Cybersecurity and Privacy in an Interconnected, Intelligent Efficiency World

September 15, 2015

Galen Rasche
Sr. Program Manager

grasche@epri.com
The Landscape

- Most new generation connecting at grid “edge”
- The “edge” is the distribution system
- Distribution has least amount of utility visibility/control

Distributed Energy Resources (DER)

- Combined Heat & Power
- Demand Response
- Home Energy Management
- Rooftop Solar
- Energy Storage
- Electric Vehicles
- Large-Scale Solar
Trends Impacting Security

- Increased number of Internet connected systems and devices
- Increased capability of equipment in the field
- Connections with more business players
- Attacks from economic criminals, nation states, and terrorist organizations
EPRI Smart Thermostat Project Analytics Project

Smart Thermostat Project Analytics

“Traditional”
- Premise-level data
- Seasonal/Annual
- Controlled Pilots

“Data-driven”
- Thermostat-level & other data
- Real-time (or more so)
- Applications: RT M&V, others…
## Insights and Complexity of the New Data Paradigm

- Single AMI data stream to multiple asynchronous data streams
- Leverage data from different sources to better understand customer behavior and grid uses
- Data privacy and confidentiality should be a primary concern
- Development of new tools and analytical treatments

<table>
<thead>
<tr>
<th>Time stamp to be synced</th>
<th>AMI Data</th>
<th>Device 1 data</th>
<th>Weather data</th>
<th>Device 2 data</th>
<th>Survey data</th>
</tr>
</thead>
<tbody>
<tr>
<td>User ID</td>
<td>Time</td>
<td>Meter Read (kWh)</td>
<td>Indoor Temp</td>
<td>Set point</td>
<td>Out door temp</td>
</tr>
<tr>
<td>1234</td>
<td>4/5/2015 5:00 PM</td>
<td>13456.2</td>
<td>72.3</td>
<td>76</td>
<td>94</td>
</tr>
<tr>
<td>1234</td>
<td>4/5/2015 5:15 PM</td>
<td>13458.4</td>
<td>72.4</td>
<td>76</td>
<td>95</td>
</tr>
<tr>
<td>1234</td>
<td>4/5/2015 5:30 PM</td>
<td>13460.2</td>
<td>72.4</td>
<td>76</td>
<td>94</td>
</tr>
</tbody>
</table>
Sample Use Cases for Data from Customer Resources

- Understanding customer preferences
- M&V 2.0 – Real time performance verification for EE & DR
- Optimizing DR potential
- Flexible Load Operations
- Locational load control
- Understand changing load usage
- Analyzing rate structures
- Customer Targeting for EE & DR programs
- Understanding micro-level EE & DR potential
Threat Model and Security Challenges
Threat Model

- Adversaries with intent
- Insiders or outsiders, groups or individuals
- Failure in people, processes, and technology, including human error
- Loss of resources, in particular key employees or communications infrastructure
- Accidents
- Natural hazards as they impact cyber security
Recent IoT Vulnerabilities

Jeep Hack: Fiat recalls 1.4 million vehicles for software fix

by Chris Matthews       @crobmattewhs       JULY 24, 2015, 11:41 AM EDT

Samsung's smart fridge could be used to steal your Gmail login

by Stacey Higginbotham @gigastaceey       AUGUST 24, 2015, 1:10 PM EDT

#IoTsec Disclosure: 10 New Vulnerabilities for Several Video Baby Monitors

Posted by Tod Beardsley in Information Security on Sep 2, 2015 9:28:04 AM
Moving Forward…

- Address **interconnected systems** – both IT and control systems
  - Cyber security needs to be addressed in **all** systems, not just critical assets
  - Augment existing protection controls, as applicable

- Continuously **monitor and assess** the security status

- Ensure that devices can be upgraded to patch vulnerabilities

- Acknowledge will be some security breaches
  - Focus on response and recovery
  - *Fail secure*
    - Address both safety and security
Together…Shaping the Future of Electricity