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National Institute of Standards and Technology
U.S. Department of Commerce

Lessons Learned from Smart Grid

Jim St.Pierre
Deputy Director
Information Technology Laboratory
National Institute of Standards and Technology
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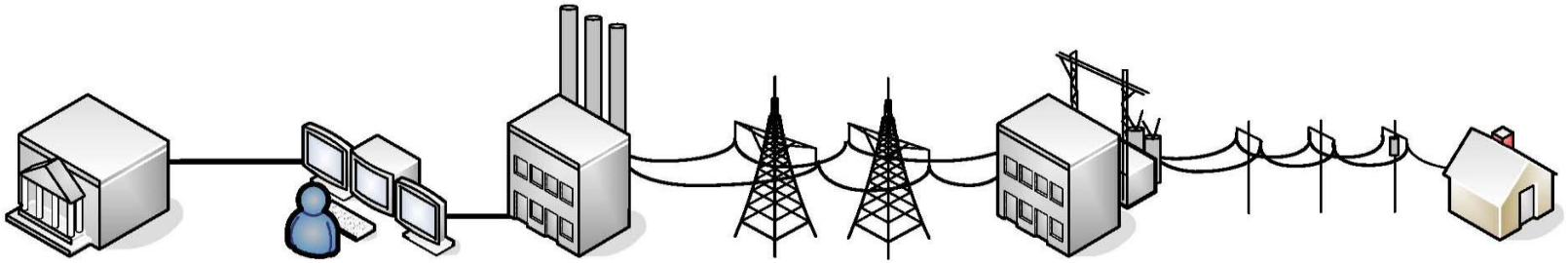
Outline

- Introduction
  - Overview of Smart Grid
- Lessons learned
  - Smart Grid - one example of NIST working with Industry

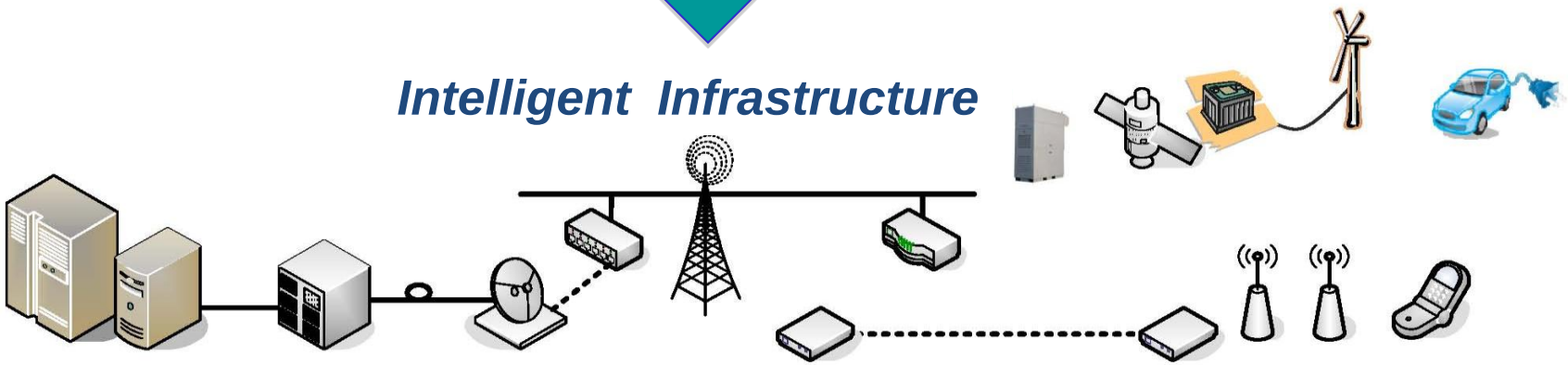
Smart Grid: The "Energy Internet"



Electrical Infrastructure

2-way flow of electricity and information

Intelligent Infrastructure



Standards Provide a Critical Foundation

Graphics courtesy of EPRI

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Smart Grid – A National Priority

- "We'll fund a better, smarter electricity grid and train workers to build it…" President Obama
- "To meet the energy challenge and create a 21st century energy economy, we need a 21st century electric grid…" Secretary of Energy Steven Chu
- "A smart electricity grid will revolutionize the way we use energy, but we need standards …" Secretary of Commerce Gary Locke

Smart Grid Enables:

- Higher Penetration of Renewables
- Smart Charging of Electric Vehicles
- Consumers to Control Energy Bills
- Efficient Grid Operations & Reduced Losses
- Reduced Distribution Outages
- Improved System Reliability & Security






US Government Roles in Smart Grid

Federal

Office of Science & Technology Policy; National Economic Council; & Council on Environmental Quality

Smart Grid Task Force / National Science & Technology Council Smart Grid Subcommittee

Other Federal Agencies (EPA, …)

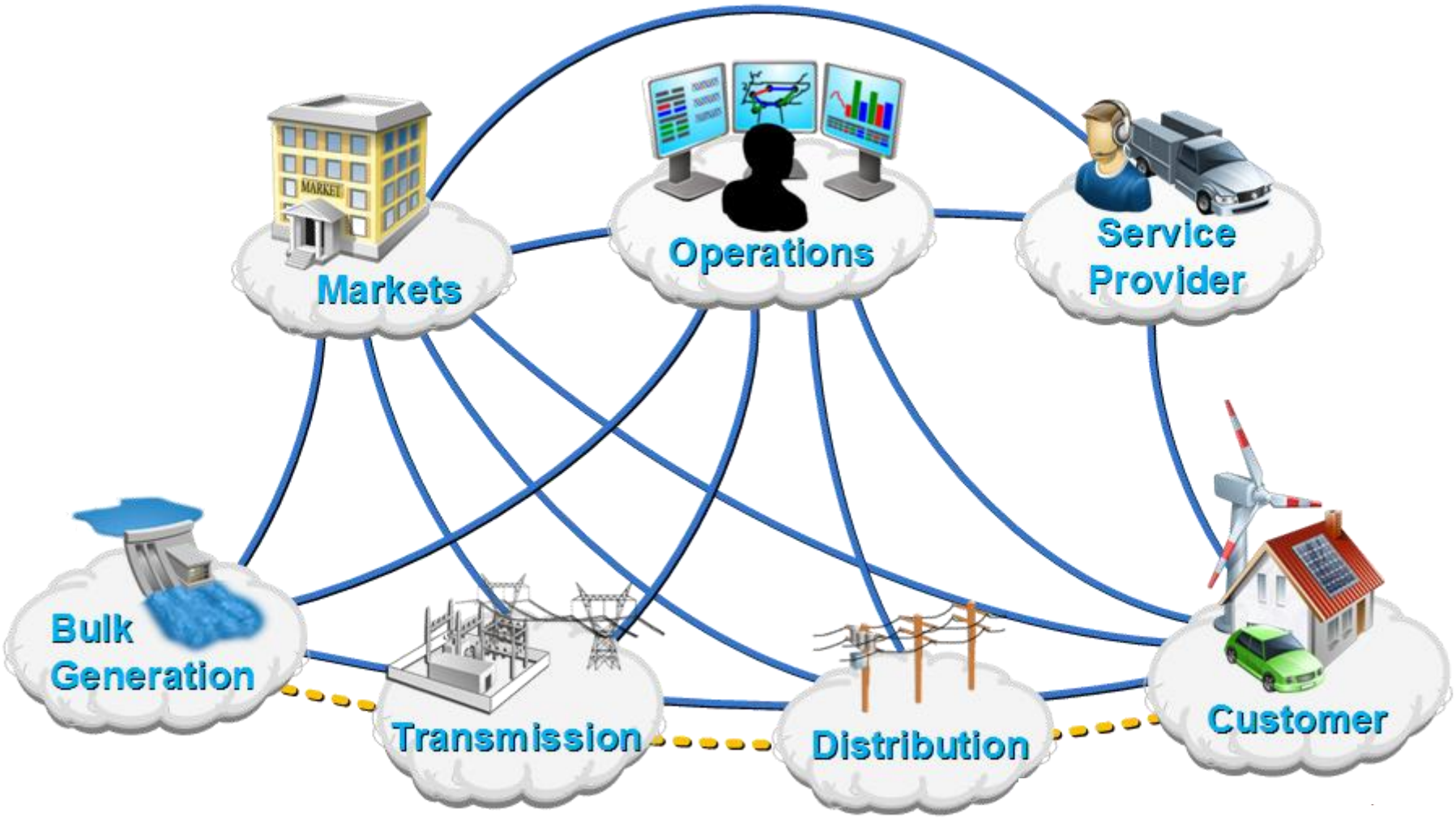
Federal Energy Regulatory Commission

State

FERC – NARUC Smart Response Collaborative

Public Utility Commissions

NIST Smart Grid Conceptual Model



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Lessons learned from Smart Grid and other efforts

- Importance of establishing a strong partnership with industry, government, standards development organizations, and other stakeholders!
- Importance of definitions and taxonomies to enable progress
- Roadmap helps ensure everyone is on the same page
  - Reference Conceptual Model/Architecture provides common understanding
  - Measurement and Testing is important – finding the right model requires working closely with industry, other agencies, SDOs…
  - Prioritize and look for low hanging fruit
- Use cases are valuable to articulate requirements
- Importance of international standards
- Cybersecurity is critical and crosscutting

Lessons learned from Smart Grid and other efforts

Implementation

- Coordinating large groups – breaking the problem down is important
  - E.g., Smart Grid CSWG example (~500) – sub groups – workshops, telecons
  - In the case of this cloud effort:
    - Government Agency Requirements (use cases)
    - Roadmap for addressing these requirements
    - Interim solutions – e.g., SAJACC
- Public review of documents and resolution of comments is important.
  - We do this with all our cybersecurity documents and it is a critical aspect of getting stakeholder input and buy-in.
  - Use of web to share documents under development

Conclusion

- The good news is that NIST has been involved in these types of collaborative standards efforts for many years – one recent example is Smart Grid, others include Health IT, IPv6, Voting, Cyber Security standards for the Federal Government…

- Together we can get there!

Backup

NIST Smart Grid Role: Coordination of Interoperability Standards

- Under Title XIII, Section 1305 of the Energy Independence and Security Act (EISA), NIST has

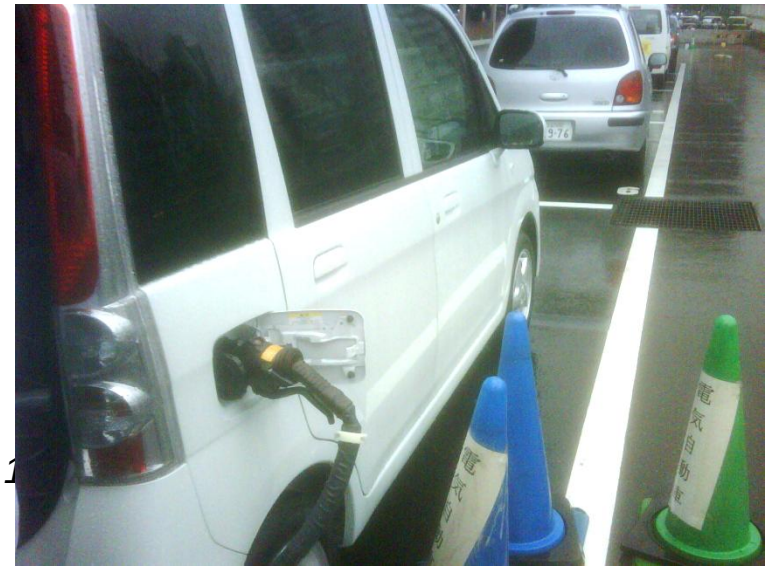
  > *"primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems…"*

- Input to Federal Energy Regulatory Commission (and State Public Utility Commissions)

  > *"…after [NIST]'s work has led to sufficient consensus in [FERC]'s judgment, [FERC] shall institute a rulemaking proceeding to adopt such standards and protocols…"*

- Use of these standards is a criteria for Department of Energy Smart Grid Investment Grants

Potential of Electric Vehicles



- Idle capacity of the power grid could supply 70% of energy needs of today's cars and light trucks
- Displace half of US oil imports
- Reduce CO_2 20%
- Reduce urban air pollutants 40%-90%
- Batteries in EVs could provide power during peak demand