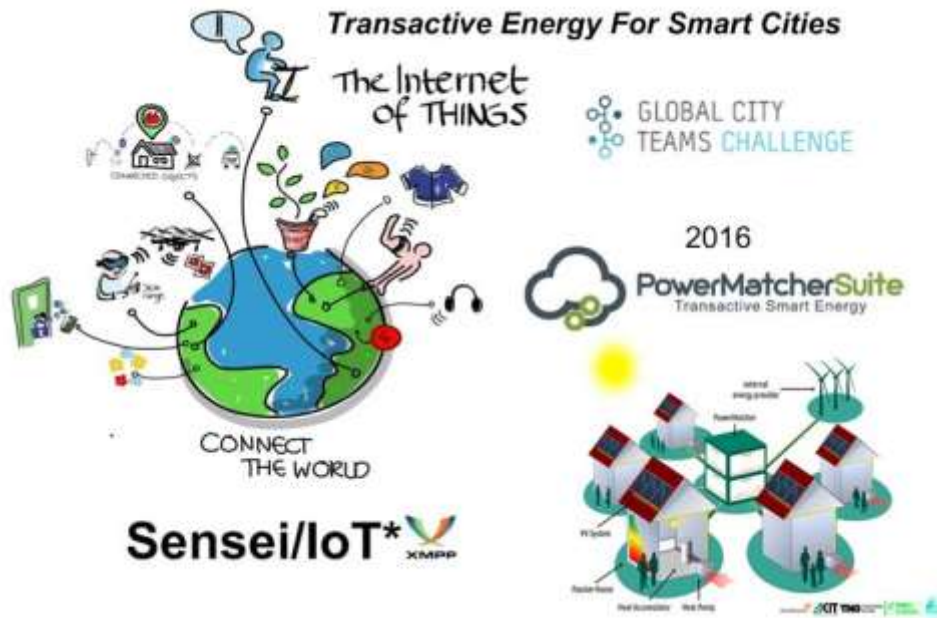


PowerMatcher IoT Team



Leader: William Miller, MaCT USA

Goals:

Demonstrate the benefits to the US electric grid of a market approach using PowerMatcher. PowerMatcher has been deployed successfully to enable energy flexibility in Netherlands, Denmark, and Germany.

Deliverables:

Demonstration with multiple universities providing loads and DER assembled into a virtual PowerMatcher network implementing PowerMatcher bid interactions over XMPP.

Participants:

- NIST GCTC II / TE Test Bed Team
 - TNO/Alliander – Netherlands
 - SUSE SE – Sweden
 - Esensors – Buffalo, NY
 - MaCT USA – Washington, DC
- Smart City participants:
 - Buffalo State (Buffalo, NY) – Solar PV
 - Rowan University (Glassboro, NJ)
 - University of Ontario Institute of Technology (Oshawa, ON) – Solar PV and wind

- Virtual (simulated) loads/DER:
 - Carnegie Mellon University (Pittsburgh, PA)
 - Vanderbilt University (Nashville, TN)

IoT/PowerMatcher Test Bed

- Utilizes XMPP over Websocket and IoT Discovery/Provisioning
- Provides high performance to make energy transactions in a simulated energy micro market via the Internet
- Demonstrates the benefits of decentralized energy grid balancing

IoT/PowerMatcher Benefits

- Benefits for Consumers
 - cost savings
 - maximum choice in consumer devices
 - prevent equipment lock-ins
 - enable micro energy market
- Benefits for Utilities
 - reduced complexity
 - shifting energy usage control to consumers for better engagement
 - balancing energy grid
 - support of renewable generation

TE Test Bed Methodology

- Using PowerMatcher to demonstrate decentralized energy transactions
- Protect privacy of end-users and without exposing end devices
- Bi-directional data exchange to multiple PowerMatcher nodes with secure streaming metadata
- RE: IETF RFC & IoT XEPs in ISO/IEC/IEEE P21451-1-4 (Sensei-IoT*)
- IoT/PowerMatcher Cities in the US and Canada
- The Smart Cities approach is similar to the pilots in the Netherlands
- Transaction metadata will be sent via the Internet
- PowerMatcher clients will communicate with the aggregator which interfaces with the simulated transactive energy grid

TE Test Bed Devices

- Time-shifters – appliances or equipment that operate on discretionary basis to energy cost savings
- Buffers – devices that can store energy temporarily
- Uncontrolled loads or producers, such as wind and solar generation
- Energy storage - batteries or electric vehicles (EVs)

PowerMatcher

Energy Flexibility- Power Interface (EF-PI)



Network Architecture for Transactive Energy (TE)

