Smart & Connected Homes: Key Trends and Opportunities

John Raspin
Partner, Energy & Environment

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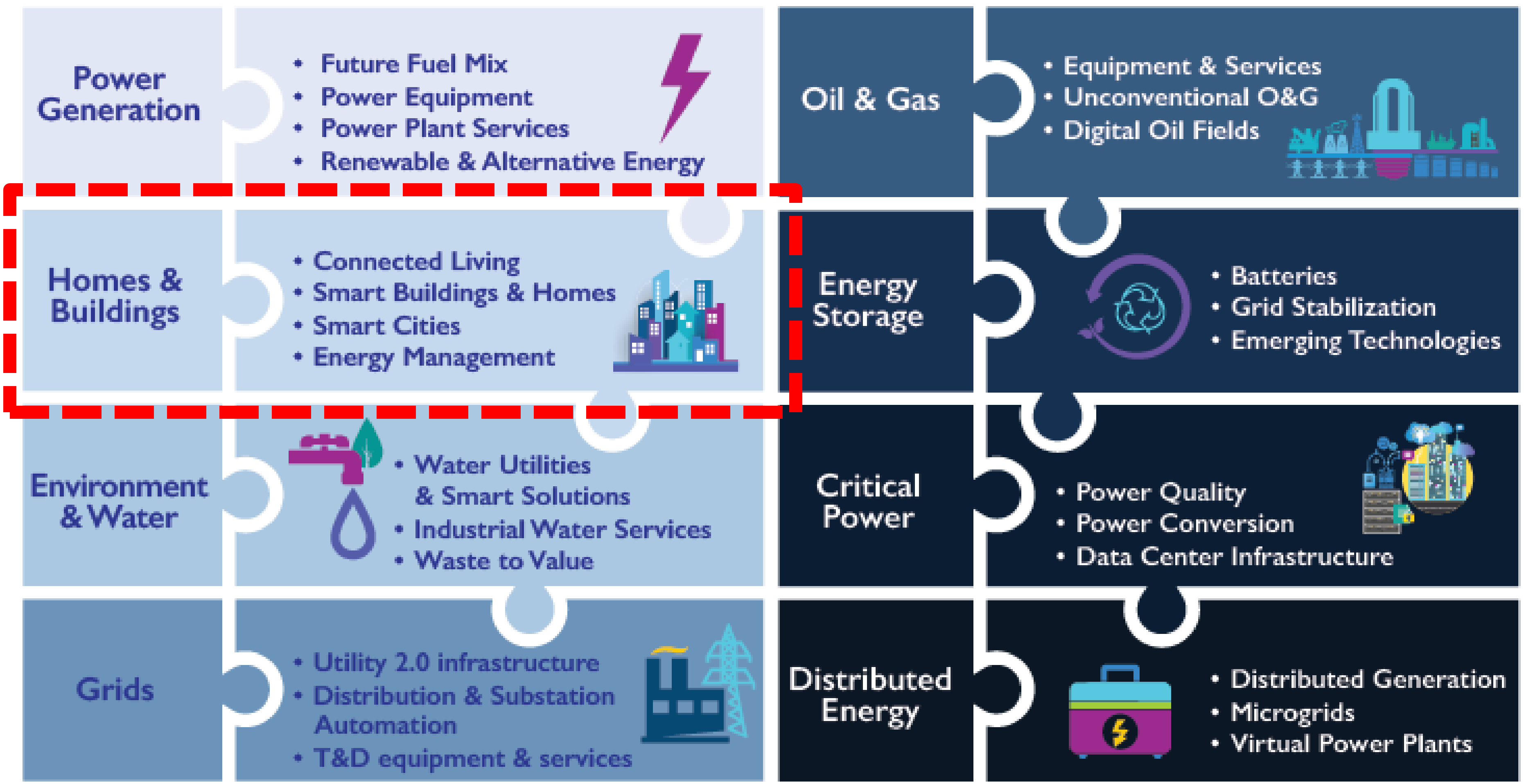
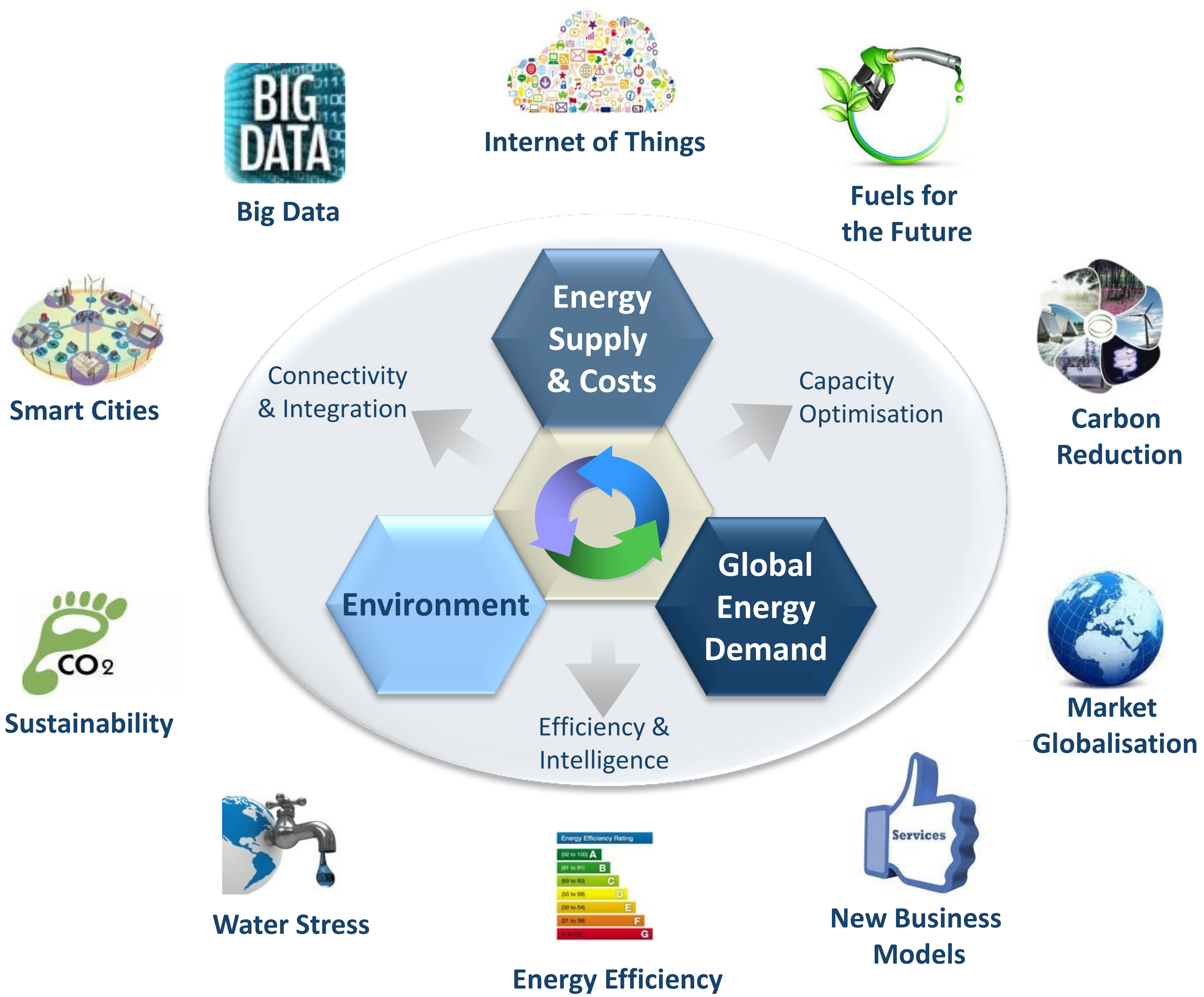
Energy & Environment Focus Areas for Thought Leadership

Our Homes & Buildings Group



Energy & Environment

Top 10 Mega Trends Defining the Future



Source: Frost & Sullivan

Homes & Buildings

Top 10 Technologies and Markets to Watch for to 2025

Source: Frost & Sullivan

Homes & Buildings

Focus Areas and Expertise built around Transformational Trends

Frost & Sullivan's expertise in Homes & Buildings research and consulting includes work in the following dynamic areas:

Future of Lighting

Impact of the LED lighting revolution, new business models, smart lighting, technology integration and future competition.

Connected Living

Smart and connected homes, home automation, business models, functional evolution, homes of the future.

Facilities Management

Service integration, energy management, business productivity, smart technology and contract internationalisation.

Smart Buildings

Digitally connected intelligent buildings, data analytics, building and energy efficiency, and smart city integration.

IoT & Cloud Solutions

IoT enabled solutions for BAS, HEMS & BEMS, software embedded controllers, remote monitoring and internet of buildings.

ESCO 2.0

Next generation of energy management services, performance contracting, XaaS models, convergence of competition.

Source: Frost & Sullivan

Smart and Connected Homes—Features

A smart and connected home is a residential solution using advanced technologies that offers a variety of connected living services ranging from entertainment to education, so as to create a truly efficient and sustainable home.

Smart and Connected Homes: Features, Global, 2010–2020

Home Automation: Remote monitoring and centralised control of lighting, window blinds, and home appliances

Home Energy Management: Automatic synchronisation of energy consumption data for minimised future energy use (on the basis of usage patterns and exterior conditions)

Home Entertainment: Personalised entertainment through open platforms from various broadcasters and Internet providers

Virtual Education: Virtual tutoring through technology-enhanced Web-based services and high-speed Internet

Safety and Security: Remote surveillance of entire home and its occupants through smart phones and tablets

Health and Wellness: Continuous monitoring and evaluation of the general fitness and well-being of occupants

Note: Some solution providers include HVAC, home entertainment, and safety and security as part of their comprehensive home automation solutions.

Source: Frost & Sullivan

Smart Homes …. Key Findings

	Key Findings
1	The level of activity and investment being made by major corporations – Google, Samsung, Apple, Amazon etc. – suggests that ***the industry is reaffirming its commitment to the smart home space*** – nobody wants to be left behind when consumers eventually become engaged. Amazon in particular has been closing the gap on the more acknowledged players – Google and Apple – and has the potential to be a major force in smart homes.
2	As of the end of 2015, market ***penetration rates for smart home appliances and smart hubs remain low***; customer awareness and understanding of the product offering is low. However this could change through greater customer education, but mainly through smart hubs being sold through “Trojan horses” such as televisions and routers.
3	Differing strategies suggest ***no one certain route to success***. However should anyway be successful, the others can switch quickly. Anyone who can engage on a mass market level will be successful. Integration of smart hubs within televisions is one example where this could happen.
4	***Control over the smart hub is vital to the development of future business***. The hub manufacturer may have access to large quantities of data within the home domain, providing significant future revenue potential.
5	Technology providers are only one of the groups seeking to penetrate this market, there are others such as ***telecoms and utilities that are keen to play a significant role in the smart home***.
6	***Security is an important issue***, but all providers have yet to properly address this area. For Samsung at the moment, this is an area of potential weakness, as its legacy product business means security is weaker.

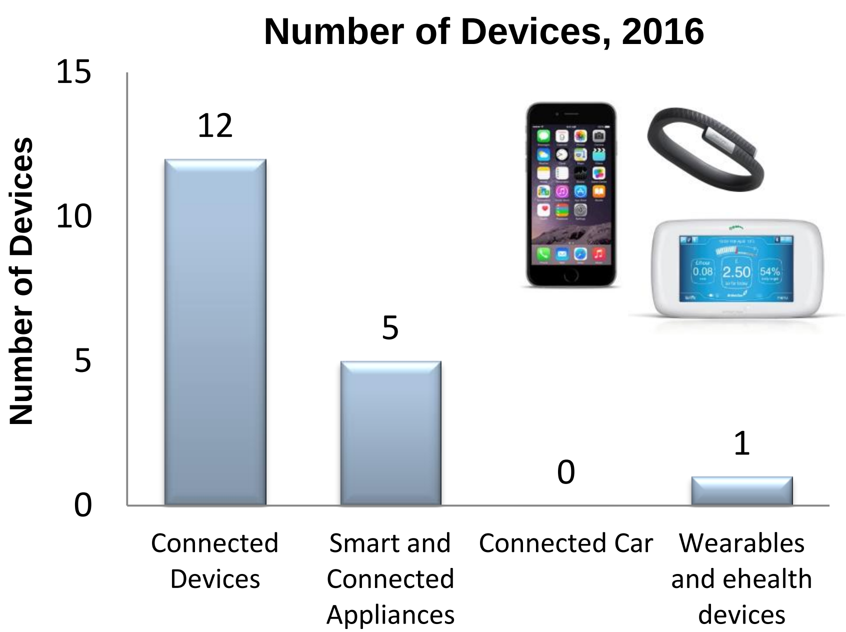
360 Degree Perspectives on Smart & Connected Homes

1	Home energy management, home automation, home entertainment, and safety and security are emerging as top priorities for smart and connected home solution providers.
2	Health and wellness and virtual education will be in the second wave of growth as they are still immature commercial offerings; however, they will rise in importance in the next 5 years.
3	Internet of Everything (IoE) will become the next intelligent platform connecting the physical and virtual worlds to address urban living challenges.
4	Cross-industrial partnerships between market participants are vital in creating new business models for service offerings.
5	High and medium income economies in India, China, the United States, the United Kingdom, Germany, France, Japan, South Korea, and some Middle-Eastern countries are driving global growth.

Source: Frost & Sullivan

Smart Home Device Ownership in Developed Countries

Average household to have 18 smart devices in 2016 as the march towards IoT in the home continues



- Ownership of multiple smart phones and tablets in the home now a relatively standard practice across Europe and North America.
- Highest future growth forecast for wearables and ehealth devices, although smart meters will also become a standard feature in most European homes within 5 years.

Devices	2016
Smart Phone	4
Laptops	2
Tablets	2
Smart TV	1
Connected set-top box	1
eReaders	2
Printer	1
Scanner	1
Connected stereo systems	2
Energy monitoring device	1
Wearables and ehealth devices	1
Connected car	-
Home Automation Sensors	-
Smart Thermostat	-
Smart Meter	-
Connected Light Bulbs	-
Smart Plugs	-

Source: OECD, Frost & Sullivan

Timeline of Market Developments

2014 and 2015 saw a large number of acquisitions and partnerships, as players jockey for position in the market

Feb 2014: Google acquires 100% of Nest labs Inc for $3.2 billion.

Aug 2014: Samsung acquires SmartThings for around US$200 million.

Jan 2015: Google partners with Insteon to boost the range of compatible products Nest can connect with and enable Nest to be controlled through an Insteon hub.

Nov 2014: Amazon launches Amazon Echo.

Oct 2015: Legrand announces it will partner with Google Nest and use its weave protocol for its products

Jan 2016: Samsung announces SmartThings compatibility with Smart TVs.

2014

2015

2016

Jul 2014: Open Interconnect Consortium was formed.

June 14 and Oct 14: Google Nest acquires Dropcam (cameras) and Revolv (smart hub hardware).

Nov 2015: Intel launches a new IoTplatform, Intel Quark and the Tiny House to demonstrate its smart offering

Jan 2016: SmartThings announces a formal partnership with BMW

Jun 2014: Microsoft partners with Insteon (leading home autor protocol player).

INSTEON

Complexity of the Vendor Ecosystem

- The Example of Home Energy Management

Customer Engagement

ACLARA, alertme*, bidgely, C3 Energy, comverge, EcoFactor, ecova, EnergyHub*, ENERGYSAVVY, greenwant, GRIDPOINT, HARRIS, Intelen, Landis+Gyr, myenergy*, NAVETAS, Nexant, ohmconnect, ONZO, OPOWER, Planet Ecosystems, plotwatt, SAMSUNG, Schneider Electric, SIEMENS, Silver Spring, SIMPLE energy, TENDRIL, wattvision, WeatherBug

DR Platform (Utility Services)

Residential Demand Response Platforms (incl. T-stat, DLC)

ACLARA, AutoGrid, C3 Energy, ceiva energy, comverge, EATON, EcoFactor, ENERGATE, EnergyHub*, Honeywell, Integral Analytics, nest, OATI, OPOWER, Schneider Electric, SIEMENS, Silver Spring, thinkeco

Home IoT Software Platform

Alarm.com, alertme*, Apple, ARRAYENT, at&t, Ayla Networks, DENKO, Everything, iBridge, icontrol, IFTTT, NEXIA, people power, prodea, smartenit, SmartThings*, zonoff

Gateway

Alarm.com, Blue Line, Control4, Digi, ENERGATE, Honeywell, Insteon, iris, pēq, rainforest, revolv*, SAMSUNG, Schneider Electric, SmartThings*, connect, vivint., wink, Vera

Home Hardware

Thermostat

Alarm.com, belkin, Carrier, CentraLite, Computime, ecobee, EcoFactor, EMERSON, ENERGATE, EnergyHub*, Filtrete, HAI, Honeywell, Ingersoll Rand, invensys, king, LockState Connect, LUX, nest, NEXIA, Radio Thermostat, Schneider Electric, tado, TRANE, VENSTAR

In-Home Display

2GIG, ceiva energy, HAI, rainforest, SCHLAGE

Smart Plugs

belkin, bro, embertec, ENMETRIC, Insteon, Intelligent Power, OATI, P3 International, Plugwise, thinkeco, TrickleStar, Visible Energy, ZOLI

Notable Service Providers

Security

Alarm.com, ADT, vivint.

Select Telcos & Broadband

at&t, BellAliant, Blue Ridge Communications, bright house, COMCAST, COX, Midcontinent, ROGERS, swisscom, Time Warner Cable, verizon

Solar/Inverter

enphase energy, SolarCity, SUNPOWER, sunrun, vivint. solar**

Big Box Distribution

Solutions Provider***

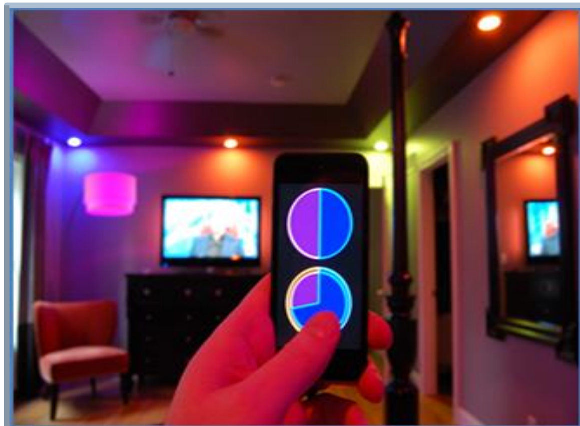
Best Buy, The Home Depot, Lowe's, Staples

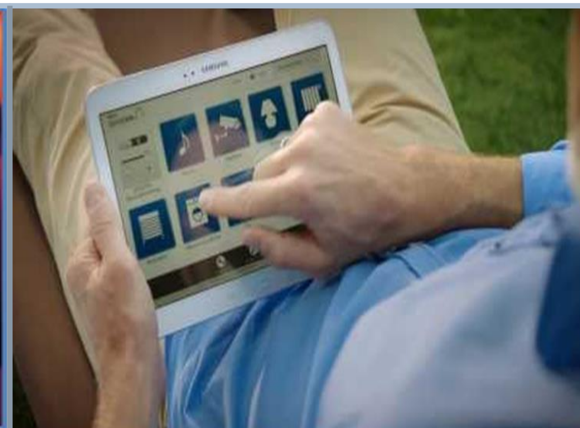
Device Re-distributor

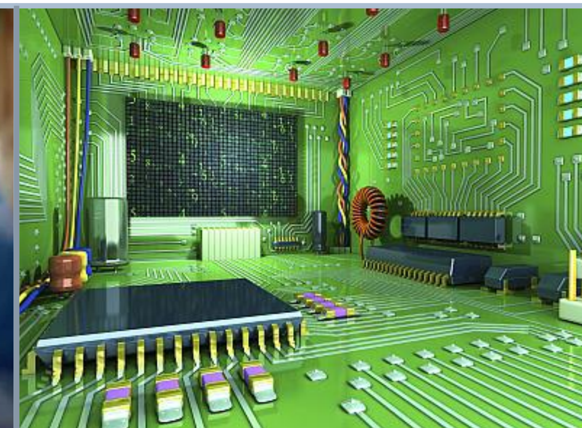
amazon, sears, Walmart

* Acquirer/Acquirees: Nest - MyEnergy, Revolv | Samsung - SmartThings | Alarm.com - EnergyHub | British Gas - AlertMe ** Bilateral Marketing Agreement with Vivint Inc *** In-house developed, licensed, or through exclusive partnership

What does a smart home solution look like? Examples of Service Providers and Business Models

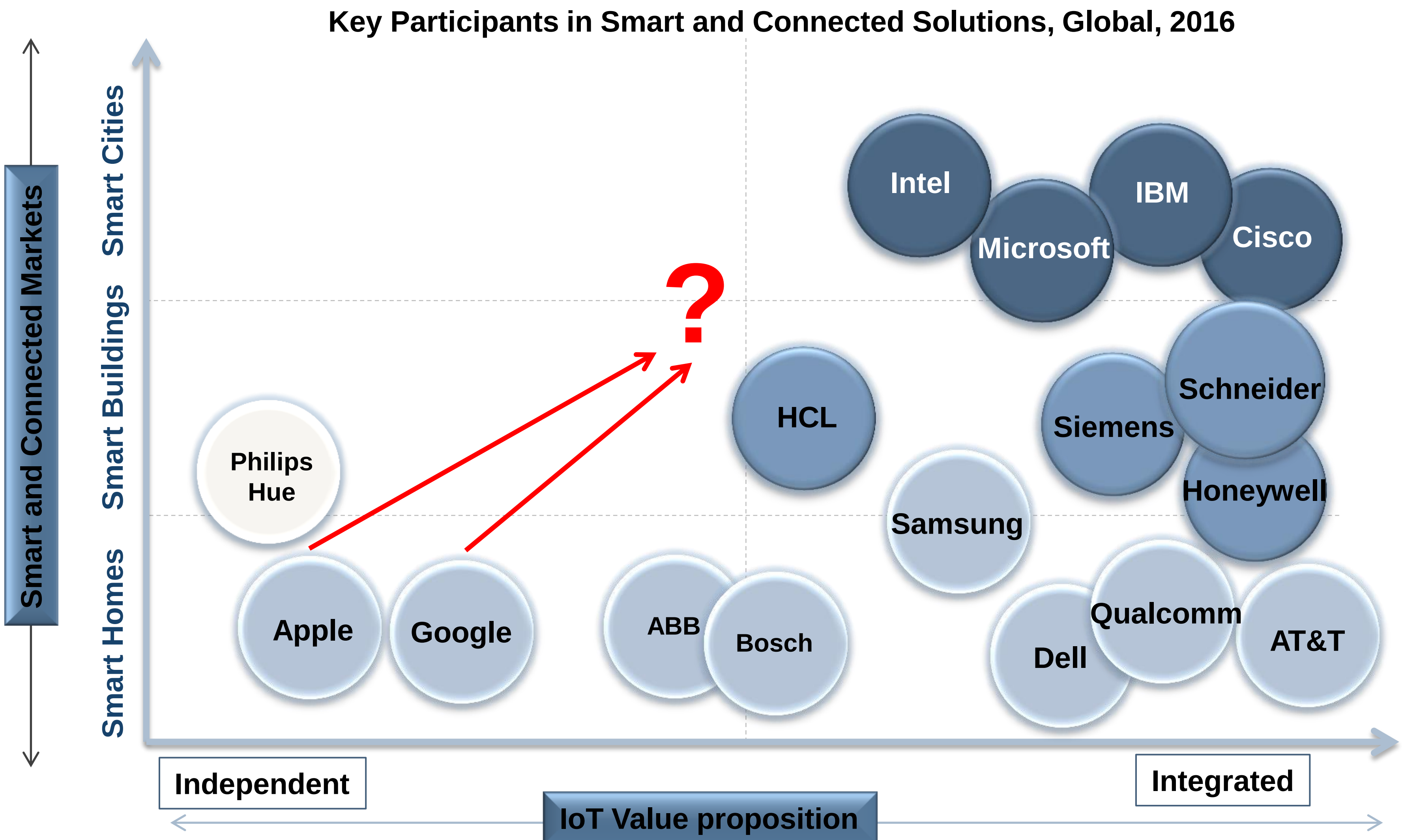






Philips Hue (Launched) – Assimilator Approach	QIVICON (Launched)– Aggregator Approach	Microsoft HomeOS (Planned)– Integrator Approach

IoT Key Participants in Smart and Connected Markets - Different Approaches to Integration



Note: Key participants list is not exhaustive

Source: Frost & Sullivan

Connected Living—Who will own customer relationships?

Connected Living Market: Opportunities in the Connected Living Space in the Future, Global, 2016–2020

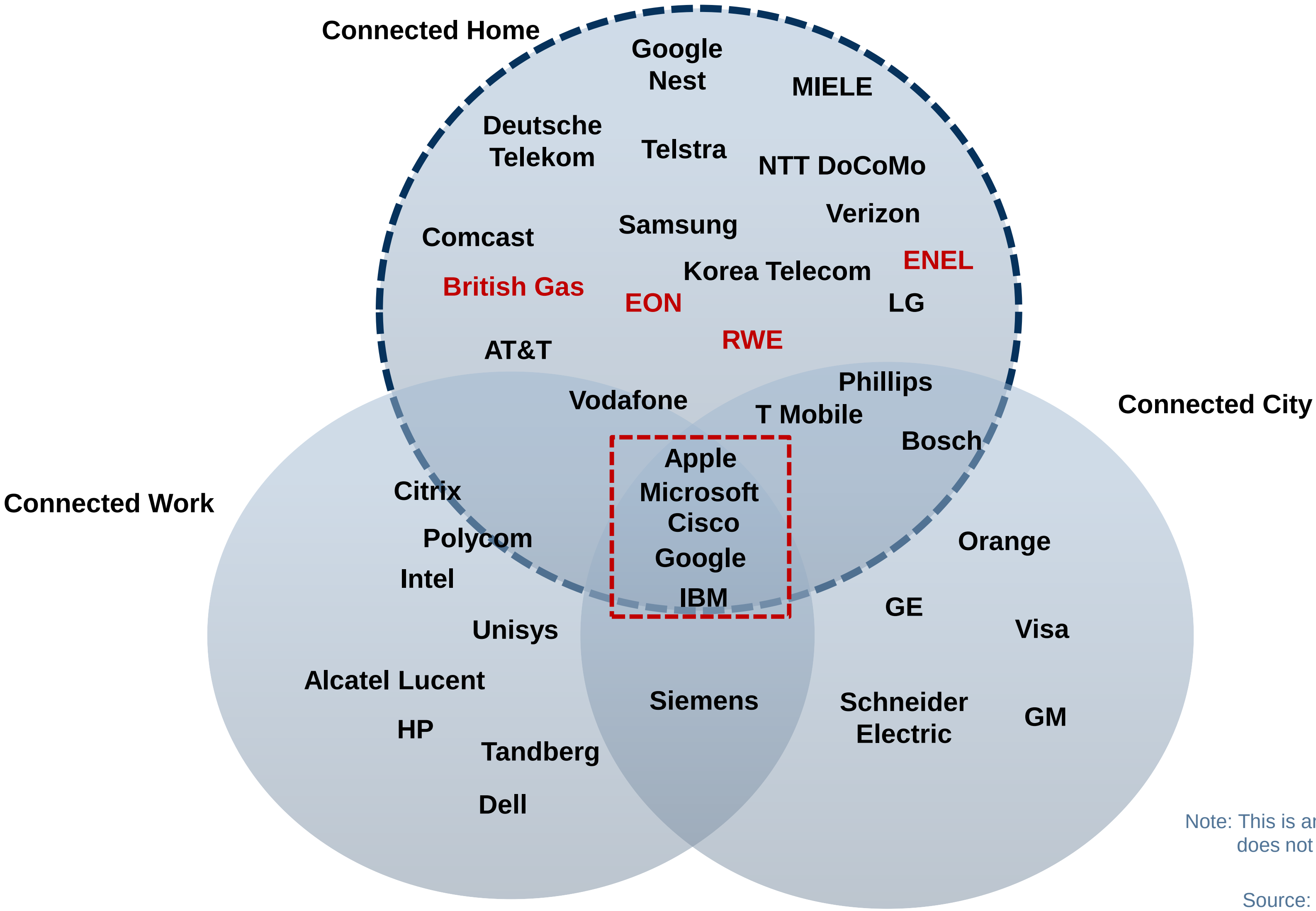
Solution Provider	Impact	Opportunities in Connected Living in the Future
Telecom Operators	↑	Solutions such as shared data plans, split billing, and reprogrammable SIMs could lead to significantly more attractive pricing models as data sales will be restricted. Partnering with OEMs and service providers will be key.
Mobile Network Operators	↑↑	Key participants are amongst the most influential in integration of connected products and services as the mobile and tablet is the central consumer use platform.
Utilities	▬	Key participant in home energy management through remote control of devices and provision of data on energy consumption; will enable better understanding of billing advantage through customer connections but low ability to diversify
Software Providers	↑↑	Key ability to commercialize connected applications and services, and make solutions more scalable and upgradable easily
Original Equipment Manufacturers	↑	Track record in successful partnerships with service providers and ability to offer converged products and smart innovations
Application Developers	▬	A decoupling of apps from phones may eventually become reality as more content and services are shifted to being hosted on the cloud rather than on native apps.

Stable ▬ **Increasing** ↑

Source: Frost & Sullivan

Global Participants in the Convergence of Competition

Apple and Microsoft are likely to achieve the greatest revenue from service commercialization.

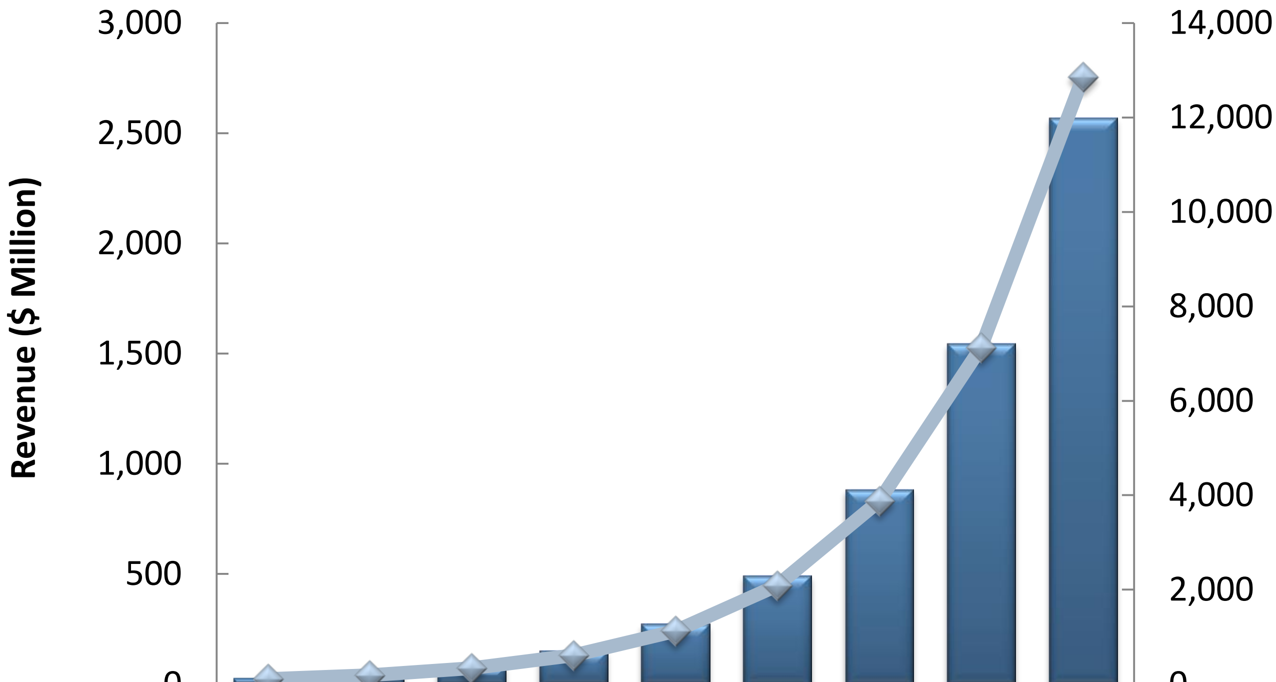


Note: This is an illustration and does not show all market participants.

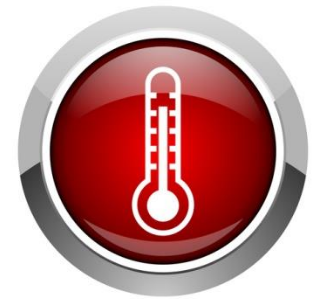
Source: Frost & Sullivan

Connected Energy Management … Growth Example

By 2020, there will be 30 million Smart Thermostats in European Homes; The UK and Germany will lead the EU Market



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Revenue	29	49	86	153	274	493	884	1,546	2,571
Units	110	191	339	610	1,122	2,090	3,877	7,126	12,853



New Products

e·on
British Gas
RWE

Utility Business Models

Connected Living

QUESTIONS & DISCUSSION