Smart Grids

Opportunities for Reliable & Sustainable Power

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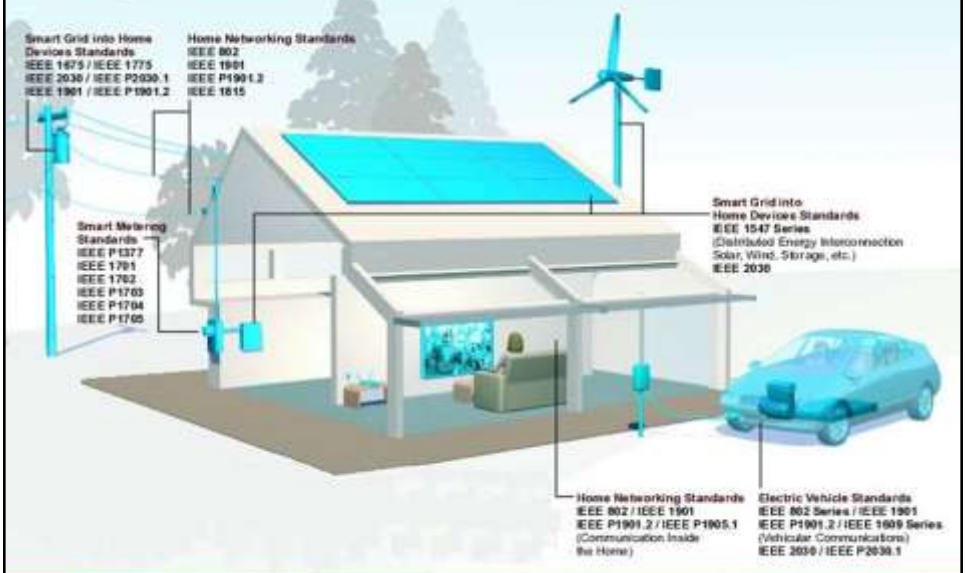
Agenda

- Powering the future
- Future of distributed generation and green power
- Interweaving technologies
- Challenges of cyber security
- IEEE activities towards advancing Smart Grids
- Get involved

Powering the future

- Having safe and reliable power relies on an improved Grid
- Reliable power is essential to the advancement of technology
- Traditional means of generating power is not forever
- Smarter monitoring, protection and control is essential to a Smart Grid
- Electricity touches so many areas of our lives

IEEE Enabling Consumer Connectivity Through Consensus Building



Distributed generation and green power

- Fossil fuels here today, and gone tomorrow
- Small scale power generation a reality:
  - Solar
  - Wind
  - Fuel Cell
- Need for more efficient power conversion and high capacity storage is essential
- Issues working against
  - Mother nature
  - Peak demand
  - Power quality issues
- The grid needs to be fortified to address:
  - Higher usage
  - Sharing of power generated from small sites
  - Dealing with the issues of back feeding power
- Traditional bulk generation will still be required

Interweaving technologies

- Reliable and robust high speed communications vital:
  - Smart metering
  - Distribution automation
  - Smart monitoring to manage congestion
  - Smart grid control to manage diverse generation sources
- Disciplined and robust software development
  - Systems need to work all the time
  - No bugs allowed!
- Reliance on more powerful microcontroller technology
  - 32 bit technology essential
- Importance on nanotechnology and sensors
- Standards to ensure interoperability
  - Happening now

Challenge of cyber security

- The Internet is a double edge sword
  - High speed communications essential to improved reliability and interoperability
  - Public networks not secure
  - Internet with sufficient bandwidth is essential to the deployment of IEC61850
- Need for Global Standards required to ensure interoperability
  - Ethernet fiber or power line carrier favored over wireless for bulk power assets
  - Wireless favored for consumer, commercial and industrial applications
- Emphasis by governments on cyber security may lead to dumb grid

IEEE and Smart Grids

- The importance of Standards on interoperability
- Examples of published IEEE Standards:
  - Smart metering: IEEE Stds 1377, 1701, 1702, 1704, 1705
  - Distributed generation: IEEE Stds 1547 series, 2030
  - Network protocols: IEEE Std 1815
  - Network security: IEEE 1402, 1888.3
  - Ethernet connectivity: IEEE 802, 1901, 1901.2
- Ongoing and potential IEEE Standards development efforts:
  - Network control: IEEE P2030.3 and P2030.4
  - High capacity storage technology standards other than lead acid
  - Equipment and apparatus standards for a Smart Grid World
  - Smart sensors
  - More efficient power conversion technologies
  - Power quality for power conversion

Get involved

- IEEE Innovative Smart Grid Technology:
  - Conferences sponsored by IEEE ISGT at www.ieee-isgt.org
  - Focus on future path for the Smart Grid
  - Join: http://smartgrid.ieee.org/
- Subscribe: IEEE Transactions on Smart Grid:
  - Multi-discipline and international journal on Smart Grids
  - www.ieee-pes.org/ieee-transactions-on-smart-grid
- Current IEEE Smart Grid Standards development efforts:
  - http://standards.ieee.org/develop/project/smart_grid.html
- Published IEEE Smart Grid Standards:
  - http://standards.ieee.org/findstds/standard/smart_grid_all.html

Thank you!