



## Australian Institute for Energy

### Smart Metering in Context of the Broader Smart Grid



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## Cisco Connected Energy



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# The Energy Network Platform

The network and networking technologies will enable the electric grid to become:



Full determination of grid state – deep situational awareness

**OBSERVABLE**



Rapidly adapt to changing conditions with minimal human supervision

**AUTOMATED**



Ability to carry out necessary actions across the grid via M2M intelligence

**INTELLIGENT**



Dynamically linking diverse and distributed market participation

**TRANSACTIVE**

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## IEC and the System Perspective

*“The IEC has identified key areas where significant emission reductions and efficiency increases can be achieved without holding back economic development.*

*... the IEC intends to change its orientation so as to emphasize the standards needed to achieve systemic efficiencies, and specifically to develop a set of specifications ... for the operation of smart electric grids ...*

*...we must understand and extend our activity to aim at systems and reference architectures as a basis for global solutions. The message in this paper is that the thinking must start from the system and go down to the parts, rather than start from the individual products and possibly progress to the system, as is the case today. ...”*

*Summary and Recommendations:* [http://www.iec.ch/smartenergy/pdf/summary\\_lres-e.pdf](http://www.iec.ch/smartenergy/pdf/summary_lres-e.pdf)

*Full White Paper:* [http://www.iec.ch/smartenergy/pdf/white\\_paper\\_lres.pdf](http://www.iec.ch/smartenergy/pdf/white_paper_lres.pdf)

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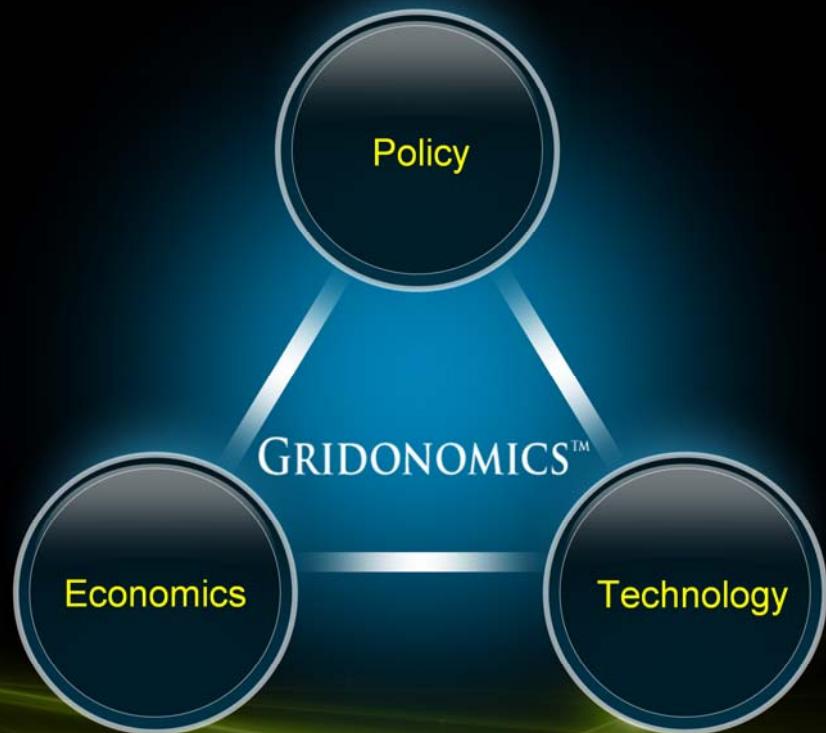


# Transformation of the Grid

Electricity regulation needs to evolve to 21<sup>st</sup> Century realities

Understanding customer value and addressing behavioral considerations is essential

Technology will be disruptive and an enabler – those that manage best will succeed



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## Power of Internet Protocol

- Today's grid is a combination of multiple **siloed subsystems**—each with one network per service
- Only IP can deliver **multi-service capabilities** over a common physical network to **optimize Opex and Capex**
- Making smart grid work **hinges on observability** and the **fast, reliable and secure exchange of data** among all its components
- Information flow will **evolve from one way to N-way**
- **Internet Protocol-based communications are crucial** for advanced networks
  - Transmits data over multiple media
  - Can change & grow with industry
  - Connects multiple types of systems
  - Enables and encourages innovation
  - **Ensures security**



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# Cisco Smart Grid Vision

## Enabling the Smart Networks Transformation

*Building an intelligent IP-based end-to-end communications network is the foundation to building a Smart Grid.*



- Architect end-to-end IP-based communications platform integrated with the power grid from generation to consumption
- Converge utility systems and processes across all key elements of the grid to increase grid intelligence and efficiency
- Enable the Smart Grid to become a platform for energy services innovation

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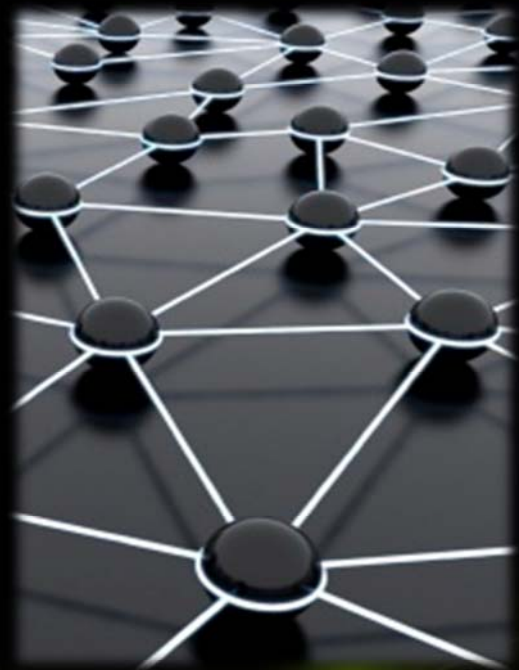
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## Distributed Intelligence

### The Enabler

- Distributed Intelligence is a fundamental enabler for advanced smart grids
- As smart grid systems become more complex, data management inherently must become a distributed function
  - Robust, secure & resilient
  - Latency requirements
- New designs will be a hybrid of both centralized and distributed elements

Distributed Intelligence residing in the network will become the innovation platform for new smart grid applications that we have not even thought of today

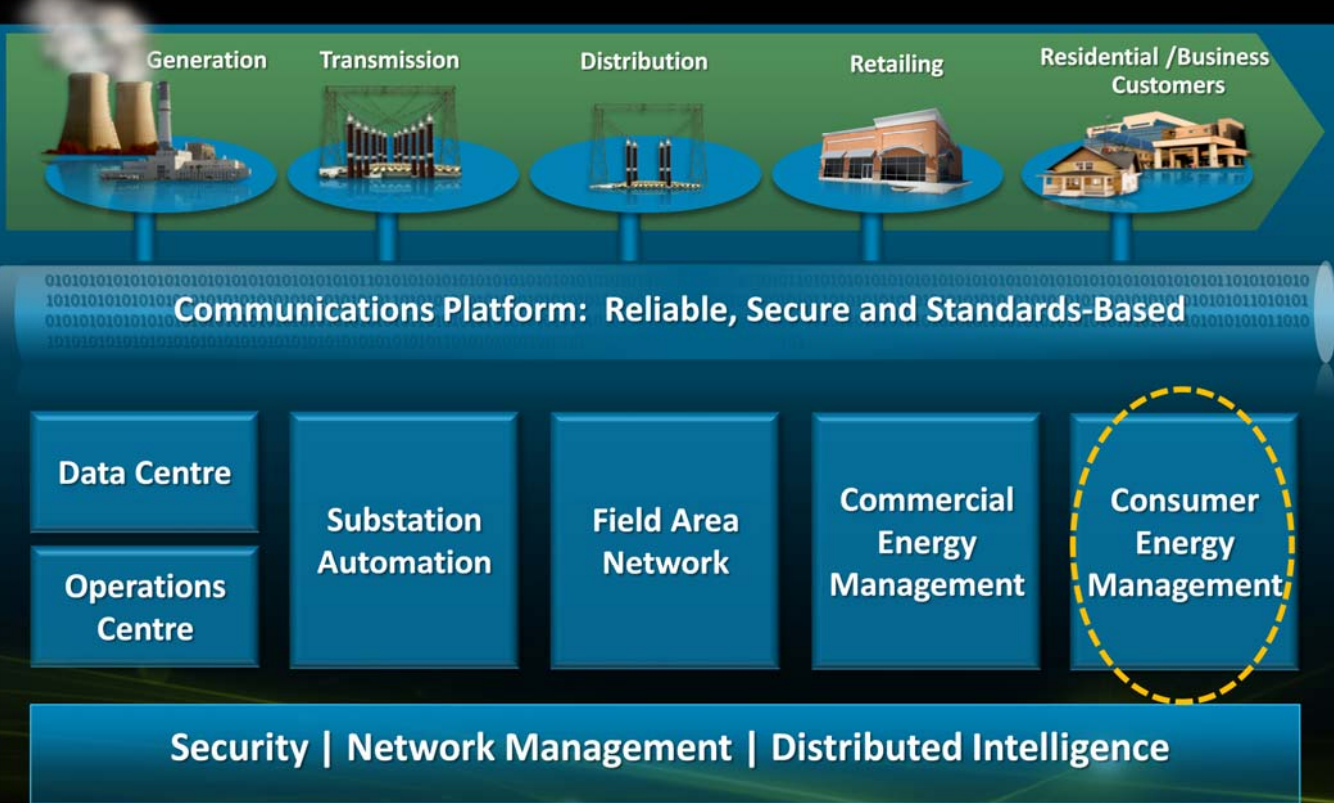


***The Network is the Platform***

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# Smart Grid – End to End Architecture



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## Cisco Home Energy Management



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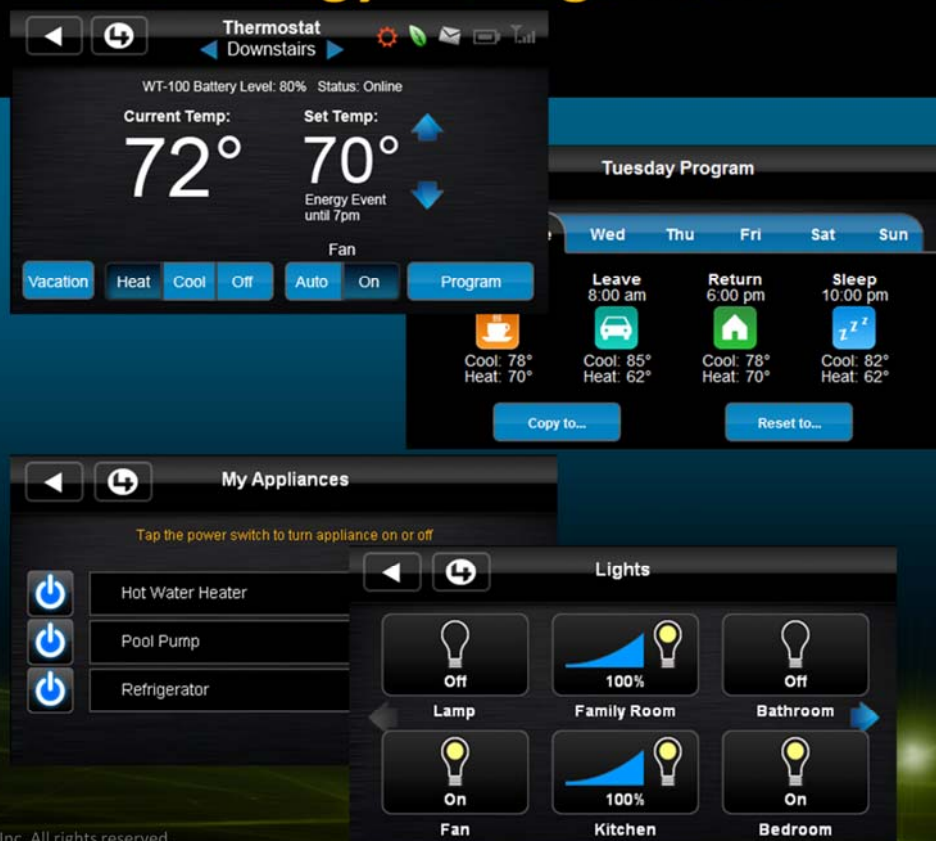
# Cisco Home Energy Management Platform

## Architecture



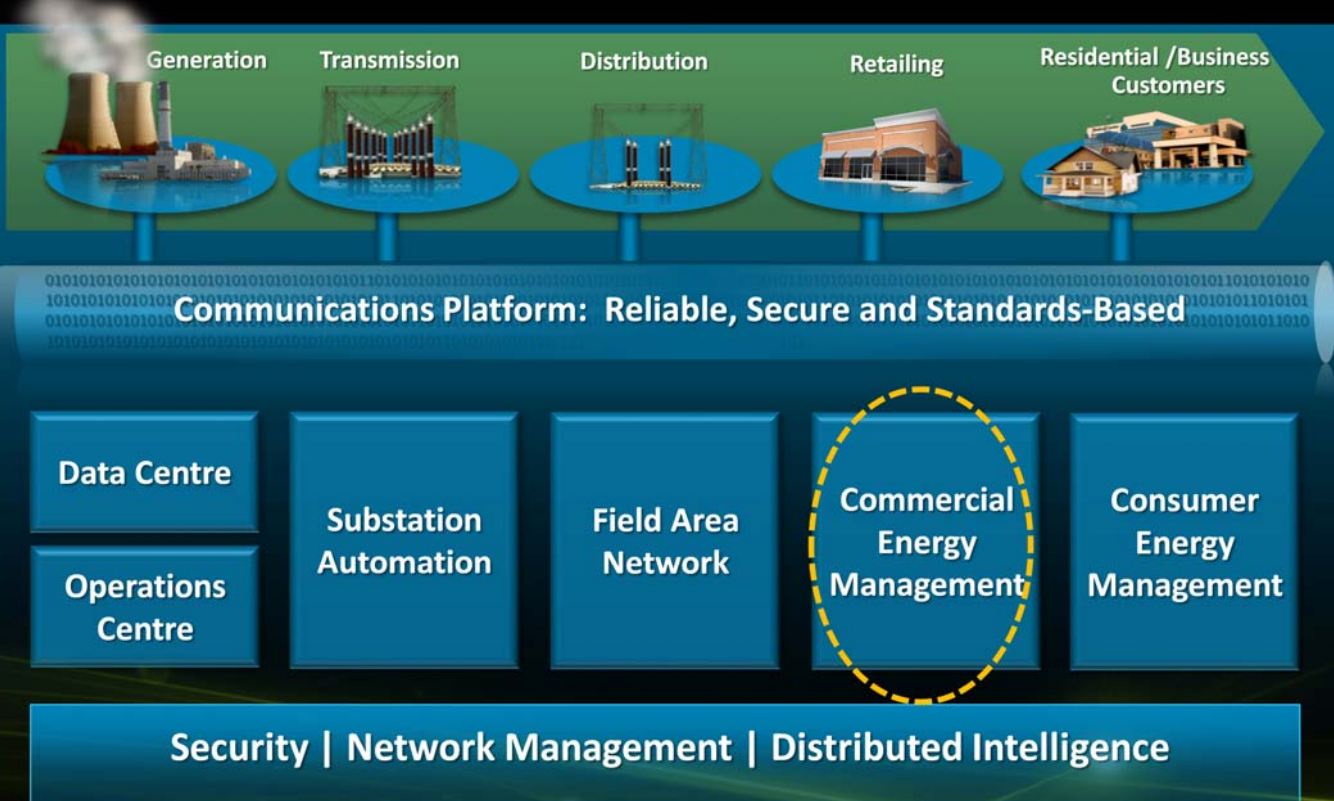
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# Cisco Home Energy Management



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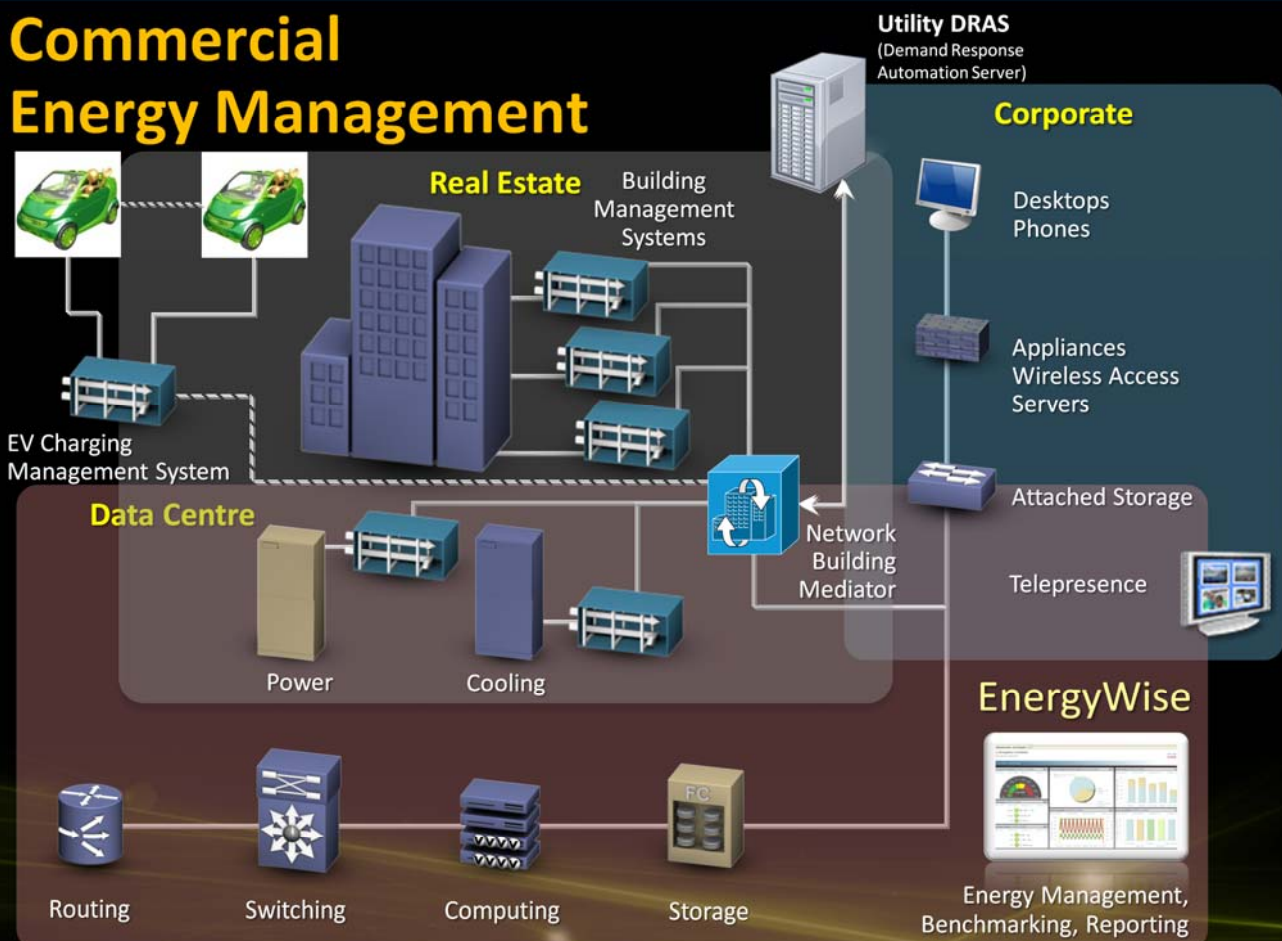
# Smart Grid – End to End Architecture



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## Commercial Energy Management

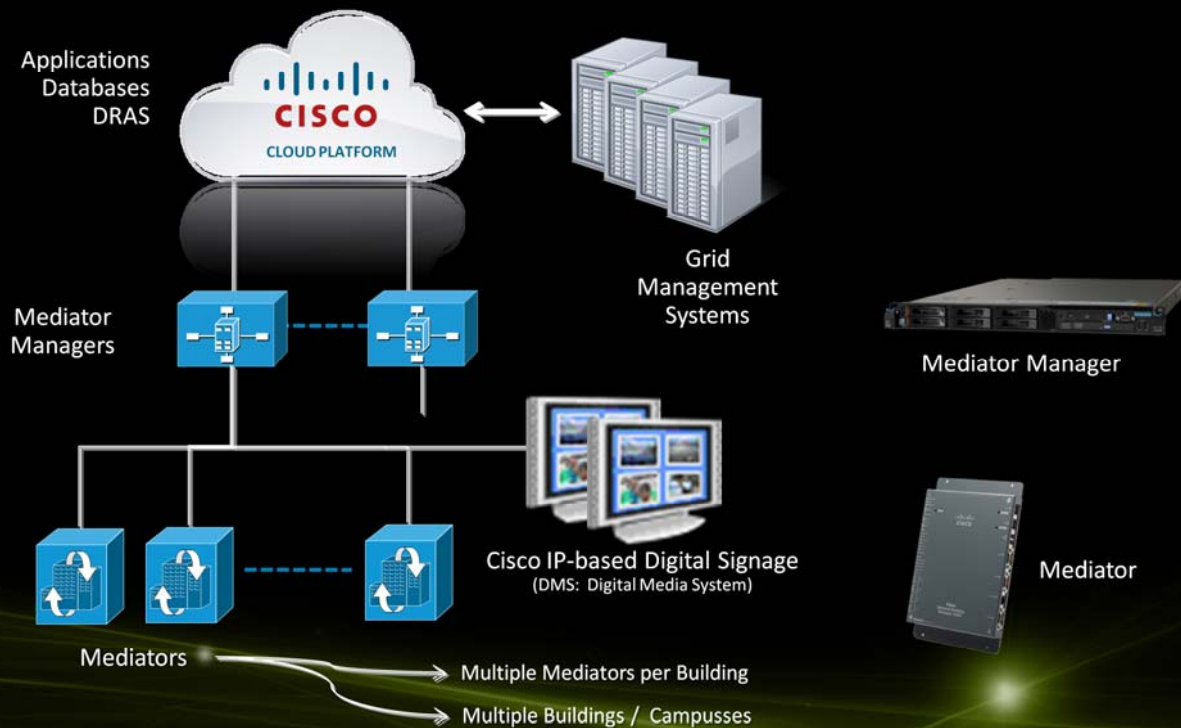


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# Energy Management System Architecture



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## Key Benefits of Network Building Mediator Solution

- Integrates energy management over existing IP network
- Enables holistic energy management policies
- Solution scales well → single buildings to campus environment
- Provides visibility and engagement for staff using digital signage over IP
- Provides an effective platform for demand management in installed base
- Addressable market is not just corporate buildings

Energy consumption from existing buildings will still represent the large majority of total commercial buildings energy in 2020

Source: ClimateWorks Australia "Commercial Buildings Emissions Reduction Opportunities" 2010

Offices only represent 20% of energy use in commercial buildings; retail and education are the next two largest users with 40% of total energy consumed

Source: ClimateWorks Australia "Commercial Buildings Emissions Reduction Opportunities" 2010

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# Conclusions

1. Recognising the value of a systems approach to technical and business architecture.
2. Building an intelligent IP-based end-to-end communications network provides a foundation for the Smart Grid.
3. Energy Management Pilots should be structured to evaluate a systems approach to business models.

