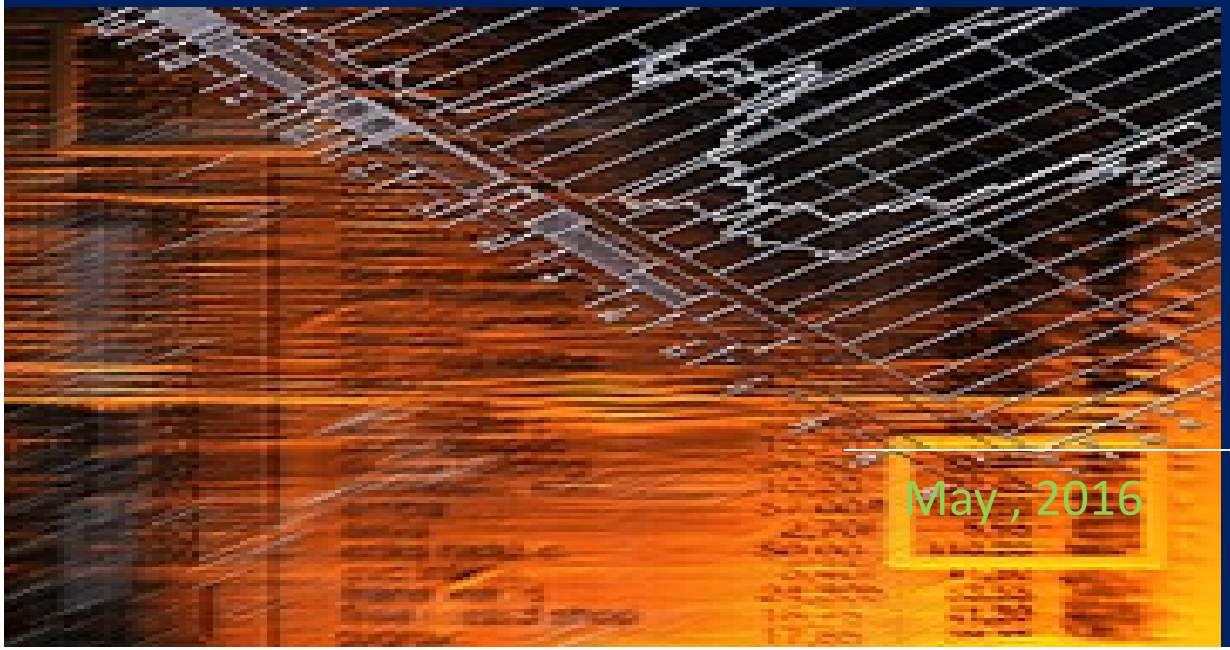
OpenADR and Internet of Things

An Overview



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Presentation By:

Michel Kohanim

CEO

Universal Devices, Inc.

➢ IoT is Here

- Ubiquity of connected and off-the-shelf communicating devices

➢ DR Programs Target Large Loads

- No low cost and non-proprietary solution that extends DR and M&V to IoT

➢ Automating IoT Is Cool But Benefits Are Not Tangible

- Customers cannot reap the benefits of energy conservation programs and rebates
- How about those billions of IoT devices out there which can participate in DR programs but are left out?

WHY OPENADR?

The Marriage!

- Why don't we marry IoT Automation with Energy Management?
- They are definitely compatible: Energy Management and Automation are pretty much two sides of the same coin
- But: the marriage would be short-lived without a common language!

The Language: OpenADR

- Standards based and Device Agnostic (common)
- Communicates DR and Price events to the VENs
- Measurement and Verification reports sent to the VTNs

The Rest is History!

- And they are still married … but …

WHY OPENADR?

Interoperability

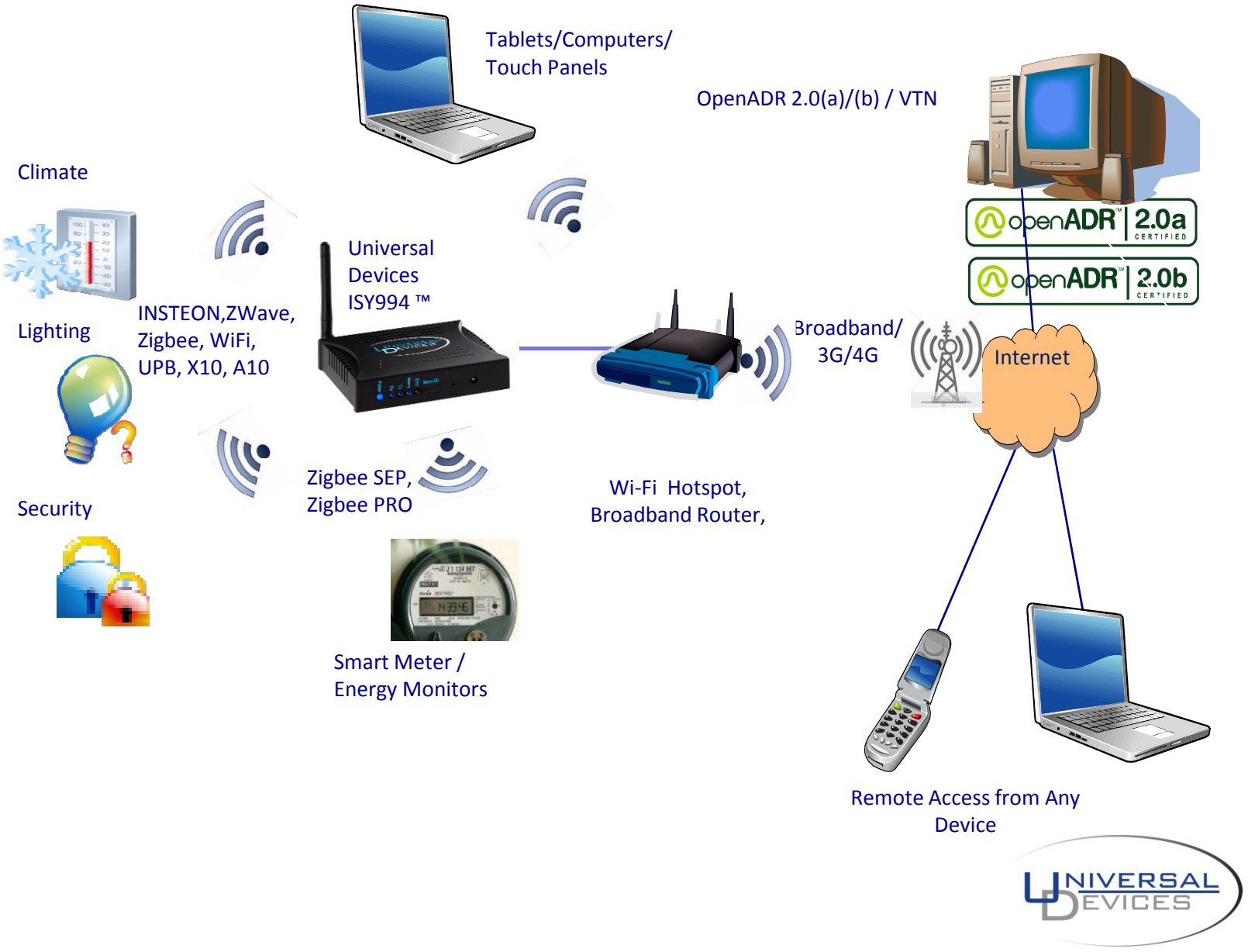
- Currently ISY figures out device classes and capabilities based on some heuristics
- In the brave new world of IoT, device classes and capabilities must be automatically discoverable
- Many disjoint and competing IoT standards: IPSO, AllJoyn, OIC/UPnP, Lightweight M2M, Thread, etc.

Cooperation

- OpenADR and IoT standards bodies must cooperate otherwise every minor change may cause major interoperability issues

TOPOLOGY

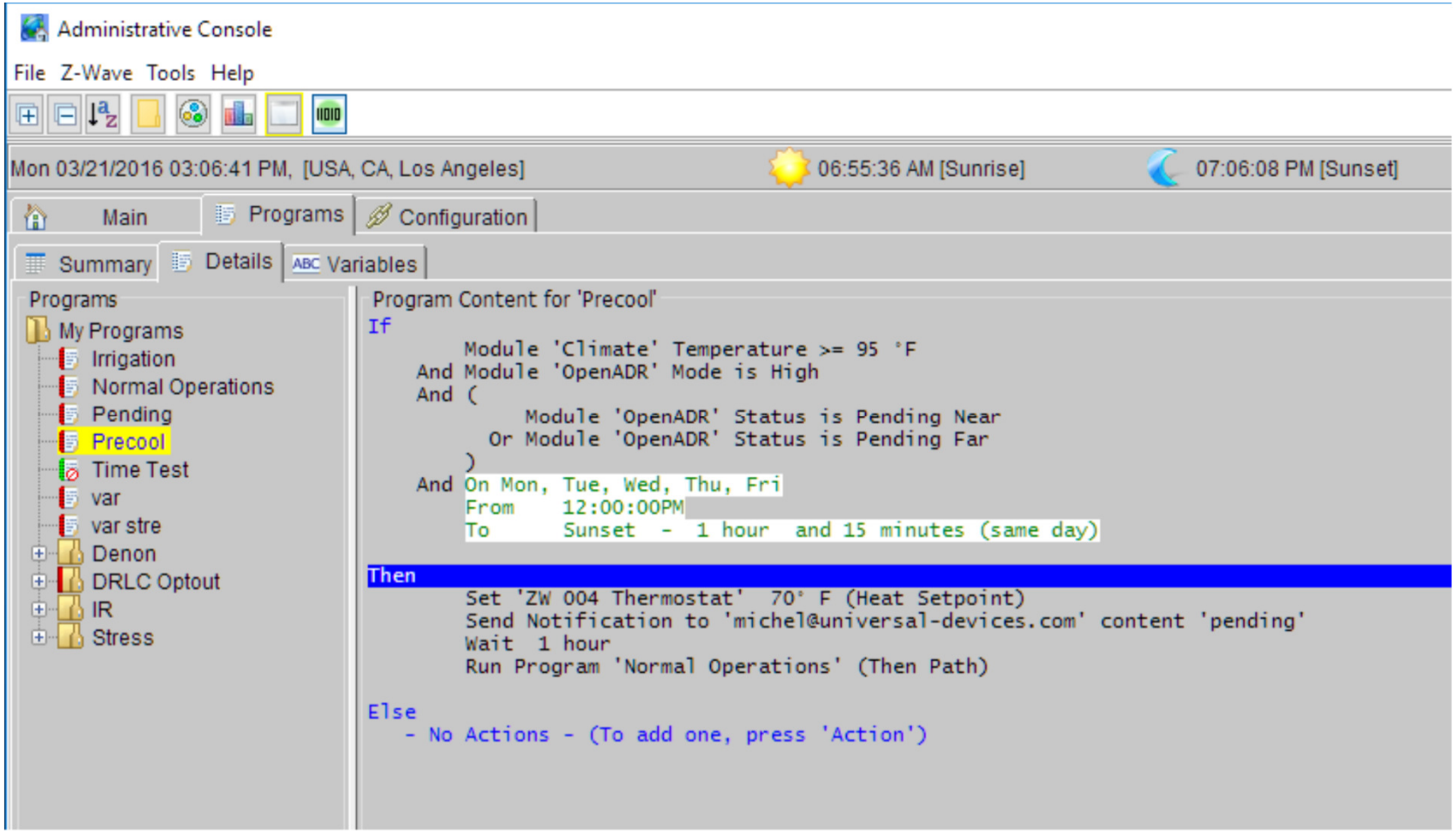
TOPOLOGY



SAMPLE - CONFIGURATION

CONFIGURATION

SAMPLE – RULES



SAMPLE DEPLOYMENTS – OPENADR 2.0A/B

- Smart Meter, Thermostats, and Load Controllers in Residential (2.0b)
  - Off-the-shelf Z-Wave
  - Off-the-shelf INSTEON
  - Zigbee SEP 1.1
- Thermostats in SMB (2.0b)
  - Off-the-shelf Z-Wave and Zigbee
- Thermostats in College Campus (2.0b)
  - Off-the-shelf Zigbee
- Load Controllers on RTUs (2.0a)
  - Off-the-shelf Zigbee
- DR + Measurement & Verification (2.0b)
  - Off-the-shelf wired relays
  - EM3 Energy Monitor + Pulse counter

UNIVERSAL DEVICES

Thank you!

Contact Information

Michel Kohanim
Universal Devices, Inc.
michel@universal-devices.com
(818) 631 - 0333

ISY994 Series

- A fully autonomous and low cost Automation and Energy Management system:
  - Utilizes off-the-shelf devices for command/control
    - Z-Wave, Zigbee, INSTEON, A10, X10 and Network
  - OpenADR 2.0a/2.0b Certified
  - Simple configuration for how devices respond to OpenADR Events
  - Opt Schedules automate when to Opt-in or Opt-out of OpenADR Events
  - Measurements are automatically sent to the VTN/DRAS utilizing OpenADR 2.0b Report Service
  - Not cloud based
  - Supports up to 1024 devices and therefore applicable to both residential as well as SMB

UNIVERSAL DEVICES

ISY994zw ZS

- Ideal For SMB and Residential Venues
- Direct Communications with Smart Meters
  - SEP 1.1 Certified
  - PG&E, SCE, NVE, and Oncor Certified
  - Near real-time energy readings from the Smart Meter are automatically sent to the VTN using OpenADR 2.0b Report Service
- Z-Wave Support
  - Support for any off-the-shelf Z-Wave device, including – but not limited to – thermostats and heavy duty load controllers
  - Energy readings from Z-Wave devices that report energy information is automatically sent to the VTN
  - Our OEM Z-Wave thermostats show OpenADR Events on their displays

ISY994R ZS

- Ideal for Venues with Existing Building Management Systems
- Direct Communications with Smart Meters
  - SEP 1.1 Certified
  - PG&E, SCE, NVE, and Oncor Certified
  - Near real-time energy readings from the Smart Meter are automatically sent to the VTN using OpenADR 2.0b Report Service
- Relays
  - Two relays to send signals to building management systems

UNIVERSAL DEVICES

EM3 Series

- Ideal for Venues without Smart Meters
- A fully autonomous and low cost Energy Monitoring and Relay Control System
  - OpenADR 2.0a/2.0b Certified
  - Energy Monitor – 3 Phase / Billing grade
    - Up to 480 volts balanced
    - 5 Channels of energy monitoring
    - 2 Temperature sensors
    - 2 Pulse counters or 1 KZY Simple configuration
    - Up to 16GB of storage
  - 4 x Relays
    - Communicate with Building Management Systems or
    - Turn on/off devices directly
  - Opt Schedules automate when to Opt-in or Opt-out of OpenADR Events
  - Measurements, for all channels – and including Pulse Counts – are automatically sent to the VTN/DRAS utilizing OpenADR 2.0b Report Service
  - Not cloud based

SOLUTION – EM3 SERIES

EM3 ZW

- Ideal for Venues without Smart Meters and Building Management Systems (SMB)
- Extends EM3 with Z-Wave Capabilities
  - Support for any off-the-shelf Z-Wave device, including – but not limited to – thermostats and heavy duty load controllers
  - Energy readings from Z-Wave devices that report energy information is automatically sent to the VTN
  - Our OEM Z-Wave thermostats show OpenADR Events on their displays

EM3 ZB

- Ideal for Larger Venues without Smart Meters and Building Management Systems such as SMB and Rooftops
- Extends EM3 with Zigbee Capabilities
  - Support for our OEM Zigbee Thermostats and Heavy Duty Load Controllers
  - Our OEM Z-Wave thermostats show OpenADR Events on their displays

HARDWARE SPECIFICATIONS - ISY

Hardware

- Freescale CPU
- 2MB Flash/8MB RAM
- Up to 16GB SD Card storage
- 10/100 Ethernet
- Real Time Clock on board
- 2 Serial Ports
- 4 digital I/O

Firmware

- HTTP
- HTTPS
  - Up to TLS 1.2
  - Client Authentication/Digital Certificates
- Open ADR, SEP, Flex Your Power
- Abstraction layer for support of other devices/protocols

UNIVERSAL DEVICES

EM3™

- 3 Phase Energy Monitor
  - Automatic configuration
  - Up to 480 volts balanced
  - 5 Channels of energy monitoring
  - 2 Temperature sensors
  - 2 Pulse counters or 1 KZY
  - Zigbee communications to ISY

EM3-RTU™

- 3 Phase Energy Monitor and RTU Diagnostics (SMDS)
  - Same features as EM3
  - Up to 16GB data storage
  - Real time clock on board
  - Network accessible

UNIVERSAL DEVICES