ESI Resources, Assets, and Publishing

Re-using existing standards for discovery and profiles

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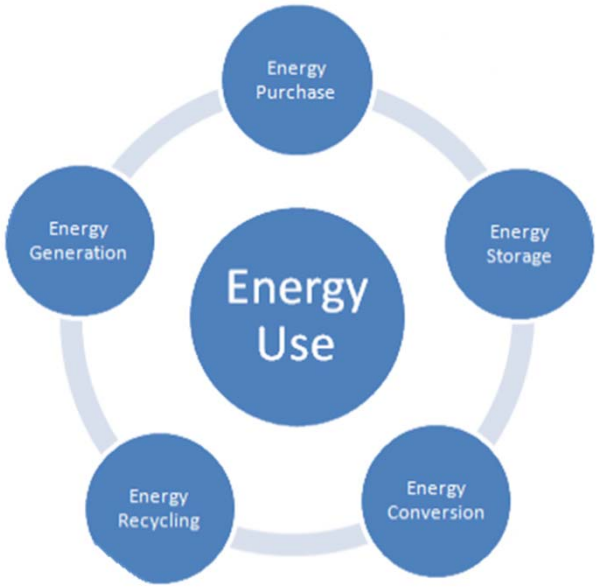
Defining the Resource

- To the grid, each end node is a Resource
- A Resource responds to Economic Signals and to Events

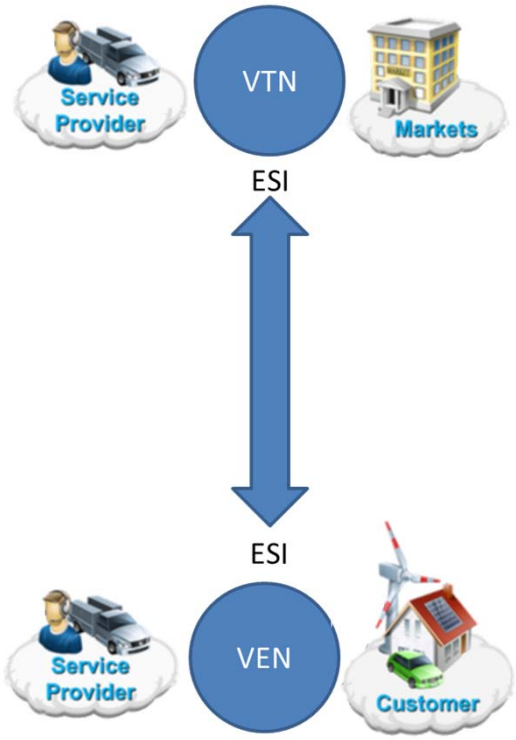
The ideal resource is responsible for its own Energy

- Autonomous System
- Market Operations to make up shortfalls
- Grid acts as settlement engine



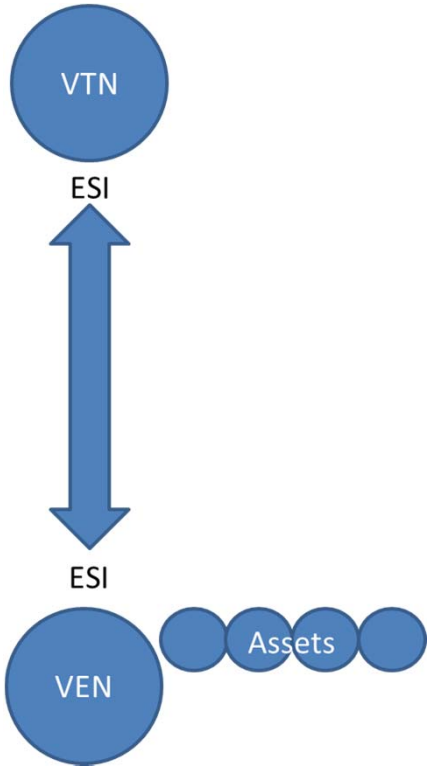
Resources are more complex

- Agents may have different roles at different times
- Resources have contents
- Market rules may reward limited exposure of contents



Introducing the Asset

- Assets have limited functions exposed to VTN
- A VEN may choose to expose only a few of its Assets
- We need a means to discover, offer to market, and interact with Assets



Existing Standards for Discovery

- The Resource may expose the managed discovery interface defined by WS-DD: this will allow the Smart Grid clients to obtain a list of Asset public addresses, based on some query criteria. WS-DD defines Types and Scopes as standard criteria, but it is extensible. The Resource will still act as gateway between the exposed public address and the internal address of each Asset. Discovery messages are kept small by design, so the usual way of working once a client has obtained a public address for an object is to send a metadata request to the address to obtain more detailed information.

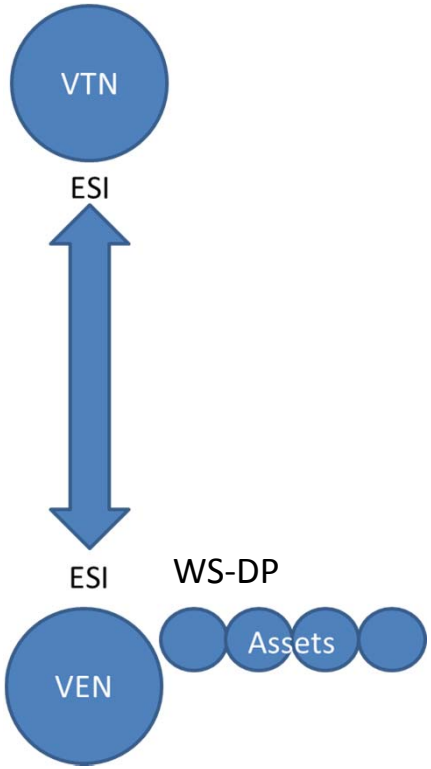
- The Resource may be able to automatically and dynamically gather information about available internal Assets by using WS-DD and DPWS: if each asset implements the Device Profile, then standard mechanisms (including ad-hoc or managed discovery and metadata exchanges) may be used by the Resource to discover Assets and their capabilities, and auomatically build its Asset database.

- Standard metadata exposed by devices compliant with the Device Profile include the list of available services and their WSDL description. There are two choices: (i) add a dedicated metadata service to each Asset; (ii) extend the standard metadata exchange mechanisms with your own dialect, using the standard extensibility mechanisms.

- If the Smart Grid clients are WS-Eventing compliant, they will be able to subscribe to events exposed by DPWS-compliant Assets and be asynchronously notified of important changes in the Asset state. Due to the presence of the Resource acting as a gateway, some kind of event brokering mechanisms may need to be added to route events from Assets to clients through the Resource.

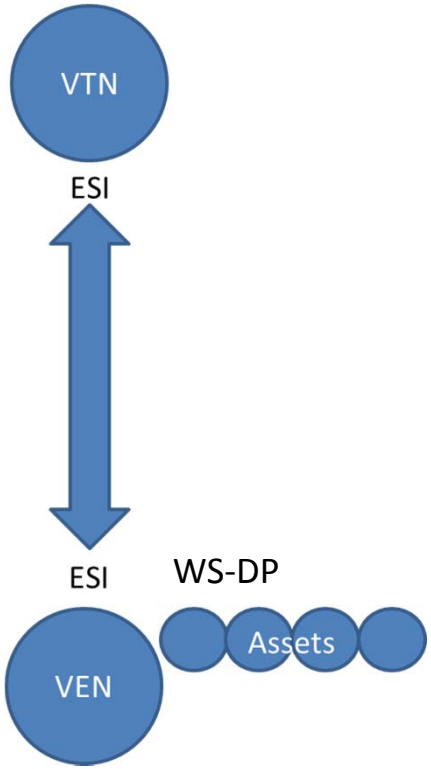
Device Profile for Web Services

- DP-WS is restricted WS-DP, developed for 5 Euro devices
- Well known, well understood protocol
- Securable
- Already understood by XP, Linux, Vista/Win7, Macs
  - Embedded version of windows built into things. Do they support?



Managed Discovery Interface

- No direct discovery allowed
- Secure request to remote agent to discover for you
- Remote agent can choose what to reveal
- Range of Operation and current level

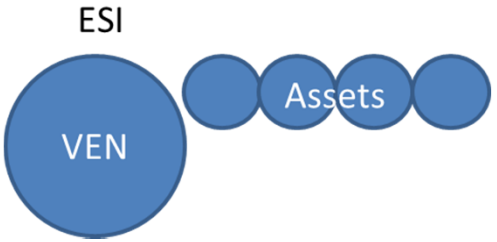


Essential Properties of an Asset

- Energy Resource Decription
- Thermostat Set-point
  - Allowable Range
- On-Off
- Current Status
- Storage:
  - Charge now
  - Discharge Now
  - Remaining Capacity
- Generators / Solar
- Capabilites as defined in last SPC201

Building Out Managed Discovery

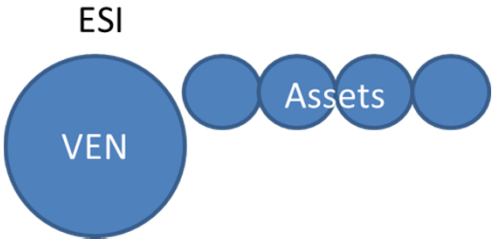
- Legacy
- SEP
- ASHRAE SPC201
- Industrial



Building Out Managed Discovery

Legacy

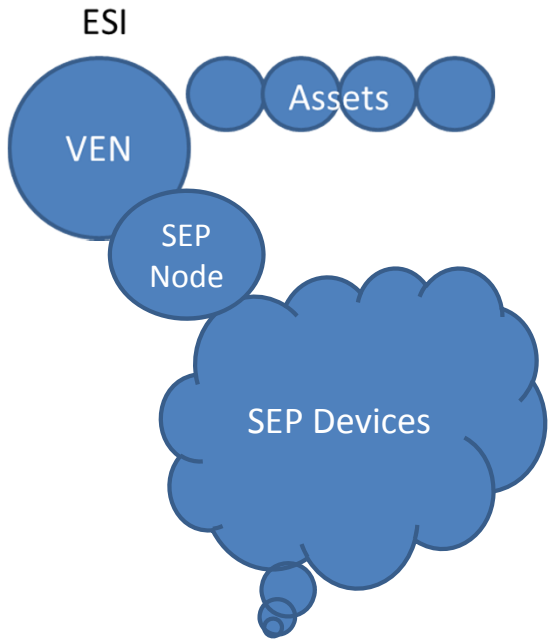
- Manual Entry into ESI Application
- Remote Entry by Utility Registration
- Some Other Means



Building Out Managed Discovery

SEP

- Someone who knows more SEP than I can describe how this would work



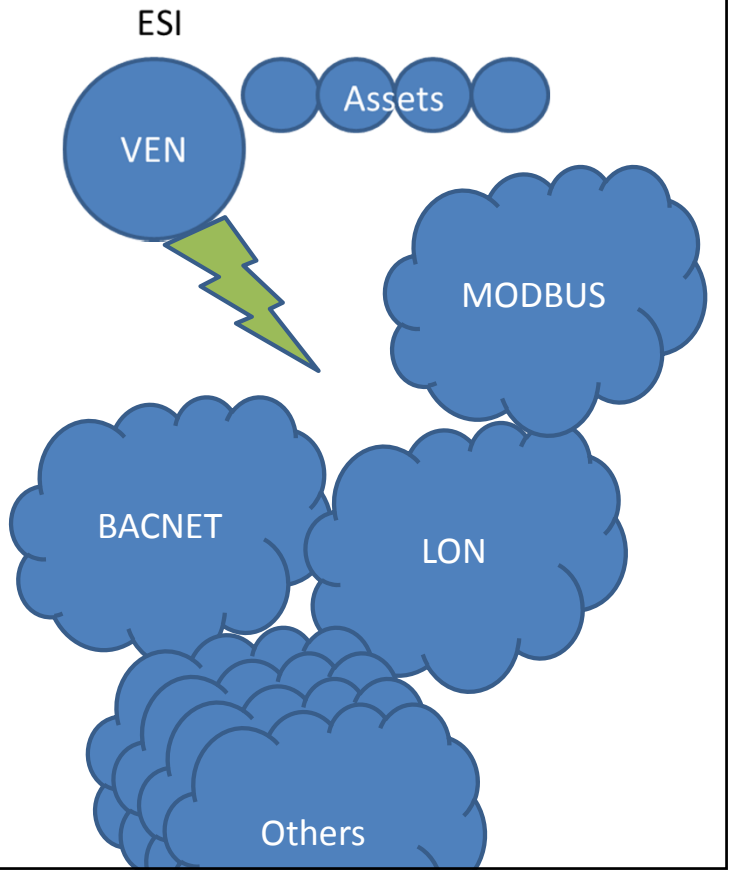
Building Out Managed Discovery

ASHRAE SPC201

- Wilcher Energy Profiles
- BACnet System Objects

Such as…

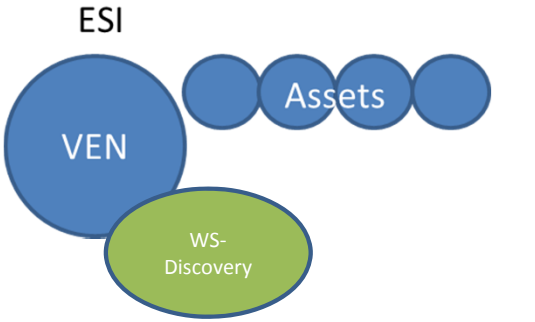
- HVAC for 3rd Floor

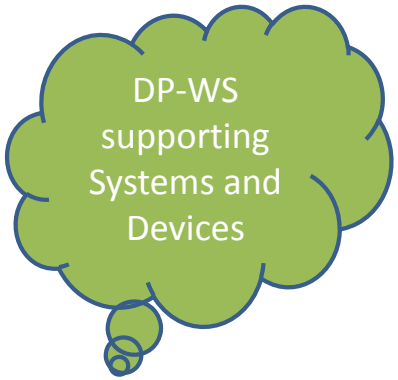


Building Out Managed Discovery

WS-DD and WS-DP internally

- New devices discoverable internally
- Manager chooses to expose some Assets to Market
- Market Pays for access to Assets

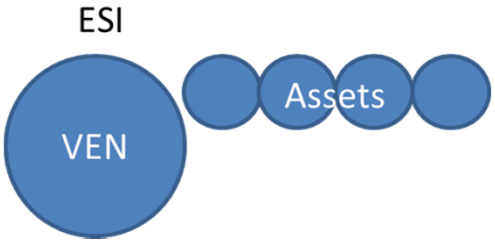




Different groups identify Assets differently

Industrial Site

- No exposure of Industrial Processes
- All office space accessible as a single "Asset"
- Stone Crusher



From here on down, rough notes from the meeting

- SOA4D
  - Open source for key work on WS for small devices
  - https://forge.soa4d.org/
  - http://cms.soa4d.org/
- DPWS 1.1
  - http://docs.oasis-open.org/ws-dd/dpws/1.1/cs-01/wsdd-dpws-1.1-spec-cs-01.pdf

An ESI might be in front of a virtual facility encompassing many buildings (Phil Davis)

- Would be useful to agregate [motors] from multiple buildings to be one Asset on the vf
- No restriction on the ways agregation is done internally should be imposed.
- Should a geo-tag of some kind be applied to the Assets which may be different than that of the ESI?

What services and info to expose (John Nunneley)

- Hierarchies should not be exposed through ESI
- Careful choices about what to expose to the market interface.
- May wish to expose more detailed profiles / services to other service providers
- In ESI, energy profile shared should be minimal and non-specific
- Called out reference to recent SPC201 work

Generation and CHP (Katz)

- Generation may be forward deployed by Utility
  - Esp to take advantage of Heat Load
  - Need to account for Heat in load management
- I

End of Slides

Happy world of Smart Energy above