LONWORKS
Technology Update

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LONWORKS
Presentation Overview

- LonWorks Terminology & Overview
- UFGS and UFC status
- LonWorks Benefits
- Lessons Learned
- UMCS/DDC Plan
- LonMark – What’s new
Terminology

- **LONWORKS®**: General term for the technology related to the ANSI-709.1 protocol

- **ANSI-709.1**: Standard communications protocol; a set of rules for communication between devices

- **LonTalk®**: Name for the Echelon implementation of ANSI-709.1 on a Neuron® chip

- **ANSI/EIA-852**: Standard for using ANSI-709.1 communications over an IP Network
**Terminology**

- **LonMark® International**: An industry organization that develops Interoperability Guidelines and certifies LONWORKS devices.

- **LonMark Certification**:

- **LONWORKS® Network Services (LNS™)**: A network management and database standard developed by the Echelon Corporation.
LONWORKS Applications

- HVAC controls
- Lighting
- Power management
- Remote monitoring
- Electric sub-metering

- Access control
- Security
- Elevators
- Fire/life safety

Only HVAC controls are included in the current design and specification criteria. Metering/Power Mgmt are ‘supported’.
UMCS & DDC

• Utility Monitoring and Control System (UMCS)
  – Specification: **UFGS-13801**
  – Central supervisory monitoring and control system
  – Interface to one or more multi-vendor building-level DDC systems
  – Unlike the old EMCS specs, does not specify/include the building-level controls

• Direct Digital Control For HVAC & Other Local Building Systems
  – Specification: **UFGS-15951**
  – Building-Level control systems and communications network (based on ANSI-709.1 communications protocol)
  – Focus is on HVAC controls (but supports other technologies)
LONWORKS® UMCS/DDC - Overview

UMCS
LNS Database
UMCS Client
UMCS Client
UMCS Client
UMCS Client?

BPOC
Router
BPOC
Router
BPOC
Router

AHU 1&2 Vendor A
VAVs Vendor A
AHU Vendor B
Boiler Vendor B
AHU Vendor A
Boiler Vendor B
Chiller Vendor C

Bldg 1
Bldg 2
Bldg 3

IP network
(ANSI 709.1 over IP)

DPW O&M PC
DPW O&M PC
DPW Mgmt PC
Other PCs
‘Outside’ PC

BPOC=Building Point of Connection (UMCS to Building Control Network)

O&M Laptop(s)
Laptops with:
Network Config. Tool & LNS ‘Plug-ins’

WWW
Firewall

ANSI 709.1
LON network
LON network
LON network

AHU 1&2
Vendor A
VAVs
Vendor A
AHU
Vendor B
Boiler
Vendor B
AHU
Vendor A
Boiler
Vendor B
Chiller
Vendor C

DPW
O&M
PC
Bldg 1
Bldg 2
Bldg 3
Basewide ANSI 709.1B over IP Network (EIA-852) >=100Mbps

One or more servers running:
- LNS Server
- Network Management Tool
- Graphical User Interface (GUI)
- Monitoring and Control Software
- Web Server (optional)

One or more workstation running:
- GUI Clients
- Network Management Tool Clients
- Web Clients (optional)

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UFGS-13801

**UFGS-15951**

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LONWORKS®
UMCS/DDC System
LONWORKS – UFGS & UFC Status

• Specs: UFGS-15951 & 13801 released FY04

• Draft UFCs  http://www.cecer.army.mil/KD/HVAC/
  – UMCS DDC System Overview
  – Project Implementation Summary
  – Control System ACAD dwgs (A/E/C CAD Std 2.0 compliant)
  – Points Schedule (drawing) Instructions
  – AutoCAD Drawing User's Guide

• PROSPECT Training  (Crs 094, 340, and 382)
LONWORKS Benefits

- UMCS front-end provides opportunity to better manage facilities/buildings
  - Monitoring capability, alarms, scheduling, etc.
  - Support for technologies other than HVAC
- Use of a single Network Configuration Tool
  - Helps O&M staff to be more effective
  - Will minimize training needs over the long term
- Simplifies the overall mix of softwares, dongles, and controllers (simpler for both construction and O&M staff)
- Supports open competition, but will likely limit the mix and variations of DDC
- Provides choice/options in replacing substandard controls (due to standard ‘building control network’)

US Army Corps of Engineers

Engineer Research & Development Center
Tri-Service Infrastructure Systems Conference  August 2005  St. Louis, MO
LONWORKS Installations

- Fort Sill
- Fort Hood
- Sheppard AFB
- Fort Bragg – Planning stage
- Fort Stewart – Planning stage

- Successful projects use a long-term-contracted **Systems Integrator** to execute UFGS-13801 requirements via Huntsville IDIQ, local IDIQ, or ESPC contract mechanism
LONWORKS Lessons Learned

Most importantly…
You really do need a plan
UMCS/DDC Plan

- Select, define, & document a strategy/plan, including how to...
- Find a **System Integrator** (SI) to manage front-end
- Obtain LONWORKS® **UMCS front-end** software package
- Obtain **LNS™ Network Tool** (software)
- Require LONWORKS controls for all building-level projects
- Identify Contractors/products that meet LONWORKS reqmts
- Define in-house (Govt.) support mechanisms/strategy
- Coordinate with DOIM (Important & must be done early!)

Fort Bragg’s plan is described in Technical Report. Contact David.M.Schwenk@erdc.usace.army.mil
LONWORKS Lessons Learned

- **Application specific controllers (ASC)**
  - Prevalent in the Lon ‘World’
  - Simple. O&M folks love them compared to programmable.
  - Dumb down your control schemes to get ASCs. Permit contractors to submit alternate control sequences.

- **LonWorks Network Services (LNS) platform**
  - Used to launch/configure multiple vendors ASCs using ‘plug-in’

- **ASC’s with LNS plug-ins:**
  - Circon, Distech, Honeywell, Johnson Controls, TAC
  - Lots of others (for lighting, power management, etc.)

- **Insist on LNS and LNS plug-ins**
  - Enforce specs. Minimizes software tools. Simplifies O&M.
LONWORKS Lessons Learned

• Open systems involves complexity
  – Welcome to the world of interoperability
  – All controls are complex. Pick your poison.
  – Government competitive procurement rules dictates need for open systems
  – LonWorks/open systems not a silver bullet. But with UFGS much of the work has been done for you.

• Trend toward networked systems will continue
  – Networked systems and controls are complex
  – We need to get used to it and get a grip
  – Networking requires DOIM involvement. Get to know them.
  – Evolving security issues & requirements (i.e. ‘Networthiness’) 
  – On plus side: Guidance, training, expertise available
LONWORKS Lessons Learned

• IP network security:
  – Army “Networthiness” requirements
  – New. Based out of Fort Huachuka.
  – 79 item checklist. ~80 manhour effort by Contractor.
  – Networthiness Certificate issued to ‘system’
  – Can avoid if IP network is dedicated to UMCS/DDC
LONWORKS Lessons Learned

- LonWorks weak on some supervisory functions
  - Scheduling (occ/unocc etc.). UFGS is very prescriptive to provided necessary functionality.
  - Alarms: LonWorks supports, but not efficient.
  - Trends: Bulk data transfer not standardized. Front-end PC used to capture trend data.
  - On plus side: Don’t always have need for supervisory functions and LonWorks negates the need for beefy proprietary building controllers that would otherwise perform these functions.
LONWORKS Lessons Learned

- You will need a System Integrator (SI)
  - Original intent. Executes UFGS-13801 requirements.
  - Obtain through Huntsville IDIQ contract or local sources
  - A list of SI’s: http://osa.echelon.com/Solutions/FindNI.htm

- Don’t let 15951 Contractors give you front-end software with each new project. Use UFGS-13801 (existing front-end software) and SI services.

- Your alternative? Proprietary systems: Use UFGS-15910A (Navy spec) or dust off old UFGS-15951A.
UMCS Front-end & Network Configuration Tool
(Acceptable* Vendors)

- **UMCS front-end** software vendors*
  - Circon *(Visual Integrator 3)*
  - Honeywell *(EBI or SmmetrE)*
  - Wonderware *(Intouch)*
  - Intellution *(FIX)*
  - TAC *(VISTA)*

- **LNS Network Tool** vendors*
  - Circon *(Network Integrator)*
  - **Honeywell** *(CARE 4.0)* {Writes LNS, but not doesn't use/read LNS}
  - Richards Zeta *(PerfectHOST for LNS)*
  - Visual Control *(VC Network Manager)*
  - Echelon *(LonMaker)* {TAC uses this tool}
  - Distech *(LonWatcher)*
  - Johnson Controls *(MCL Tool)* {Not on Echelon** Website}

*Incomplete list. Others may be acceptable. Underlined=More confidence

**http://www.echelon.com/products/development/lns/pwrtools.htm
LONMARK – What’s New

- Over 670 products have been LonMark certified to date
- ‘Utility Meter’ Functional Profile (FP)
- Developing an Open Spec template
  - May provide perspective (comparison to UFGS) / options
- Systems integrator testing/certification program being developed to improve the quality & availability of integrators
LONWORKS Summary

• Open systems provide non-proprietary options
  – Big benefit & Must adhere to procurement rules.

• Our challenges…
  – Building Automation Systems (controls) aren’t rocket science, but are far from simple. Always have been always will be.
  – Open systems are not turn-key. Proprietary systems can be but the Vendor/Contractor owns the key.
  – Most DDC vendors not willing to provide open systems
    • Technology and ‘know how’ exist, but openness is not their goal
    • There are Exceptions (1 or 2 vendors and System Integrators)

• Develop a plan
  – Need a vision/goal. Controls require attention.
Duplicate slides...
One or more servers running:
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Basewide ANSI 709.1B over IP Network (EIA-852) >=100Mbps

BPOC Gateway

BPOC Router

RTR=Router
BPOC=Building Point Of Connection
RPTR=Repeater
Circle ○ = node (ANSI-709.1 device)

More devices.
No more RTRs or RPTRs

More devices.
No more RTRs or RPTRs

More devices and/or ‘subnets’

RTR=Router
BPOC=Building Point Of Connection
RPTR=Repeater
Circle ○ = node (ANSI-709.1 device)

LONWORKS®
UMCS/DDC System