



Trustworthy Technologies for Local Area Management, Monitoring, and Control

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Number of Activities: 5

2012 Industry Workshop

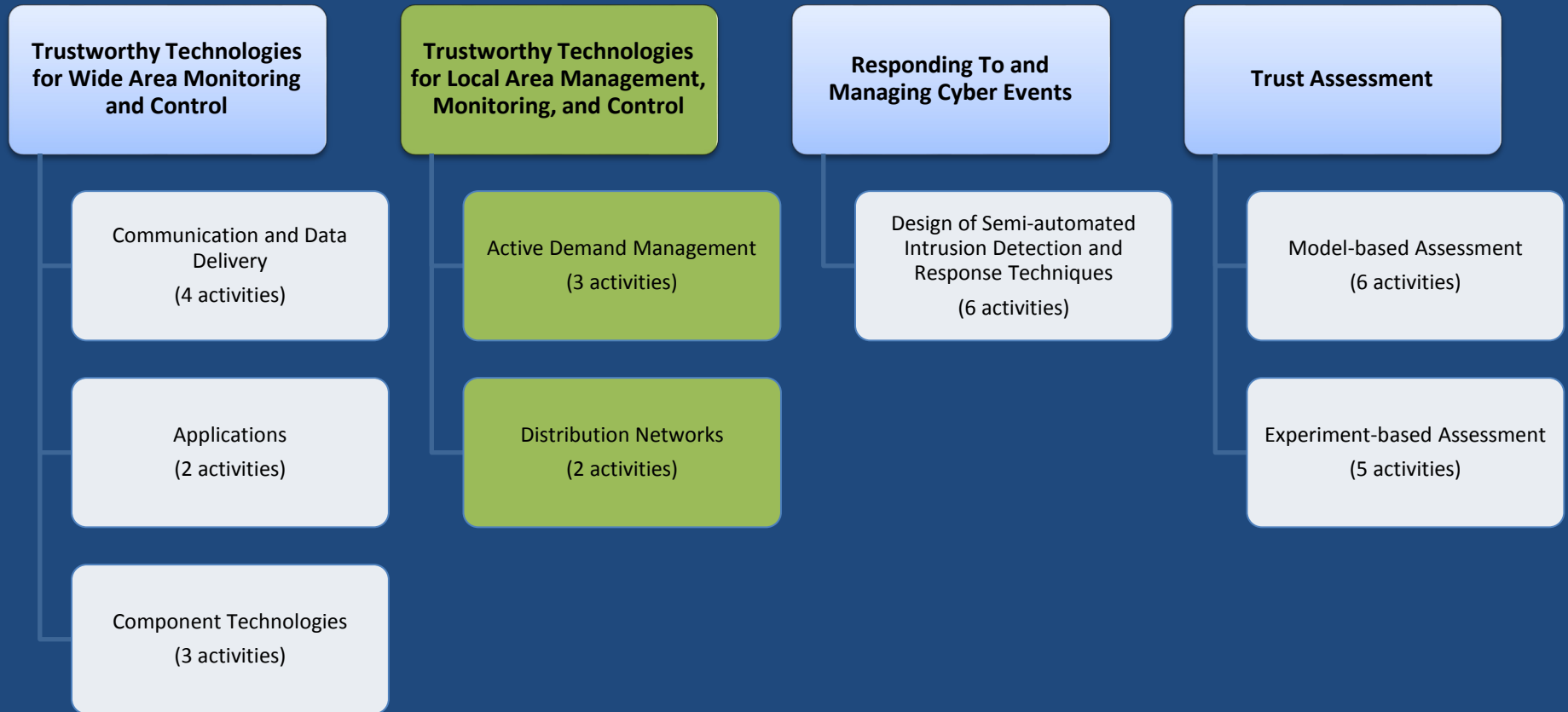
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UCDAVIS



TCIPG Technical Clusters and Threads



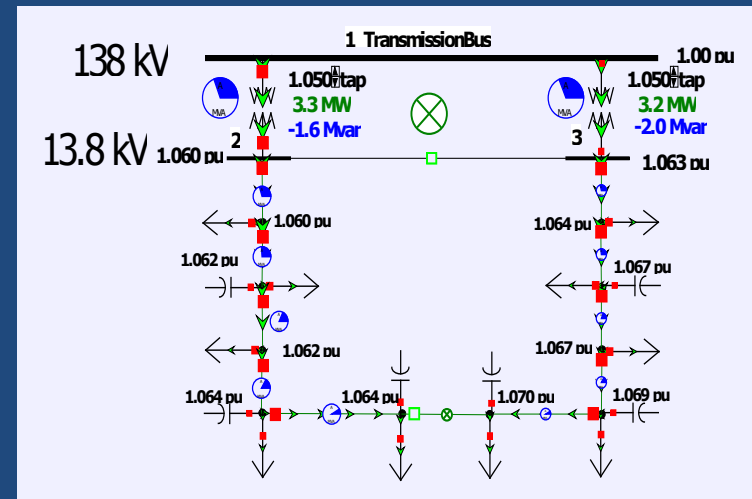
Cluster Overview

- Cluster focuses on the distribution system and the end load
- Adding more renewable, but less controllable generation, will require more participation by the electric load
 - Distributed generation may be embedded in “demand”
 - Demand could drastically change with new loads
 - New loads can have unexpected societal impacts
- New distribution technologies promise better reliability
 - Cyber security of distributed devices is a growing concern



Cluster Problem Areas

- Focus on issues associated with making the distribution system and load more known and/or controllable
- Directly addresses many of the core issues associated with the “smart grid”
 - Traditionally, distribution and load have been viewed as relatively passive
 - Key smart grid premise is to make customers participants, providing information to help them optimize their electricity usage
 - Making the distribution and demand more “active” adds cyber security issues



Cluster Approach

- Objective of the cluster is to better determine and solve the cyber security issues related to making for a more active distribution system and demand
- Distribution Network Thread
 - Growing number of cyber enabled distribution system devices makes password management problematic
- Active Demand Management Thread
 - As the load becomes more active, and potentially mobile, new opportunities and challenges are emerging



Activity Highlights

- Password Changing Protocol
 - Large number of distributed devices make password management difficult; activity is investigating the use of authenticated hand held devices that then communicate securely to the pole mounted devices
- Development of the Information Layer for the V2G Framework Implementation
 - Loss of fuel tax revenue is a key concern with a transition to electric vehicles (EVs); looking at security aspects of mileage-based tax collection using GPS systems



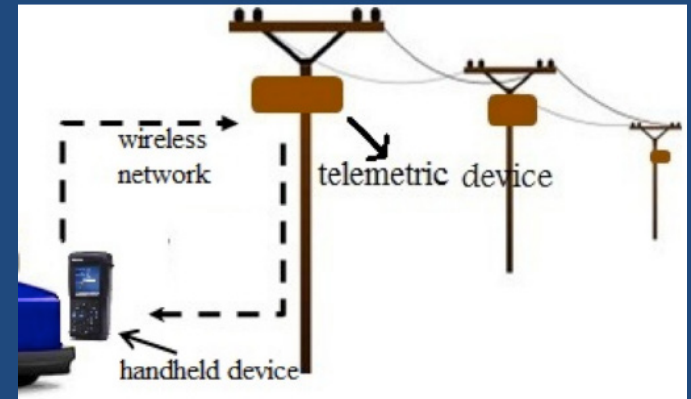
Activity Highlights

- Trustworthy Framework for Mobile Smart Meters
 - Idea is meter is on EV with reporting to utility of amount charged, and utility providing the EV with pricing options; work is progressing on development of a basic obstacle-aware routing protocol
- Control of distributed reactive resources
 - Distributed devices like EVs and PVs can provide reactive power; algorithms needed to determine the amount of information necessary to determine the appropriate power factor



Cluster Impact

- Demonstration of the password changing framework between a laptop and an android phone to test performance
- Specification of a basic reliable routing protocol titled Obstacle-Aware Cyber-Physical Routing for Vehicle-to-Infrastructure Communication
- Assessment of past mileage-based data usage projects
- Development of a localized control scheme to achieve a target household power factor using smart meters and a home monitoring and control system



Planned Research for Coming Year

- Explore camera based authentication protocols.
- Continue the assessment of previous EV studies, and develop a set of key requirements for the architecture and the data collection/processing aspects
- Study the issues of reliable and secure communication and routing over heterogeneous networks (WiFi/cellular/ZigBee)
- Move towards validation on distributed reactive resource control algorithms on the UIUC distribution network

Questions?