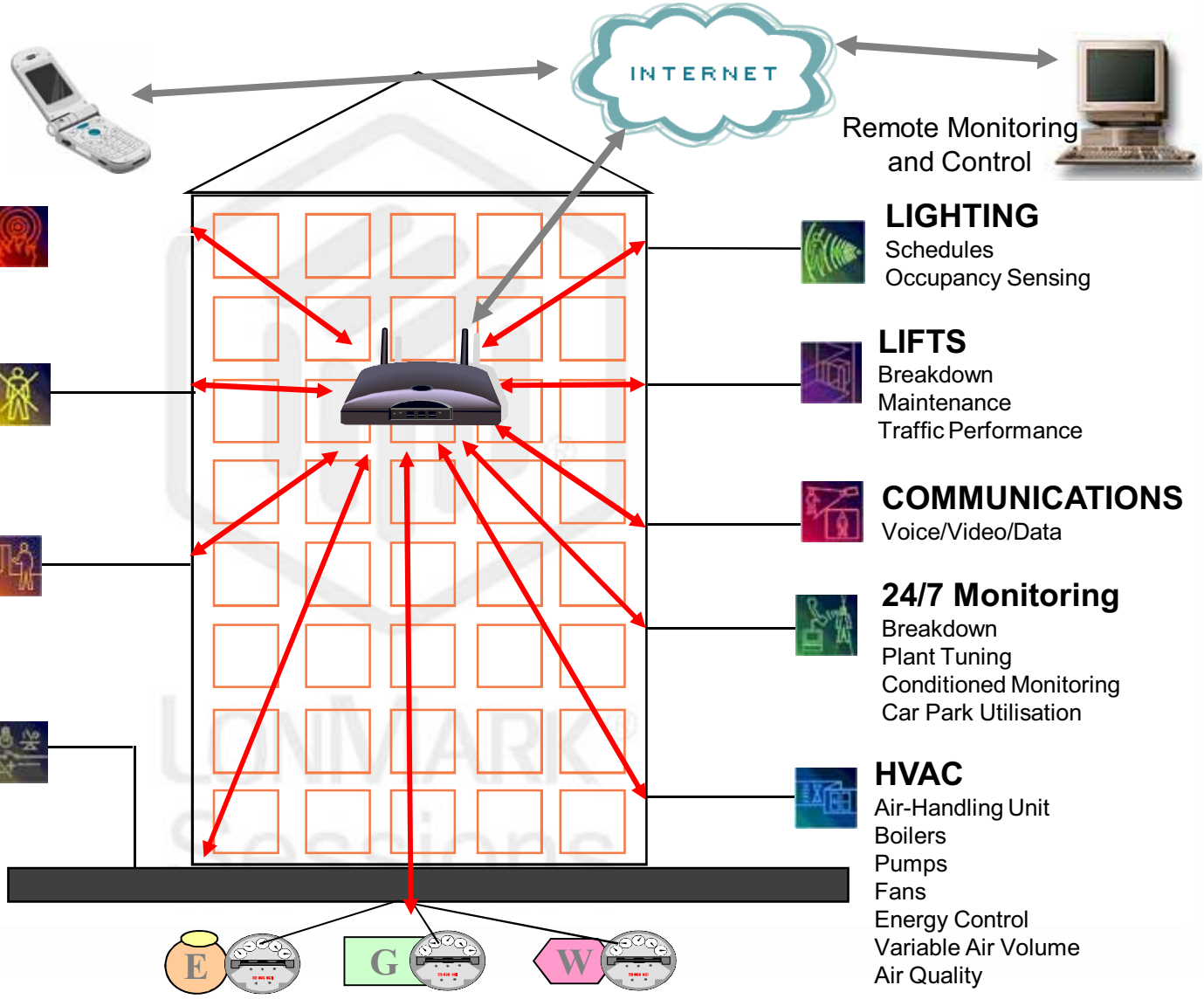
- надежность –100 миллионов устройств проинсталлировано
- Широта выбора из тысяч доступных устройств
- Множество квалифицированных независимых итеграторов



Сложные сети – LON ->LAN->WAN

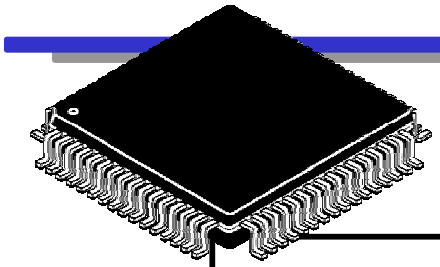


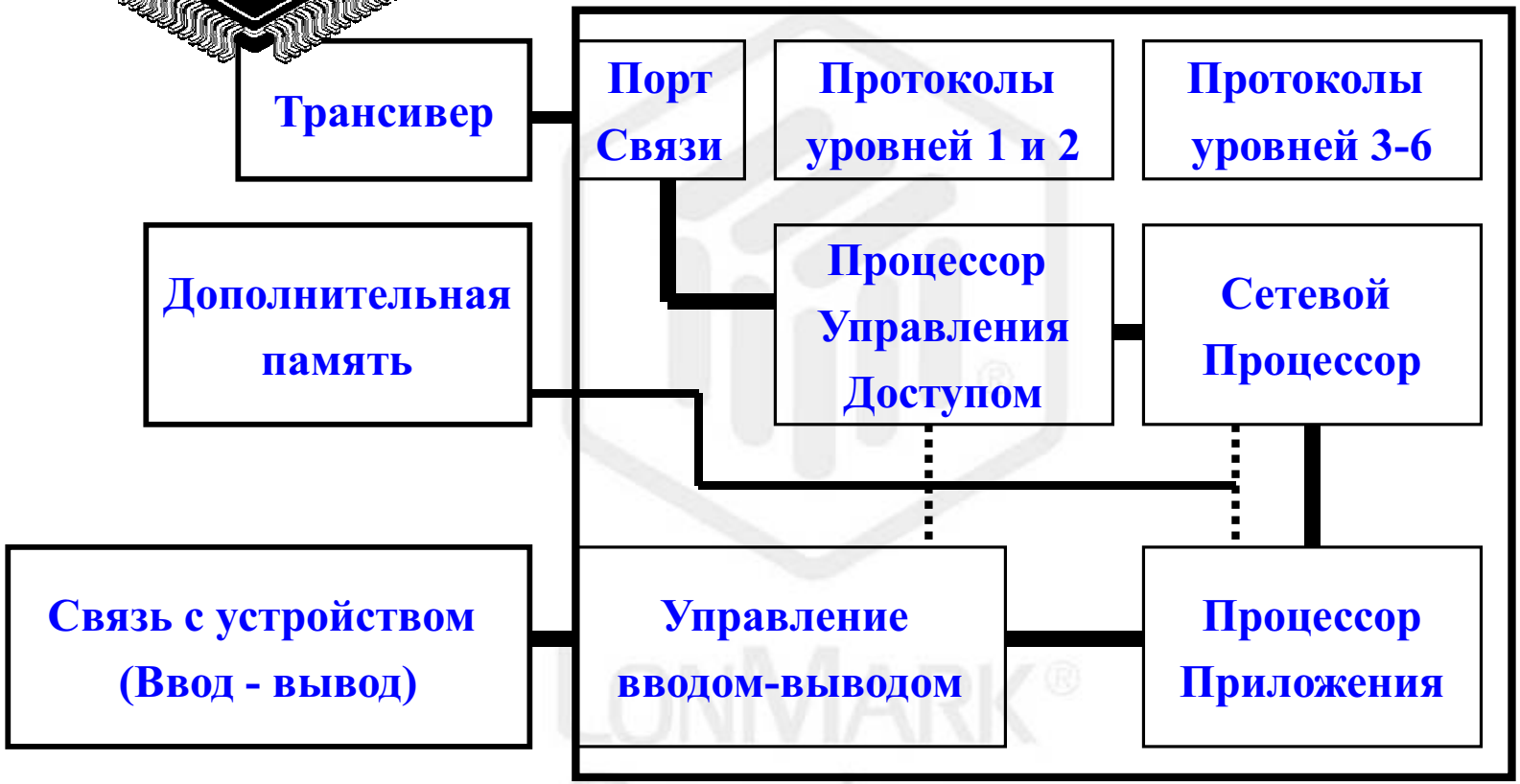
Интеграция на уровне здания означает доступ к информации



LonMark Sessions

Neuron chip - сердце программируемого контроллера LonWorks



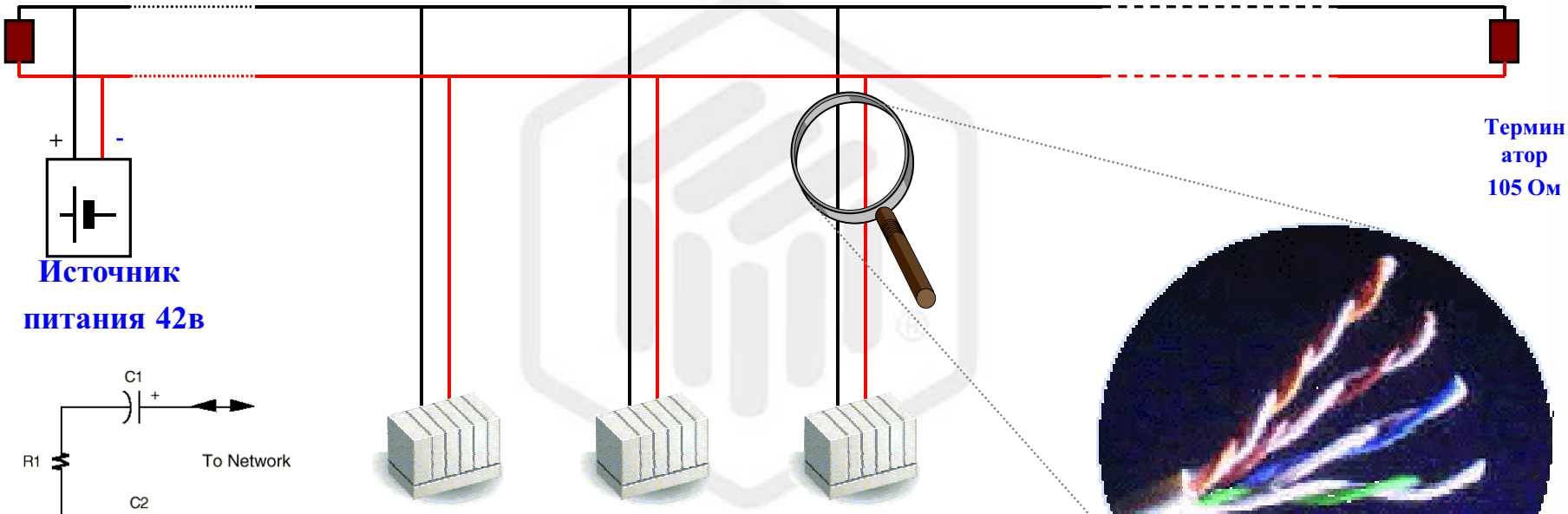


- Функциональная схема
- микропроцессора Neuron

LonMark Sessions

Свободная топология TP/FT-10

Термин
атор
105 Ом



Термин
атор
105 Ом

Источник
питания 42в

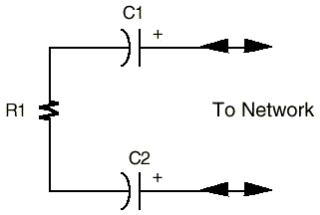


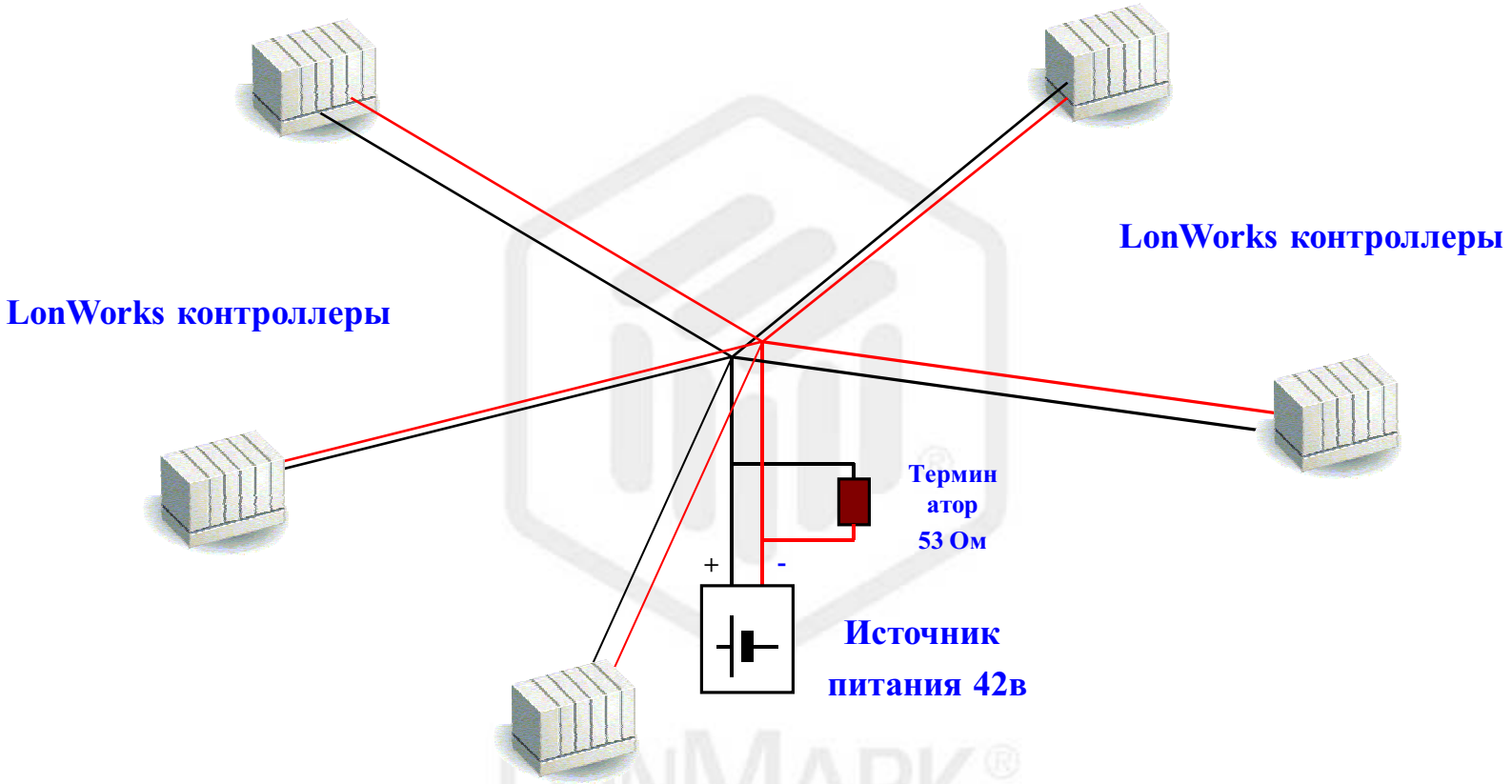
Схема терминатора

LonWorks контроллеры

Вариант топологии «общая шина»

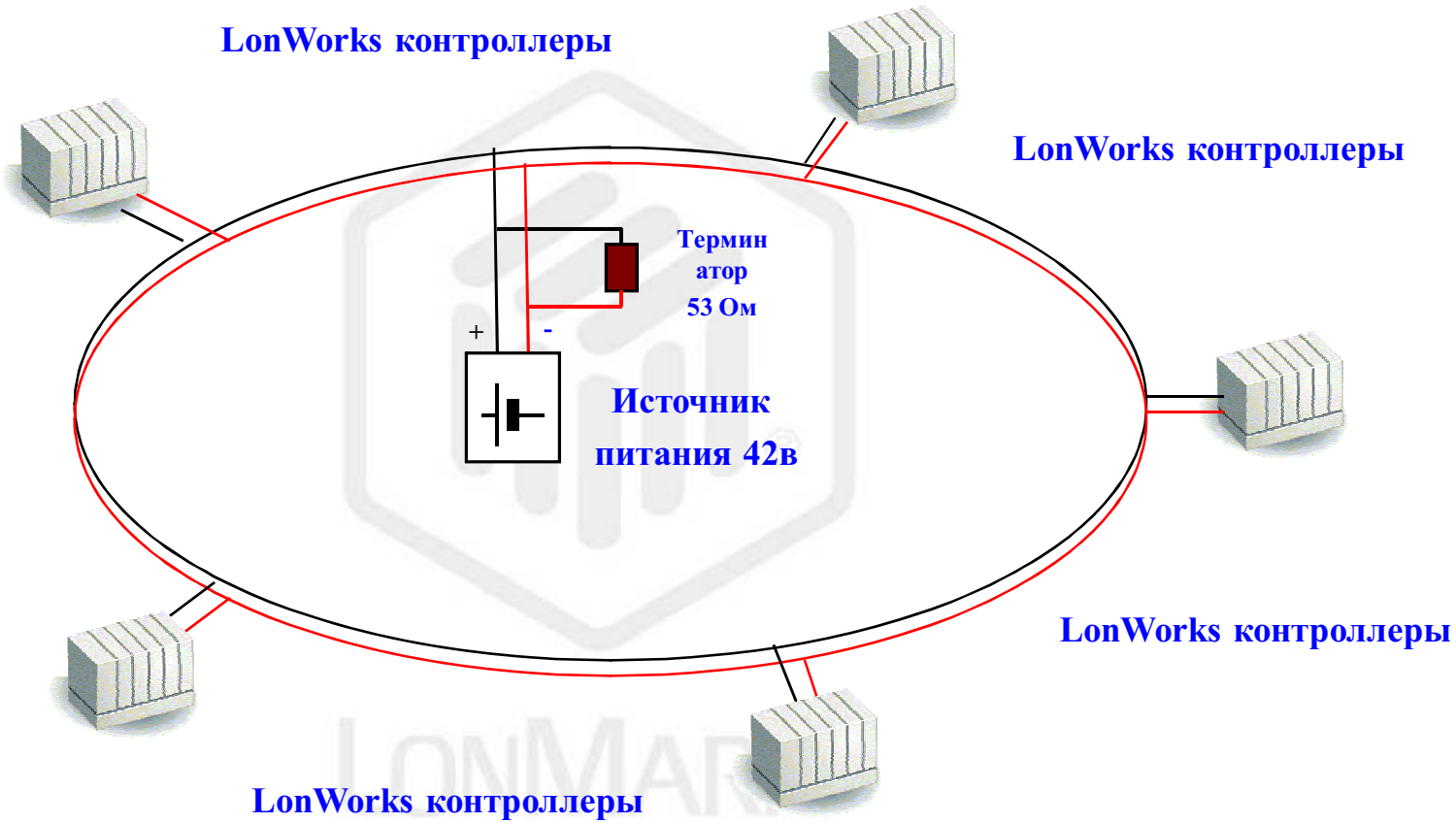
LonMark Sessions

Свободная топология TP/FT-10



Вариант топологии «звезда»

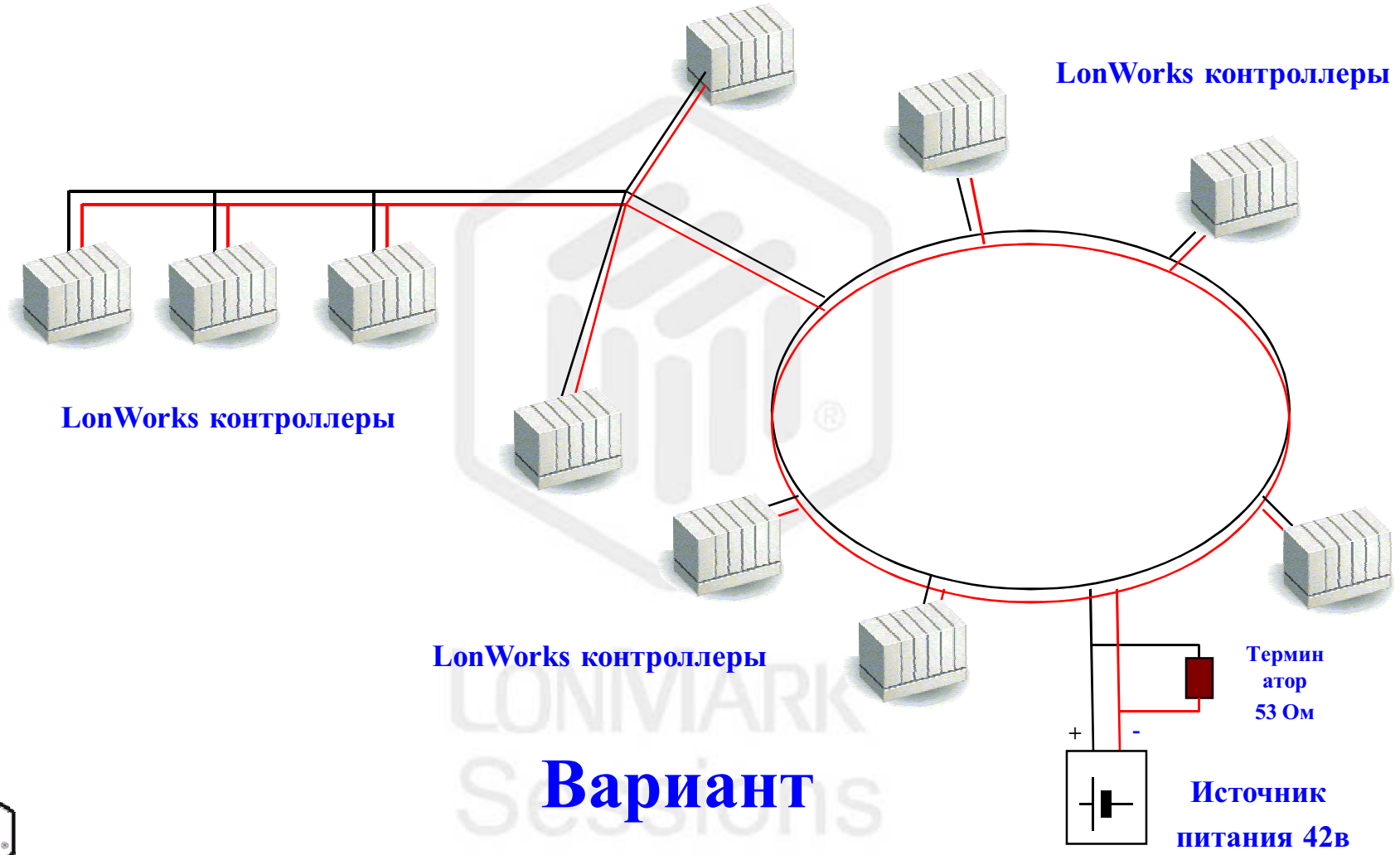
Свободная топология TP/FT-10



Вариант топологии «кольцо»

LonMark Sessions

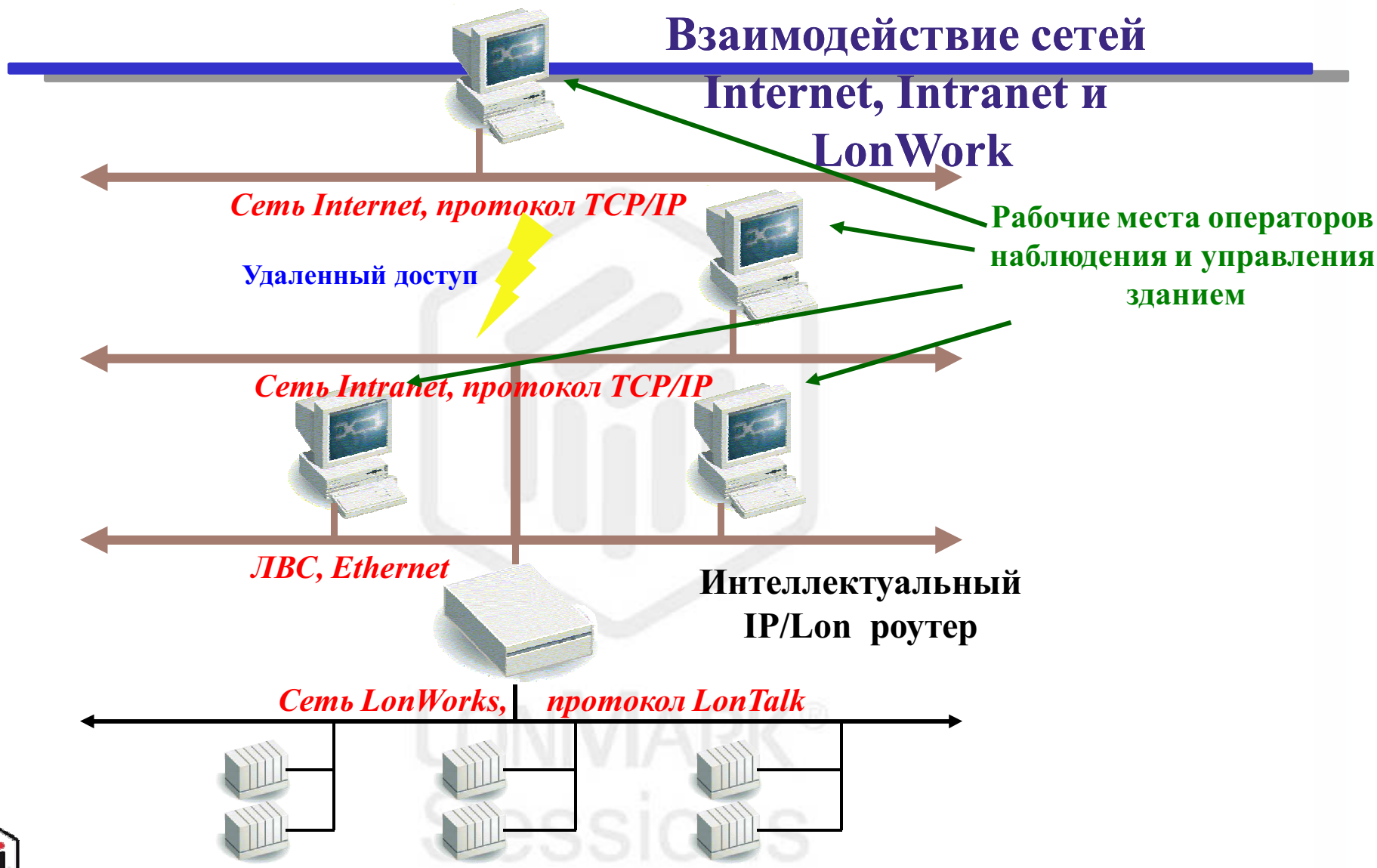
Свободная топология TP/FT-10



Вариант смешанной топологии

LonMark Sessions

Взаимодействие сетей Internet, Intranet и LonWork



LonMark Sessions

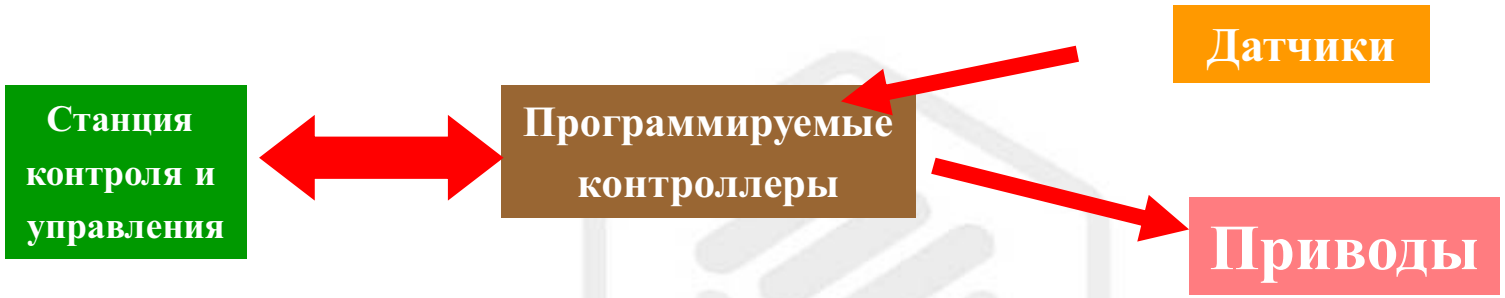
LonMark Membership

Оптимальный подход

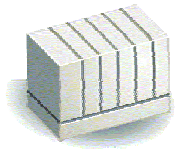
Основные принципы построения ИЗ:

- **Децентрализованная архитектура**
- **Использование открытых протоколов**
- **Использование испытанных тех. Решений**
- **Интеграция на уровне протокола**
- **Использование ERP систем для организации эффективной эксплуатации здания**

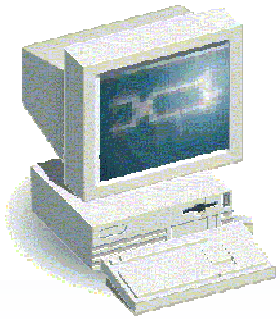
Не важно «что», важно «как»



Логика работы устройств задается:



На уровне программируемых контроллеров

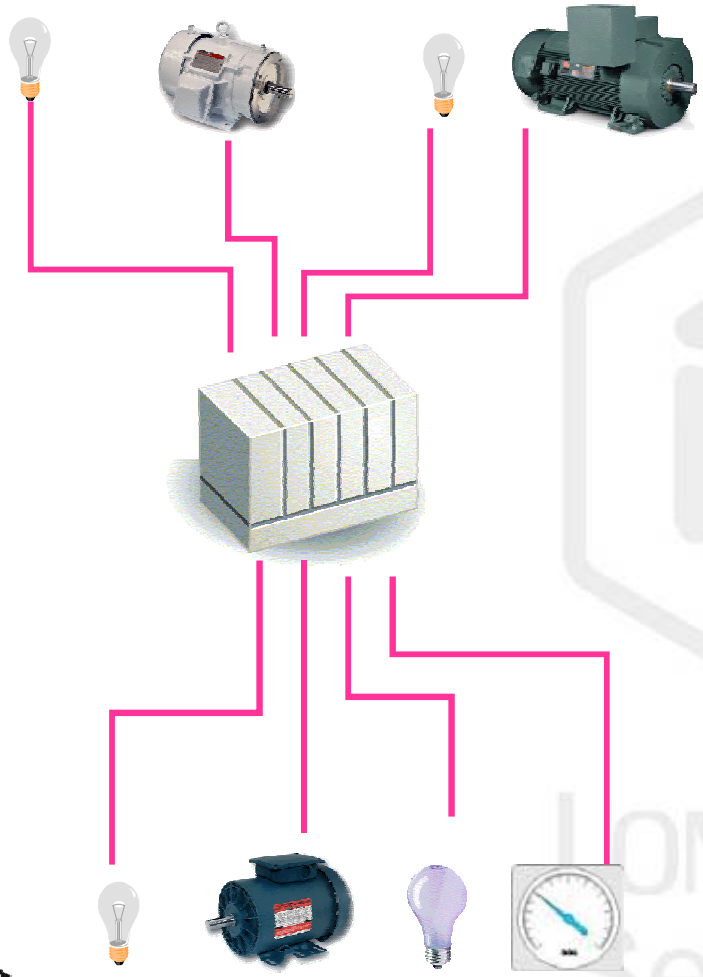


На уровне рабочей станции контроля и управления

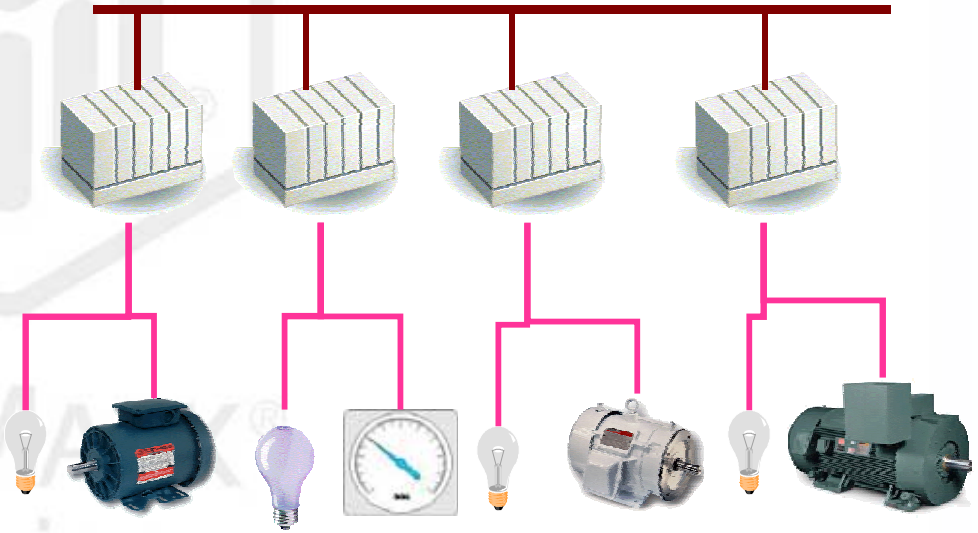
LonMark Sessions

Классификация систем автоматики

Централизованное управление



Децентрализованное (распределенное) управление



Принцип построения распределенных систем

Специализированная сетевая карта

Рабочая станция оператора контроля и управления

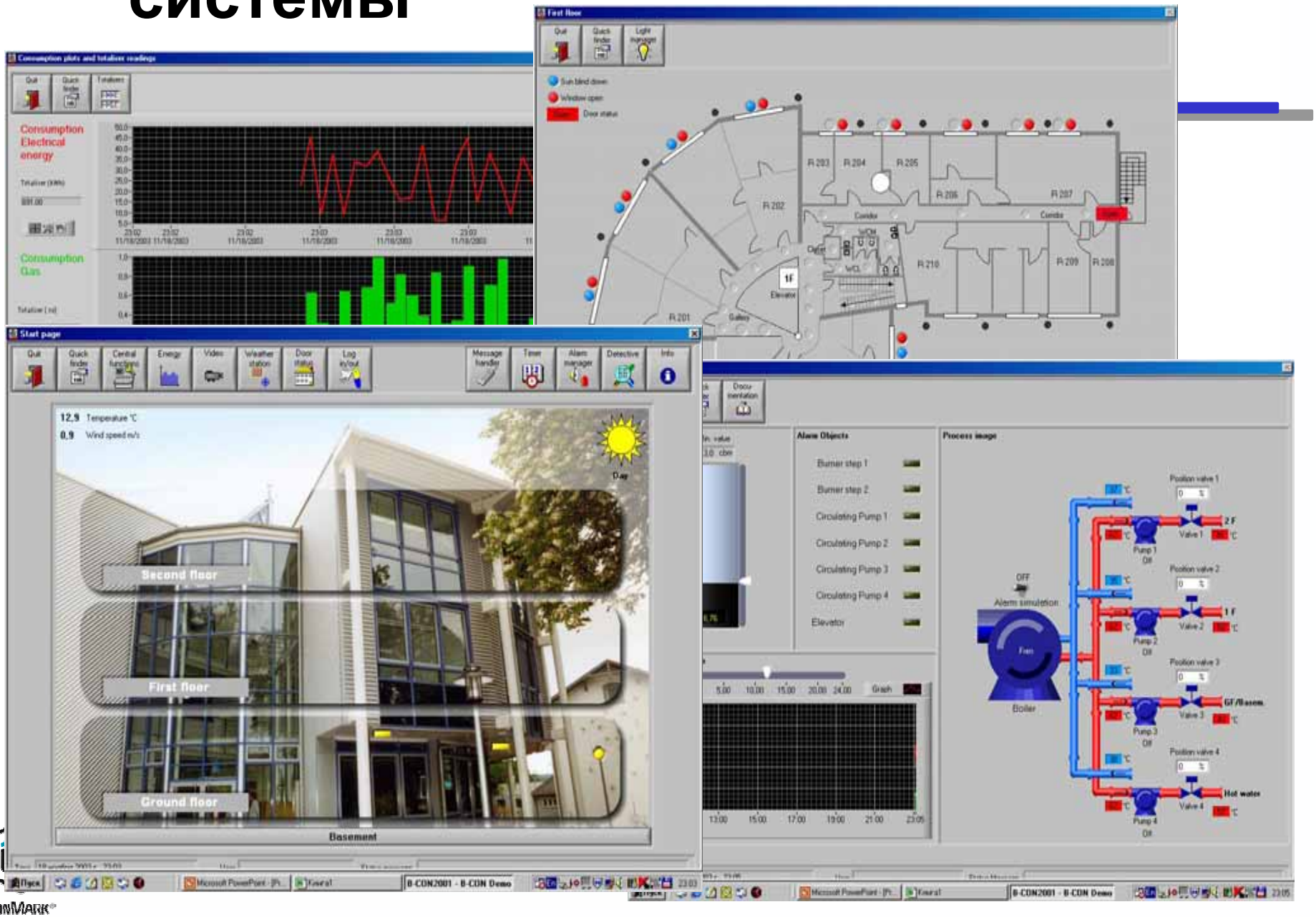
Сеть передачи данных

Программируемые контроллеры

Датчики и приводы

LonMark Sessions

Пример SCADA системы



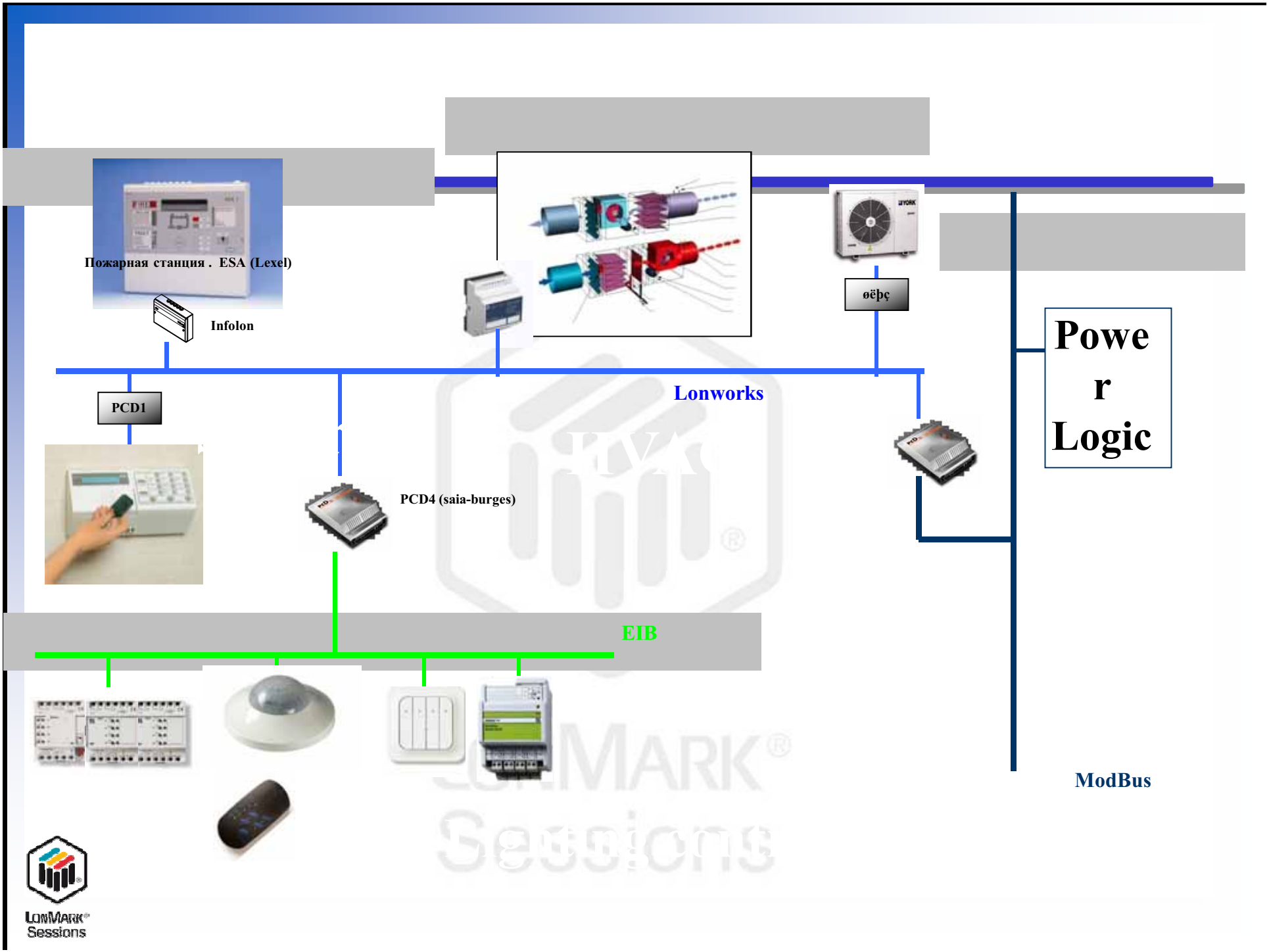
Экономия средств на этапе

выбора оборудования на этапе строительства и (или) модернизации (независимость от одного производителя)

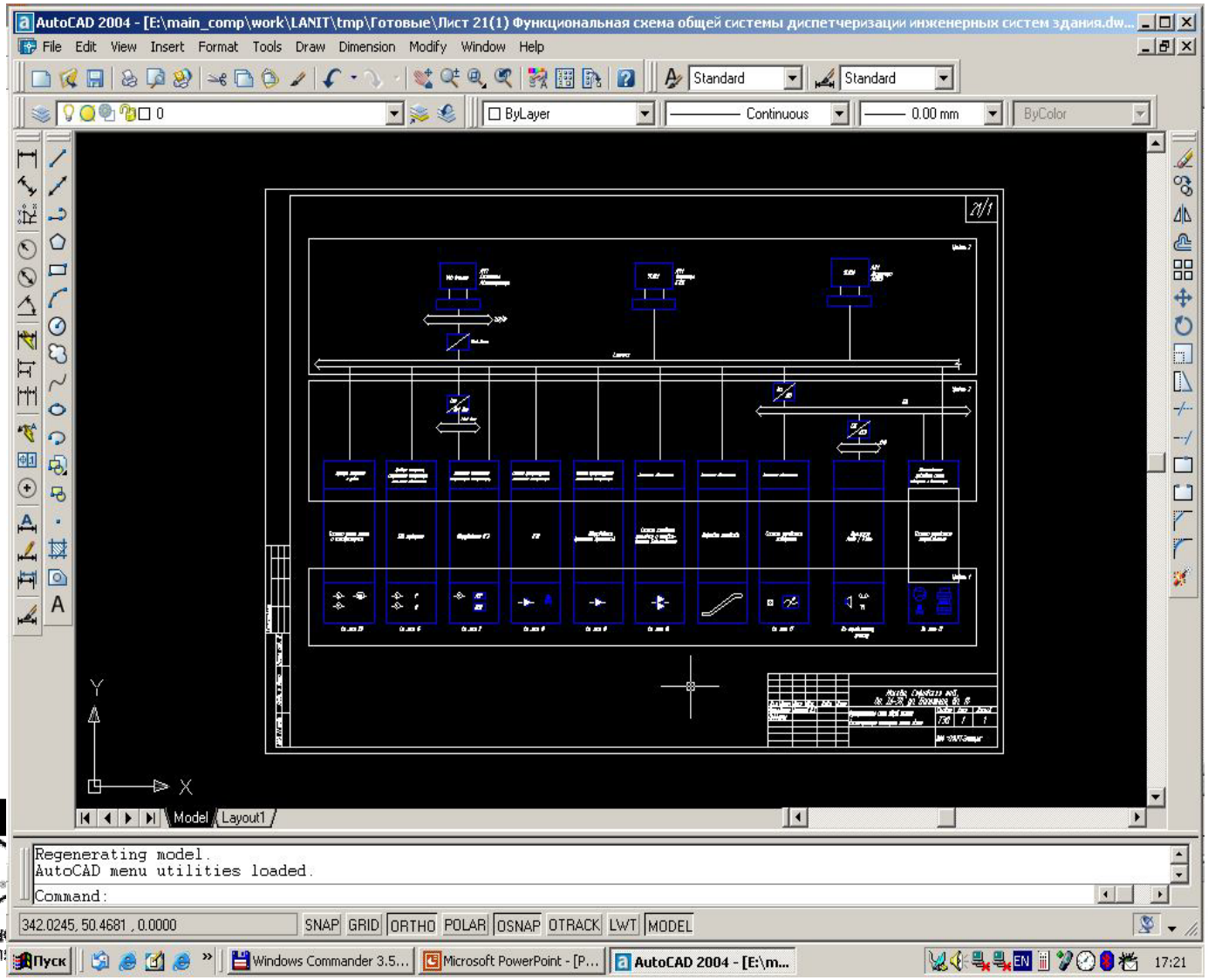
2. Возможность организации тендера на реализацию проекта

3. Возможность интеграции подсистем на уровне протокола

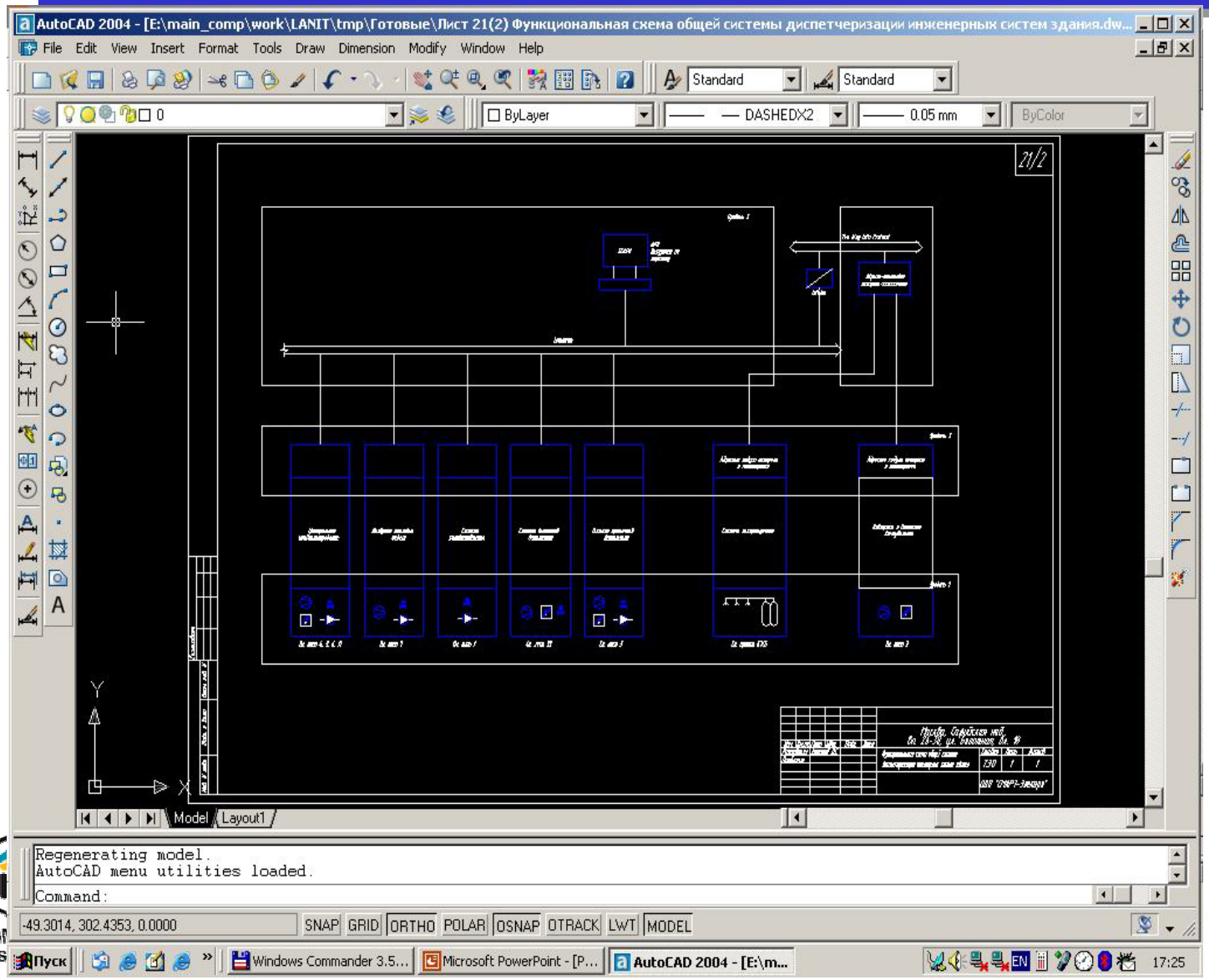
4. Широкий выбор устройств со встроенной поддержкой протокола.

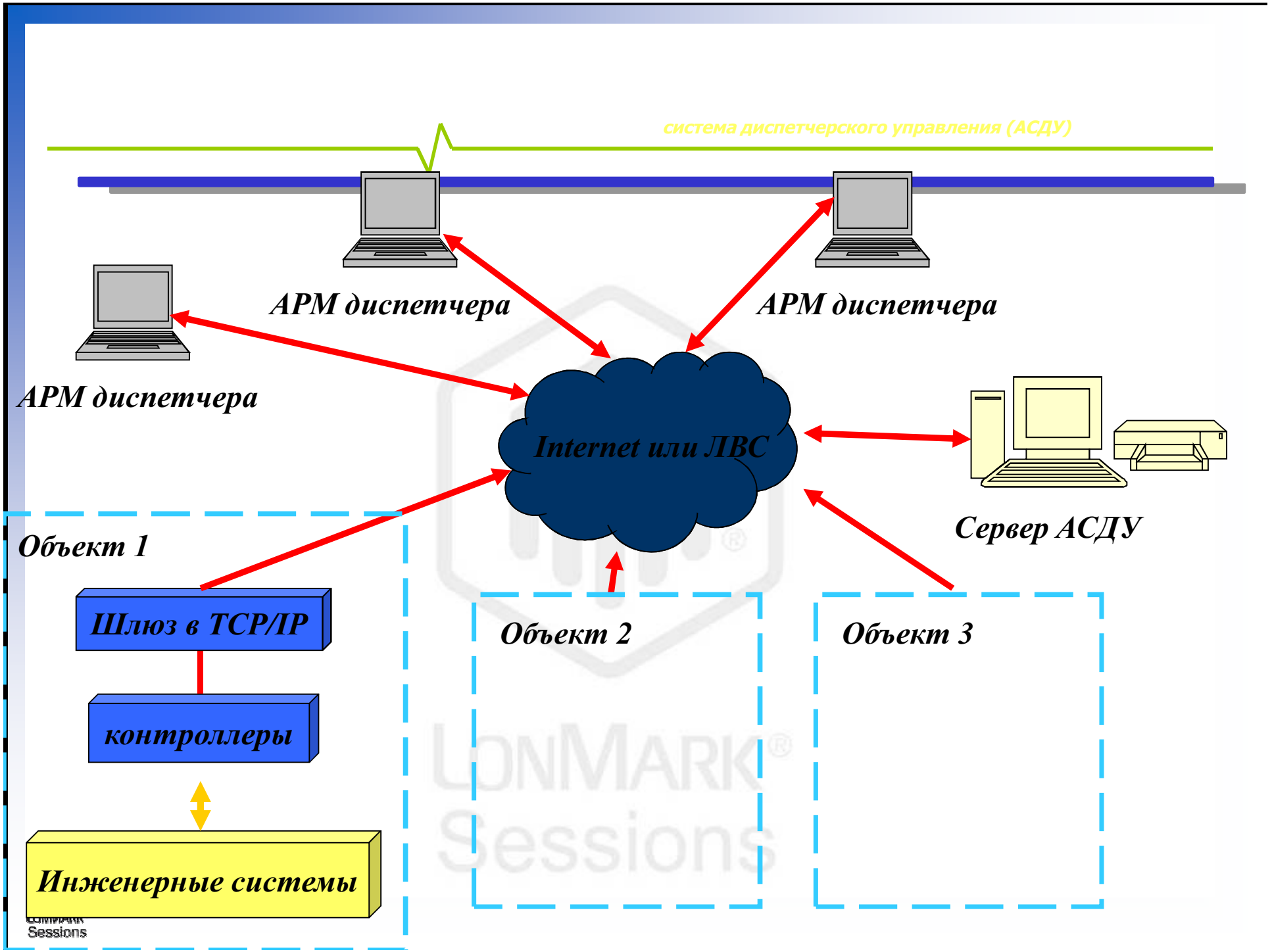

Пожарная станция . ESA (Lexel)
Infolon
PCD1
PCD4 (saia-burges)
Lonworks
EIB
ModBus
Powe
r
Logic
LonMark
Sessions

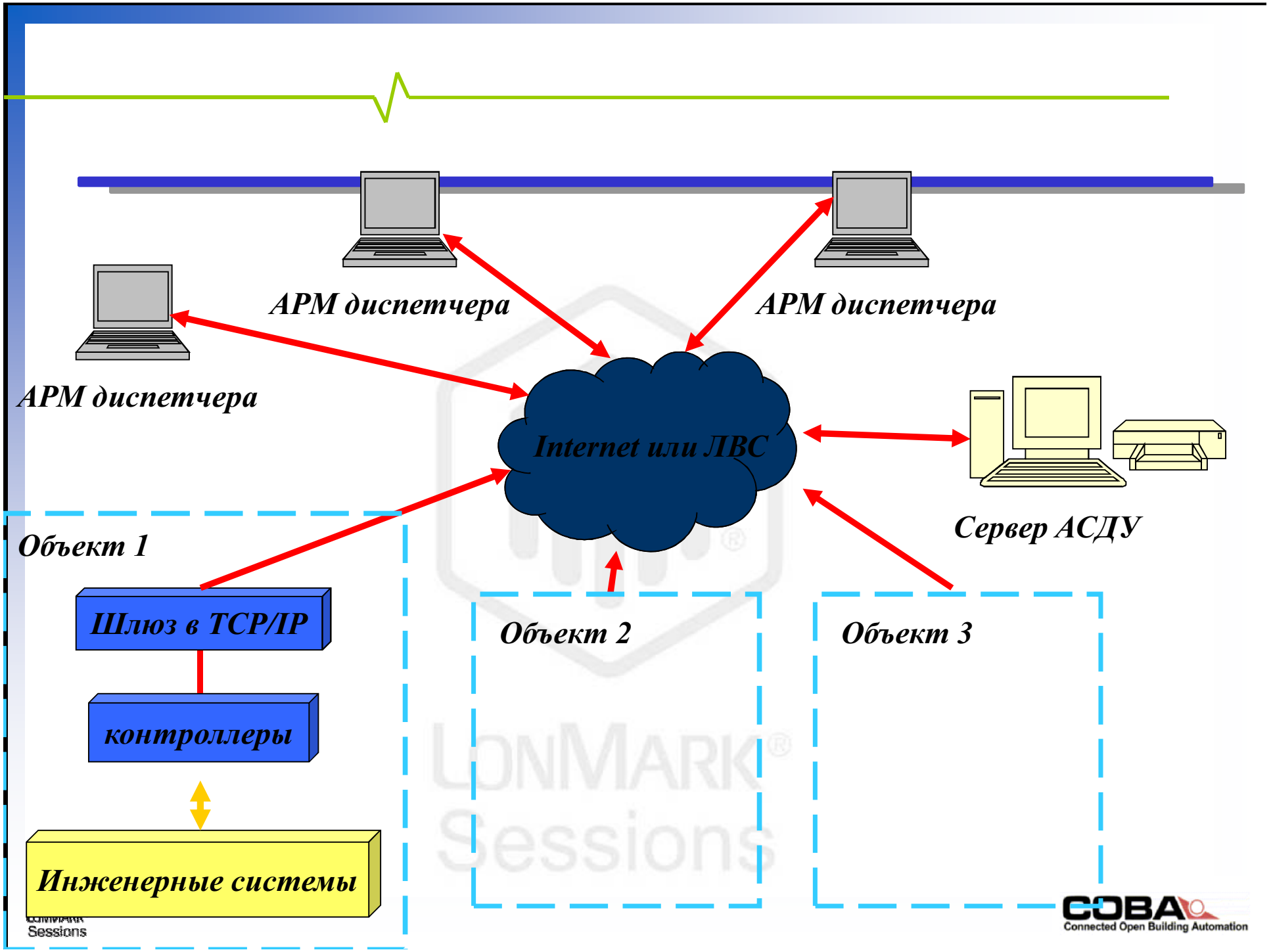
Пример построения комплексной системы офисного здани

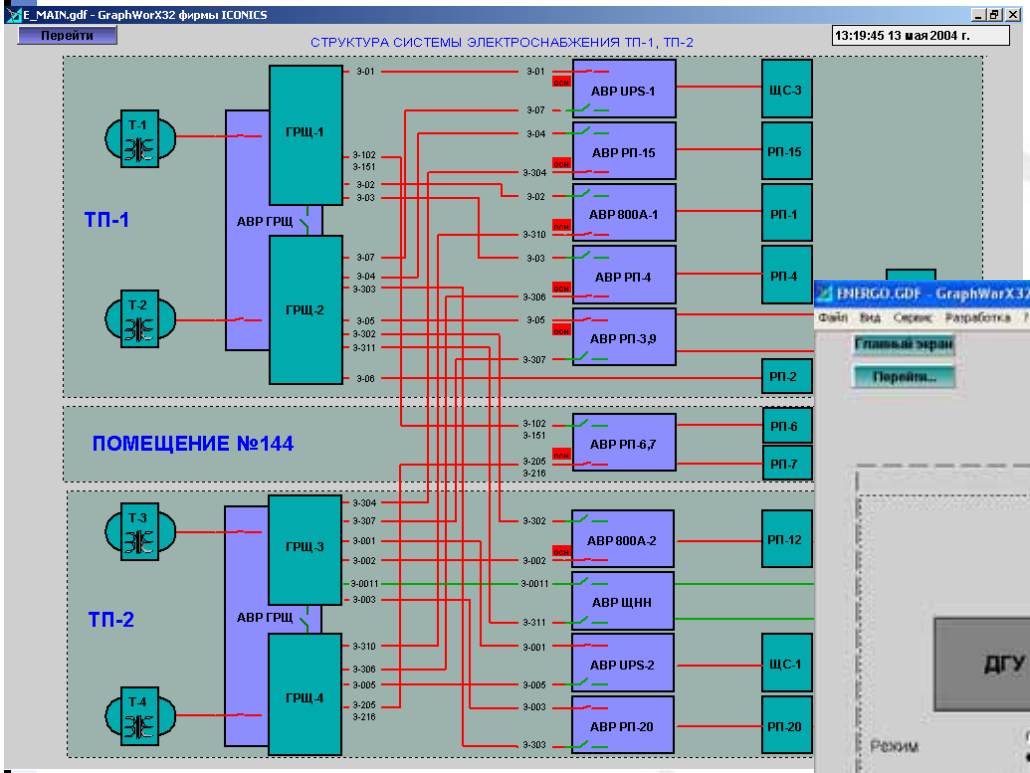


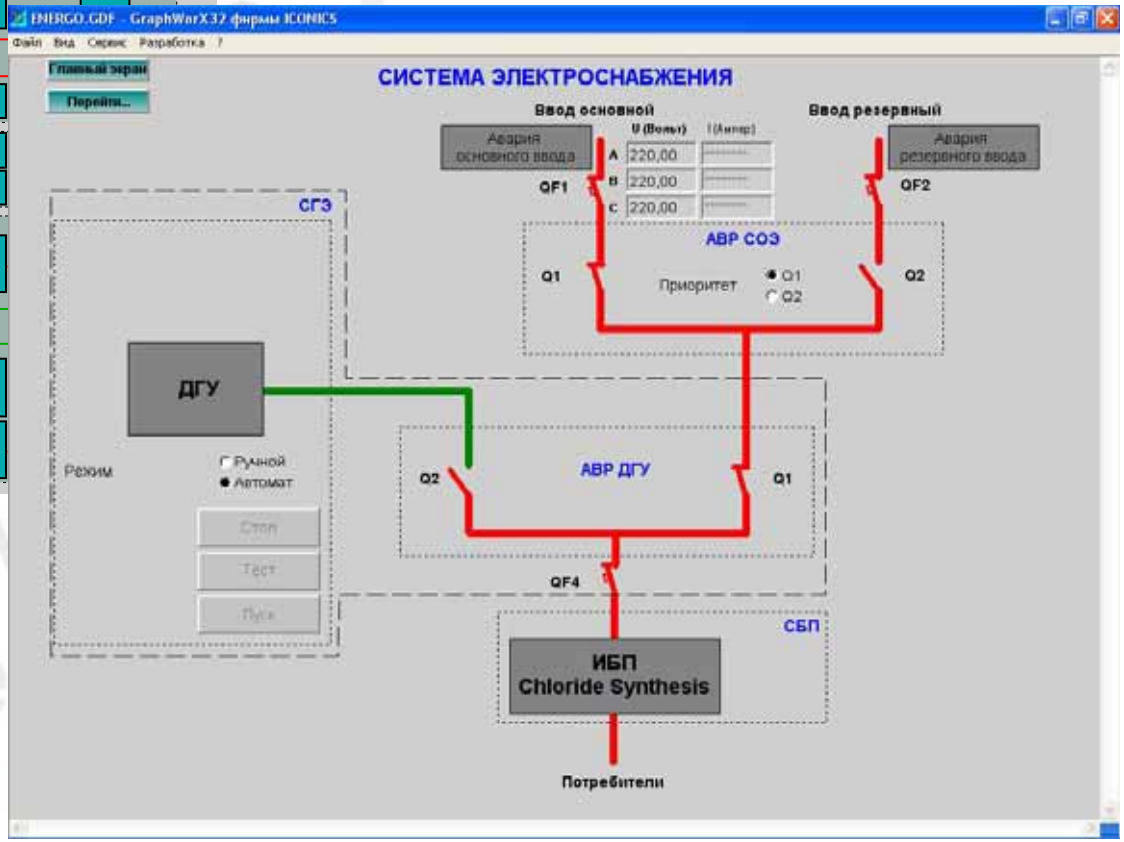
Пример построения комплексной системы офисного здани




система диспетчерского управления (АСДУ)
АРМ диспетчера
АРМ диспетчера
АРМ диспетчера
Internet или ЛВС
Сервер АСДУ
Объект 1
Шлюз в TCP/IP
контроллеры
Инженерные системы
Объект 2
Объект 3


АРМ диспетчера
АРМ диспетчера
АРМ диспетчера
Internet или ЛВС
Сервер АСДУ
Объект 1
Шлюз в TCP/IP
контроллеры
Инженерные системы
Объект 2
Объект 3
Connected Open Building Automation



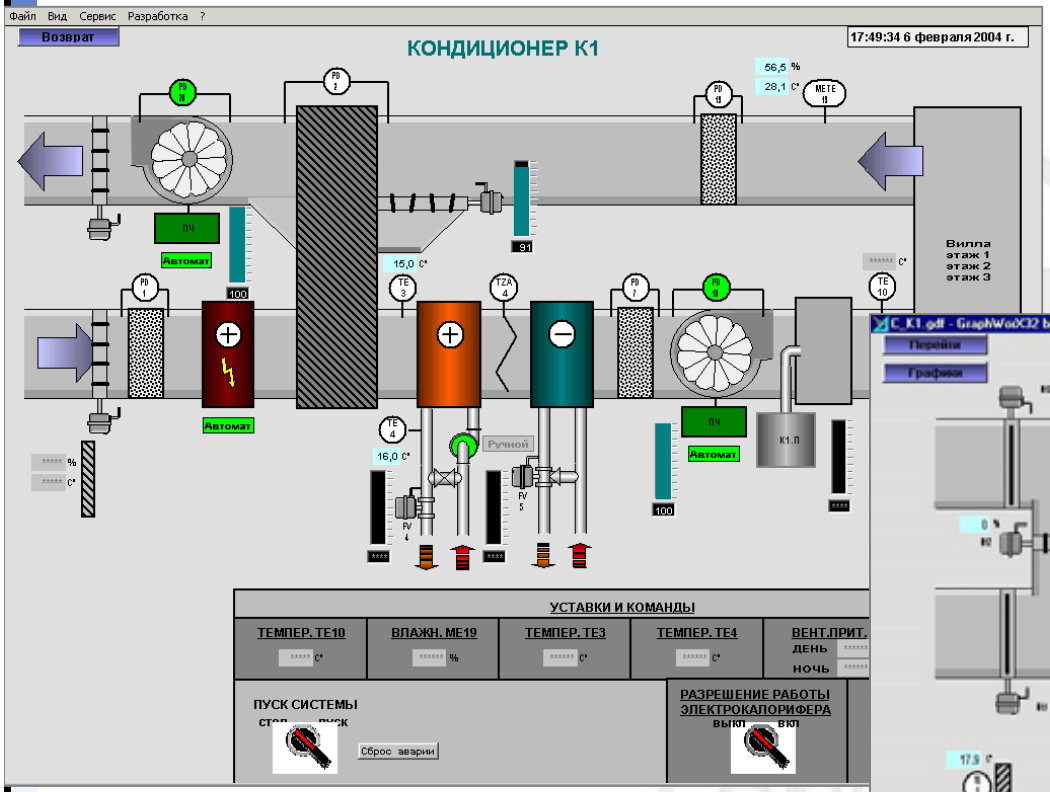


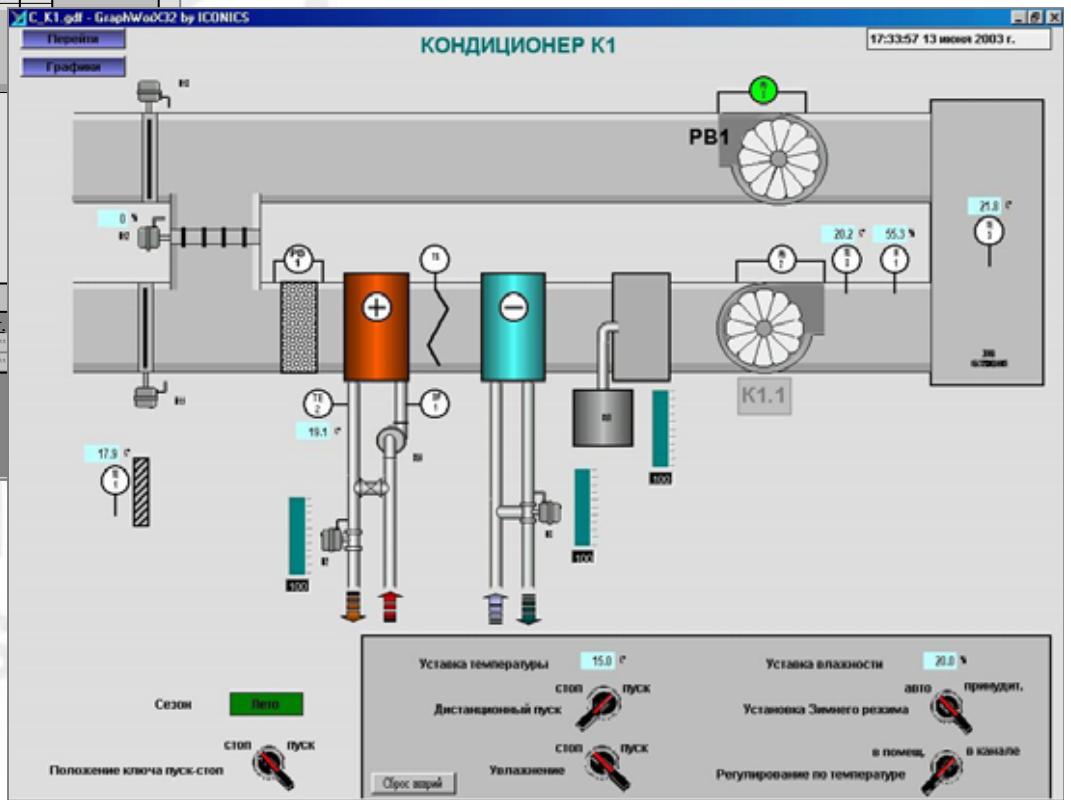
Наглядное отображ
системы электро
крупного офисн

Удаленный мониторинг
системы электроснабжения
загородного дома

LonMark Sessions

АСДУ: экран центрального кондиционера

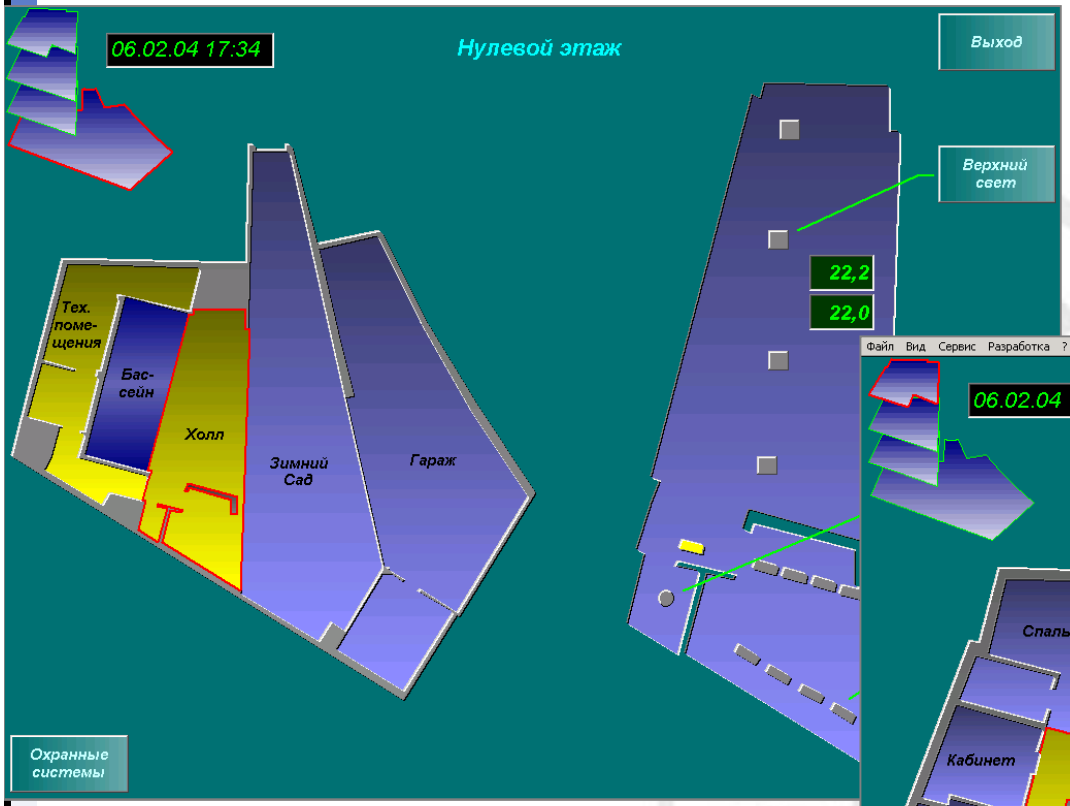




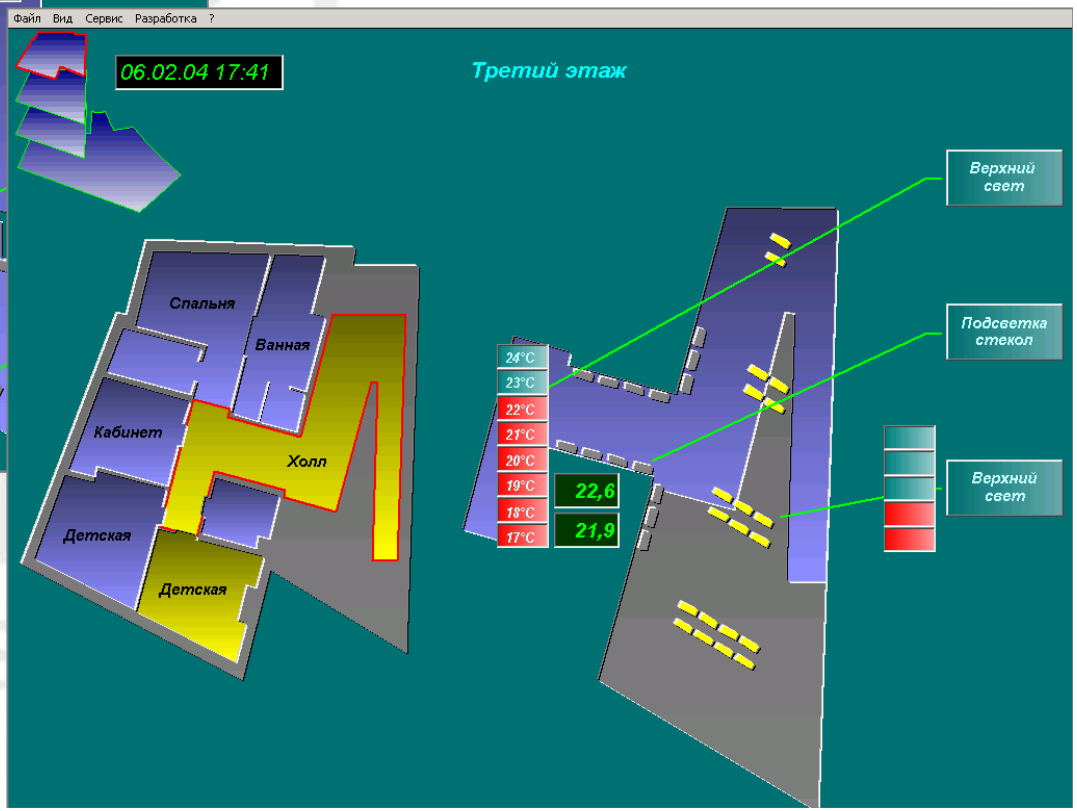
Отображени
рабо
и аварийны
на мнемосхеме

Анимация работы
всех узлов кондиционера
для обеспечения наглядности

LonMark® Sessions

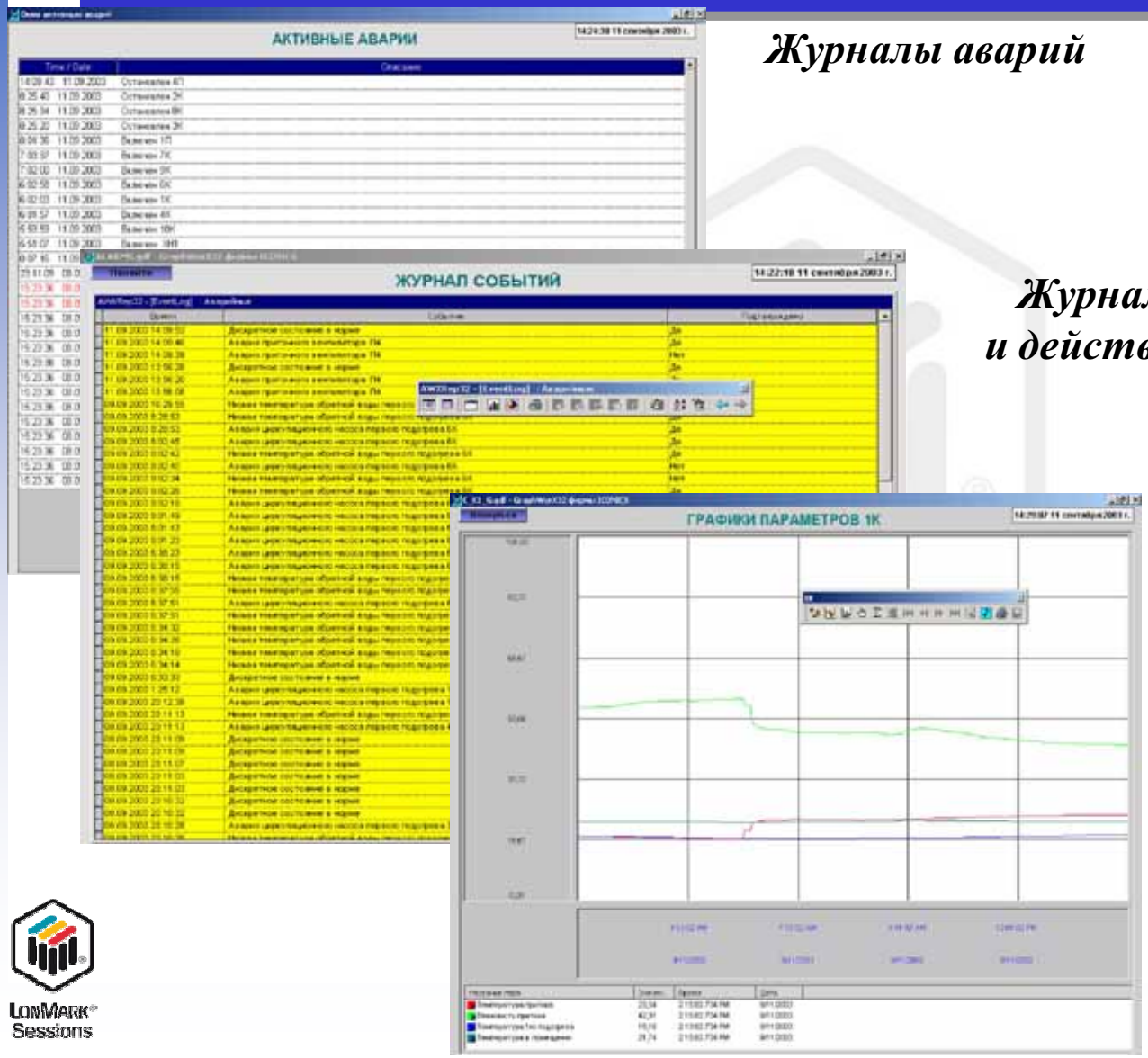


Отображение светильников и параметров микроклимата на планах дома



Интуитивно простое управление нажатием на экран

LonMark® Sessions



Журналы аварий

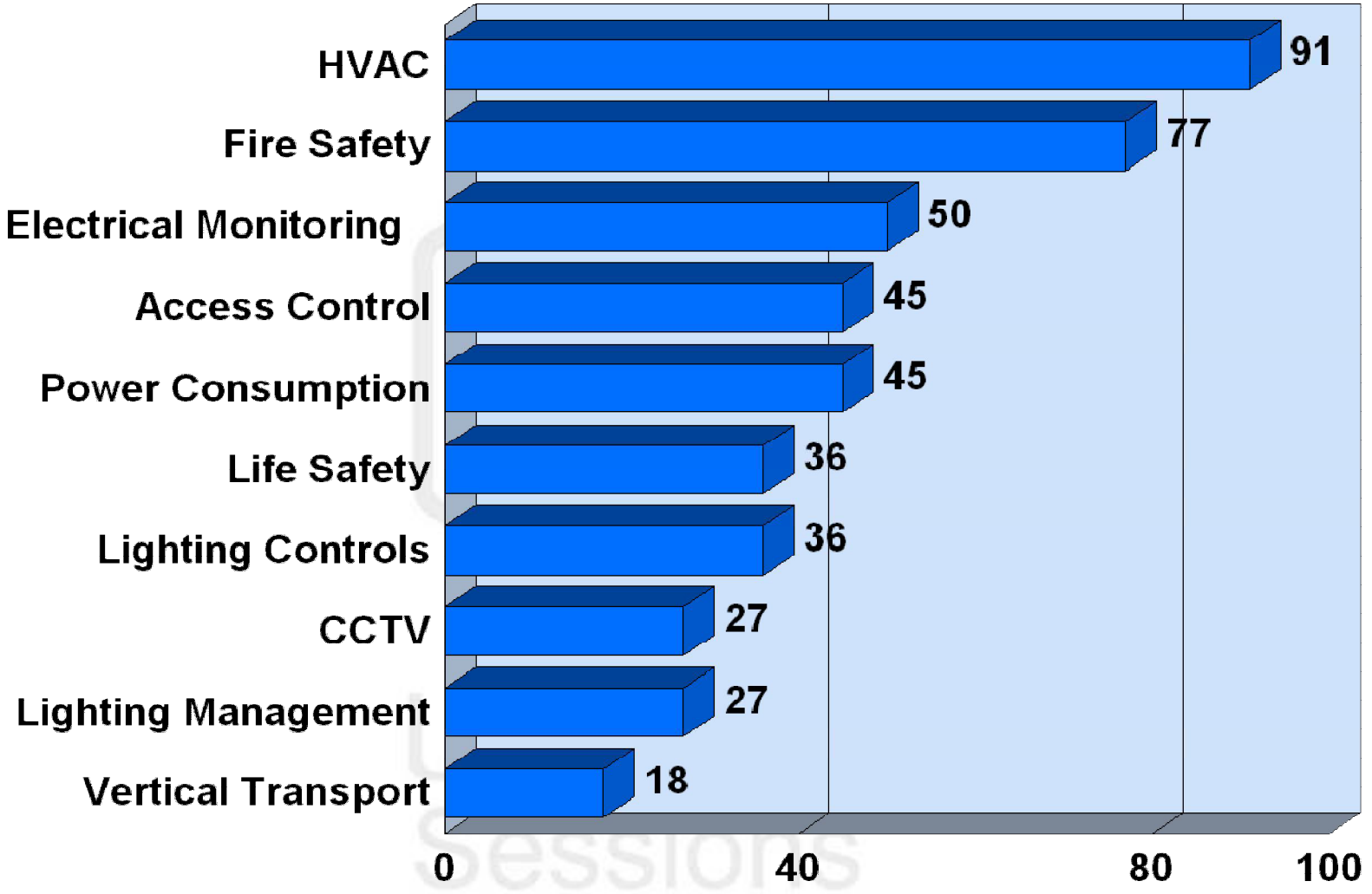
Журналы событий
и действий оператора

Графики процессов
в реальном времени

LonMark® Sessions

COBA
Connected Open Building Automation

Системы, наиболее часто интегрируемые с другими



LonMark Sessions

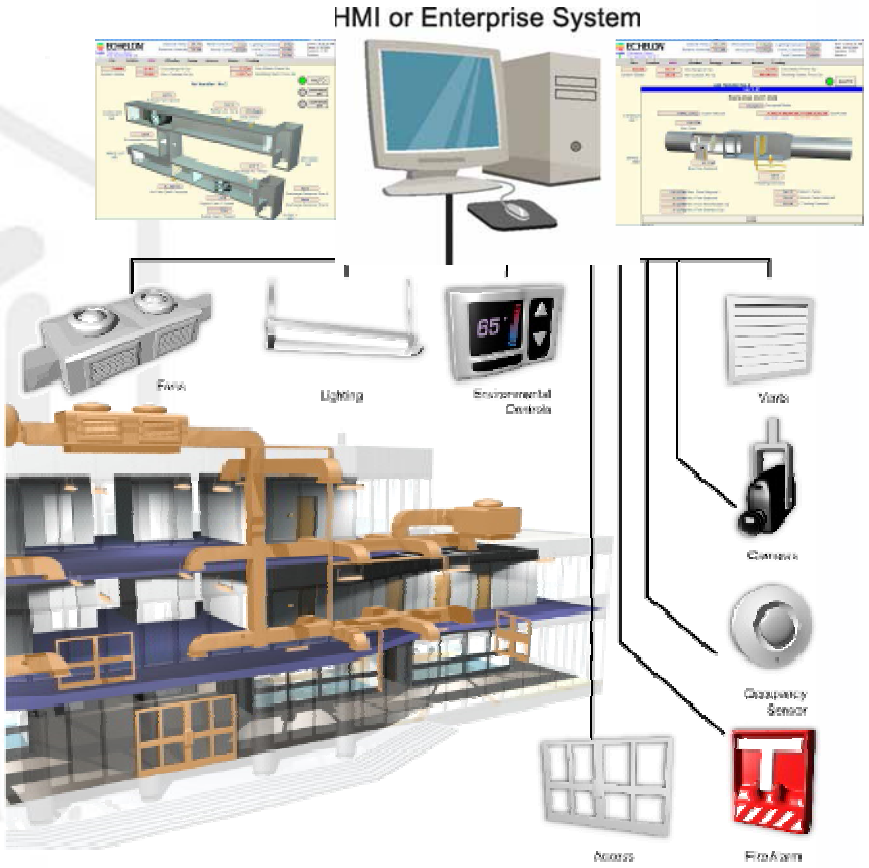
Source: U.S. Department of Energy

Тенденции рынка

- Преимущественный выбор отрытых систем в Промышленной Атоматике
- Ожидание лучшей энегоэффективности
- Возрастающие требования к интегрированности
- Снижение операционных расходов
- Больше отдачи, меньше затрат

Универсальность и независимость

- Выбор универсальных SCADA вместо протоколо-ориентированных
- Независимый выбор устройств
- свобода при построении распределенных приложений, выборе инструментальных средств
- Создание типовых алгоритмов для реализации



LON предоставляет широкий выбор продутов

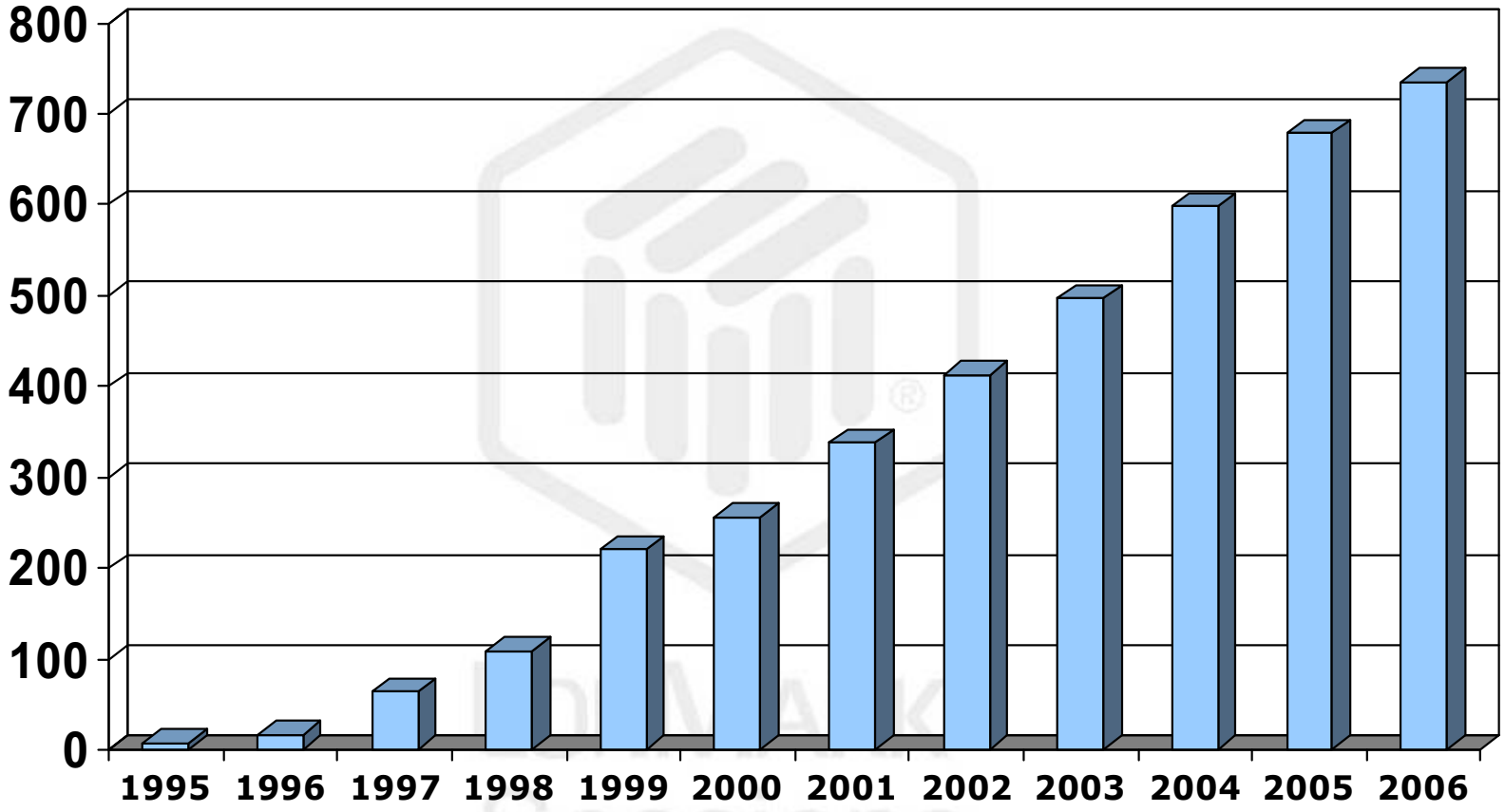
- Access Control - 71
- Actuators - 123
- Asset Management - 5
- Doors/Windows/Sun Blinds - 103
- HVAC - 282
- Hospital Equipment – 54
- Human Machine Interfaces - 95
- Life/Fire/Safety – 40
- Lighting Control – 337
- Network Infrastructure - 446
- Mechanical Devices - 47
- Motor control - 45
- Network Management - 55
- Plumbing & Irrigation - 12
- Power Management - 69
- Refrigeration - 46
- Security - 130
- Sensors - 168
- Software Applications - 79
- Wiring Devices - 58

LonMark Sessions

http://www.echelon.com/productdb/

Source: Echelon Corporation

LONMARK сертифицированные продукты



*includes certifications in process

LONMARK Sessions

HVAC (OBK)

PRODUCT	DESCRIPTION
ST-31-F/-31-P	Thermostat
EC-STAT	Thermostat
Model 1150-1250	Network temperature transmitters
PentaSens	Multifunction detector for room control
S-ADR112-F	2 UI's, 2 AI, 2 AO, 2 DIO, 3 relays
S-EC230-F	5AI, 4 AO, 7 DI, 7 DO
Model 200	Temperature/Relative humidity probe
FCX	LonWorks fan coil controller
AM24LON	18Nm Damper Actuator
GM24LON	36Nm Damper Actuator
AF24LON	15Nm Damper Actuator
NV24LON	1000N/800N Valve Actuator
NVF24LON	800N Retracting Valve Actuator
NVF24LON-E	800N Extending Valve Actuator
AV24LON	2000N Valve Actuator
NVS24LON	1200N Valve Actuator
AVS24LON	2000N Valve Actuator
UK24LON	Belimo MP-Bus to LON
Xenta 101/102-ES/103/104	Zone Controllers
Xenta 101-VF	3-Speen Fan Coil Controller
Xenta 102-AX VAV	Controller with Actuator and Airflow Transducer
Xenta 110-D	Dual Zone Controller
L-Combo	Temp and Humidity Sensor
100-07P	Thermostat
EC-FCU-L	Fan Coil Controller
EC-RTU-L	Roof Top Controller
EC-HPU-L	Heat Pump Controller
UHC-320	VAV Controller Single Duct
SCC-200-UVC	Unit Ventilator Controller
EC-VAV-L	VAV Controller

LonMark Sessions

Source: Engenuity Systems Inc.

Модули ввода-вывода

PRODUCT	DESCRIPTION
16DIO	16 channel DIO module
4DI4DOR/C	4 DI, 4 RO or 4 OC
Digital I/O Module	8/8 DIO module w/ RTC
8UI4DOR, T, C	12 channel general I/O
DI-04/02	4 DI module
DIFO-11/PDIO-11	11 channel Digital I/O module
FLEX/56	56 point analog and digital I/O
IMD-I8	8 DI module
LA-R10	4 RO module
LON I/O Module	4 DI, 2 RO module
LonPoint AI-10	2 AI module
LonPoint AO-10	2 AO module
LonPoint DI-10	4 DI module
LonPoint DIO-10	4 DO module
LonPoint DO-10	4 DO module
Nico 1108L	8 Ch Analog Output module
Nico 1208L	8 Ch Analog Input module
Nico 2108L	8 Ch Digital Output module
Nico 2208L	8 Ch Digital Input module
SW-80-F	8 channel switch input module
T-DIO-6	4 DI, 2 DO Valve controller
T-DIO-64	64 channel DIO module
T-DIO-8	8/11 channel DIO rack for G4/G5
T-I/O-2	2 ch A or D I/O rack for G4/G5
T-IO-8	8 channel I/O rack
T-OAC-8	8 AC DO module

PRODUCT	DESCRIPTION
MIO-ID4	4 DI module
MIO-ID8	8 DI module
MIO-OA2-OR2-IA4-ID4	2 AO's, 2 DO's, 4 AI's, & 4 DI's
MIO-OA2-OR2-IV2-IC2-ID8	2 AO's, 2 DO's, 4 AI's, & 8 DI's
MIO-OR10-ID4-OA2	2 AO's, 10 DO's, & 4 DI's
MIO-OR8-ID8-OA2	8 RO's, 2 10V AO's, & 8 DI's
Model 1400	Dual 4-20 mA network bridge
Model 2100	4 AI, 5 relay outputs
Model 2200	2 Channel Pulse Count Input Node
Model 2300	8 Channel Current Input Node
Module 311	Universal mixed I/O module
OMD-OR4	4 channel RO module
OMD-OR5-ID4	5 RO, 4 DI module
OMD-OT8	8 channel DIO module
RO-04/02	4 Relay Output module
S-AD81-F	8 channel universal I/O module
S-ADR112-F	2 UI's, 2 AI, 2 AO, 2 DI/O, 3 relays
S-D80-F/S-Di80-F	8 channel DIO module
S-Di100S-F	10 channel DIO module
S-EC230-F	5 AI, 2 AO, 7 DI, 7 DO
S-PID-20/22-F	Dual PID loop controller
S-TC80D-F	2 TCI's (type-k), 6 DI/O

LonMark® Sessions

Source: Engenuity Systems Inc.

Управление освещением

PRODUCT	DESCRIPTION
WNX-2624	8-72 relay lighting control panels
Lightpoint	Lighting system
SL-ARP-F	2 relay lighting controller
SL-ACPxx-xxxF	8-48 relay lighting control panel
PentaSens	Multifunction detector
LC2	2-Channel light controller module
DaliLon	LON infrared remote control system
HIWS4-2	4 Button Wall Switch
4404L	4 Channel Digital Dimmer
SIMLXTB	Touch Tablet Panel User Interface
Simplicity LX	LonWorks Lighting Panel
LX Switch	Programmable LonWorks Switch

LonMark Sessions

Source: Engenuity Systems Inc.

Датчики и измерители

PRODUCT	DESCRIPTION
TL-BOX	Light level & temperature
WD-2800	Water leakage detector
Model 1100/1200	Temperature/Humidity/Dew Point
Model 1150	Indoor Temp. Network Transmitter
Model 1300	Differential low pressure transmitter
Model 200	Temperature/Relative humidity probe
ECC-0XX	Strength, strain, LVDT, PT100 sensor
EV400LON	Passive infrared detector
ISD-LON	Smoke detector
Focus 1575	PIR detector
AC-101	Acoustic glass break detector
PentaSens	Multifunction detector for room contrc
WattNode	Energy management device
WattNode+	Energy management device
GM20 Series	Carbon dioxide transmitters
GMT220 Series	Industrial carbon dioxide transmitter
Model 1150/1250	Network transmitters
The Nose	Air Quality Monitor
WRF02I	Room Motion Sensor
FTK130	Humidity/Temp Sensor
MDS-L1	Occupancy-Lux Sensor
PR-243	Pressure Sensor
HU-226	Humidity Transducer w/ temp sensor
OMNI-DT	Adaptive Occupancy Sensor







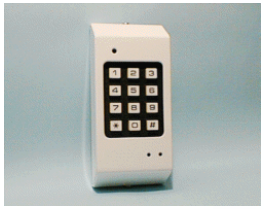


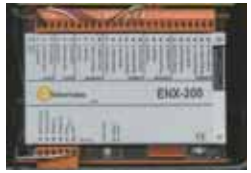


Source: Engenuity Systems Inc.

Охранная сигнализация и контроль доступа

PRODUCT	DESCRIPTION
ENX-200	Access control & security management system
3150020A1	Minipass Door Controller
Globe2000 System	Apice access control & security management system
DeCode	Standalone Keypad for door access in security systems
DINA DVR	Digital Video Recorder
TriSound	Multifunction siren
AC-101	Acoustic glass break detector
EV400LON	Passive infrared detector
Focus-1575	PIR detector
PentaSens	Multifunction detector for room control
Indala	Proximity Readers
Minipass	One Door Controller
WebPass	Web-based access control system
EC-ACC	Distech 2 door access controller



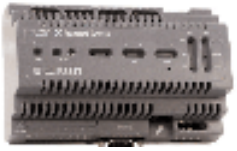


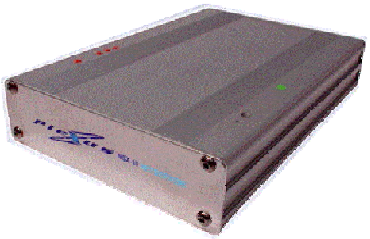
LonMark Sessions

Source: Engenuity Systems Inc.

Интернет-шлюзы

PRODUCT	DESCRIPTION
NSX	TCP/IP to LonWorks Web Server
i.LON 10	Ethernet Adaptor
i.LON 100	Internet Server
i.LON 600	IP Router
NCB/EL	Ethernet TCP/IP tunneling router
EasyLon Web Server	Java to LonWorks 'Software' Interface
GadgetNode	Programmable Internet Server
NSX-1000e	Embedded - LonWorks Web Server
NSX-1000	Net Server - LonWorks Web Server
L-IP	Ethernet Router



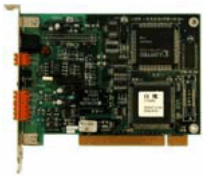


LonMark Sessions

Source: Engenuity Systems Inc.

Сетевые карты и адаптеры

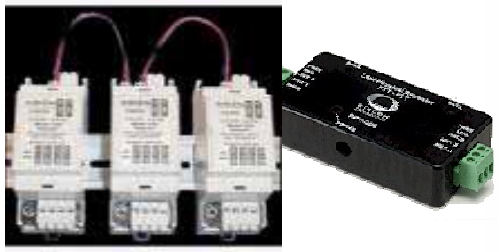
PRODUCT	DESCRIPTION
PCC-10	PCMCIA LonTalk Adaptor
SLTA-10	Serial LonTalk Adaptor
PCLTA-21	PCI LonTalk Adaptor
PC104-LTNI	PC104 network interface
STD-LTNI	STD network interface
VME-LTNI	VME network interface
SLM	Network interface with modem
LM-10	Serial network interface with modem
AMC	Fiber optic PMC interface
FPOD	Fiber optic pod for PCC-10
PC 104 Card	PC 104 to LON interface card
XLON Dongle	Adapter for printer port
XLON USB	Adapter for USB
XLON PC Card	Adaptor for PCMCIA
XLON PCI	Adapter for PCI bus
CNSRFPOD433	PCC-10 Card RF Pod
XLON PC104	Adapter for PC104
EasyLon USB	USB Interface
EasyLon PCI	PCI Interface
EasyLon PC104	PC104 Interface
EasyLon ISA	ISA Interface
i.Lon 10	Ethernet Adaptor
NIC709-PCI	High Speed EAI-709 Net Interface



Source: Engenuity Systems Inc.

Маршрутизаторы повторители

PRODUCT	DESCRIPTION
LonPoint Router	LonPoint router module
i.LON	Internet router and web server
FTR	Fiber optic router
L-Switch	Multiport switch
GadgetGateway	IP gateway, router, and packet monitor
NCB/IM/EM	Telephone line router
NCB/RF	RF router
NCB/AY	Serial link router
NCB/FL	Fiber optic router
NCB/IS	ISDN router
Model 110	FTT-10 repeater
RPT-200	FTT-10 repeater
LR-01	LonWorks based fiber repeater
LR-11	LonWorks based fiber router
11117/11118 LR-10	FTT10A/FTT10A or FTT10A/TP-1250 Routers
FTR-10	Multi-segment FTT-10A repeater
PTR-21/22	Power line router
RTX	LonWorks routers
RPT-FTT10	Multi-channel FTT10A repeater
RPT-TP/RS485	2-channel RS485 repeater
RTR	Universal router module
RTRCSMX-Boxed	Boxed SMX router
EasyLon Repeater	FTT-10 repeater
EasyLon Router	FTT-10, TP/F-78, TP/XF-1250
LNFR/S	FTT-10 to Fiber Repeater



LonMark Sessions

Source: Engenuity Systems Inc.

Шлюзы

PRODUCT	DESCRIPTION
FS Bridge	Communications Bridge
FS LonWorks Bridge	LonWorks Communication Bridge
FS Scanner	LonWorks Scanner
Z-COM	RS232 Serial Gateway
11080 SG-10	Serial Gateway
11107, 11103, 11143 IRAC	Remote Access Communicators
IFM-RS232	RS232 Interface
XLON LSG	LonWorks Serial Gateway
Serial Gateway	Configurable Serial Gateway with LNS Plug-in
MBG 2000	Modbus Gateway
PSG/3 TP-1250	Programmable Serial Gateway
PSG/3 RS485	Programmable Serial Gateway
PSG-20	Serial Gateway Core Module
PL-PSG	Programmable PL Serial Gateway

LonMark Sessions

Source: Engenuity Systems Inc.

LONWORKS кабель

22 AWG Conductors, Unshielded Non Plenum CM Rated
W221P-1002 22/1Pr. Gray Jacket
W222P-1004 22/2Pr. Gray Jacket

22 AWG Conductors, Unshielded Plenum CMP Rated
W221P-2001 22/1Pr. Lt. Blue Jacket
W222P-2003 22/2Pr. Lt. Blue Jacket

22 AWG Conductors, Shielded Non Plenum CM Rated
W221P-1003 22/1Pr. Gray Jacket
W222P-1005 22/2Pr. Gray Jacket

22 AWG Conductors, Shielded Plenum CMP Rated
W221P-2002 22/1Pr. Lt. Blue Jacket
W222P-2004 22/2Pr. Lt. Blue Jacket

Composite Control/Power Cable Non-Plenum
W22162P-1820 22/1Pr., 16/1Pr. Gray Jacket
J-Y-(St)-Y-2x2x0.8 КПСВЭВ 2x2x0,75

LonMark® Sessions

Source: Engenuity Systems Inc.

Стыковка с существующими ротоколами

- **Drivers/Protocol Support:**
  - Allen Bradley DF 1, DH+, Ethernet
  - BACnet-Serial, ArcNet, Ethernet Dedicated, TCP/IP
  - Honeywell Link
  - LonWorks
  - Metasys DX9100, N2
  - Modbus ASCII
  - Modbus Plus, RTU, TCP/IP
  - Notifier-AFP200/300/400/600
  - Notifier-INA
  - Notifier-1010/2020
  - OPC
  - SGS Ethernet
  - Siemens Cerberus MXL Telnet
  - DDE
  - YorkTalk
  - Weightronics

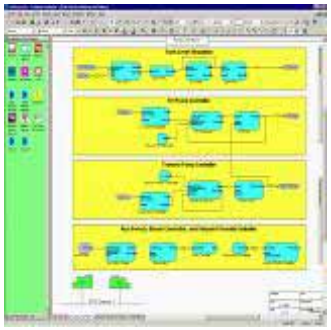
- **Interoperability**
  - Liebert
  - TeKAire
  - Wonderware
  - Intellution
  - Trane
  - Alerton
  - Andover Controls
  - Johnson Controls
  - Honeywell
  - Automated Logic
  - Simplex
  - Notifier
  - EST
  - Square D
  - Siemens
  - Echelon
  - York

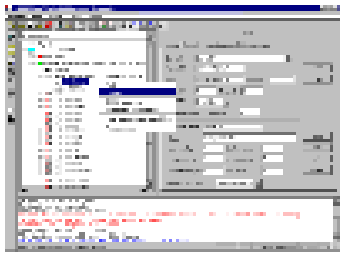
LonMark Sessions

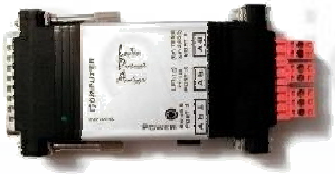
Source: Engenuity Systems Inc.

Средства разработки и пуско-наладки

PRODUCT	DESCRIPTION
LonMaker	Network management tool
NLFacilities	Graphical Network installation and management
Network Integrator 3	Network Installation tool
NL220	LNS compliant network manager tool
NLUTIL	Node Utility software
LPA	Protocol analyzer
Model 33100	Protocol analyzer
ALTO	Design tool for projecting and installing
Altogop	Wall-mounted panel with graphical display
Altohandheld	Handheld RS232 OP panel with graphical display
11081 Handheld	Handheld network terminal
TERM-FT-10	Network bus terminator
TG-10	Traffic Generator
ACC-BT	Network terminator
Model 25	Low voltage AC/DC power supply
Model 30	Low voltage Isolator/Regulator



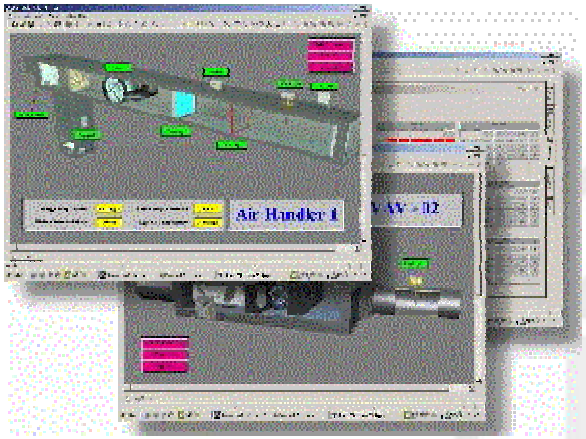


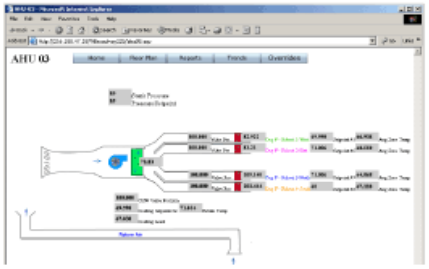


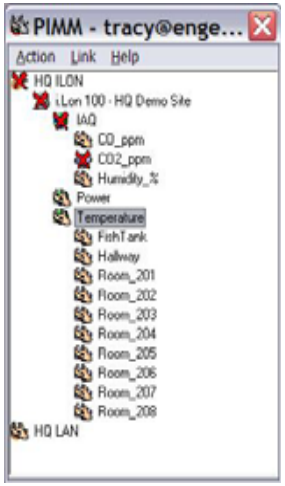
LonMark® Sessions

Source: Engenuity Systems Inc.

АСУТП (SCADA)







PRODUCT	DESCRIPTION
DotVision	Web Graphical Interface
i.Vue 100	Real-Time Monitoring Package
Inet Supervisor	Webpage Development Tool
OSS 2000	Visual Interface Software
Osmosis PIMM™	User Friendly Monitoring tool
Hosted Controls™	Web-based front-end and control applications

LonMark® Sessions

Source: Engenuity Systems Inc.

Интерфейсные панели

PRODUCT	DESCRIPTION
Infodisplay	Information display
LDX	Local user interface
ViewBox	General LCD display
XLON PC	Terminal with LonTalk Adapter
EC-Display	Multi-Function LCD Display
LN-DSP	Wall Mount Display Panel
L-Vis	LCD User Interface









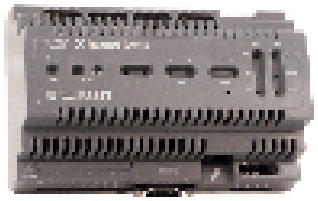


LonMark® Sessions

Source: Engenuity Systems Inc.

Планировщики

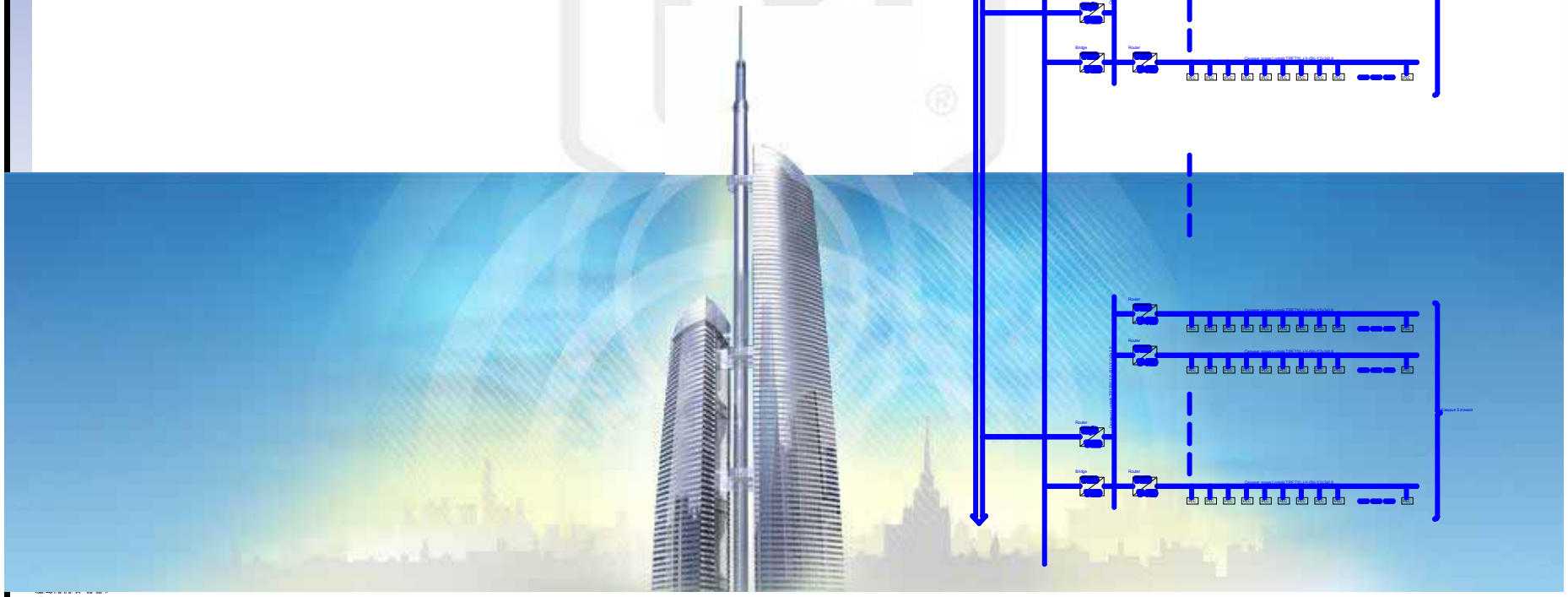
PRODUCT	DESCRIPTION
i.Lon 100	Ethernet Interface
SC-2000P-F	Multifunction Network Scheduler
LN-SCH-MZE	Multi-Zone Event Scheduler Module
LN-SCH-MZ/CAL	Multi-Zone Scheduler Module
LN-SCH-MZE-OPT	Multi-Zone Event Scheduler w/ Optimum Start/Stop
11121 SL-10	Network scheduler
110-03	Scheduler w/Display

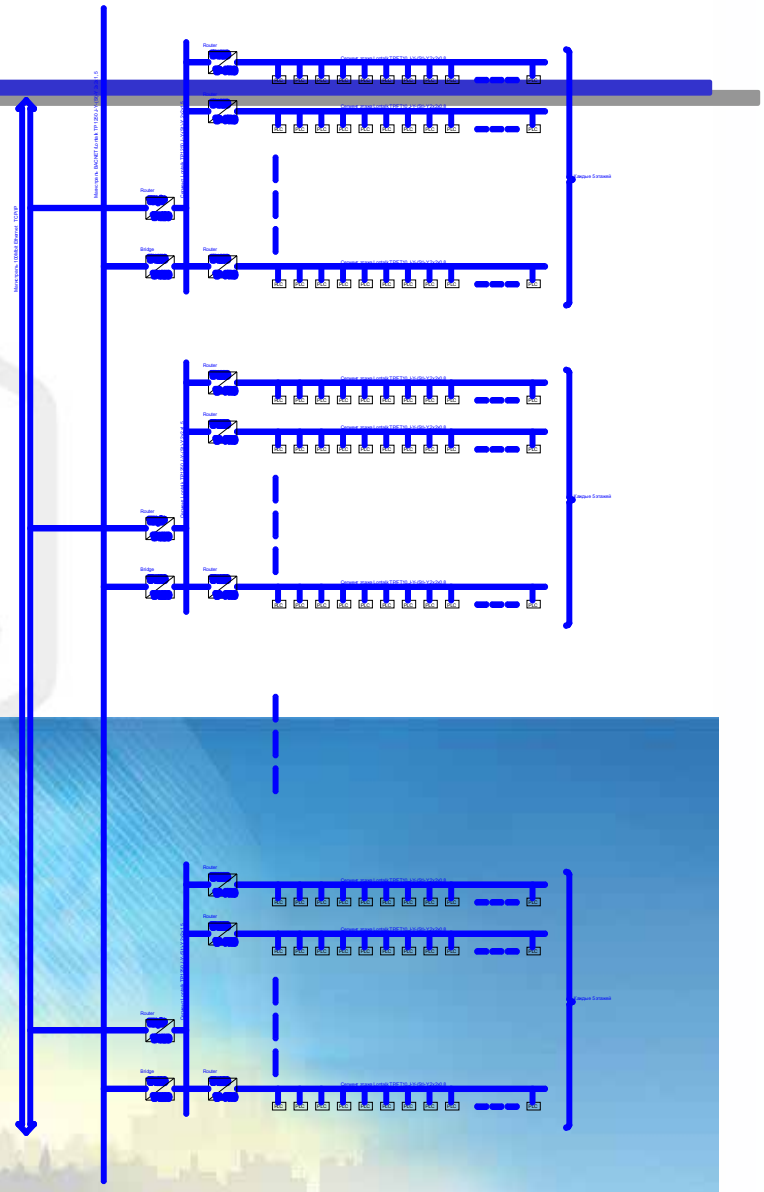


LonMark Sessions

Source: Engenuity Systems Inc.

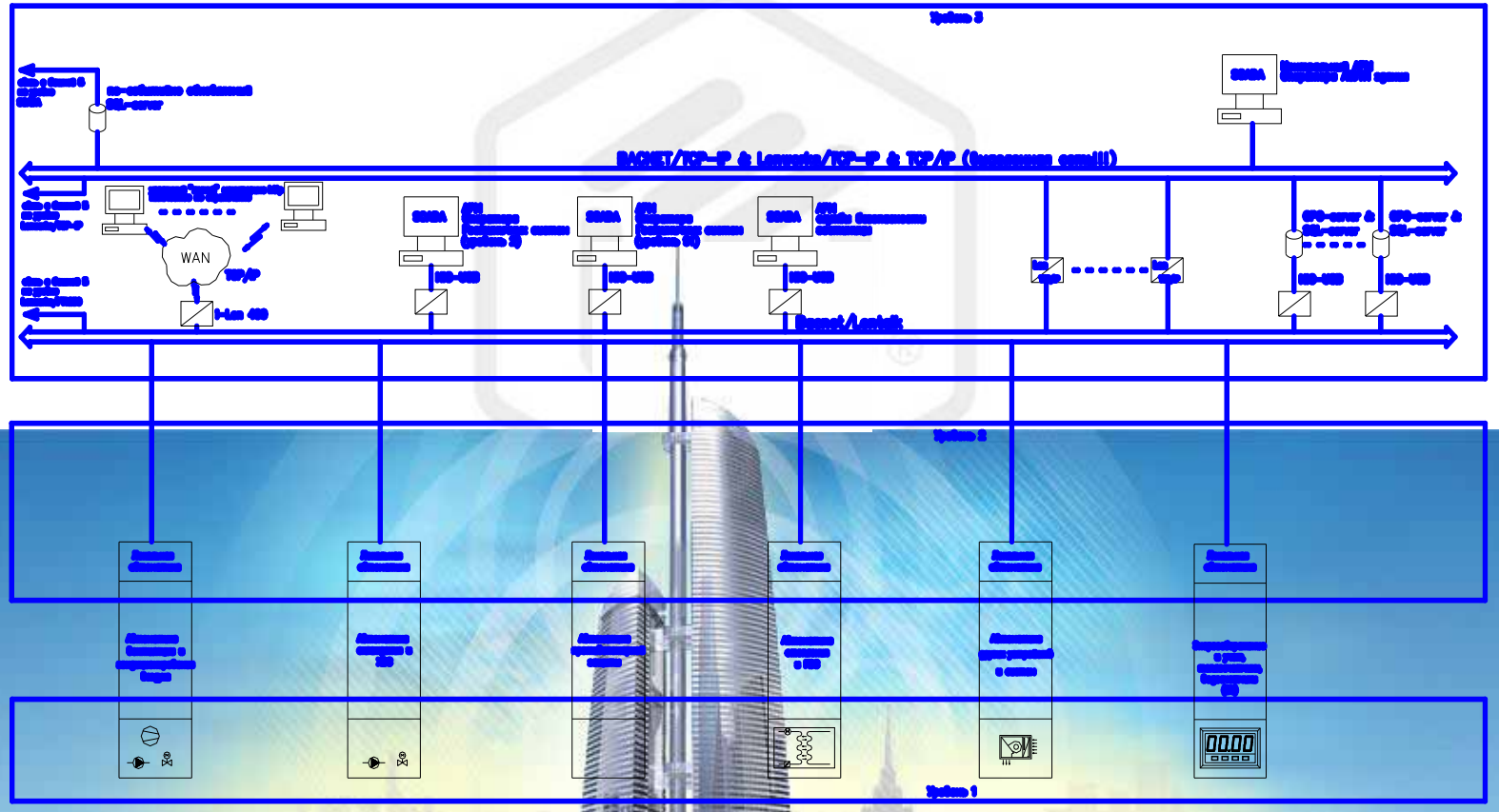
- Примеры технических решений для крупных объектов





Примеры технических решений для крупных объектов

Общая структурная схема построения сети АСУП башни А комплекса "Федерация"



Connolly Middle School – Tempe, Arizona

- 184,034 sq ft - 6 separate buildings
- Retrofit of an « aged, pieced-together mechanical system »

- 650 points : 112 Distech Controls configurable controllers
  - Central plant control
  - AHU Control
  - 85 VAV Controls
  - Rooftop Unit control
  - BTU Meters

- Distech Controls' Lonwatcher: LNS based tool for network management
- User interface – Web browser access using i.LON 100 as primary means of access including scheduling, trending, alarm

- Open system
- Web accessibility
- Centralized control and monitoring of all buildings
- Improved comfort
- LNS based plug-ins allowed for custom configuration of sequences
- Energy savings for the first 6 months was over $58,000, a 34% reduction of historical costs
- **Won Governor's Energy Award**

Complete case study: http://www.distech-controls.com

1120 Vermont Avenue, NW Building Washington, DC

- 500,000 square foot, 12-story building
- Complete renovation, phased approach
- Wanted to move to an open system and required greater reliability and better response to tenants' needs

- 700 custom programmable controllers (Distech Controls) providing in excess of 8500 points of control:
  - Chillers
  - Pumps
  - cooling towers
  - boilers
  - generators
  - FCUs, VAVs and AHUs.

- Distech Controls' Lonwatcher LNS tool for network engineering, database management and archiving of logs and histories.
- Web server to monitor global activity

- Open System
- Web connectivity for monitoring and remote connectivity
- Programmable controllers allow complete customization of functionality and operation
- **Annual energy consumption savings of $500,000.**

LonMark Sessions

Complete case study: http://www.distech-controls.com

Quebec Biotechnology Innovation Center
Laval, Quebec, Canada

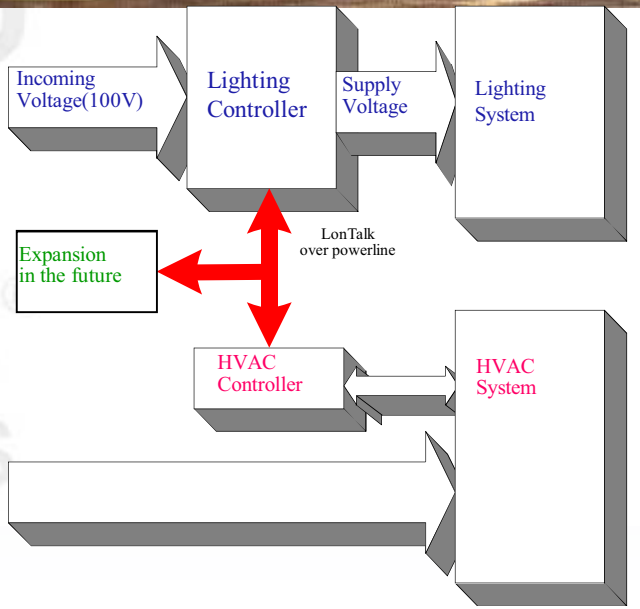
- 27,000 sq ft – new construction including office spaces, labs, clean rooms
- Centralized system to manage all sub-systems
  - HVAC
  - laboratory equipment
  - lighting
- And the custom requirements for each space - clean rooms, labs and office spaces
- 90 custom programmable controllers – Distech Controls
- Automation of lighting controls
- Distech Controls' Lonwatcher for LNS network management and Londisplay, LNS GUI

- Open System
  - Interoperability amongst sub-systems
- Allowed best-of-breed selection of components and controls
- Flexibility of the system allows for simple and quick modification as interior arrangements are modified and new tenants move in
- High precision control strategy, managing sensitive mechanical/electrical equipment while achieving high energy efficiency

Complete case study: http://www.distech-controls.com

7 Eleven Stores in Japan

- Power line network controls lighting and HVAC
- Installed in over 7,300 stores
- Benefits
  - 10% energy reduction per store
  - 30% reduction in development costs



Roppongi Hills - Japan

OVERVIEW:

- World's largest stand-alone LONWORKS enabled building project with 759,100 m^2
- Four zones, 13 Buildings
  - Mori Tower; Four residential towers

SOLUTION:

- 16,500 LONWORKS devices primarily HVAC&R
- Over 170,000 points monitored
- Over 20% savings in energy costs over projection
- LONWORKS/IP integration using *i*.LON® servers
- Mori Building general developer/operator
  - Urban developer operating more than a hundred buildings
  - Extensive use of LONWORKS planned for world's tallest building – Shanghai World Financial Center

LONMARK® Sessions

NTT DATA Shinagawa Building

OVERVIEW:

- 3,459.07㎡ with 29 floors with three sub floors
- Mixed use facilities
  - Offices
  - Restaurants
  - Retail stores
  - Branch shops
  - Conference facilities

SOLUTION:

- IP Backbone
- Integrated BMS, CCTV, access control
- VOIP Communications
- LONWORKS open architecture

Singapore Management University

OVERVIEW:

- Installed state-of-the-art Intelligent Building Management System (IBMS)
- Multiple buildings
  - Class rooms
  - Dormitories
  - Offices
  - Restaurants
  - Conference facilities

SOLUTION:

- Integrated HVAC, lighting, access control, hot water
- Project 20% energy savings
- IP backbone
- LONWORKS open architecture

Pfizer Pharmaceuticals

OVERVIEW:

- 37,000m2, four story Pfizer pharmaceutical research laboratory in Sandwich R&D facility
- Arup & Partners were appointed by Pfizer Ltd to provide the engineering design services for the new building

SOLUTION:

- Uses open LONMARK solution for BMS for monitoring, metering, operational and supervisory control, trending, alarm handling and web browser functions.
- 2435 LONWORKS devices from over 15 different vendors
- Connected on over 60+ sub nets, backed by dual redundant IP network.
- 51,475 total points monitored

KfW Building - Germany

- Utilizes latest energy-saving technologies for an optimum indoor climate and minimum energy costs.
- The Benefits
  - Energy savings up to 70%
  - Optimum indoor climate
  - Flexibility for future changes
- Products used in this project
  - Xenta 300 and Xenta® 400 Controllers – TAC AB (LONMARK Certified Product)
  - Xenta 511Webserver (LONMARK Certified Product)
  - Gebrueder Trox Fire smoke damper actuator (LONMARK Certified Product)
  - Danfoss Variable speed motor drive (LONMARK Certified Product)
  - WAREMA electronic GmbH Sunblind Control (LONMARK Certified Product)
  - Multiport Router L-Switch – LOYTEC GmbH
  - Gateway weather station – SVEA Building Control Systems GmbH
  - i.LONTM1000 – Echelon Corporation

LonMark® Sessions

Deutsche Post - Germany

- This impressive 41 floor architectural showcase houses 2,000 people in over 1,520 offices

- The Benefits
  - Maximum user comfort and control
  - Future proof design
  - Energy efficient solution

- Products used in this project:
  - Single room controller LCS-420- SysMik GmbH
  - LON Control Panel BT-121-Svea Building Control Systems GmbH
  - Temperature Controller ecolon– Sauter AG
  - External Venetian blinds and motor control unit LON-MSE4 M230 I - WAREMA Renkhoff GmbH

Coeur Defense Complex - France

- Building required a flexible, high tech, and open solution for its control-networking needs

- The Benefits
  - Cost-reductions
  - Flexibility
  - Easy changes and upgrades
- Products used in this project:
  - Desigo RXC21.1 fan-coil regulators – Siemens BT - Landis & Staefa Division
  - LRC 5048 8-way lighting controllers – Philips
  - 120 routers and 22 LNS servers - Echelon Corporation

Dusseldorf Airport

- The new 231,000m² Terminal B, opened in 2002 accommodates over 22 million passengers a year
- The Benefits
  - Increased safety
  - Passenger comfort
- Products used in this project:
  - Excel 10 controllers – Honeywell (LonMark Certified Product)
  - Q7015C (LION C) universal module – Honeywell (LonMark Certified Product)
  - Excel 5000 plant controller – Honeywell
  - Fire damper modules (partially equipped with smoke detectors) – Gebrueder Trox
  - LONWORKS System Components
  - LNS® Network Operating System

LonMark® Sessions

NASA

- Scope
  - Kennedy Space Center - Florida
  - Upgrades to existing control systems – built in the 70s
  - Multi-year, multi-phase project
  - Need open system bidding process
- The Spec
  - Calls for LNS, LONMARK, and IT connectivity into existing SCADA front end
- Status
  - Several projects underway using spec
  - Multiple bidders winning jobs

NYC Schools

- Scope
  - 1200 buildings
  - Upgrades to existing pneumatic systems
- The Spec
  - Has two components
    - Building level
    - Enterprise connectivity
  - Bidders on the buildings cannot bid on the enterprise and vise versa
- Specs released in January 2004
  - Multiple buildings bid and won by multiple controls contractors
  - Master Systems Integrator (MSI) contract awarded

State of Louisiana

- Scope
  - Open Systems with LONWORKS for all State buildings – Police, City, Universities, etc.
  - Open to competition
  - 100s of buildings
- Status
  - Multiple buildings already bid, won and installed
  - Many more in the works
- Issues
  - Original spec developed 3-4 years ago
  - Finger pointing on Enterprise Integration “not part of original scope of work”
  - Contract specifics required to define scope of integration work – looking at a two tier spec – Building and Integration
  - Importance of a good specification

Jacksonville, FL Airport

- Complete HVAC system retrofit using LONMARK certified devices
  - Over 500 nodes in this fully open system
  - York Chillers
  - TAC VAV boxes
  - ABB Variable Speed Drives
  - Square D Variable Speed Drives
  - Onicon Sensors
  - Echelon Routers, PC Interface, infrastructure
  - TAC Vista Web Station front end

Morton Plant Hospital

- 100 year old hospital with 687 beds
  - 25 Surgery suites
  - 22 buildings
- Started LONWORKS retrofit in 2002
- Over 2000 LONWORKS devices installed, integrating
  - Lighting
  - Security-Card Access
  - CCTV
  - Asset Management
  - Baby Tracking
  - Energy Monitoring
  - Isolation Room Monitoring
  - VFD Reports
  - Maintenance Tracking
  - include 455 more nodes this year alone
- Ethernet backbone using i.LONs
- Seamless integration with Legacy system

Philips Normandial - France

Overview:

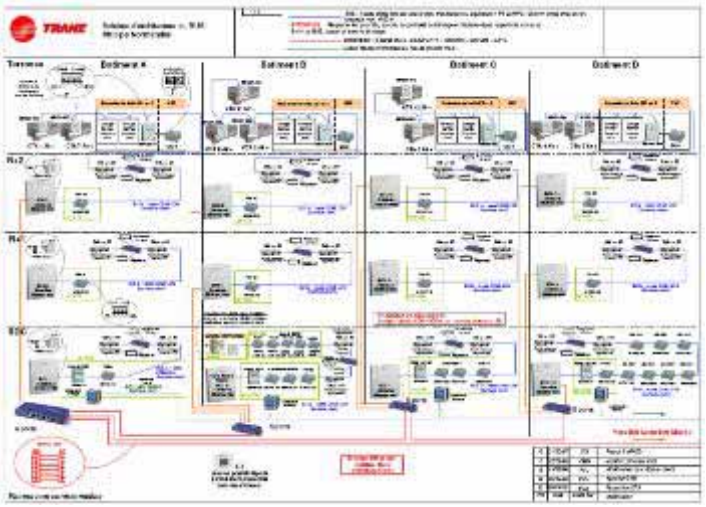
- 6 buildings (17 000 m^2) on "Normandie Technologies" Campus.
- Mixed use facilities
  - Offices
  - Laboratories
  - Restaurant
- HVAC : 10 Chillers, 12 AHU's, 6 CCU's, 1000 Fancoils
- Power, Lighting, Safety.

Customer needs:

- One single BMS, integrating all systems,
- Open Solution,
- Multiple HVAC vendors :
  - AHU's & Fancoils : Trane
  - Chillers : Carrier,
  - CCU's : Jupiter,

Solution:

- Tracer Summit BMS Workstations
- 14 BCU's on IP Backbone
- LONMARK certified controllers ZN523, MP 581, MP501/503
- Seamless integration of all vendors on the same LON network



LONMARK Sessions

Unitech - India

Overview:

- 5 buildings (80 000 m²) in different locations.
- Offices rented to various IT based companies
- HVAC : Chillers, AHU's, VAV Boxes.
- 2500 I/O : Power, UPS, Plumbing, Firefighting, Lifts, DG…

Customer needs:

- Flexibility
- Peer-to-peer communications
- Open technologies,
- Many remote I/O's … How to :
  - Reduce wiring costs ?
  - Enable automated sequences ?
  - Maintain flexibility & reprogramming ?
  - Maintain high speed communication ?

Solution:

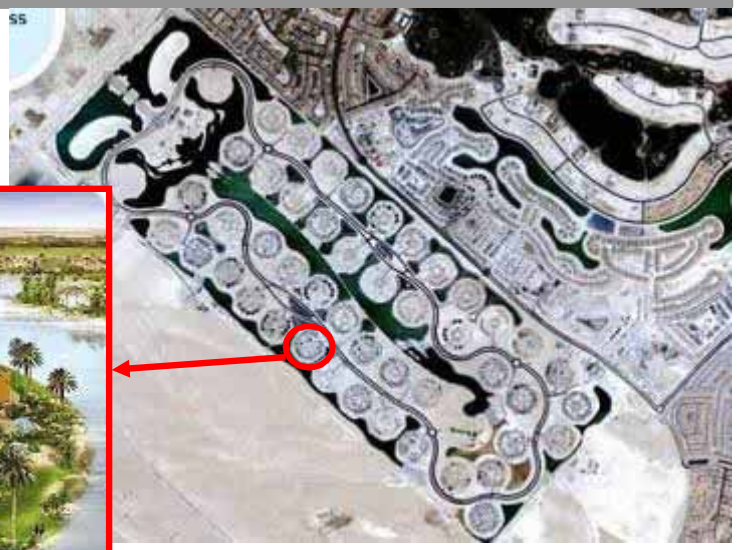
- LON was the preferred technical solution :
  - Enable flexibility thru easy reconfiguration
  - Bindings technology allows for tying many remote I/O's in logical sequences, with reduced wiring costs
  - Open & evolutive
- BCU's on IP Backbone
- LONMARK MP 581, MP501/503
- Seamless integration

LONMARK Sessions

Jumeirah Islands - UAE

Overview:

- District cooling for 1000 villas.
  Cooling capacity = 5 750 tons.
- Residential
- HVAC : Chillers
- Power

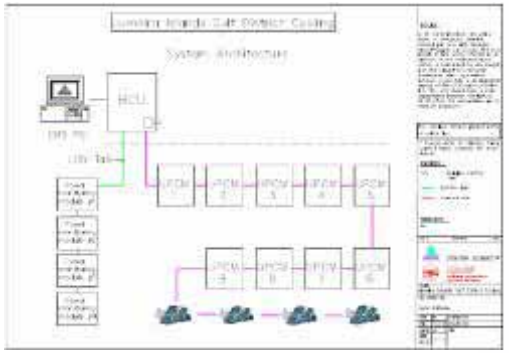


Customer needs:

- Energy Savings
- Energy monitoring
  (Current, Voltage, Power)
- Reliable communications
- Reduced I/O wiring

Solution:

- LON was selected :
  - Greater choice of power monitoring modules
  - Open & evolutive
- Direct integration of power metering module onto BCU
- Tracer Summit Chiller Plant Application



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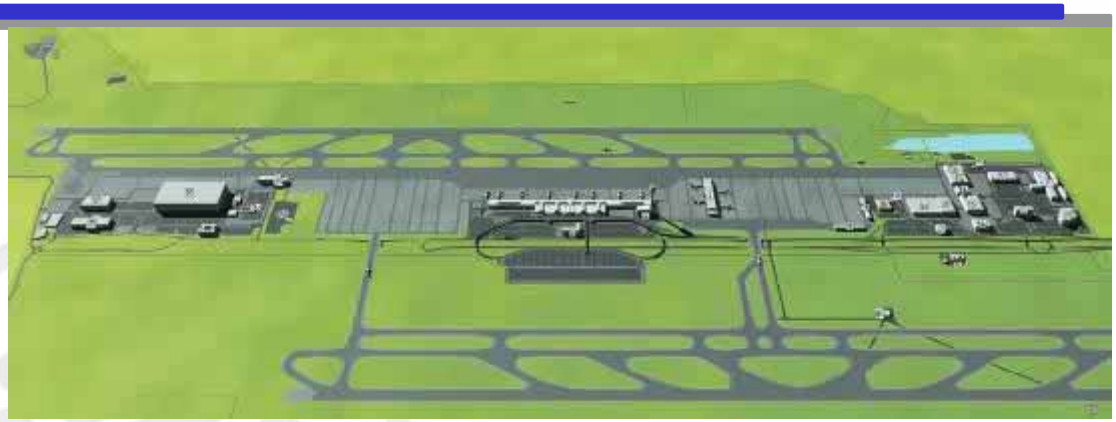
Athens Airport - Greece

Overview:

- 45 different HVAC systems.
- 3 main suppliers (Trane, Daikin, Carrier)
- HVAC : Chillers.



Customer needs:

- Real time monitoring of ALL the HVAC equipments,
- Complete & detailed status of all units,
- Real time alarming,
- Detailed unit reports.

Solution:

- LON was the only common platform for integration:
  - Available to all vendors
  - Offering full visiblity on all datapoints in the unit
  - Enabling alarming
  - Fast & reliable communication speed
- BCU's on IP Backbone
- Tracer Summit BMS Workstation
- LONMARK certified controllers MP 581, MP501/503

LONMARK Sessions

Royal Mint - UK

Overview:

- Datacenter (7 floor building)
- Offices & Datarooms
- HVAC : 4 Centrifugal Chillers.
- Existing BMS

Customer needs:

- Integration of Chiller Plant into the existing BMS
- Reliable communication,
- Detailed datapoints from Chiller Plant & all chillers,

Solution:

- LON allowed the integration in the existing network architecture
  - Physical integration on an existing branch of the network
  - Large amount of datapoint transfer
  - Open & evolutive
- BCU driving Centrifugal Chiller Plant
- LONMARK certified controllers MP 581 for cooling towers

LONMARK Sessions

Sanyo - Hungary

Overview:

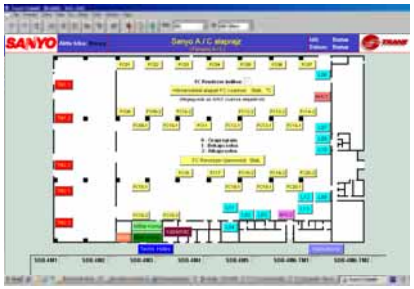
- 2 buildings (17 000 m²).
- Manufacturing Plant & Offices
- HVAC : Chillers, AHU's, Fancoils, Gas fired Boilers, exhaust fa
- +2000 I/O : Power, UPS, Plumbing, Firefighting, Lifts, DG…

Customer needs:

- Coordinating fancoil control & static heating control, at lowest cost
- Open technologies,
- Many remote I/O's … How to :
  - Reduce wiring costs ?
  - Maintain flexibility & reprogramming ?

Solution:

- Using LON bindings allowed to control in parrallel the fancoil valves (wired to Lonmark certified controller ZN523) and static heating valve from radiator,
- LONMARK certified controllers MP 581, MP501/503
- Tracer Summit BMS Workstation



LONMARK Sessions

Stekleni Dvori - Slovenia

Overview:

- 15 000 m².
- Offices rented to various Bank companies
- HVAC : 3 Chillers, CCU's, AHU's, 500 Fancoils.

Customer needs:

- 100% LON based open network architecture
- LonMark certified Controllers
- Freedom of choice for BMS System selection

Solution:

- ZN using SCC profile, LonMark Certified for Fancoil Controls
- CH530 LonMark Certified Controller for Chillers

Park Atrium, Brussels, Belgium

Overview

- 100-year-old office building in the heart of Brussels
- A building management system based on LonWorks technology offers real-time visualization and fault detection, as well as a way to monitor and control change-of-time programs and various current and limit values.

Key Benefits

- Reduced energy consumption by almost 50 percent.
- Legacy systems were easily integrated.
- LonWorks open technology let the integrator create a system from as many as 20 manufacturers.

Integrator: RUF Gebäudetechnik
Miltonberg, Germany

Alcampo Supermarket, Barcelona, Spain

Overview

- 18,0002 meter grocery store
- Over 250 devices used to integrate HVAC, indoor and outdoor lighting, fire protection, emergency exit doors, and power control
- Supports remote monitoring and failure detection and repair features.
- Integrated control system includes occupancy, intrusion, and lighting sensors to optimize indoor climate, increase security, and save energy.

Integrator: K-lon, Seville, Spain

Key Benefits

- Lowered energy costs by 20 percent by integrating occupancy, intrusion, and lighting sensors with indoor climate
- Occupancy sensors have
- helped cut energy costs by reducing lighting and HVAC in unoccupied rooms
- Improved indoor climate for a better customer experience.
- Reduced system installation time and costs.

LonMark® Sessions

DaimlerChrysler Automotive Warsaw, Poland

Overview

- System contains 400 controllers and 3,000 data points
- Integrated system controls and monitors HVAC installations and chilled ceiling systems, lighting systems, and automatic fire and emergency voice evacuation alarms
- Integrated weather station connects to BMS to automatically adjust the building's temperature as needed

Integrator: TAC, Warsaw, Poland

Key Benefits

- Energy management controls reduce operating costs, save energy, and help provide a comfortable environment.
- Building complies with European directive on energy savings
- The new headquarters opened two months ahead of schedule.

LonMark® Sessions

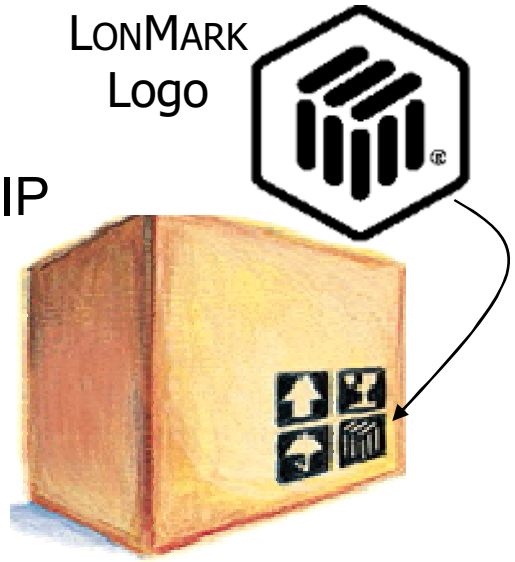
University of Miami Medical Campus

- $1.5M Clinical Research Building
- Completed Nov 2006, LEED Project
- 15-Story Medical Research Offices, Wellness Center, Parking Garage
- 20 AHUs, VAVs, Underfloor Air System, CHW Supplied from Campus CHW Loop
- UL864 Smoke Control, Fireman's Smoke Control Station, Siemens F/A System
- Douglas Lighting Controls, TAC Lonworks controllers, Viconics Thermostats
- User Interface handled on SI contract with UM Master Systems Integrator


LONMARK®
INTERNATIONAL

LONMARK Devices Guarantee Interoperability

- LONMARK International
  - Independent Industry Association
  - Established in 1994
  - Task groups focus on specific industry requirements
  - Define device SNVTs, Objects, Profiles, IP connectivity
- What we provide
  - Interoperability design guidelines
  - Product conformance testing
  - Marketing assistance
- LONMARK Stamp of Approval Means Devices Will Interoperate



LONMARK Sessions

www.lonmark.org

LONMARK Purpose

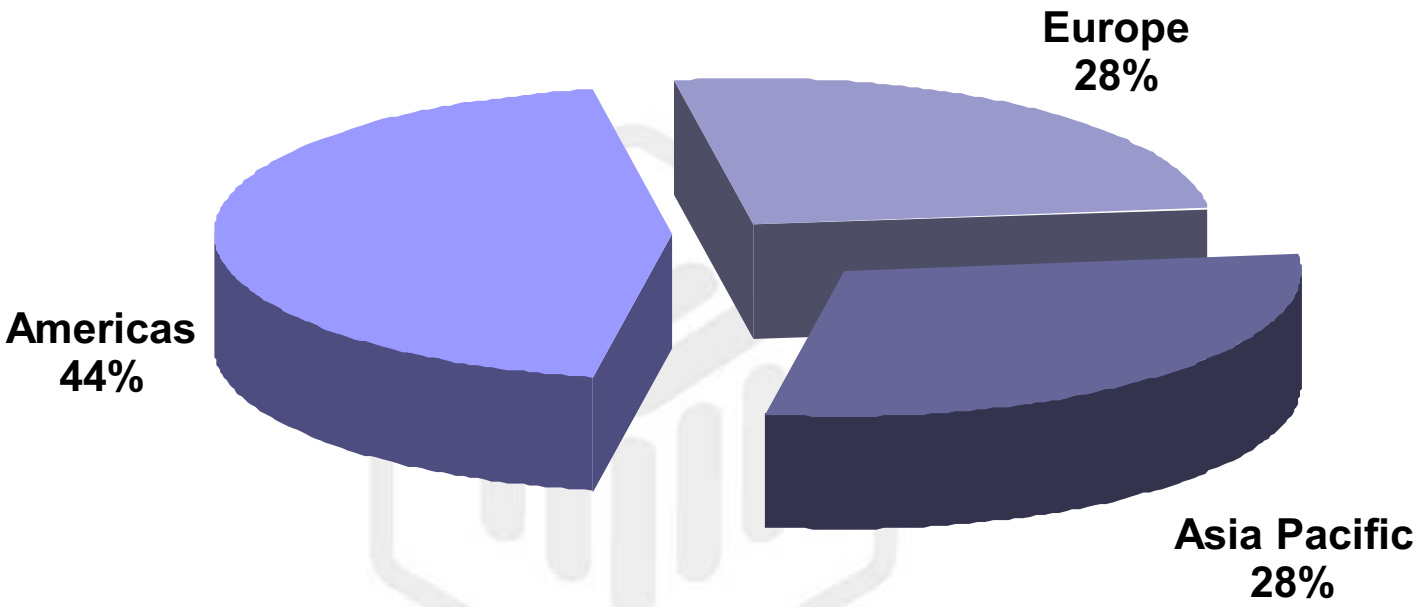
- To promote interoperable products and collaborative marketing programs
- To provide a forum to define application-specific design requirements
- To create market demand for open, interoperable systems using LONMARK certified products
- To define, develop, and certify truly interoperable products
- To deliver a comprehensive educational programs and professional certification testing program

Who is LONMARK International?

- Non-Profit Trade Association
- Independent, member supported organization
- Strong LONMARK Board of Directors
  - Distech, Echelon, Engenuity,
  - Envidatec, Fuji Electric,
  - Furukawa Electric, Honeywell, IBT,
  - Johnson Controls, Kenmark, Matsushita,
  - Nico, NTT Data, Phillips, Samsung,
  - Siemens, TAC, Trane, US Army Corps,
  - Yokogawa Electric, ZDANiA
- World wide staff support

LONMARK® Sessions

LONMARK Membership



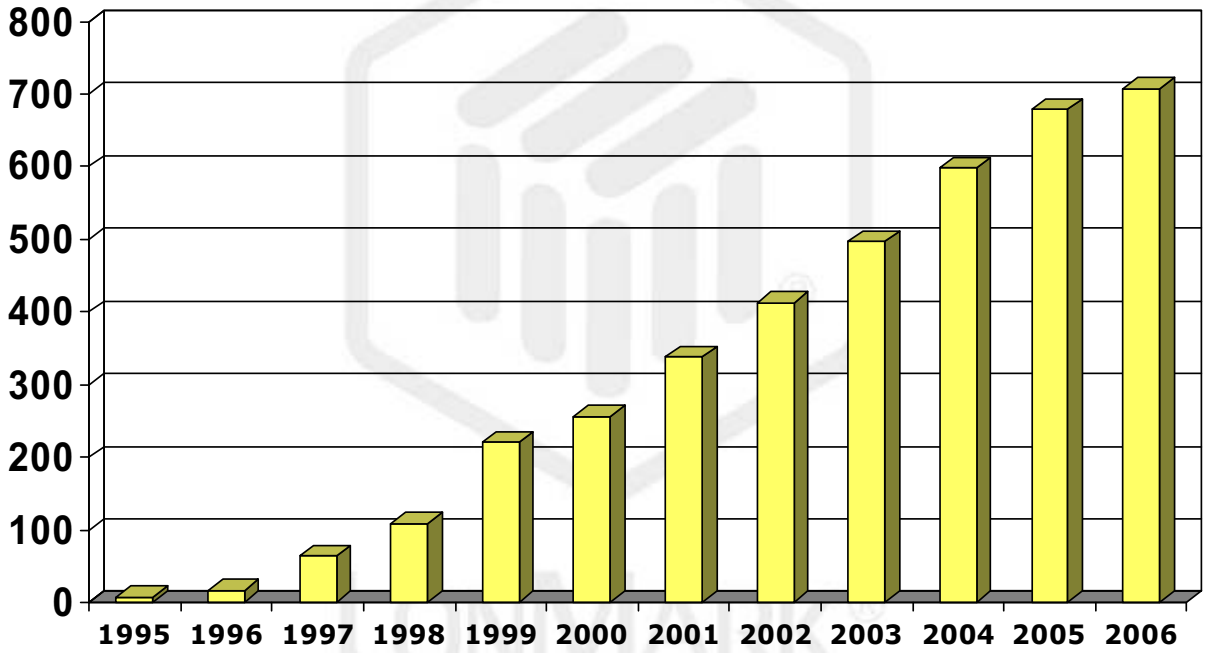
Membership is open to any company or individual committed to the development and use of open, interoperable products using ANSI/CEA 709.1 and related standards including European standard EN 14908.

Currently - >500 + members

LONMARK Sessions

LonMark Membership

LONMARK Certified Products



LONMARK Sessions

Growing Affiliate Organizations

- Active
  - Americas
  - Austria
  - China*
  - Denmark
  - France
  - Germany
  - Italy
  - Japan
  - Netherlands
  - Spain
  - Sweden
  - Switzerland
  - UK

- In Process
  - ASEAN
  - Australia
  - Korea
  - Russia
  - Ukraine

- Interested
  - Adriatic
  - Finland
  - Poland

*Affiliate Office

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Standardization Activities

- LON is a European standard: EN 14908
- LON is a China National Standard
- Submitted Interoperability Guidelines to CEN for inclusion in EN 14908 standard
- Supporting Web Services standard through OASIS
- Working with CECED (appliances) and IFSF (forecourts) on European standards
- Working with various governments to create country specific national standards
- Pursuing ISO standardization

Integrator Testing/Certification Program

- Program to deliver a comprehensive professional testing and certification
- Worldwide standard of proficiency
- Web-based exam
- Installer, Professional, Integrator, and Expert levels planned
- www.lonmark.org/testing

Educational Programs

Worldwide Educational Seminars

- LONMARK Session 2007 – 57 city seminar tour
- Modular – adaptable content for various markets
- Opportunities for sponsorship
- Opportunity for Affiliates Customization
- Target Audience
  - Owners
  - Architects
  - Facility Managers, Operators, Engineers
  - IT Professionals
  - Influencers

Ongoing Projects and Programs

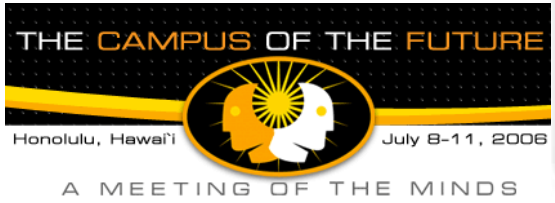
- Leverage Trade Partners
  - Magazines, Associations, Blogs
  - Articles, Press Releases
  - Fair, accurate, up-to-date source of information
- Leverage partnerships with key stake holders, trade organizations, influencers
  - Trade Shows, Conferences, Symposiums, Industry Events
    - APPA, NJATC, BuilConn, TFM, RealComm, BOMA, CABA, HiTech House, Smart House Ukraine, WSS-UK, Connections, NECA
- Functional Demonstrations
  - Real Products
  - Real Solutions
- Case Studies
  - Real References

LonMark® Connection

LonMark® Sessions

Exhibitions & Conferences

LonMark® Connection



LONWORLD® Exhibition and Conference

November 14-15, 2007

Amsterdam, the Netherlands

www.lonworldexpo.com

LONMARK® Sessions

LONMARK Magazine

- Quarterly magazine
- European Edition: 5,000 copies
- International Edition: 7,000 copies
- Self funding through ads
- Great resource of case studies, tech info, applications
- More info: www.lmimagazine.com
- Free subscription

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Ongoing Efforts

- Global
  - Interactive Technology Demonstration with members products in a single integrated system
    - Permanent setup for worldwide access
    - Continuous upgrades, enhancements
    - Take to various trade events
  - Educational events
    - Building Automation Conference
    - TFM LONMARK Sessions
    - AHR LONMARK Sessions
    - Light+Building Sessions

The Future of LonMark

- ISO Standardization
  - Lobby support from major vendors and industry leaders
- Advance the Certification Testing Program to specialty areas
- Move LonMark into new markets
  - Home Automation
  - Retail
  - Convenience Stores
  - Enterprise Solutions

The Future of LonMark

- Expansion of LonMark standards
  - LON/IP-852.1 – new enhancements
  - oBIX – XML standards
  - Certification of Programmable Controllers
  - Certification of Routers, Interfaces, Gateways
  - Enhance profile and certification of data loggers, schedulers, network management tools, diagnostic tools, alarm managers
- Enhancements to New LMI Website
  - www.lonmark.org

The Future of LonMark

- LMI Training Classes
  - Online web based interactive training
  - LON basics and advanced modules
  - Compliment the testing program
  - In Development Now
    - See www.lonmark.org/training
    - Sneak Preview of First Module

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СПАСИБО ЗА ВНИМАНИЕ

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