Global Collaboration on Smart Grid Interoperability and Cyber Security

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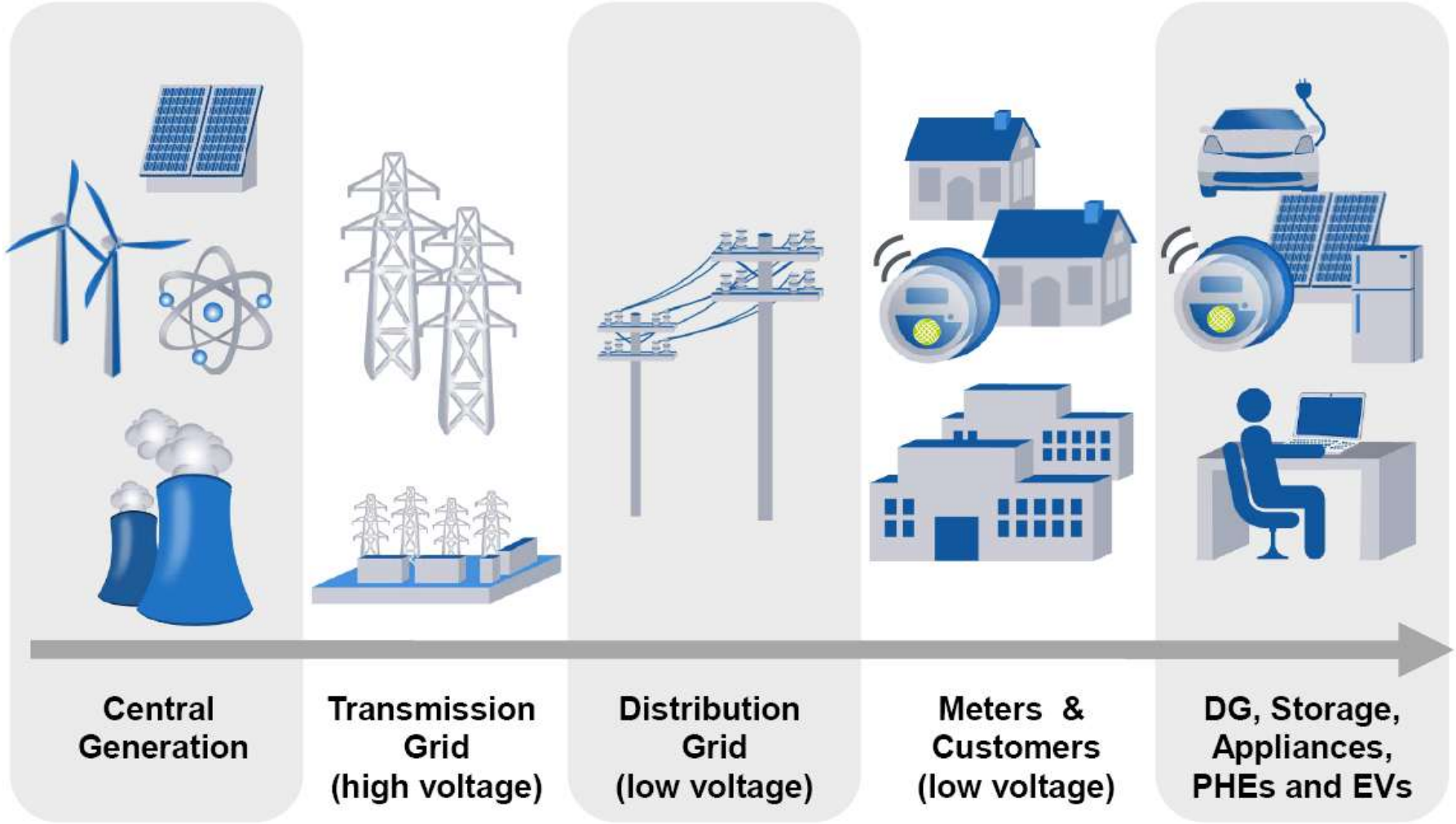
Smart Grid Infrastructure Ecosystem



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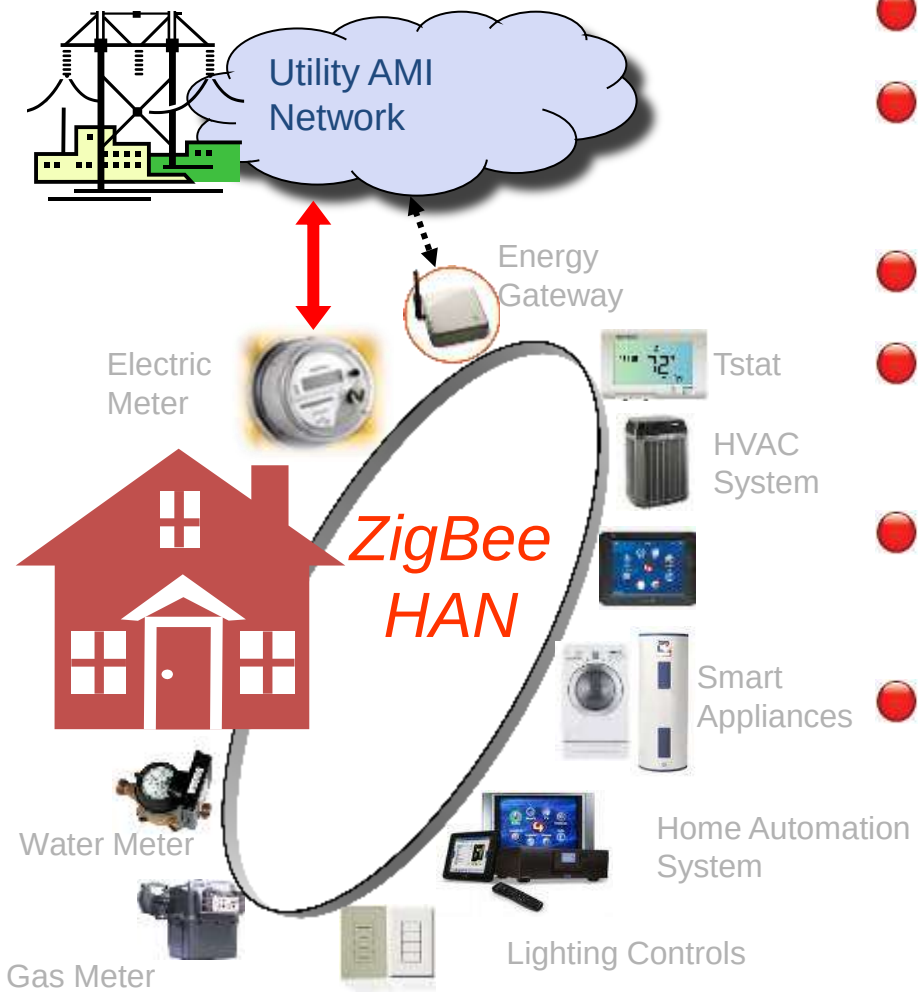
Requirements for HANs



- Retail products
- Competitive market / No vendor lock-in
- Low cost
- Solutions for the Global Market
- Large pool of people who understand the technology
- High levels of security

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ZigBee Alliance Overview

- Organized as an independent, neutral, nonprofit corporation in 2002 for wireless sensor networks Standards Development
- Open and global
  - Anyone can join and participate
  - Over 400 companies worldwide are members
  - Membership is global [approx. 40% Americas, 30% EMEA, 30% Asia]
- Activities include:
  - Open Standards for wireless sensor and control
  - Product Certification and compliance programs
  - Branding, market development and user education
- ZigBee is a key enabler for the Internet of Things

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Utilities Are Looking For …

- Open standards
- Large global manufacturer base and participation
- Proven technology
  - Reliable
  - Secure
  - Easy and simple
  - Low power
  - Low cost
  - Support large networks with thousands of devices
  - Interference tolerant
- Ecosystem of products
- Established certification test program to guarantee product interoperability

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Ecosystem of Stakeholders

- Utilities and Retail Energy Providers
- Government and Regulators
- Security Experts – internal & external
- AMI and Meter Vendors
- Demand Response and Load Control Vendors
- White Goods Vendors
  - Thermostats
  - Displays
  - Smart Appliances
- System Integrators
- Semiconductor Manufacturers
- Outreach to other standards & requirements bodies such as OpenHAN (within UCAIug)

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ZigBee Alliance - 400 Members and Growing

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ZigBee Alliance Industry Partners

We work with a number of industry associations, groups, and initiatives…

ANSI American National Standards Institute

ATA AMERICAN TELEMEDICINE ASSOCIATION

BACnet International

CABA 20th ANNIVERSARY

CEA Consumer Electronics Association MEMBER

cen

Continua HEALTH ALLIANCE

EMerge™ ALLIANCE

ETSI

ESMIG EUROPEAN SMART METERING INDUSTRY GROUP

dlms device language message specification

DRSG Demand Response and Smart Grid Coalition

ENERGY RETAIL Association

EPRI ELECTRIC POWER RESEARCH INSTITUTE

HOMEPLUG® POWERLINE ALLIANCE

IEEE

ipso Alliance

NIST

UPnP™

SunSpec™ alliance

WiFi

SAE International

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Specification Development Process

- Open, democratic approach to specification development – mirroring IEEE (and other SDO) process
- Marketing Working Groups manage market requirements
- Technical Working Groups manage specification development
- Organization-based membership and voting – attendance-based voting rights
- Specifications must go through several reviews before ratified by Alliance Board
- Specifications made publicly available for free download once complete and ratified
- ZigBee Smart Energy standards work open for public comments in process

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ZigBee Smart Energy Security

- Uses common security protocols
  - AES-128-CCM encryption
  - HTTPS
  - HTTP over TLS with handshaking
- Multiple Key Support
  - Master Keys: Shared Secret for encrypting frames at network join
  - Network Keys: Network layer security shared throughout a network
  - Link Keys: Optional for device-to-device communication
- FIPS 140-2 validated Elliptical Curve Cryptography (ECC)
- ECC signed digital certificate in every ZigBee Certified device
- External review conducted by Carnegie Mellon for ZigBee Smart Energy 1.0

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NIST Cyber Security Work Group

- Represents variety of stakeholders
  - Utilities
  - Cyber security experts
  - Product developers
- Goals
  - Develop an overall cyber security strategy for the Smart Grid that includes a risk mitigation strategy to ensure interoperability
  - Include prevention, detection, response, and recovery
- Produced NISTIR 7628
  - Definition of 180 high level security requirements
  - Identifies strategy for risk assessment: Threat X Vulnerability X Consequence = RISK
  - Provides a model for evaluating standards

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ZigBee Smart Energy Deployments

- **40+ million ZigBee electric meters being deployed by more than 11 utility companies in the USA**
  - Major deployments in California, Texas, Oklahoma, Maryland, Michigan, Washington, DC & Virginia
  - An additional 40 million meters (from utility RFPs) in the USA are in various stages of business case development and rate approval with local regulatory bodies
- State of Victoria in Australia upgrading all its meters
- British Gas selected Smart Energy for its multi-million meter roll out and will start deployment shortly

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Questions / Discussion

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