



From Catalog of Standards to Interoperable Deployments

A Field Area Network Perspective

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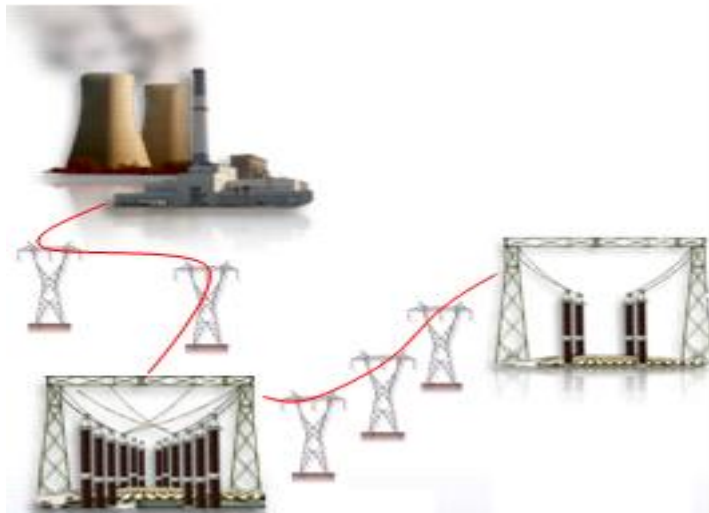
Cisco Connected Energy

December 2012

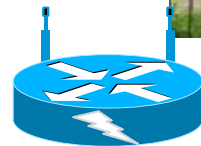
The NIST/SGIP Standards Pool

- NIST SP 1108 (Framework for SG Interoperability) identifies 75 specification candidates.
- SGIP (CSWG, SGAC, etc) has so far recommended 41 standards for CoS
- CoS will continue to grow.
- This just North America.
- Plenty of guidance is available from GWAC, SGAC etc re: conceptual workings of a Smart Grid architecture.
- How does all this come together re: production of an actual, interoperable, deployable, secure Field Area Network?

Multi Service FAN (GridBlocks™ Reference Model)

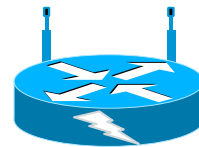


Transmission and Distribution Substations



Distribution Automation:

- Volt/Var control
- Fault Isolation/Restoration
- Transformer Monitoring
- Etc

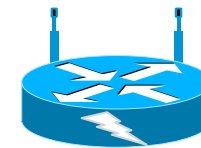


BANs and HANs:

- Metering
- Outage Management
- Demand Response
- Pricing
- Etc



Distributed Generation



PEV Charging Station



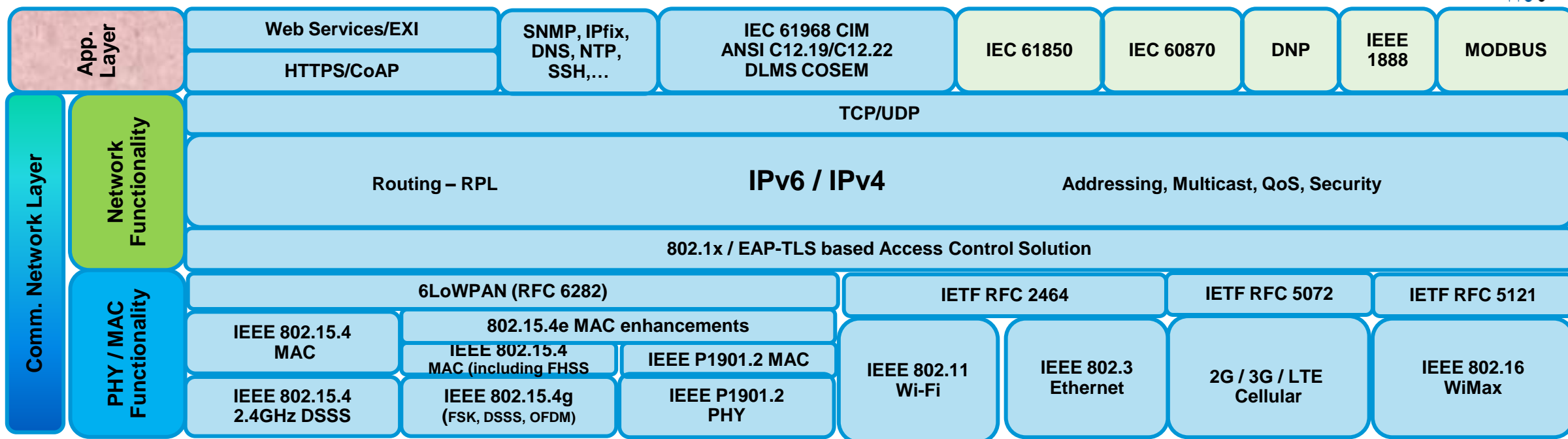
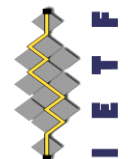
Substation Automation

Field / Neighborhood Area Network (FAN / NAN) Use Cases

Field Area Network Use Cases

- Obvious first step is to define the operational requirements of the FAN
- Cisco Field Area Network Solution and its use cases.
- Technology choices are made to fulfill those requirements.
- Applicable standards are selected as appropriate.
- We have many utility use case references...
 - SCE
 - Intelligrid
 - OpenSG's SG-Network Effort.
 - Utility RFPs

Cisco Open Standards Reference Model for FAN



- Use cases drive requirements. Requirements + recommended Standards = Implementation.
- Standardization at all levels to ensure interoperability and reduce technology risk for utilities
- IP enables common application layer services over various wired and wireless communication technologies

Interoperability “Are We There Yet?”

- No ... still not specific enough to construct a working system.
- The specifications typically contain many optional behaviors (sausage making)
- Three pieces are missing...
 1. A technical “Profile”
 - Which collection of specifications is used.
 - How each of the technologies is used.
 - How each of the technologies is configured.
 2. A test plan and certification program defining how we test for compliance to the profile
 3. A “Plugfest” program to insure multiple vendors implementations do in fact interop

Enter the Alliances

- Pick up where the standards process leaves off.
- Formed to develop specific profiles, test plans, and certification/interoperability programs.
- Often provide a logo program for compliant devices.
- Many examples.
 - WiFi Alliance(802.11)
 - WiMAX Forum (802.16)
 - CableLabs (DOCSIS etc)
 - CSEP / Zigbee Alliance / Homeplug / WiFi (SEP 2.0)
 - OpenADR
 - Etc.
- Who will perform the Alliance function for Smart Grid Field Area Network?

For the FAN: Wi-SUN

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Wi-SUN Alliance Expands Global Participation; Adds Several New Members Cisco Systems, Huawei, Tokyo Gas, and Toshiba Toko Meters Join Alliance.

PR Newswire

TOKYO and SAN JOSE, Calif., Nov. 27, 2012 /PRNewswire/ -- The Wi-SUN Alliance, a global organization leading standards compliance and interoperability testing of Smart Utility Networks, announced today continued rapid growth of its membership with many additional companies and institutions recently joining the Alliance. These new members strongly enhance the Alliance's existing coalition of leading silicon vendors, networking companies and utility equipment providers cooperating to ensure robust, interoperable products for Smart Grid and related utility needs.

From the network industry, key new additions include Cisco Systems joining at the Promoter membership level and Huawei joining at the Contributor level. As a Promoter member, Cisco Systems has additionally been accepted to the Wi-SUN Board of Directors, joining existing directors from Analog Devices, Fuji Electric, Murata Manufacturing, Japan's National Institute of Information and Communications Technology (NICT), Omron Corp., Osaki Electric, Renesas Electronics and Silver Spring Networks.

For the FAN: HomePlug Netricity



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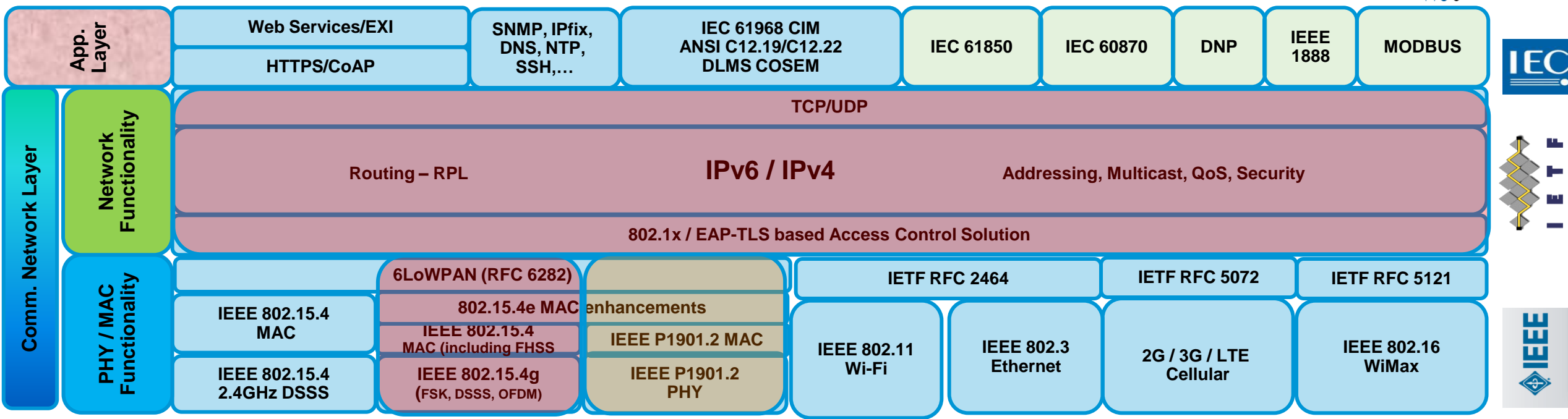
HomePlug® Alliance Announces Netricity™ Powerline Communications Targeting Smart Meter to Grid Applications

To complement our family of HomePlug products for in-home applications, HomePlug is launching the Netricity PLC (powerline communications) certification brand and marketing program to address the need for longer range powerline networking for outside-the-home, smart grid and industrial applications. The program will promote adoption and provide compliance and interoperability testing of products built on the IEEE 1901.2 Low-Frequency Narrow-Band PLC standard (<http://grouper.ieee.org/groups/1901/2/>).

Netricity PLC will operate in low frequency bands that make it ideal for grid-to-utility meter and other long range, outside-the-home applications. Lighting and solar panel powerline communications are also potential uses for Netricity PLC. The technology will address requirements that assure communication privacy and secure networks. Netricity PLC will complement and coexist with HomePlug's family of high speed networking specifications, HomePlug AV, HomePlug Green PHY, and the forthcoming HomePlug AV2.

The IEEE 1901.2 standard is built on two field-proven OFDM technologies, PRIME and G3, which have been already chosen by some of the world's largest energy providers including IBERDROLA and ERDF for Smart Meter to the Grid communication. This enables Netricity PLC to deliver a new benchmark of performance and reliability with support for IP (Internet Protocol) standard communications.

Cisco's FAN Alliance Strategy



- **Wi-SUN Smart Utility Network for wireless mesh**
- Homeplug Netricity for PLC

Closing Remarks

- Cisco aims to drive interoperability for Field Area Networks.
- End goal is for interoperable, secured, scalable, multi service FAN.
- Supporting wireless mesh and PLC based Field Area Networks.
- IP based: easy ability to incorporate other PHY/MAC.
- Wi-SUN and Homeplug Netricity are our choice of venue.
- We encourage the Smart Grid community to rally around these programs!

Thank you.

