Smarter Buildings & Homes

How AI and OpenADR 3 Can Redefine Local Demand Flexibility
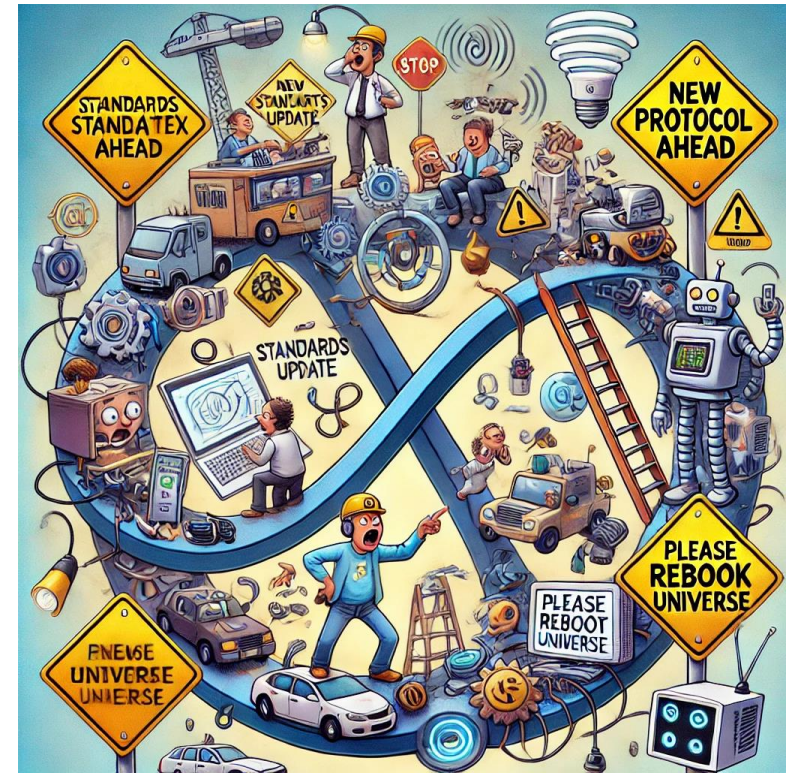
Michel Kohanim | Universal Devices

AGENDA

- Introduction
- The Gist and the Details
- What Didn't We Learn?
- Imagine!
- Is It Really Possible?
- Why AI?
- OPEn
- Demo
- Q&A

The Gist: Endlessly Repeating The Quest for ...

1) The Perfect Protocol and Standard

2) The Perfect Grid Signal and Tariff

3) The Perfect Superset Model for Devices

4) Manufacturers' Commitment for All the Above

The Quest for the Perfect Protocol and Standard

– Grid Protocols
  - OpenADR 2.0a/b
  - SunSpec
  - OCPP
  - DNP3
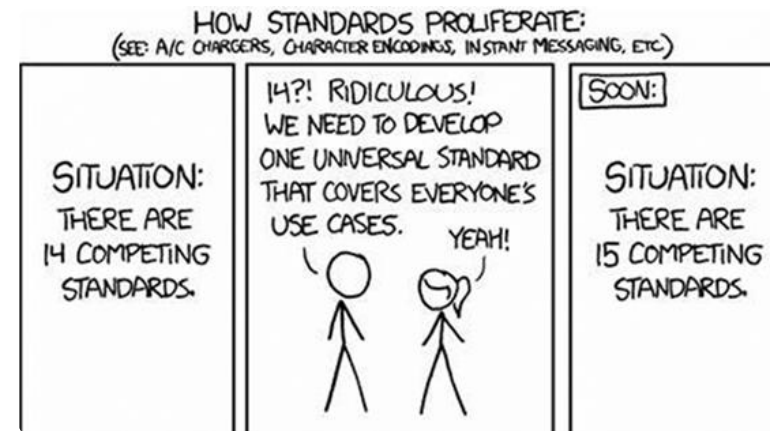 - IEEE 2030.5 (SEP 2.0)
  - Etc.

– Device Protocols
  - Z-Wave
  - Zigbee (multiple profiles)
  - Thread
  - BLE & BLE Mesh
  - LoRa
  - WiFi-based proprietary solutions
  - Etc.

– New Ones Are Born Everyday!
  - Matter
  - OpenADR 3.0
  - MIDAS (California Price Server)

The Quest for the Perfect Grid Signal and Tariff

– Different Grid Signals
  - Demand Response, set points, load control
  - Prices to devices
  - Transactive Energy (transactional), blockchain
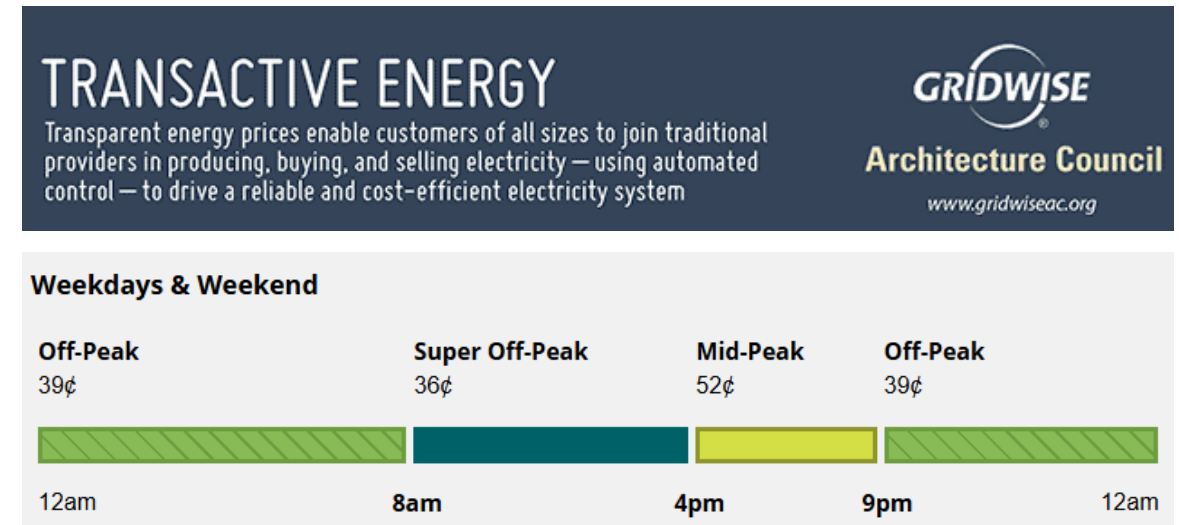 - Capacity management import, export
  - Etc.

– Different Tariffs
  - TOU, EV Rates
  - Dynamic and Realtime Pricing
  - Subscriptions
  - Etc.

– What Will There Be Tomorrow?
  - Which signals/tariffs should manufacturers support now and in the future?
  - Will we have to force all customers to change their existing equipment with every new change?

DR Demand Response

TRANSACTIVE ENERGY
Transparent energy prices enable customers of all sizes to join traditional providers in producing, buying, and selling electricity — using automated control — to drive a reliable and cost-efficient electricity system

GRIDWISE Architecture Council
www.gridwiseac.org

Weekdays & Weekend

Off-Peak	Super Off-Peak	Mid-Peak	Off-Peak
39¢	36¢	52¢	39¢

| 12am | 8am | 4pm | 9pm | 12am |

The Quest for the Perfect Grid Signal and Tariff Customer Perspective

– Understanding and Managing Devices Should Be Simple, But It's Not!

- Multiple devices responding independently create a confusing and frustrating customer experience

- Must constantly adjust devices and optimization strategies to keep up with new standards, protocols, tariffs, and signals

The Quest for the Perfect Superset Model

– Different Authentication & Authorization methods

  • Different trust hierarchies and security models

– Different Reporting & Streaming methods

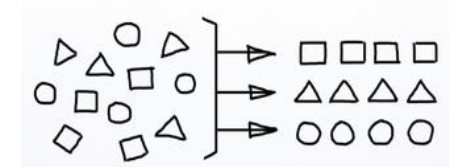 • Pub/sub, webhooks (post/put), poll, and proprietary

– Different Data Types & Representations

  • Hex, JSON, XML, YAML, etc.
  • Clusters, Points, Aggregations, Types, Channels, Command Classes, etc.

– Different Categories

  • Energy storage can be a car, home battery, or water heater
  • How do we categorize Optimus?

– Different Topologies

  • Cloud vs. local

The Quest for Manufacturers' Commitment

– Innovation Sets Brands Apart

   Every manufacturer wants to bring unique features to the table

– Competitive Edge Matters!

   • Brand identity thrives on distinctive technology and user experience

   • Proprietary protocols help safeguard innovation and investment

– Customers Want Choices

   Different products cater to different needs, preferences, and budgets – one size never fits all.

– Business Reality

   Standardization can streamline the industry, but it can also turn products into commodities and squeeze margins.

What Didn't We Learn?

- – We keep introducing new standards - like watching Titanic and hoping for a different ending

- – We keep chasing the perfect universal model - as if one model could magically describe everything

- – We still treat customers as mindless robots – forgetting there's a human on the other end

- – We expect manufacturers to choose standards over profits

- – Most importantly, we assume everything stays the same – while change remains life's only constant

Imagine!

– A plug-and-play Plugin Platform where devices, services, UI, and optimizations describe themselves in real time

- Regardless of standards and protocols
- Regardless of types and properties

– Signal and tariff changes are completely invisible to customers and manufacturers

– Natural Language Interface

- Customers can optimize all devices – past, present, and future
- Manufactures and developers to describe their plugins

Imagine More!
Self Describing Plugins

– Auto Discoverable Plugins that Provide

- Native communication with devices using the manufacturer's proprietary or standardized interfaces
- Native communications with the grid for any protocol
- Optimization
- UI

– Describe Themselves at Runtime

- Human or AI can readily understand what properties they have and what can be done to them and how

– Can be Auto-Generated

Is It Really Possible?

- Universal Concepts
  - **Typeless** – Enables interoperability without requiring prior knowledge of the type of the device or entity.
  - **ID-agnostic** – Enables interoperability without requiring prior knowledge of element IDs, clusters, command classes, or similar constructs.
  - **UOM** (Unit of Measure) – Ensures enhanced accuracy and allows for seamless unit conversions.
  - **Editor** – Helps UI components and AI agents understand property constraints, such as permissible value ranges (e.g., temperature or price), steps, precision, and more.
  - **Plugin Execution Environment** – Allows gadgets, services, widgets, and optimizations to run and work together seamlessly without requiring prior knowledge of each other.

- AI
  - Enables all the above with a Natural Language interface
  - Used as a tool and not be all end all

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  "name": "OpenADR 3.0 VEN",
  "icon": "EnergyMonitor",
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      "id": "ST",
      "editor": "price",
      "name": "Price"
    },
    {
      "id": "GHG",
      "editor": "ghg",
      "name": "GHG"
    }
  ],
  "cmds": {
    "sends": [],
    "accepts": []
  },
  "links": {
    "ctl": [],
    "rsp": []
  }
}
```

Why AI!

– ## It Is Remarkable In Classification Tasks

- Finds semantic mappings between textual representations and real-world entities

– ## Helps Manufacturers

- Self describing plugins
- Auto code generated plugins

– ## Helps Customers

- Interact as if with a human
- No need to worry about different devices, standards, and tariffs

– ## Helps Us!

- Break out of the Groundhog Day cycle

OPEn
Open Platform for Energy

– Open Source

– A complete ecosystem – store, documentation, and developer support

– Monetization ready – enabling value creation for all contributors
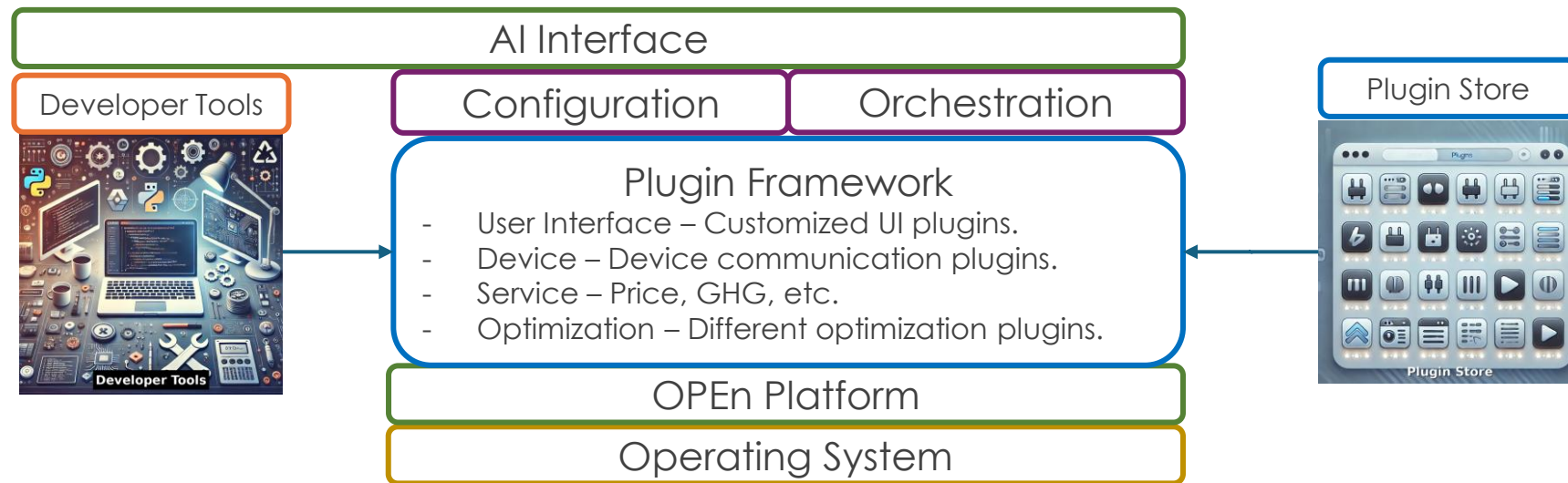
Using OpenADR 2.0/3.0

– OpenADR Is the Initial Service

– Massively Adopted

– Supports Majority of Use Cases
  - DR, Prices, Load Control, etc.

– OpenADR 3.0 Is Massively Extensible
  - Supports additional use cases such as Capacity Management
  - Supports pub/sub using mqtt

RAG

Chain of Thought

Agentic

Tools

Demo

Q&A