

**Realizing the Smart Grid of the Future
through AMI Technology**

nEXgrid[®]

The logo for nEXgrid features the word 'nEXgrid' in a bold, sans-serif font. The 'nEX' portion is green, while 'grid' is blue. A blue wireless signal icon, consisting of three curved lines and a central dot, is positioned above the 'i' in 'grid'. A registered trademark symbol (®) is located to the upper right of the 'd'.

innovative smart grid solutions

**Central District Power Accountants Association
March Meeting**

About Nexgrid

Nexgrid is drastically changing the way utilities and consumers manage and monitor energy using advanced smart grid technology.

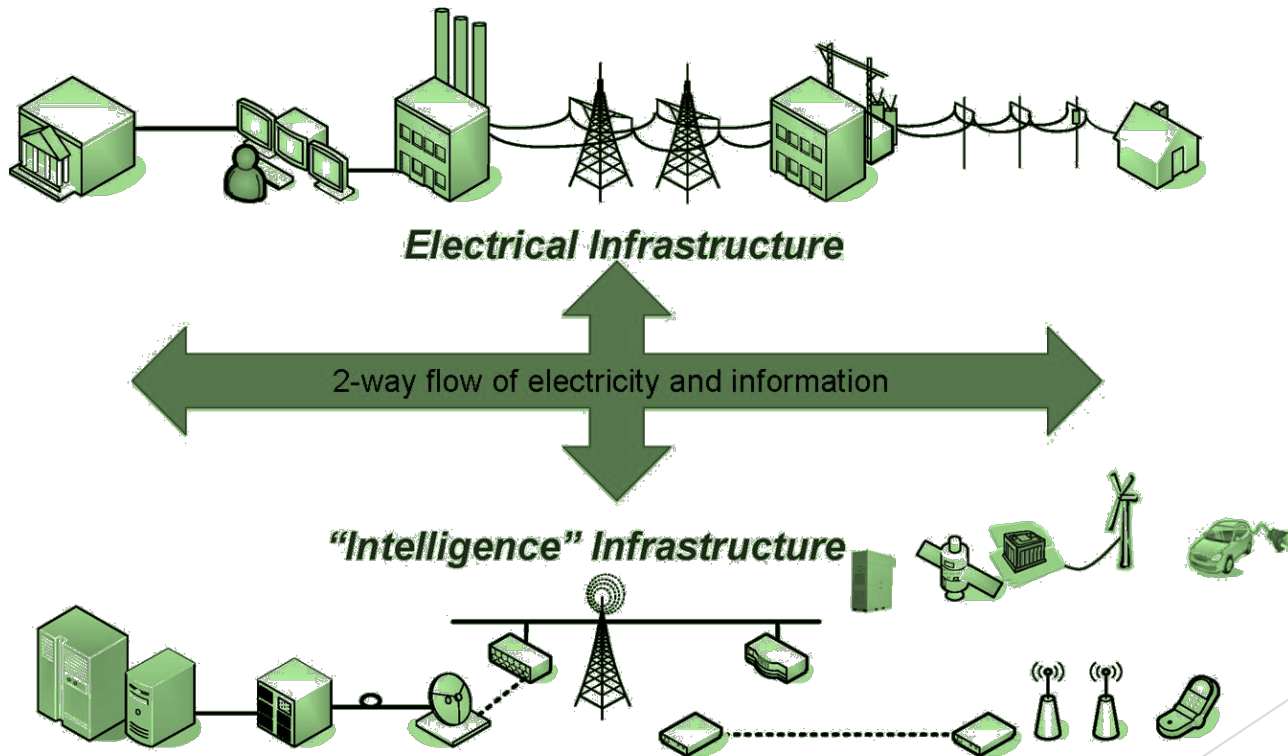
- Manufacturer of AMI and smart grid products
- Founded in 2008
- Corporate offices in Locust Grove, VA
- 17 full time employees
- 3 Patents pending specific to smart grid



What is Smart Grid?

“an electrical grid that uses information and communications technology to gather and act on information in an automated fashion to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity.”

- [Wikipedia](#)



Why Deploy a Smart Grid?

- Increased global demand for fossil energy resources
- User dependency
- Rising fuel transportation costs
- Climate change
- Renewable portfolio standards
- Aging infrastructure
- Increasing retail electric rates
- Rising electric bills - 35% increase over last six years

Electric utilities must be prepared to offer solutions to their customers or potentially face a firestorm of protest in years to come. The intelligent smart grid is one such solution.

Components of a Smart Grid

The smart grid has many components and there are many Vendors providing various pieces of the complete solution.



Interface Software

There are various software applications that take advantage of the smart grid. These applications will require integration and provide the ability for management and operation of the system.



Analytics



Cloud



Revenue Protection



Network Loss



Interval Billing



Equipment Load Monitoring



Remote Con/Discon



Register Billing



Prepayment Support



Device Lifecycle



Grid Data Vault



Settlements



Meter Operations



Energy Engage



Outage Management



Simulation and Planning

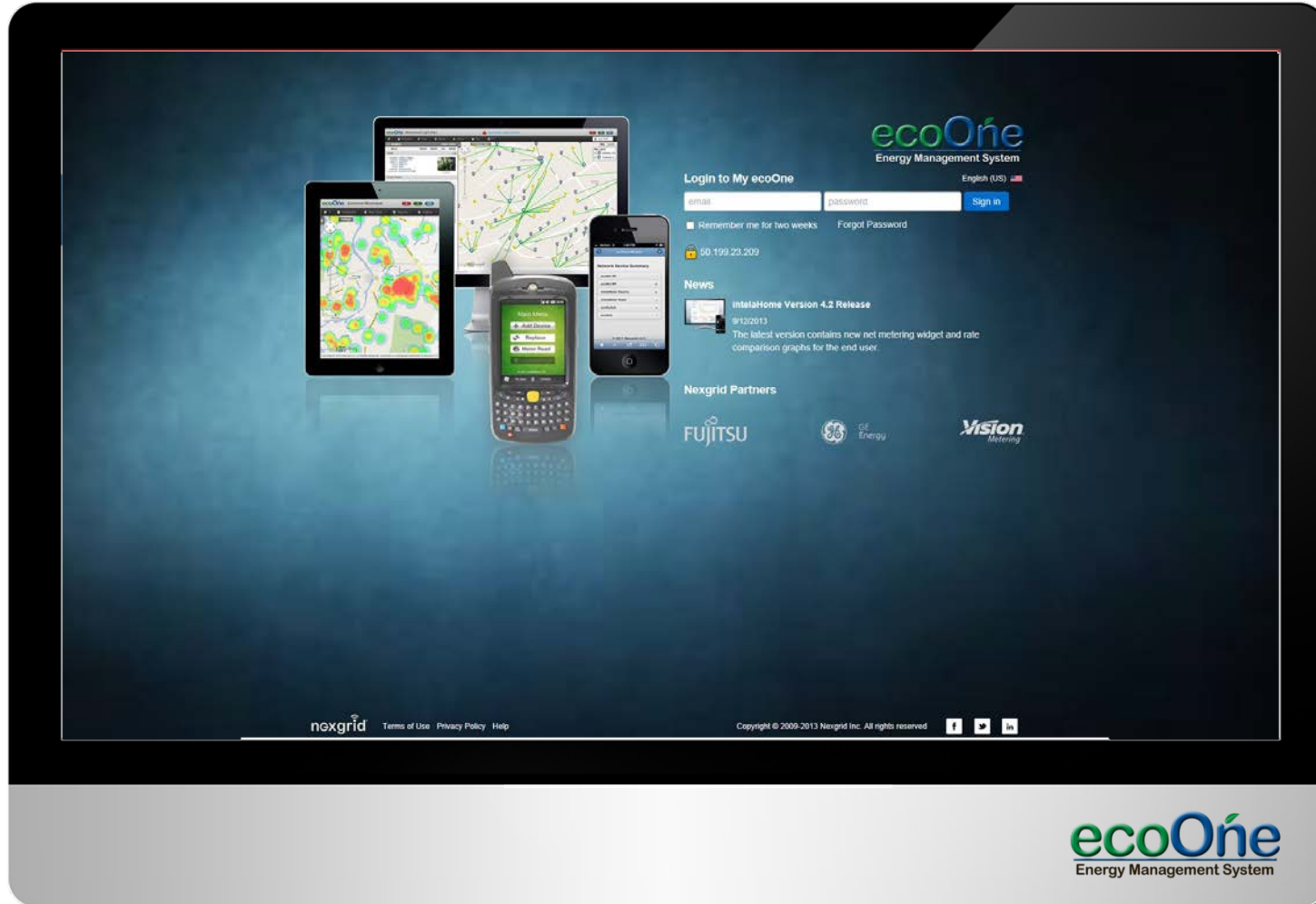


Demand Response

Interface Software

Nexgrid's ecoOne enterprise software is a one portal providing visibility into all aspects of your smart grid and advanced metering system.

Customized Portal Management



ecoOne
Energy Management System

nexgrid

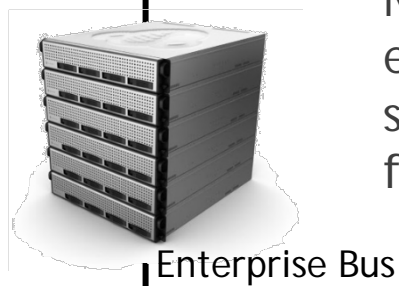
Interface Software - Customer Portal

Nexgrid's intelaHome portal provides your customers visibility into their historical usage history, real time energy consumption and control of smart home devices.



Head End

Integration is key component various server will exchange data typically utilizing a enterprise bus

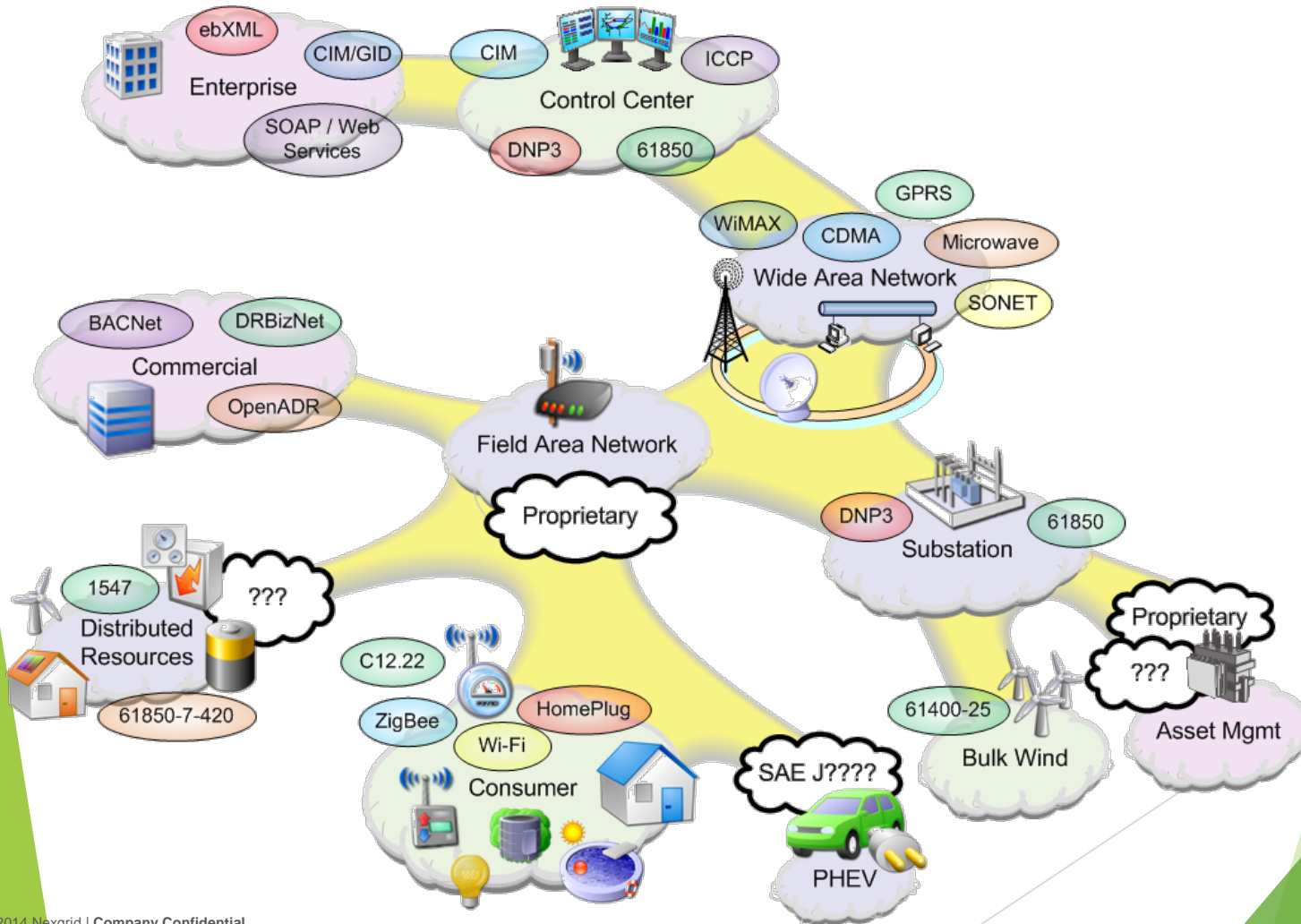


Nexgrid's Energy Data Server (EDS) acts as the energy bus to exchange data in real-time by supporting multi-speak, web services API's and flat file exchange methods between servers



Communications

Communications technology's can vary throughout a smart grid and require interoperability to provide an end to end communication platform.



Smart Grid and AMI Communication Standards

Standards are critically important in the electric power industry because they affect interoperability, compatibility, reliability, and efficiency. Keep in mind many systems are proprietary.

Technology	Advantage	Disadvantage	Application
Zigbee (IEEE 802.15.4, ZigBee Alliance) Low-cost, low power, wireless mesh standard for wireless home area networks (WHANs) or wireless personal area networks (WPANs)	Very low cost - inexpensive consumer devices; Low power consumption - years of battery life; Self-organizing, secure, and reliable mesh network; Network can support a large number of users; Smart energy profile for HANs is available	Very short range; Does not penetrate structures well; Low data rates; Developers must join ZigBee Alliance	HANs for energy management and monitoring; Unlikely to be used in NANs
Wi-Fi (IEEE 802.11b/g/n) Indoor wireless local area networks (WLANs), wireless mesh networks	Low-cost chip sets - inexpensive consumer devices; Widespread use and expertise; Low-cost application development; Stable and mature standards	Does not penetrate cement buildings or basements; Small coverage and short distances limit wide spread use; Security issues with multiple networks operating in same locations	Could be used for HANs, MGANs, and NANs
3G Cellular (UMTS, CDMA2000, EV-DO, EDGE) Wide-area wireless networks for voice, video, and data services in a mobile environment	Expensive infrastructure already widely deployed, stable and mature; Well standardized; Equipment prices keep dropping; Readily available expertise in deployments; Cellular chipset very inexpensive; Large selection of vendors and service providers	Utility must rent the infrastructure from a cellular carrier for a monthly access fee; Utility does not own infrastructure; Technology is in the transition phase to LTE deployment; Public cellular networks not sufficiently stable/secure for mission critical/utility applications; Not well-suited for large data/high bandwidth applications	AMI Backhaul, Field Area Network (FAN)
LTE Enhancements to 3G Universal Mobile Telecommunications System (UMTS) mobile networking, providing for enhanced multimedia services	Low latency, high capacity; Fully integrated with 3GPP, compatible with earlier 3GPP releases; Full mobility for enhanced multimedia services; Carrier preferred protocol; Low power consumption	Utility must rent the infrastructure from a cellular carrier for a monthly access fee; Utility does not own infrastructure; Not readily available in many markets/still in testing phases in others; Equipment cost high; Vendor differentiation still unclear; Lack of expertise in designing LTE networks; Utilities' access to spectrum	AMI Backhaul, SCADA Backhaul, Demand Response, FAN, Video Surveillance
WiMAX (IEEE 802.16) Wireless metropolitan area network (MAN) providing high-speed fixed/mobile Internet access	Efficient backhaul of data – aggregating 100' s access points; QoS supports service assurance; Battery-backup improves reliability and security; Simple, scalable network rollout and customer-premises equipment (CPE) attachment; Faster speeds than 3G cellular; Large variety of CPE and gateway/ base station designs	Limited access to spectrum licenses in the US; Trade off between higher bit rates over longer distances; Asymmetrical up and down link speeds; User shared bandwidth; Competing against future 4G cellular	AMI Backhaul, SCADA Backhaul, Demand Response, FAN, Video Surveillance

Communications

At Nexgrid we have taken a 100% end to end standardized approach to communications by supporting an IP based solution with Wireless Wi-Fi 802.11, and ZigBee 802.15.4

Traditional Smart Grid



Nexgrid Smart Grid



Communication

Nexgrid smart grid gateways utilize the street lights as communication nodes



ecoNet SL Gateway
Installation

Smart Devices

Smart grid end points are not only meters when the system is designed on a open platform



Metering



Electric Vehicle



Load control



Street light



Video Surveillance



Thermostat



After the smart grid is deployed

Once you have installed a smart grid there are a few things to consider .

- Operational changes
- Database management
- Network optimization
- Addition of new smart devices
- Expansion of coverage area
- Equipment warranty
- Security and performance updates

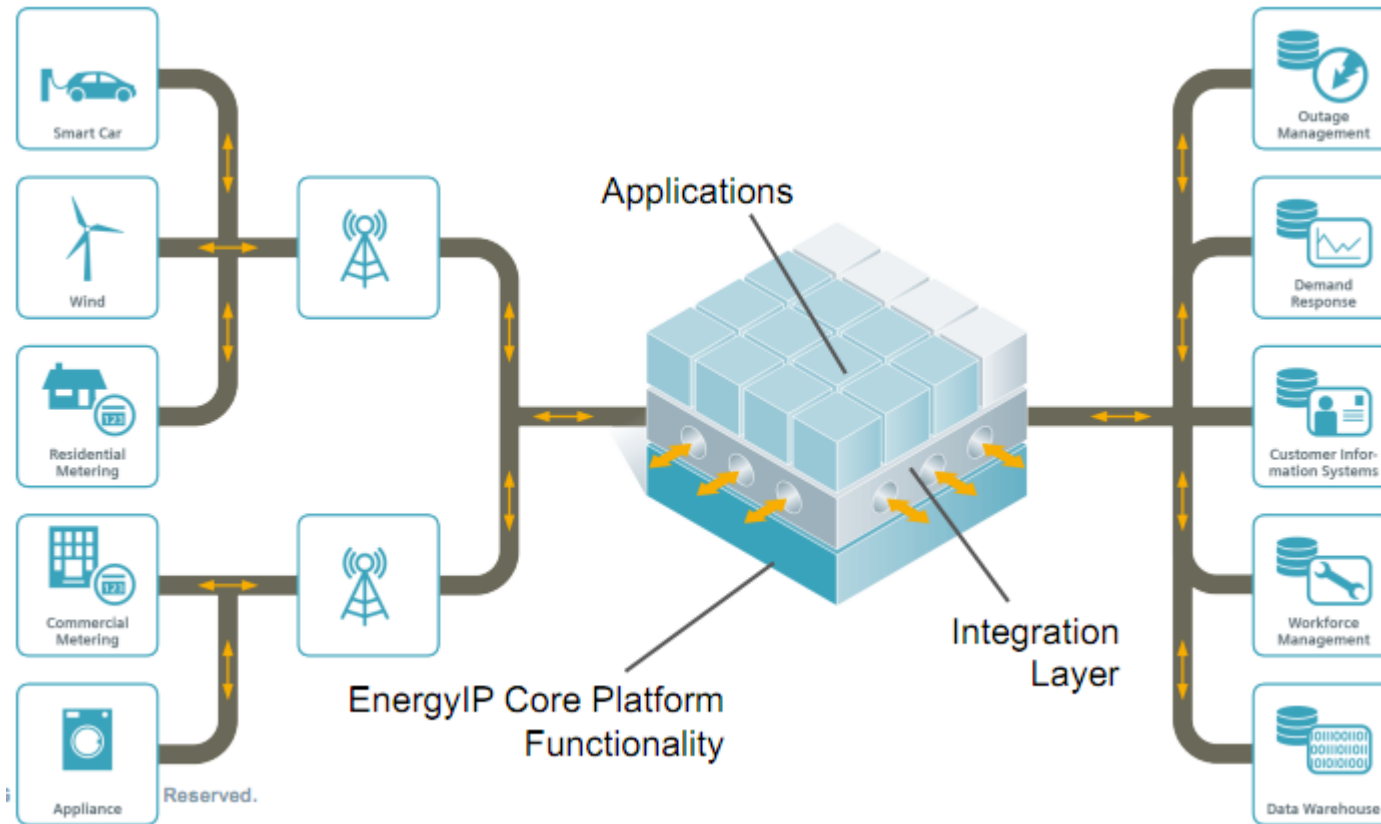
Conclusion

- Advanced metering can be much more than automated just automated billing.
- The information provided by AMI systems can be used to support improved decision making by system operators, engineers, maintenance managers, and other persons throughout the enterprise.
- The AMI should be a foundational element and a vital part of the communication backbone of electric utility's Smart Grid vision.

Thank
you

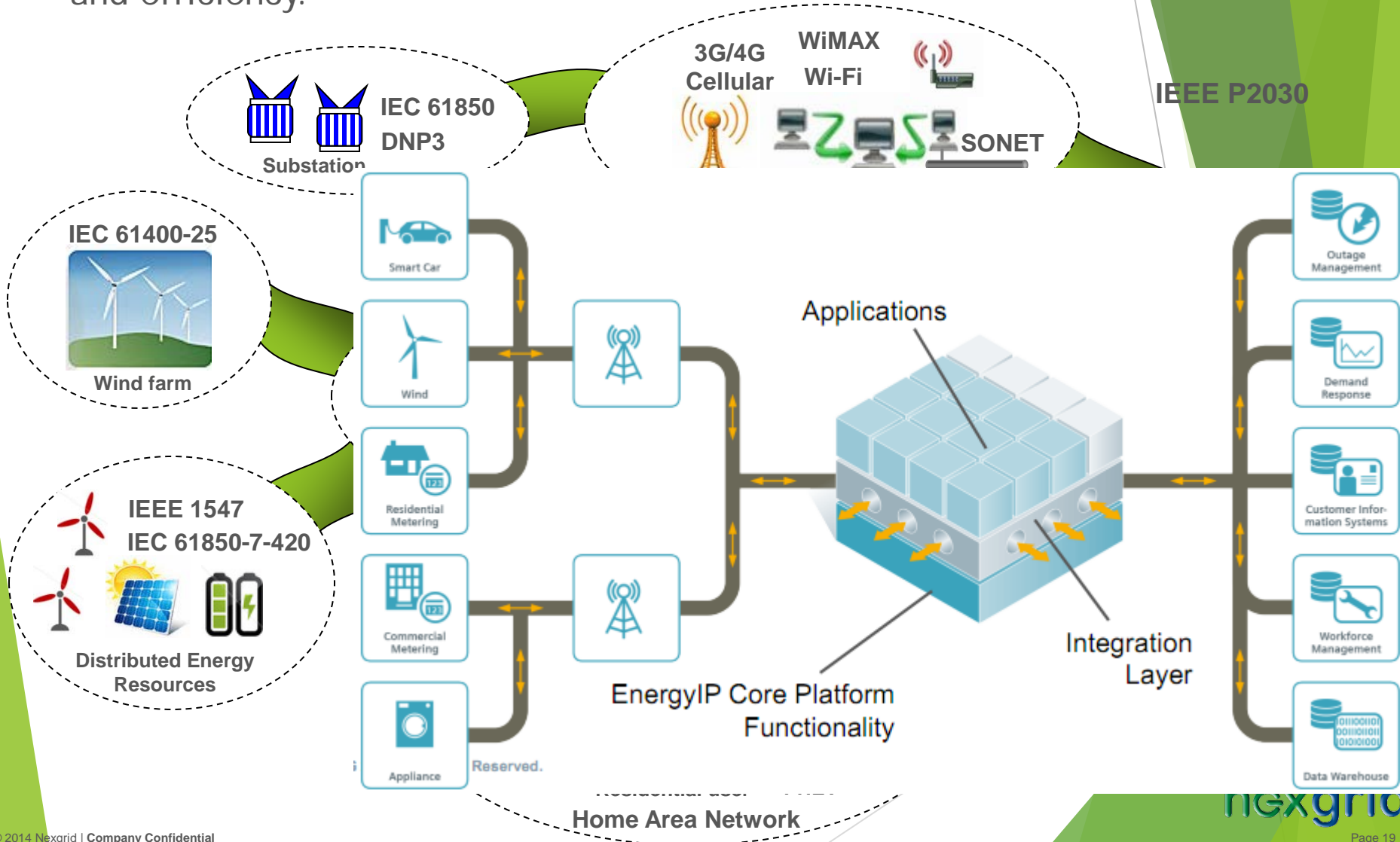
Smart Grid and AMI Standards

Standards are critically important in the electric power industry because they affect interoperability, compatibility, reliability, and efficiency.



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