Achieving Interoperability in a World of Standards Compliance

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The nice thing about standards is that there are so many of them to choose from.

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The Problem

- **Vendors** declare systems are “standards based”
  - Start with a standard and add “secret sauce”. System remains proprietary.

- **Utilities** need and want “interoperability”
  - Systems from multiple vendors that just “plug and play” with each other – “bring your own meter”

- Standards compliance is necessary but not sufficient to achieve interoperability

- We will examine what is needed to achieve true interoperability
  - Common “profiles” along with interop certification

- Objective: Help utilities become more discerning in vendor discussions

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The Problem for Utilities
Let’s Look at what others are doing……
Let’s view a couple of videos…..

- Reasons for Standards (URL given below)
- Wi-SUN (URL given below)
Imagine A World Without Standards
Promote the adoption of open industry standards for wireless Smart Utility and Smart City applications.
Who Makes Standards, Anyway?

- Proprietary Systems - vendor specific
- Industry Practice - informal practice
- Industry Standards - formalized practice
- National Standards (ANSI, NIST, IEEE)
- International Standards (ISO, IEC)
- Interoperability Alliances (WiFi, WiMAX, Wi-SUN)
What is necessary for Interoperability?

- Compliance with relevant Standards
  - Including entire stack from Physical to Application
- Interoperability Testing
  - “Plugfests”
- Certification by independent third party
Communications Using the OSI Model

7 - Application Layer: Window to provided services
   MMS, FTAM, VT, DS, MHS, CMIP, RDA

6 - Presentation Layer: Common data representation

5 - Session Layer: Connections between end users

4 - Transport Layer: End-to-End reliable delivery

3 - Network Layer: routing and relaying of data

2 - Data Link Layer: error-free transmission
   error checking & recovery, sequencing, media access

1 - Physical Layer: physical data path
   Ex: RS232, Ethernet CSMA/CD (IEEE 8802-3), FDDI
What is a “Profile”?

- A Communication Profile is a list of the standards and their options necessary to achieve end-to-end interoperability.

- Variations in profile between two systems may make them proprietary.
Is Security Jeopardized by Interoperability?

- NO

- “Security by Obscurity” is a flawed concept (https://en.wikipedia.org/wiki/Security_through_obscurity)

- Security principles:
  - Use open, publically scrutinized security practices – they are more secure than proprietary schemes that don’t receive such scrutiny
  - Publish *how* security is done.
  - DO NOT Publish the Key
  - ..... Just like we do with locks and doors.
Standards for DA and Metering

- IEEE 802.15.4g for Wireless Mesh (Physical and Transport)
- RS232 (Physical Layer)
- Ethernet (Physical Layer)
- Internet Engineering Task Force (Internet Standards) (Transport through Application)
- ANSI C12.18, C12.19, C12.22 for metering (Application Layer)
- DNP 3.0 for DA and SCADA (Application Layer)
- IEC 61850 for DA and SCADA (Application Layer)
Interoperability Success Stories

- Bar Codes
- Wi-Fi
- WiMAX
- DNP
- IEC 61850
- And Many More.....
Interoperability Promised

- ANSI C12.18, C12.19, C12.22
  - Non-interoperable interpretations
  - Lack of profile agreements
  - Lack of 3rd party testing
- Wi-SUN
  - Physical Layer certifications released
  - Transport Layer certifications soon
- Zigbee
  - Flawed profile model failed in Zigbee 1.0.
  - (My Opinion) Will be superseded by Internet of Things and Wi-SUN
Who Certifies?

- Physical and Transport Layers:
  - Wi-Fi Alliance (http://www.wi-fi.org) (Physical)
  - WiMAX Forum (http://www.wimaxforum.org/) (Physical)
  - Wireless Smart Utility Networks (Wi-SUN) Alliance (Physical and Transport) (https://www.wi-sun.org)
  - Internet Engineering Task Force (IETF) (Transport) (https://www.ietf.org)

- Application Layer:
  - UCA International Users Group for IEC 61850 (Application Layer) (http://www.ucaiug.org)
  - North American End Device Registration Authority (NAEDRA) for metering (Application Layer) (http://www.naedra.org)
For Further Reading

- World Without Standards video: https://www.youtube.com/watch?v=TaxWfz_MB2A
- Wi-SUN video https://www.youtube.com/watch?v=B_dfHB5kVro
¿Maswali?