Intwine Connected Gateway for VOLTTRON Applications

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Who We Are

• IoT network provider / energy systems integrator
  • Located in Cleveland, Ohio
  • Partnership Case Western Reserve University

• Deep experience developing VOLTTRON based systems for >3 years

• Established relationship with EPRI
  • Successfully executed on NREL INTEGRATE project
  • Currently engaged with additional VOLTTRON demonstration projects

• Active development engagements with DOE national labs

• Designed, built and currently offer:
  • Grid-edge, multi protocol, cellular router
  • CTA-2045 modules
  • Complete end-to-end software stack
Intwine Connected Gateway

• Linux based system
• Processor: Sitara ARM, 800MHz
• Memory: 512MB RAM, 4GB flash, MicroSD card slot
• Radios: WiFi b/g/n, ZigBee HA1.2, Bluetooth (4.0 and 2.0), LTE Cellular
• Physical: Ethernet (10/100/1000), USB
• Expansion Module: RS485, RS232, XBee, 2\textsuperscript{nd} Ethernet, etc
• Open-Sourced operating system and application layer

• Rugged industrial version also available
• Certified for use in US & Canada on all major cellular carriers
• Global certification expected by the end of 2017
Communication Options

- VOLTTRON and the Intwine Application Framework run in parallel
- Enables users to develop or use VOLTTRON agents or AF agents
- Easily integrate existing AF agents for ZigBee, BLE, WiFi devices
What is CTA-2045?

• Open Standard for interoperability with common home loads

• Intwine has WiFi Universal Communication Modules (UCM)
• Publicly available REST API that mirrors CTA-2045 command set
• VOLTTRON agent interact with the UCM
ICG as Brain for California Smart Grid

- Grant from California Energy Commission with EPRI, PG&E, SCE, SMUD, UL & device manufacturers
- Objective is to use HEMS for scalable solution to mitigate impact of Solar PV on distribution system
- ICGs will coordinate loads and PV within home and other ICGs in the neighborhood to minimize voltage droop at transformer
Olin Building @ CWRU

- DoE/PNNL Demonstration Project
- Integrating advanced controls into legacy BAS (Schneider 8000)
- 173 BACnet points for initial integration
- Private Facilities network for monitoring & control
- Objective is to use the storage and load control to flatten load observed by campus
To Order...

Single Piece: $600

http://intwineconnect.com/volttron

No contract cellular data is available
Interoperability / Compatibility

• Runs DOE’s VOLTTRON platform
• Standards we support
  • OpenADR2.0b to Cloud and Gateway
  • CTA-2045 using Intwine UCMs
  • ZigBee HA 1.2
  • WiFi b/g/n
  • Bluetooth 2 and BLE
  • 4G LTE cellular communication
  • Many more in the pipeline!
• CTA-2045 UCM source code is open-source
  • Also support SunSpec Modbus protocol
• Gateway Operating System is open-source
Why use a Gateway?

• Reduce cyber-attack vector
  • Instead of trying to secure EVERY connected device - secure one
• Parallel cellular connection means
  • the customer can’t accidentally firewall communications
  • Limited or no liability for problems/security on customer network
• Provides an interface between utility and customer
• Gateway provides value to customer
  • Energy efficiency, broadband backup, automation, monitoring, security