

Achieving Interoperability in a World of Standards Compliance

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HOW STANDARDS PROLIFERATE: (SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)



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

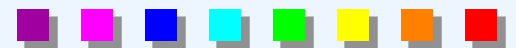
Andrew Tanenbaum

The Problem

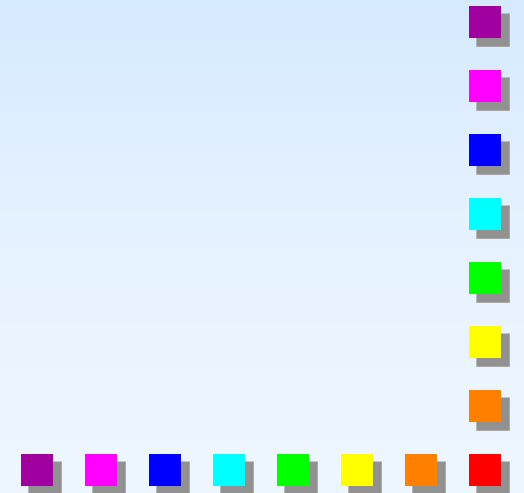
- *Vendors* declare systems are “standards based”
 - Start with a standard and add “secret sauce”. System remains proprietary.
- *Utilities* need and want “interoperability”
 - Systems from multiple vendors that just “plug and play” with each other – “bring your own meter”
- Standards compliance is necessary 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



The Problem for Utilities

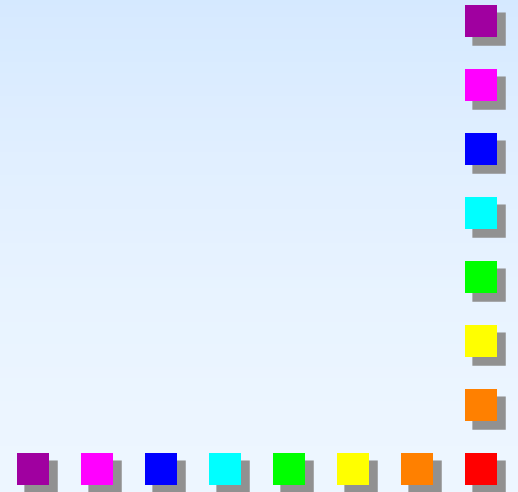



Let's Look at what others are doing.....



Let's view a couple of videos.....

- Reasons for Standards (URL given below)
- Wi-SUN (URL given below)



A dark, grayscale image of a cluttered desk with various office supplies like pens, pencils, and papers. The text "Imagine A World Without Standards" is overlaid in the center.

Imagine A World Without Standards



Promote the adoption of open industry standards for wireless Smart Utility and Smart City applications.

Who Makes Standards, Anyway?



Interoperability Alliances (WiFi, WiMAX, Wi-SUN)

International Standards (ISO, IEC)

National Standards (ANSI, NIST, IEEE)

Industry Standards - formalized practice

Industry Practice - informal practice

Proprietary Systems - vendor specific



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.**



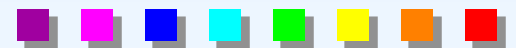
Is Security Jeopardized by Interoperability?

- 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.



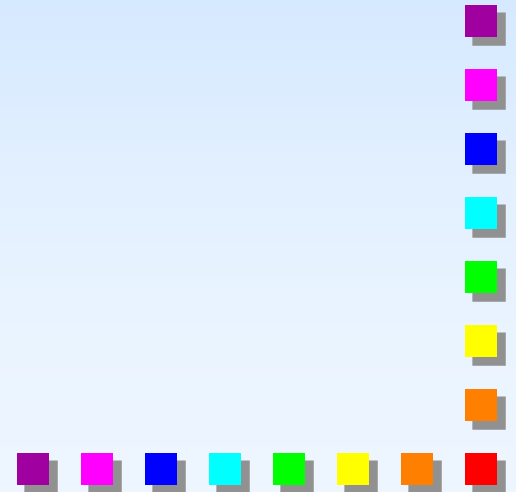
Standards for DA and Metering

- 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



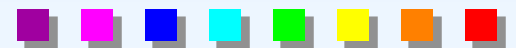
Who Certifies?

■ 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>)
- Distributed Network Protocol (DNP) Users Group (Application Layer) (<https://www.dnp.org>)



For Further Reading

- World Without Standards video:
https://www.youtube.com/watch?v=TaxWfz_MB2A
- Interoperable Standards: ITSI presentation:
[http://www.perey.com/ARStandards/\[Wiles\]CTI_Interoperability_Testing_ETSI.pdf](http://www.perey.com/ARStandards/[Wiles]CTI_Interoperability_Testing_ETSI.pdf)
- Consider a world without standards blog:
<http://www.commscope.com/Blog/Consider-a-World-without-Standards/>
- Wi-SUN overview
<https://www.wi-sun.org/images/assets/docs/wi-sun-alliance-overview.pdf>
- Wi-SUN video
https://www.youtube.com/watch?v=B_dfHB5kVro



¿ Maswali ?

