

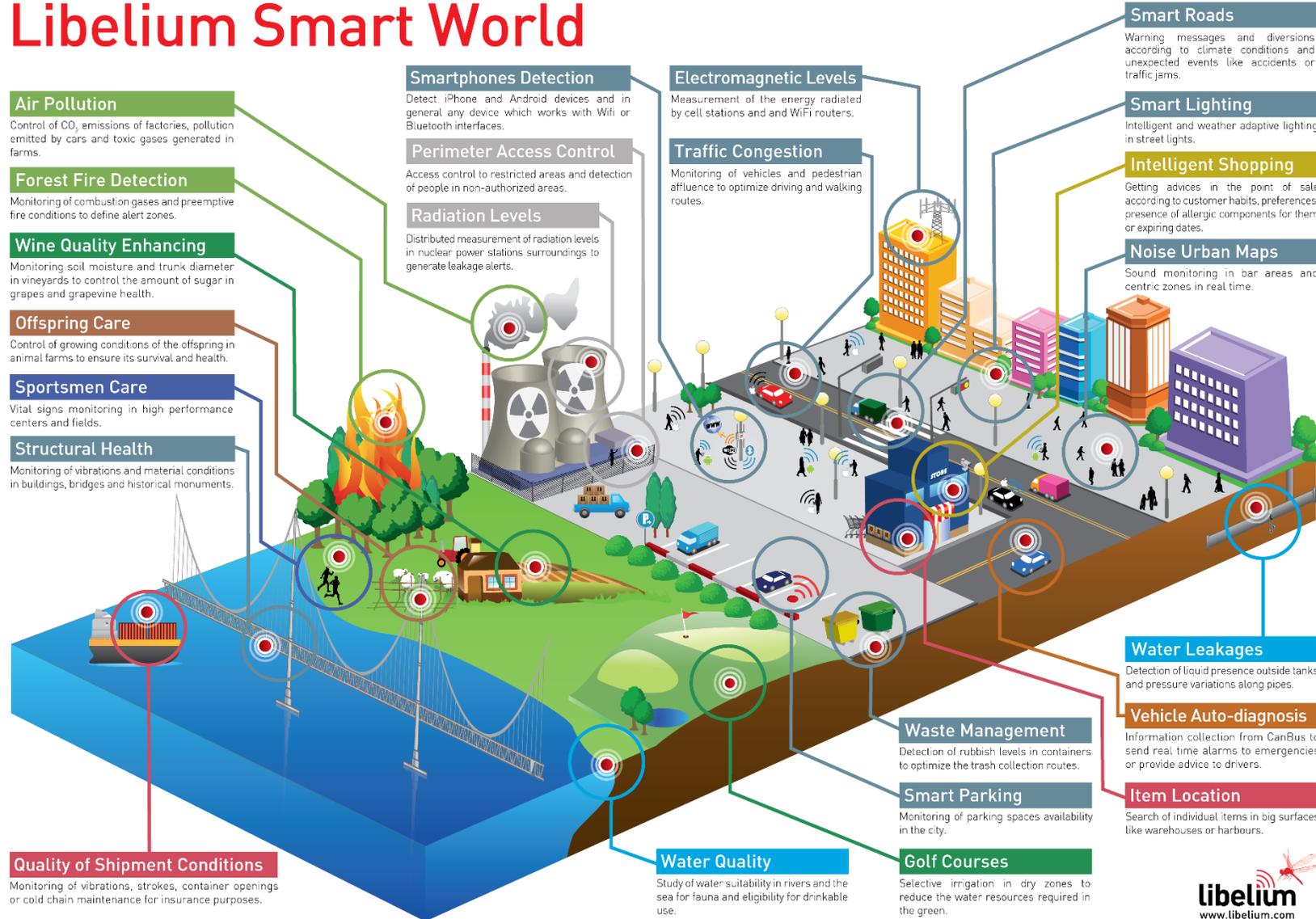
# **The Internet of Things (IoT) and the Smart Home**

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Andy Brauer

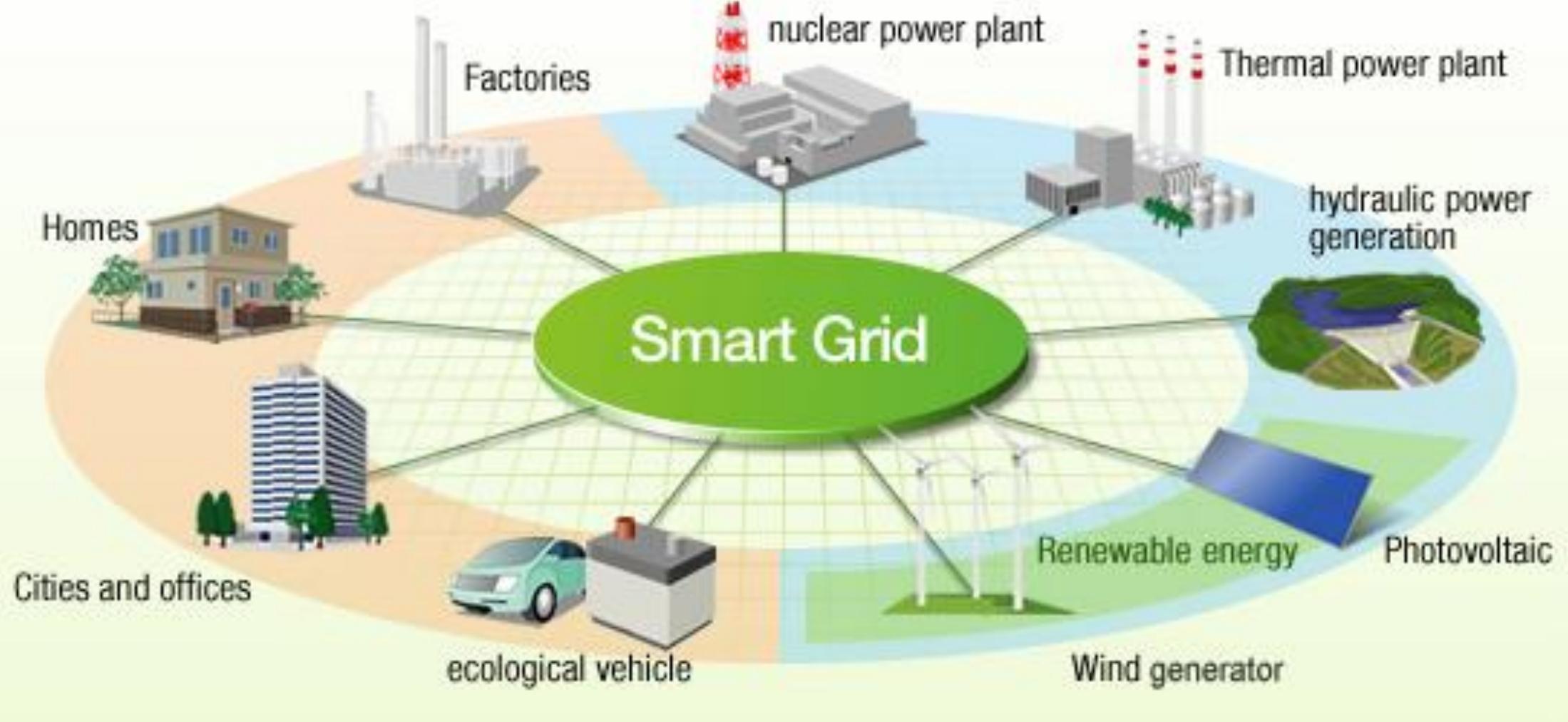
# Vision: A controllable, informed World

## Libelium Smart World



- Everything is equipped with Sensors and Controllers
- Hubs collect the data of sensors
- Hubs publish their data into the cloud
- Apps evaluate data and perform controlling actions using to models, algorithms and settings
- Mobile devices equipped with sensors publish data into the cloud
- Mobile Apps access and evaluate data, publish results back into the cloud, thus interacting with the environment

# Smart Grid

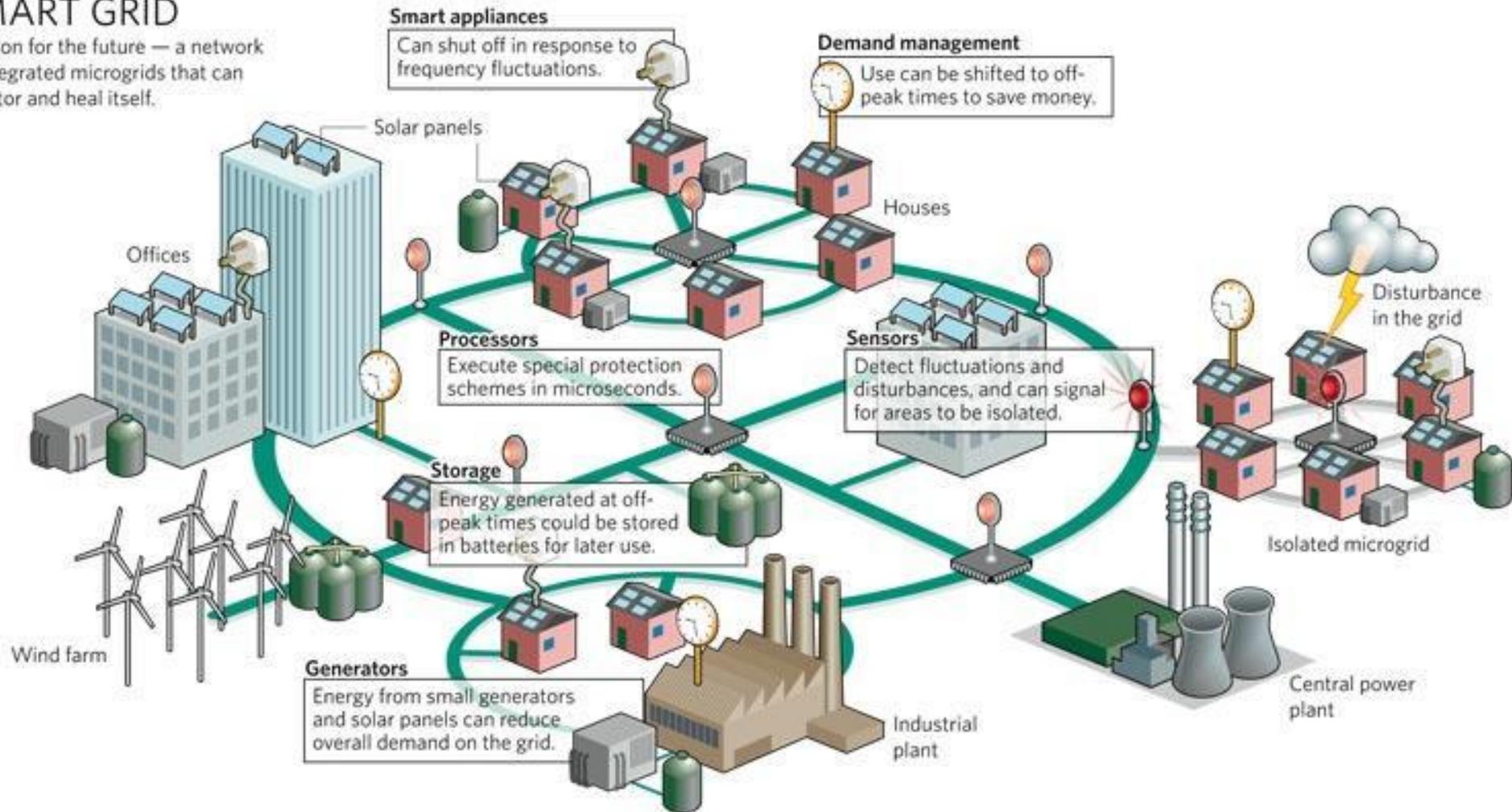


Source: <http://www.hitachi.com/environment/showcase/solution/energy/smartgrid.html>

# Smart Grid

## SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



# Internet Of Things Landscape

## INTERNET OF THINGS LANDSCAPE

### Platforms & Enablement (Horizontals)

--	--	--	--	--	--

### Applications (Verticals)

<h4>Quantified Self</h4> <p>Wearable Computing: GLASS, Pebble</p> <p>Fitness: amigo, Withings, fitbit, JAWBONE</p> <p>Health: BASIS, LUMO, HAPIfork, wahoo, NuMetrex</p> <p>Family: REST, Good Night Lamp, Withings</p>	<h4>Lifestyle</h4> <p>Leisure: blossom, ICA kitchen, Thimble, remeeo, iGrill, HEKBRIGHT, sobi</p> <p>Pets: gibi, FITBARK</p> <p>Toys: sifteo, MakeLab, KAROTZ, greengOOSE, glar</p> <p>Music: glar</p> <p>Gardening: BITPONICS, plant link, Koubachi</p> <p>Home Improv.: Radiator Labs, netatmo</p>	<h4>Connected Home</h4> <p>Home Automation: SmartThings, NINJABLOCKS, revolv, Ubi, lapka, Wovyn</p> <p>Energy Efficiency: knut, nest, we mo, tado°, LIFX, ecobee, belkin, echo, micasa verde</p> <p>Security: Kwikset, ALARM.COM, Bosch, Lockitron, CANARY, HomeMonitor, iSmartAlarm</p> <p>New Interfaces: NeuroSku, sphero, gestigon, PrimeSense, EQUISO, emotivo, Interaxon, LEAP</p>	<h4>Industries</h4> <p>Retail: Nomi, euclid, placemeter</p> <p>Healthcare: VISI MOBILE, AdhereTech, AliveCor, TELCARE, intelligentM</p> <p>Automotive: Dashlabs, SYNCR, OpenXC, ienture</p> <p>Smart Buildings: APOGEE, Johnson Controls, Schneider Electric</p>	<h4>Industrial Internet</h4> <p>Robotics: KIVA Systems, Double Robotics, Airware, ROBOTEX, 3D Robotics, MOMENTUM</p> <p>Greentech: BigBelly, Axeda, Solar, enlightened, GRID MOBILITY</p> <p>3D Printing: BOSYSTEMS, Stratasy, MezzoMill, formlabs, shapeways, MakerBot, RepRap</p>
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### Building Blocks

<h4>Connection Protocols</h4>	<h4>Telecom</h4>	<h4>M2M</h4>					
<h4>Software</h4>	<h4>Mobile</h4>	<h4>Hardware</h4>	<h4>Parts / Kits</h4>	<h4>Services</h4>	<h4>Incubators</h4>	<h4>Funding</h4>	<h4>Distribution</h4>

# Smart Home Technologies & Acronyms



INST EON



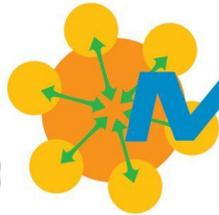
ZigBee®



Bluetooth®



QIVICON



Modbus



lightwaveRF



HVAC

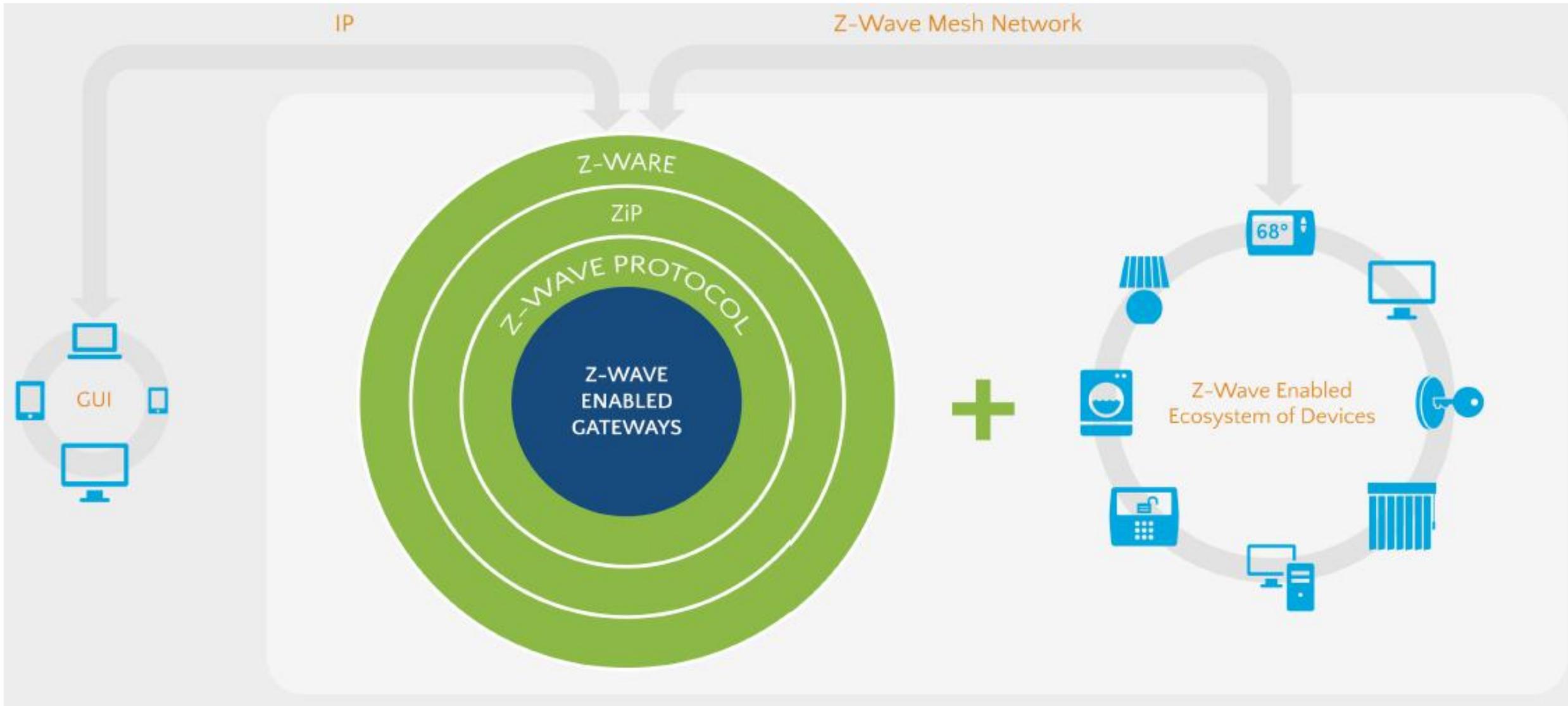


BACnet™

# Smart Home Technology Comparison

Name	Physical	Pro	Con	Price
<b>InsteOn</b>	RadioFreq + Powerline	High Reliability, Many Products		\$30+
<b>Z-Wave</b>	RadioFreq	Many Products	Controller needed, Network Size Limits	\$32+
<b>X10</b>	Powerline	Cheap	Old, Low Reliability, Slow	\$17+
<b>ZigBee (Alliance)</b>	RadioFreq	Gaining Momentum	Expensive	\$220+
<b>WiFi</b>	RadioFreq	Ubiquitous	Network Size Limits	\$50+
<b>Bluetooth</b>	RadioFreq	Ubiquitous	Range Limits (10 Meter)	\$30+
<b>UPB</b>	Powerline	Better than X10	Limited Range	\$40+
<b>QiviCon (Alliance)</b>	RadioFreq	Many Products	Local (German) Market	\$40+

# Z-Wave Radio Communication Technology



# ZigBee Standards



## ZigBee Building Automation

Integrate and centralize management of lighting, heating, cooling and security... [more](#)



## ZigBee Remote Control

Experience advanced and easy-to-use remote controls for any consumer electronic product... [more](#)



## ZigBee Smart Energy

Gain greater information and control of energy usage with a ZigBee HAN... [more](#)



## Smart Energy Profile 2

Enable IP based control, both wired and wireless, for energy management in the home... [more](#)



## ZigBee Health Care

Secure and reliable communication devices for health management and patient monitoring... [more](#)



## ZigBee Home Automation

Enjoy flexible management and control of lighting, heating and cooling systems, security and appliances from anywhere... [more](#)



## ZigBee Input Device

Energy efficient and easy-to-use keyboards, touchpads, mice, wands for consumer electronics and computers... [more](#)



## ZigBee Light Link **NEW!**

Interoperable, easy-to-use lighting products offering control via your smartphone, tablet or remote control... [more](#)



## ZigBee Retail Services

Modernization of the retail experience from point-of-manufacture to point-of-sale is now underway... [more](#)

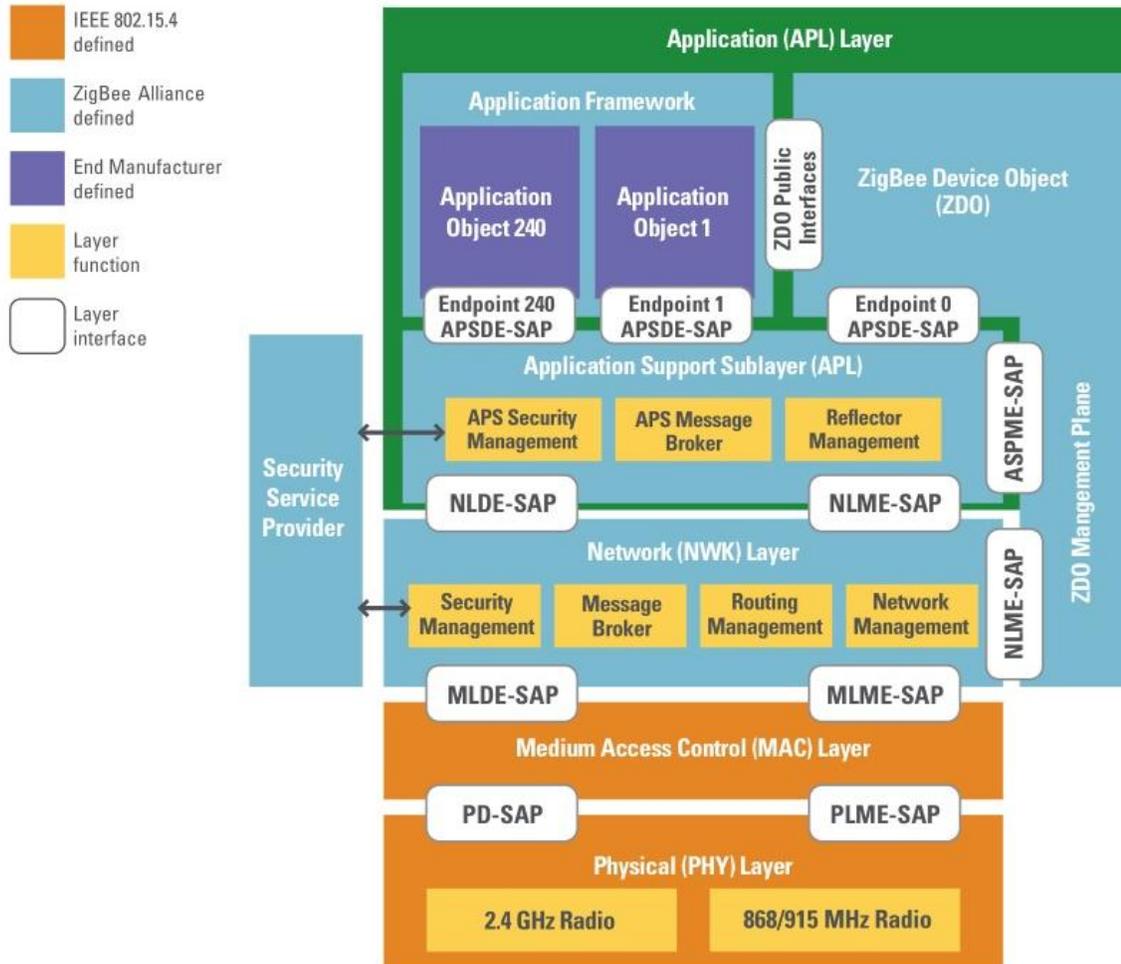


## ZigBee Telecom Services

Launch numerous value-added services that maximize mobile networks and devices... [more](#)

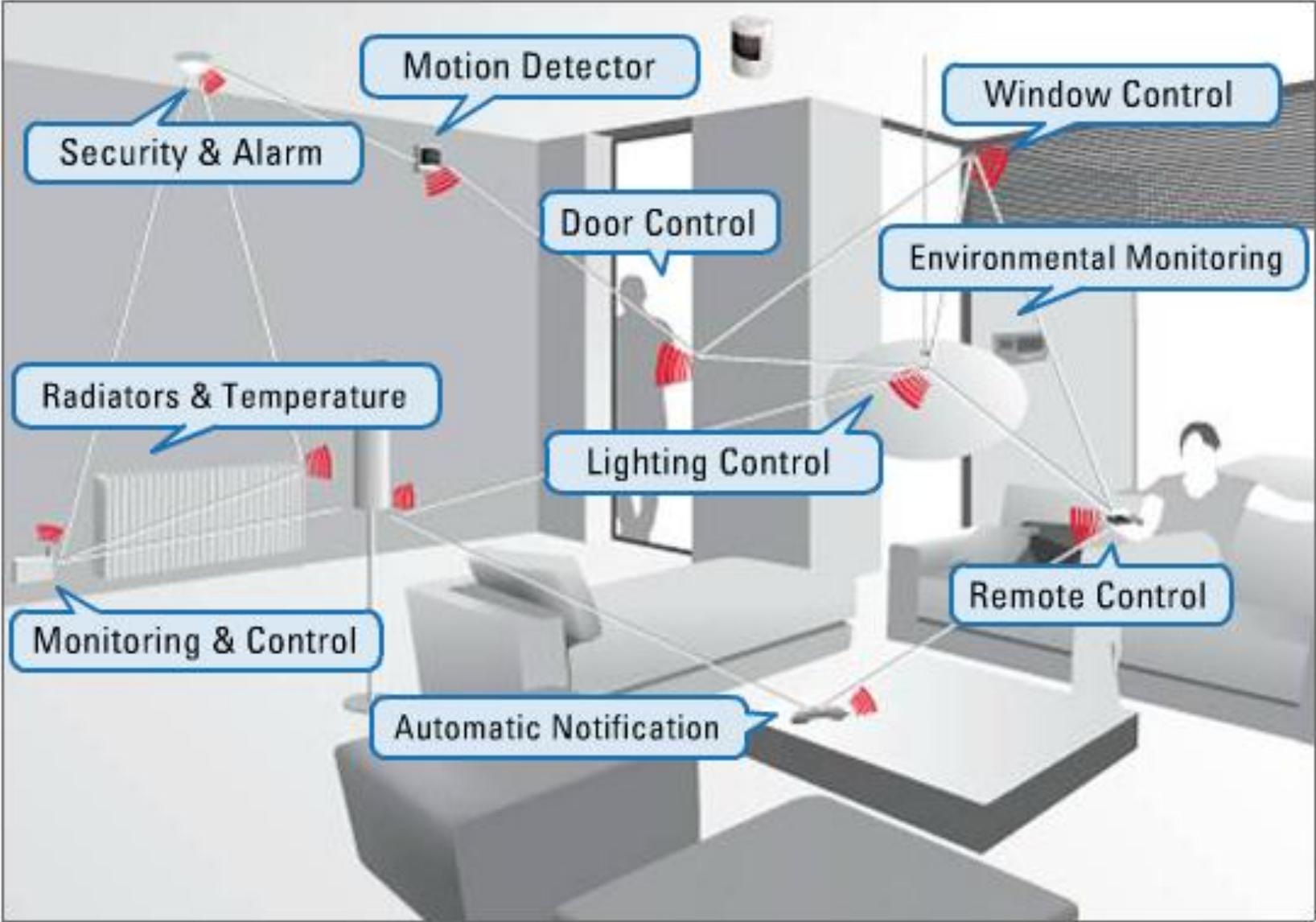
# ZigBee Example Architecture

ZigBee Wireless Sensor Applications for Health, Wellness and Fitness - March 2009

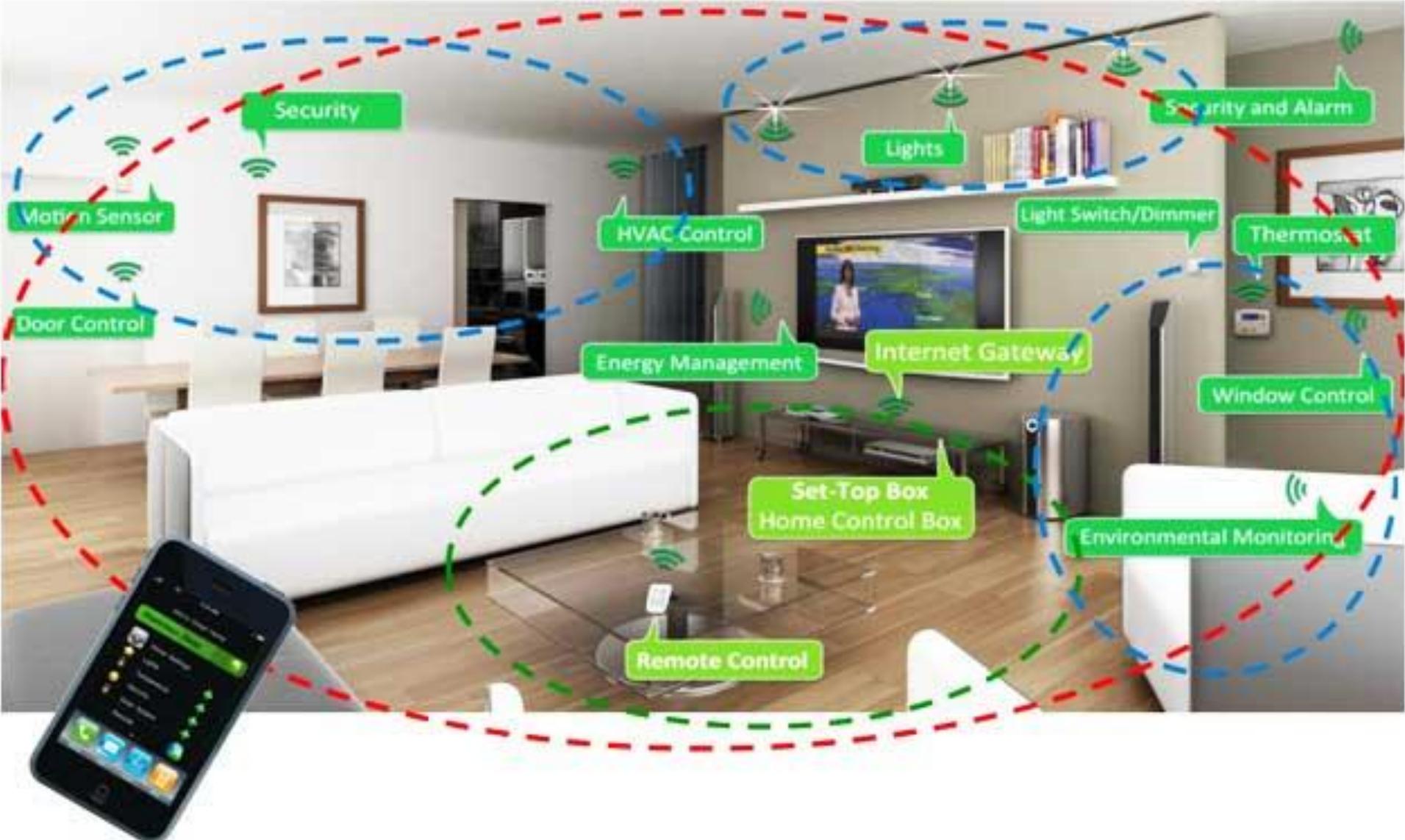


Source: [http://chipdesignmag.com/sld/files/2009/06/zigbee\\_wirelesshealth1.jpg](http://chipdesignmag.com/sld/files/2009/06/zigbee_wirelesshealth1.jpg)

# Smart Home with ZigBee



# Smart Home with ZigBee



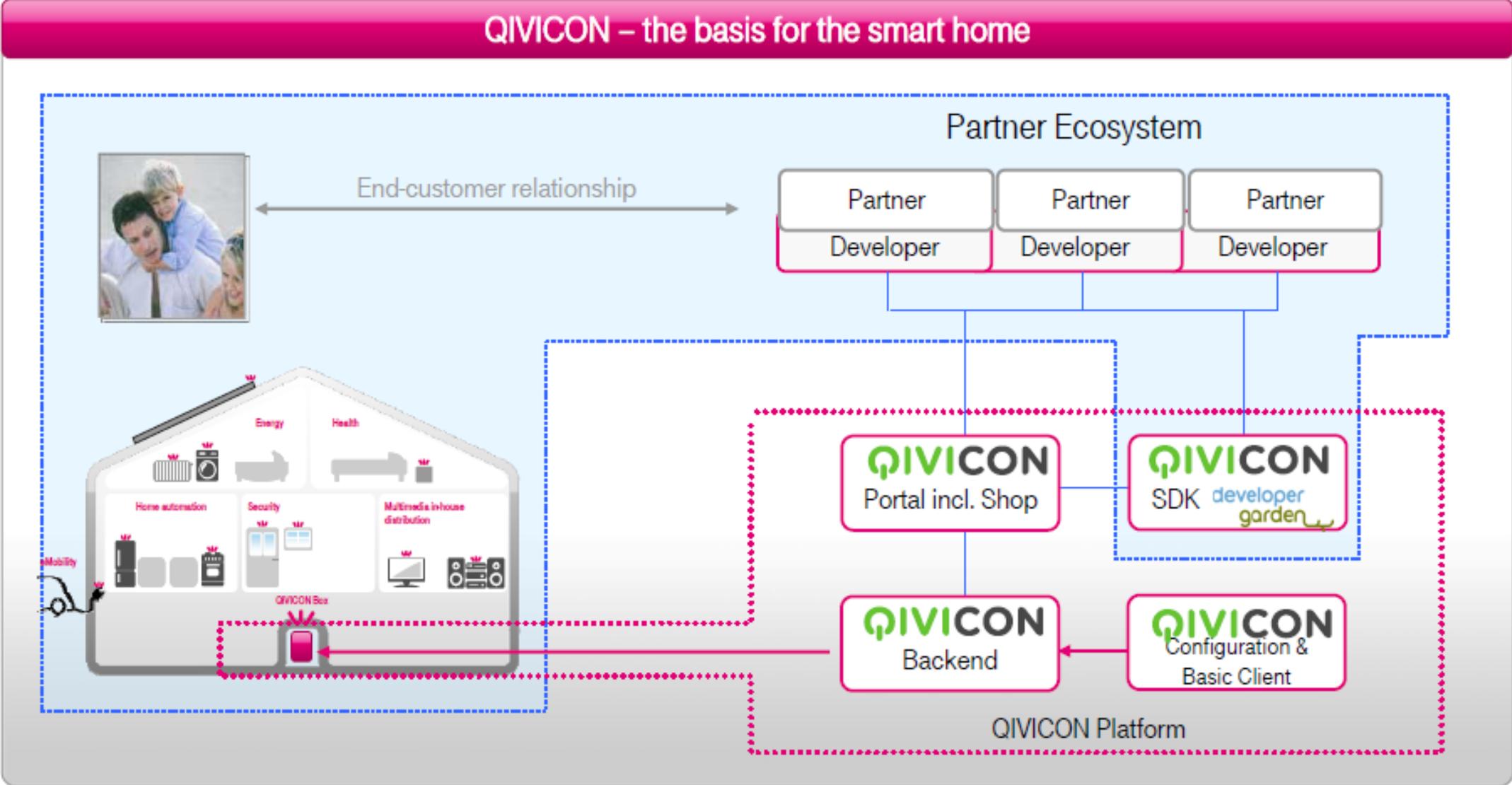
# Lightwave RF (UK)



 The Lightwave Home



# QiviCon - How it works

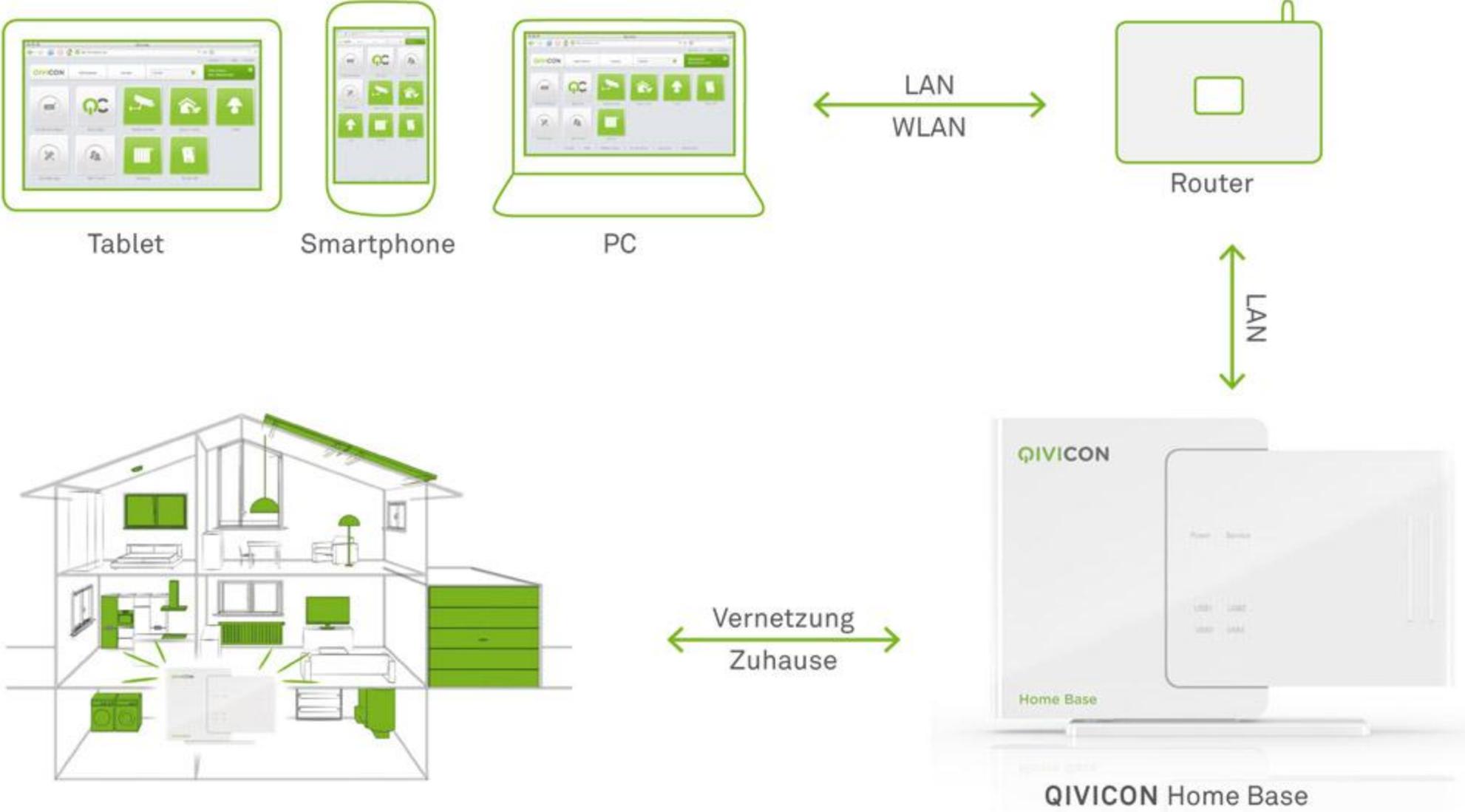


# Qivicon - How it works



Heizung Türen Dunstabzug  
Tor Heimkino Garage Sicherheitstechnik  
Trockner Alarmanlage Überwachungskamera  
Licht Solaranlage Gasmelder  
Multimedia Bewegungsmelder Dimmer Markise  
Fenster Herd Rauchmelder  
Wasserleitungen Waschmaschine

# Qivicon - How it works



# World Wide Infosec Product Spend

## Worldwide Information Security Products Spend

Protection - 97.5%

In Progress Intelligence and Response - 1.1%

Forensics - 1.4%

97.5% of the budget is spent on protection solutions to keep intruders out. Yet 90% of companies say an intruder has gotten in the "front door." On average, each breach costs businesses more than \$7 million.

Though more than 50% of organizations do not think they can prevent a future break-in (attack), only 1.1% of the budget is currently spent inside, where the majority of the damage actually occurs. Worldwide, only about one percent of every dollar is spent on monitoring and actively responding to these intrusions to minimize the impact of the attack while it's still happening.

1.4% is spent each year on forensics and response - but the damage is already done.



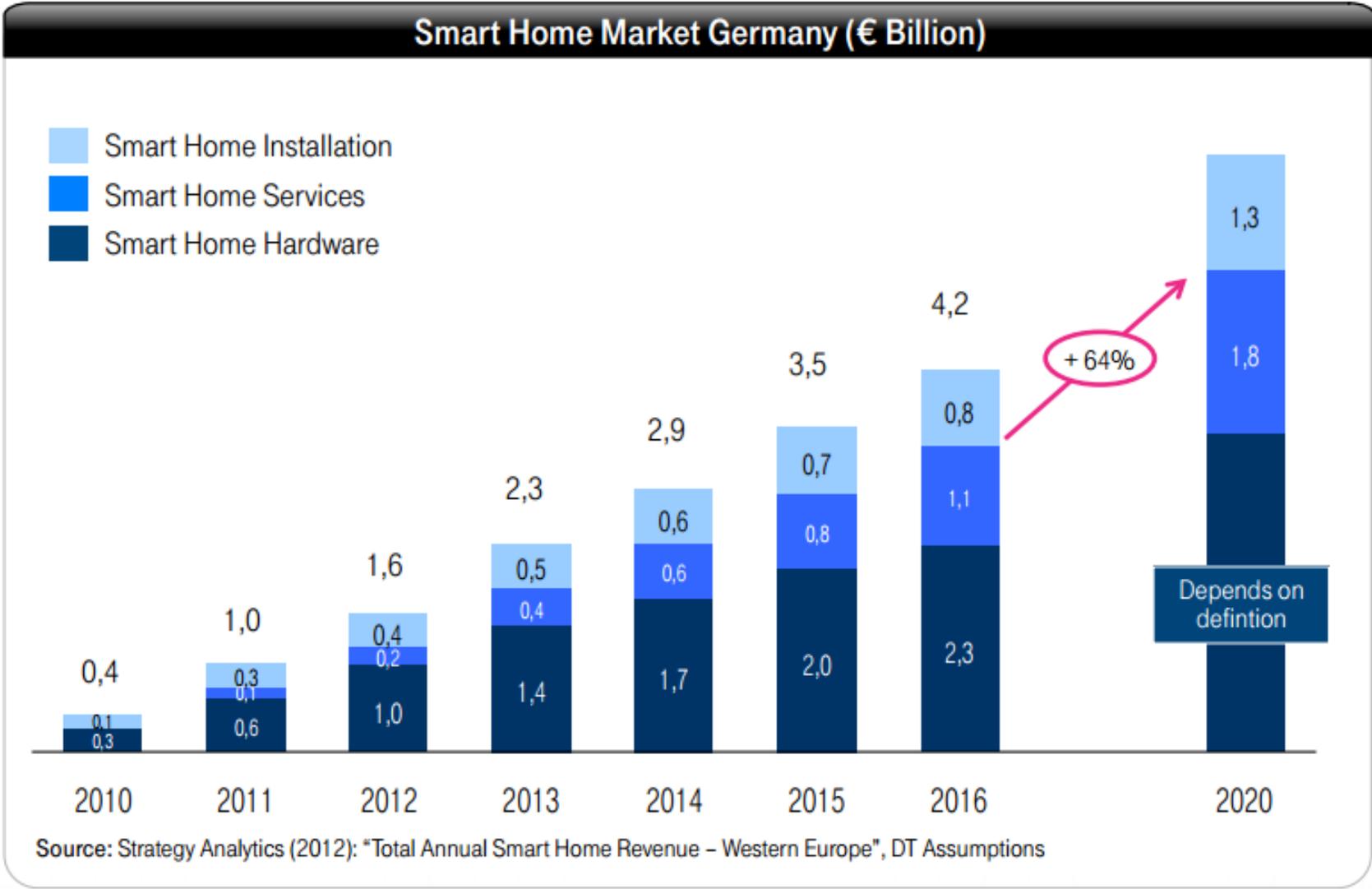
**Total Security Market Size**  
**\$32 Billion**

Endpoint \$8.42 Billion  
Network \$9.63 Billion  
Identity \$4.5 Billion  
Messaging \$3.68 Billion  
Vulnerability Mgmt \$2.84 Billion  
Web \$1.89 Billion  
Other \$0.24 Billion



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# German Smart Home Market



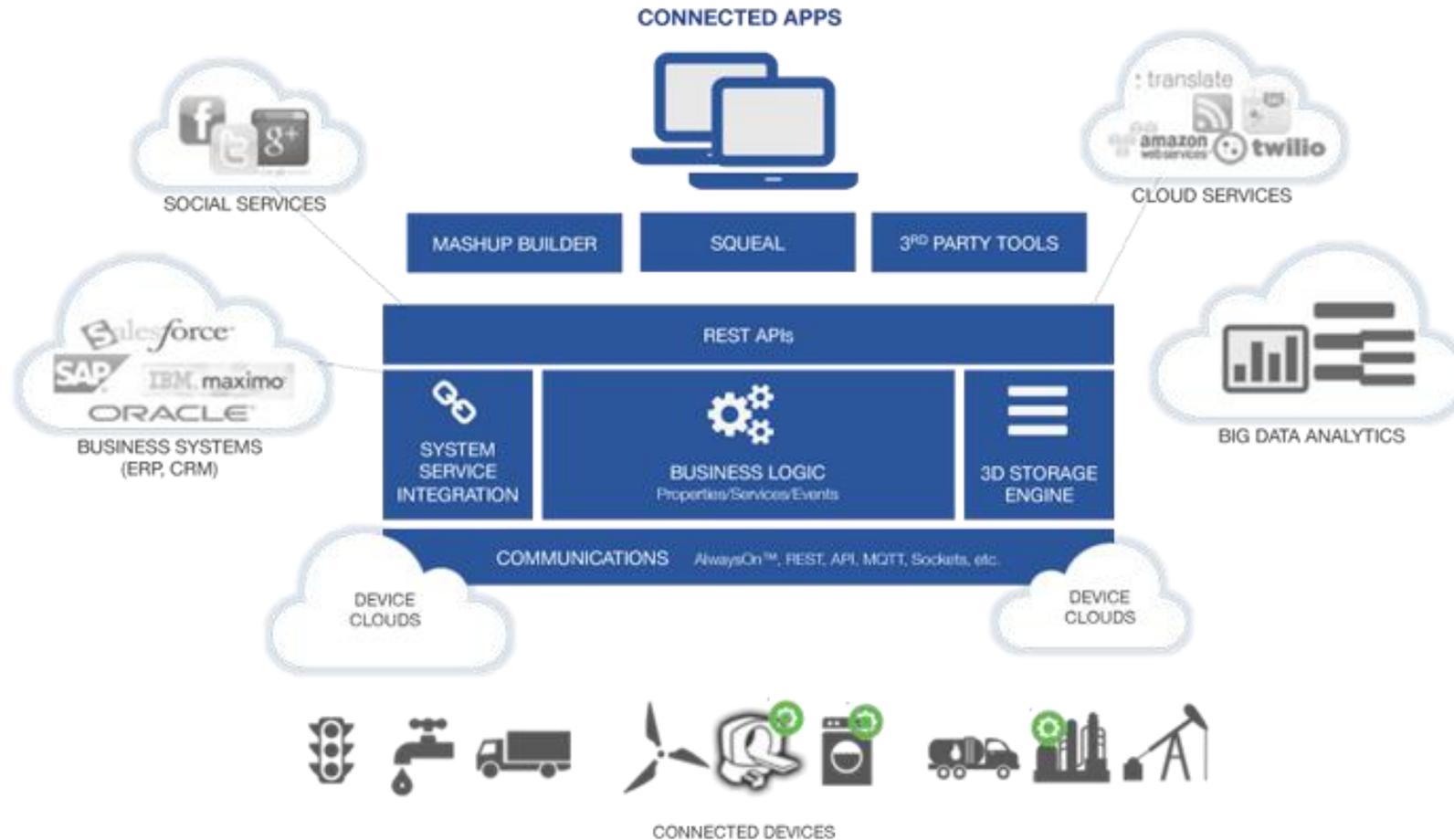
# ThingWorx - Industry Solutions

<http://www.thingworx.com>

ThingWorx is the first software platform designed to build and run the applications of the connected world.

ThingWorx reduces the time, cost, and risk required to build innovative **Machine-to-Machine (M2M)** and **Internet of Things (IoT)** applications.

- ThingWorx Composer: Application Modeling
- Codeless "Drag and Drop" mashup Builder
- Event-Driven Execution and 3D Storage



# ThingWorx



## SmartGrid Layers

- Connected Sensors & Devices
- Connected Products
- Connected Industries

## Application Sectors

- Manufacturing
- Oil & Gas
- Smart Grid / Energy
- Smart Cities - Infrastructure / Utilities
- Smart Cities - Smart Buildings
- Machine To Machine (M2M)
- Complex Machinery
- Medical Devices
- Transportation
- Education & Public Services

# ThingWorx - Manufacturing



- Automated Plants
- Production Line Dashboards and Controlling Apps
- Inventory Monitoring

# ThingWorx - Smart Buildings



Connecting of

- Environmental Sensors
- Heating, Ventilation and Air Conditioning (HVAC)
- Office & Safety Equipment

# ThingWorx - Machine2Machine



## Connect

- activities
- services
- inter-relationships

## of all

- people
- systems
- devices

## in the network.

# ThingWorkx - Complex Machinery



- Real-time condition-based maintenance
- Benchmarking
- Collaborative technical support services

# ThingWorx - Transportation



- Vehicle automation
- Smart transportation
- Smart delivery of goods
- Reduce energy consumption
- Maximize corporate and tax payer ROI

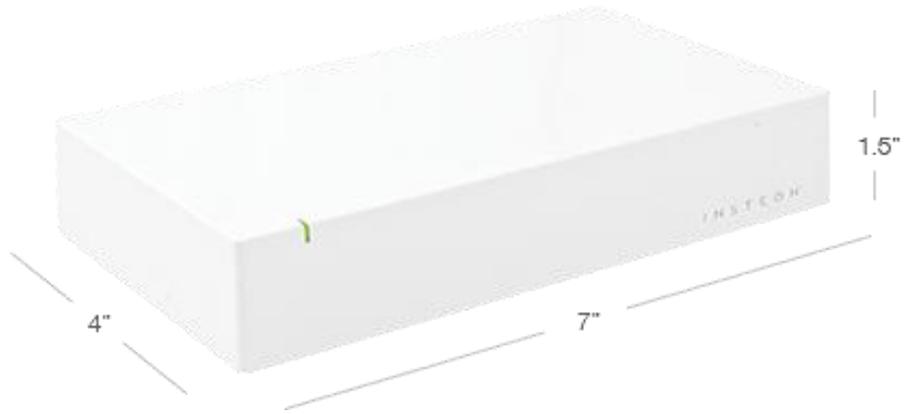
# Crestron Home Automation



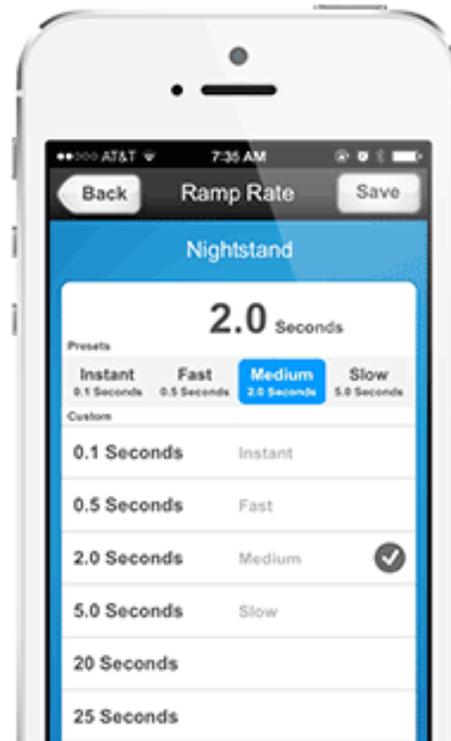
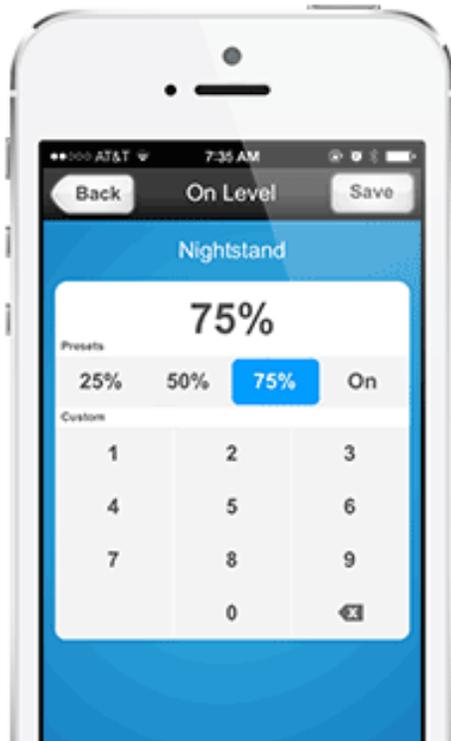
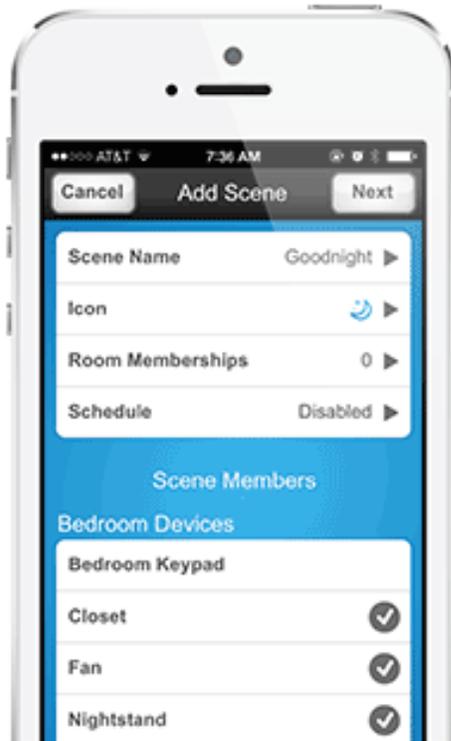
## Home Automation



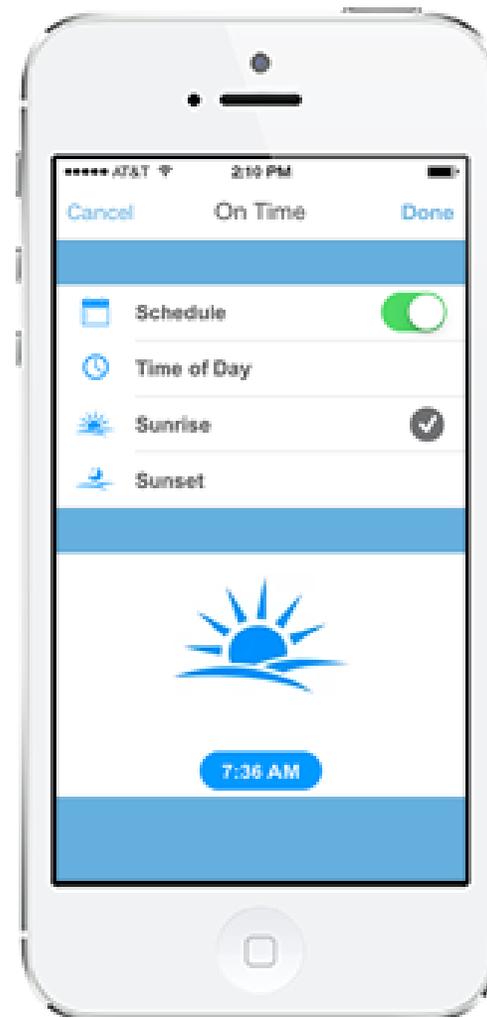
# Insteon Products



# InsteOn LED Bulbs



# InsteOn Control Central



# InsteOn Hub Hero



# Leviton Home Automation



Camera Systems



Connectors & Jacks



Internet Routers & Switches



Home Audio



Patch Cords & Cables



Power & Surge Protection



Structured Media® Centers



Tools & Accessories



Voice, Data, & Video Distribution



Wallplates



# RWE SmartHome Modules



# RWE SmartHome App

GERÄT: SCHLAFZIMMER

HEUTIGES TAG: Vorgestern, Gestern, Heute

UHRZEIT	EREIGNIS
12:46:43	63%
11:38:16	64%
11:18:46	63%
11:07:45	64%
10:07:14	65%
09:36:47	64%
08:33:30	65%
08:04:53	64%
07:45:55	63%
07:36:48	62%
07:15:50	61%
07:05:35	57%
06:56:23	53%
06:45:18	48%
06:35:36	39%
06:25:35	33%
06:14:57	22%
06:05:07	15%
05:35:05	11%
04:18:15	10%
02:52:32	11%
02:42:34	17%

RWE SMARTHOME

ZUSTAND: ZUSTAND OPTIMAL

MONAT AUGUST

MONATSZIEL: 13 €

AKTUELL bis 27.08: 9 €

PROGNOSE: 10 €

EXPORTIEREN

GERÄT: LEISTUNG

INTERVALL: 15 MIN., 30 MIN., 2 STD.

AKTUELL 216 Watt

GERÄT: BEZUG

ZEIT: WOCHEN, MONAT, JAHR, JAHRE

Zeitraum: 21.08.2013 - 27.08.2013

Vergleich: 21.08.2013 - 27.08.2013

KOSTEN 1,68 €

Tag	Normalzeit / Hauptzeit	Nebenzahl
Mi.	0,00 kWh 0,00 €	1,93 kWh 0,37 €
Do.	0,00 kWh 0,00 €	2,35 kWh 0,45 €
Fr.	0,00 kWh 0,00 €	1,54 kWh 0,29 €
Sa.	0,00 kWh 0,00 €	0,16 kWh 0,03 €
So.	0,00 kWh 0,00 €	0,16 kWh 0,03 €
Mo.	0,00 kWh 0,00 €	1,95 kWh 0,37 €
Di.	0,00 kWh 0,00 €	0,21 kWh 0,14 €

# RWE SmartHome App

The screenshot displays the RWE SmartHome App interface. At the top left is the RWE SMARTHOME logo. To its right is a 'MENÜ' button with a plus icon. Further right are a mail icon with the number '7' and a home automation icon. The main area is divided into three room control panels: 'WOHNZIMMER', 'SCHLAFZIMMER', and 'KINDERZIMMER'. Each panel shows a heating temperature (18,0°, 20,0°, and 13,0° respectively) and other controls like 'Rolladen' (56%), 'NAS', 'Alarm', and 'Nachttisch' (AUS). Below each room panel are detailed status cards for 'Temperatur', 'Luftfeuchtigkeit', and 'Sonnenaufgang'. At the bottom, there are two large icons: 'Rolladen Er...' and 'Licht Ereignis'. The Android system bar at the very bottom shows the time as 12:55 and various status icons.

**WOHNZIMMER**

- Heizung: 18,0°
- Rolladen: 56%
- NAS
- Temperatur: 23,3°
- Luftfeuchtigkeit: 41,0%
- Sonnenaufgang: 20:32

**SCHLAFZIMMER**

- Heizung: 20,0°
- Nachttisch: AUS
- Temperatur: 20,8°
- Luftfeuchtigkeit: 46,5%
- Tür- und Fenster: geschlos...
- Helligkeit: 63%

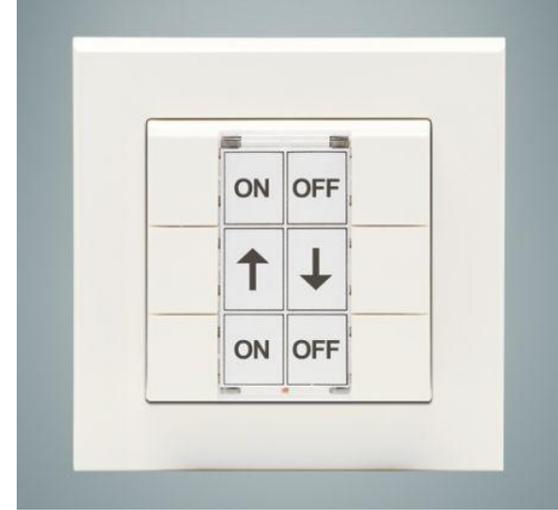
**KINDERZIMMER**

- Alarm
- Heizung: 13,0°
- Rauchmelder
- Temperatur: 21,7°
- Luftfeuchtigkeit: 42,0%

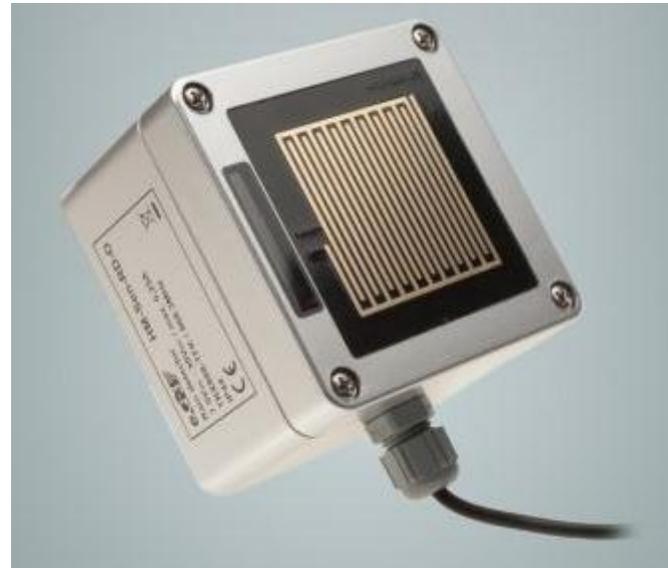
Bottom icons: Rolladen Er..., Licht Ereignis

System bar: 12:55

# HomeMatic Modules



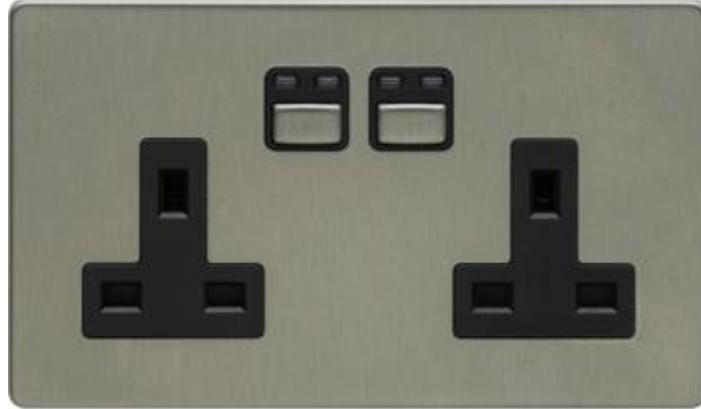
# HomeMatic Modules



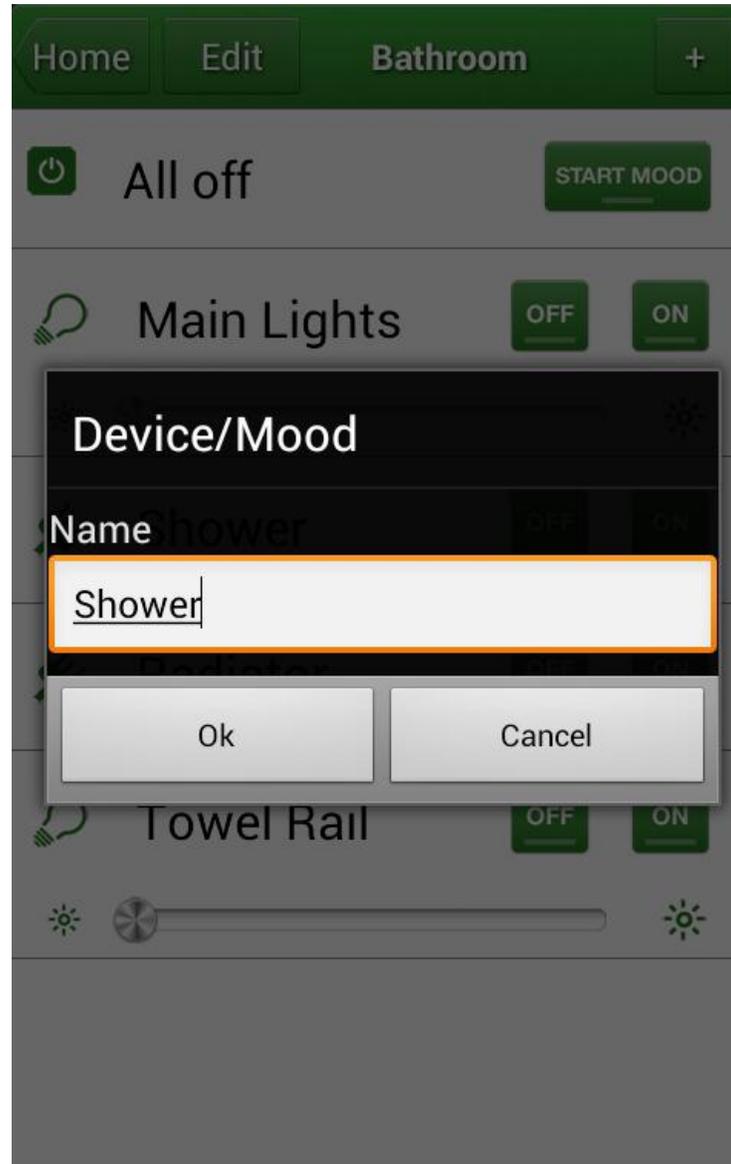
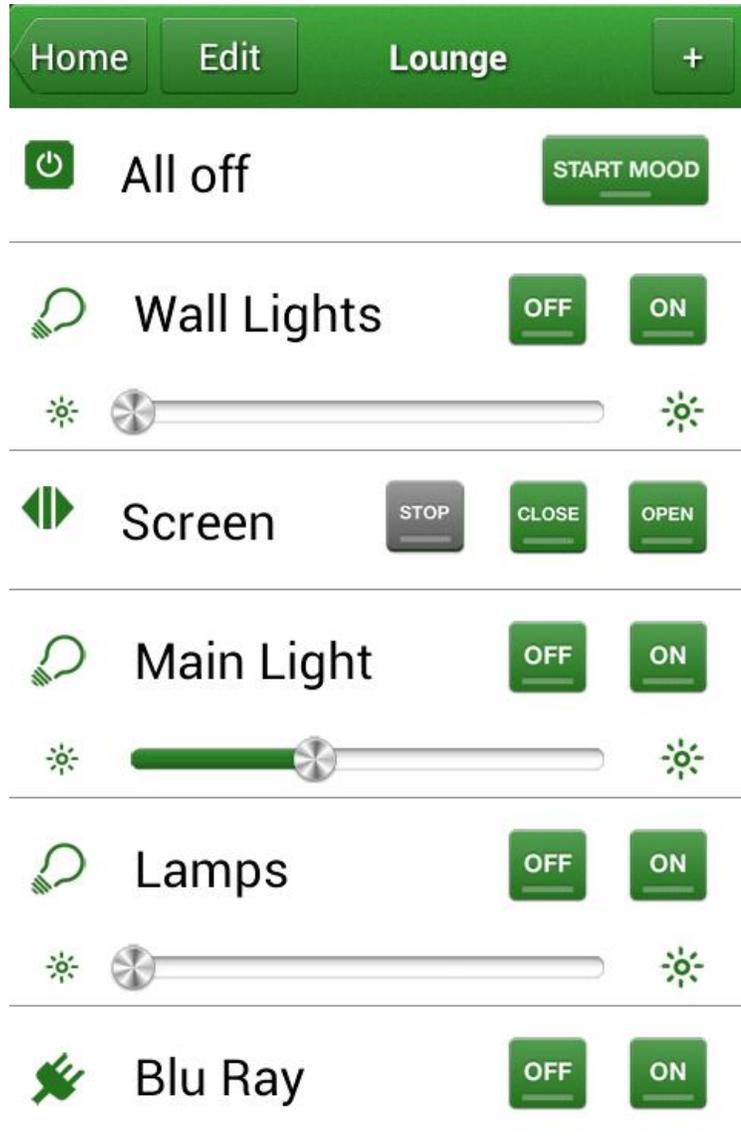
# QiviCon, Telekom, Bitron Hardware



# Lightwave RF



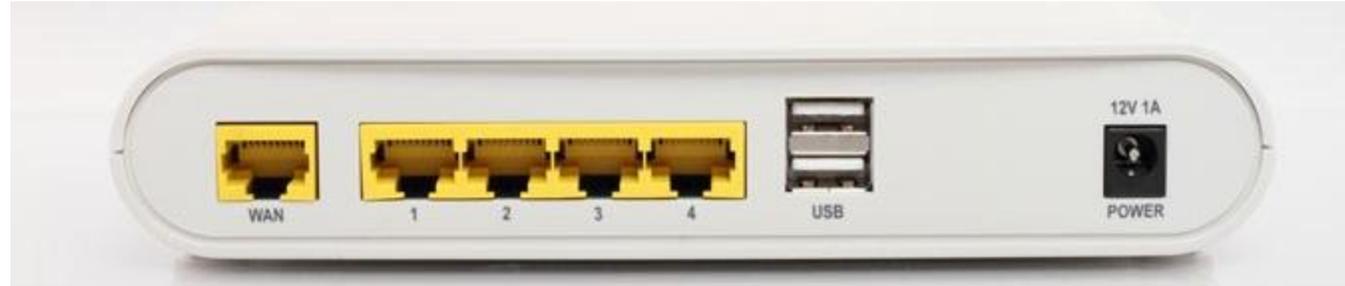
# Lightwave RF App



# Vera (Z Wave Control System)



# Vera (Z-Wave Control System)

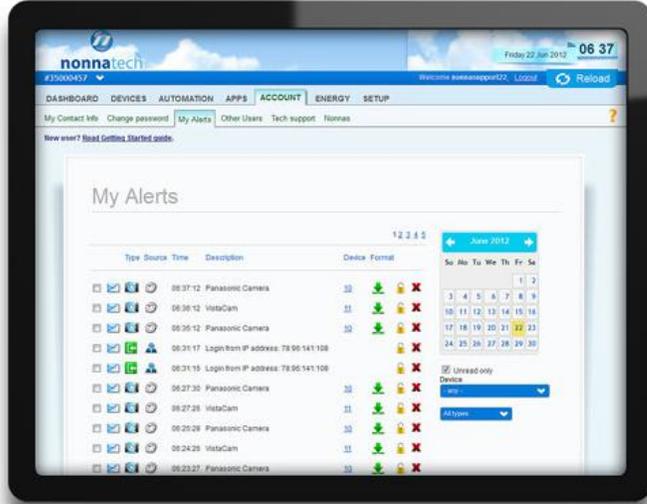


<b>Aeon Micro SES Wall Outlet Light</b> 13 w <input type="checkbox"/> Off <input checked="" type="checkbox"/> On	<b>Aeon SES Micro Dimmer Track</b> 218 w <input type="checkbox"/> Off <input checked="" type="checkbox"/> On	<b>Aeon SES Pipe Heating Module</b> 0 w <input type="checkbox"/> Off <input checked="" type="checkbox"/> On	<b>APT DOOR - Deadbolt</b> <input type="button" value="Unlock"/> <input checked="" type="button" value="Lock"/>
<b>Apt LR Accent Lamp</b> 21 w <input type="checkbox"/> Off <input checked="" type="checkbox"/> On	<b>Apt Porch Lights</b> 0 w <input checked="" type="checkbox"/> Off <input type="checkbox"/> On	<b>Kitchen Sink TrackLights</b> 52 w <input type="checkbox"/> Off <input checked="" type="checkbox"/> On	<b>Standing Floor Lamp</b> 0 w <input checked="" type="checkbox"/> Off <input type="checkbox"/> On
<b>Toaster Oven Outlet - Light</b> 13 w <input type="checkbox"/> Off <input checked="" type="checkbox"/> On			

# Z-Wave Products



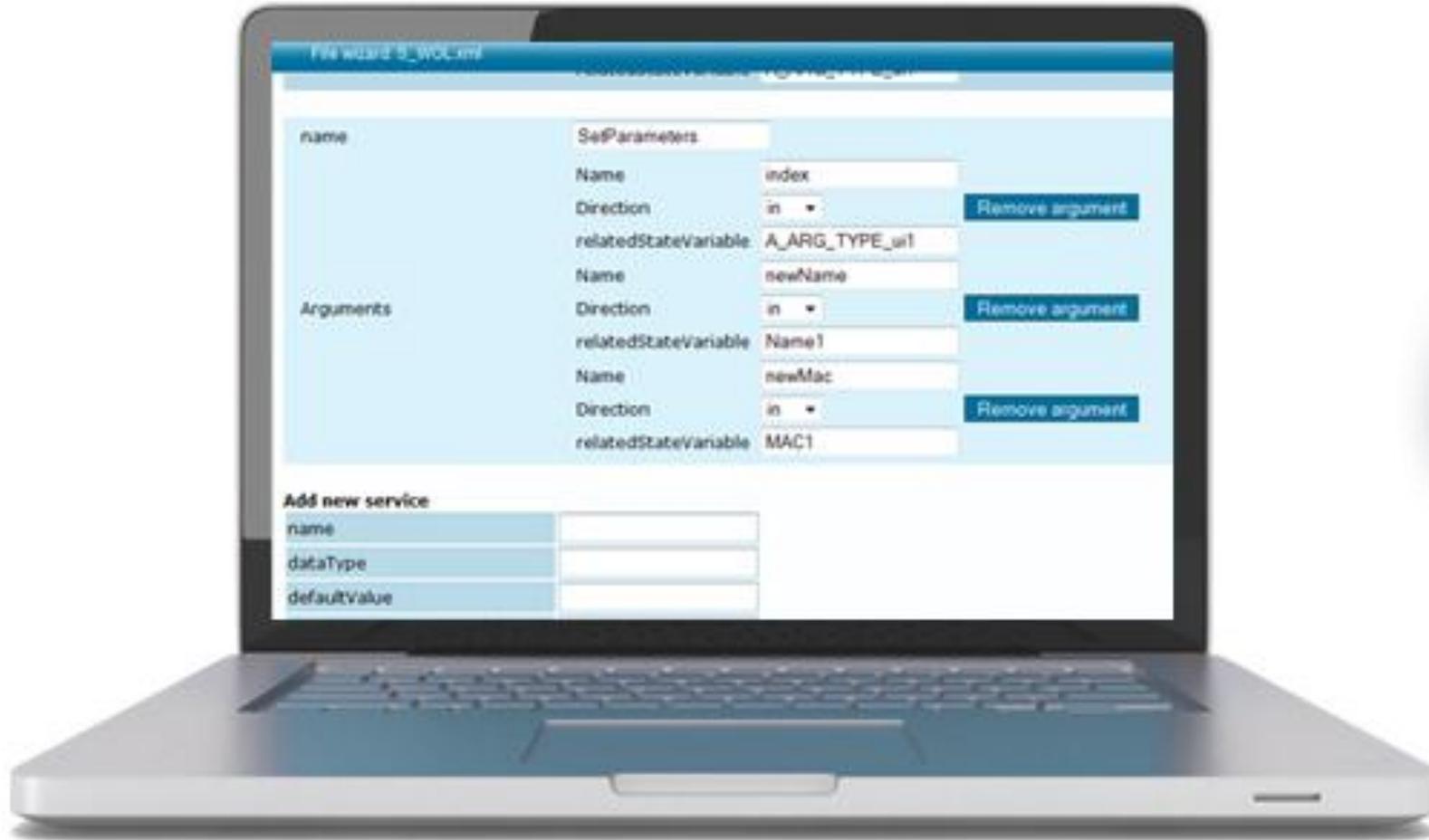
# MiOS - Z Wave Development Platform



# MiOS - Z Wave Development Platform



# MiOS Developer Kit



# MiOS LuuP

## Develop Apps

Developers

Test Luup code (Lua)

Edit Startup Lua

Luup files

Serial Port configuration

Create device

### Luup files

#### Current files

O_AMisc1.xml	<a href="#">View</a> <a href="#">download</a>
O_BedSensors.json	<a href="#">View</a> <a href="#">download</a>
O_BedSensors.xml	<a href="#">View</a> <a href="#">download</a>
O_BinaryLight1.json	<a href="#">View</a> <a href="#">download</a>
O_BinaryLight1.xml	<a href="#">View</a> <a href="#">download</a>
O_CombiDevice1.xml	<a href="#">View</a> <a href="#">download</a>
O_DataLine1.json	<a href="#">View</a> <a href="#">download</a>
O_DataLine1.xml	<a href="#">View</a> <a href="#">download</a>
O_DigitalSecurityCamera1.json	<a href="#">View</a> <a href="#">download</a>
O_DigitalSecurityCamera1.xml	<a href="#">View</a> <a href="#">download</a>
O_DimmableLight1.json	<a href="#">View</a> <a href="#">download</a>
O_DimmableLight1.xml	<a href="#">View</a> <a href="#">download</a>
O_DoorLock1.json	<a href="#">View</a> <a href="#">download</a>
O_DoorLock1.xml	<a href="#">View</a> <a href="#">download</a>

#### Upload files

<input type="text" value="C:\FoscamPTZ.xml"/>	<input type="button" value="Browse.."/>
<input type="text"/>	<input type="button" value="Browse.."/>
<input type="checkbox"/> Restart Luup after upload	<input type="button" value="GO"/>

# T-Mobile Smart Home App

**Nachrichten**

Heute

- !** Küche ist nass 12:00  
Wassermelder (Küche) meldet Nässe.

14. Dezember 2013

- i** Tür- oder Fensterkontakt ist offen. 03:37  
Tür- oder Fensterkontakt (ZigBee) ist offen.

13. Dezember 2013

- !** Sturm/Orkan 18:36  
Unwetterwarnung Stufe Violett vor Sturm/Orkan
- i** Terrassentür ist offen. 04:46  
Terrassentür (Wohnzimmer) ist offen.

12. Dezember 2013

- !** Küche ist nass 14:35  
Wassermelder (Küche) meldet Nässe.
- !** Küche ist trocken 14:30  
Wassermelder (Küche) meldet, dass es trocken ist.
- !** Straßenglätte 13:23  
Wassermelder (Küche) meldet Nässe.

**Regeln**

**Sicherheit**

- Rauchmelder**   
Informiere mich, wenn einer der Rauchmelder Alarm auslöst.
- Fenster oder Tür wurde geöffnet**   
Informiere mich, wenn während Abwesenheit oder Urlaub ein Fenster oder eine Tür geöffnet wird.
- Fenster oder Tür noch offen**   
Informiere mich, wenn bei der Aktivierung von Abwesend oder Urlaub noch Türen oder Fenster geöffnet sind.
- Bewegungsmelder**   
Informiere mich, wenn während meiner Abwesenheit oder im Urlaub Bewegung in einem Raum festgestellt wird.
- Unwetterwarnungen**   
Informiere mich über Unwetterwarnungen für meine Region.

**Mein Zuhause**

10°C  
Berlin

Morgens

**Fernbedienung**

Wohnzimmer 23.2°

<b>ein</b> Stehlampe	<b>ein</b> TV - HiFi
<b>geschlossen</b> Fenster rechts	<b>22°</b> Heizung
<b>keine Bewegung</b> Bewegungsmelder	

# uControl Smart Home Automation

uControl 113

Bad Obergeschoss: 21.0° C Normal

Arbeitszimmer: 21.5° C Normal

Bad Untergeschoss: 21.0° C Normal

Wohnzimmer: 21.5° C Komfort

Schlafzimmer: 22.0° C Komfort

Kinderzimmer: 21.0° C Komfort

uControl

Merkmale

Aktuelle Temperatur: 21.0 °C

Aktueller Modus: Automatisch

Zieltemperatur: 21.0 °C

Komforttemperatur: 21.0 °C

Eco-Temperatur: 16.5 °C

Temperatur bei geöffnetem Fenster: 12.0 °C

Temperatureinstellungen speichern

uControl 99

ComingHome Modus: Sofort

Räume bei ComingHome berücksichtigen

- Bad Obergeschoss
- Arbeitszimmer
- Bad Untergeschoss
- Schlafzimmer
- Kinderzimmer
- Küche

uControl

Deutschland

ComingHome Modus: Sofort

Räume bei ComingHome berücksichtigen

Radius: 1000m

Dresden

# inControl Home Automation

90% 6:54 AM

**DEVICES**  
14 powered on

**ENERGY**  
867 watts

Lights: 3 / 23  
Cameras: 2  
Locks: 1 / 2

Alarm System ARMED

Alarm System DISARMED

Bottom navigation: Home, Alarm, Home Automation, Settings, Refresh

63% 10:07 AM

**DEVICES**  
8 powered on

**ENERGY**  
1794 watts

LIGHTS: 2 / 23  
OUTLETS: 1 / 2  
LOCKS: 0 / 2

Scene  
Tap and hold to change

Scene  
Tap and hold to change

Bottom navigation: Home, Alarm, Home Automation, Settings, Refresh

63% 10:13 AM

**FAVORITES**

- GARAGE DOOR turned off January 1, 2010 off
- GARAGE LIGHT turned off January 1, 2010 off

Heat Cool

64	84
65	85
66	86

Current 76°

Fan Auto Fan On

Bottom navigation: Home, Alarm, Home Automation, Settings, Refresh

90% 6:54 AM

**POWERED DEVICES**

- BACK PORCH turned on 11 hours ago 18
- DEADBOLT: ENTRY locked 13 hours ago locked
- FRONT PORCH turned on 11 hours ago 17
- HEM 868 watts currently being used 868
- MOTION motion detected 9 hours ago motion
- MOTION: MASTER BED motion detected 5 minutes ago motion
- OFFICE turned on 56 minutes ago 30
- OUTSIDE HIGH 53 53

Bottom navigation: Home, Alarm, Home Automation, Settings, Refresh

# zHouse HomeControl

ZHOUSE Home Control

Home Control Icons: Home, Light, Fan, Camera, Clapperboard, Key

**KUCHNIA**

- światło główne 65%
- światła boczne OFF
- kamera
- temperatura 27°

**POKÓJ DZIENNY**

Room List:

- korytarz
- sypialnia
- łazienka duża
- salon
- pókoj dziecka

Humidity 94%



Oregon stream

Pogoda  
warunki: Clear

ZHOUSE Home Control

Termostat 10°C

auto	auto	+	+
grzanie	włącz	9°	10°
chłodzenie	cykl	-	-
wyłącz			
termostat	wentylacja	grzanie	chłodzenie

USTAW

ZHOUSE Home Control

Astronomia

	wschód	zachód
04:40:00	21:18:24	
16:15:28	02:08:32	

High Temperature 18°

Humidity 63%

Kamera

# HomeBuddy

Home Buddy 10:39

Home Buddy

Devices Scenes

- Garage Door
- VirtualSwitch
- Wake-on-LAN

Basement

- Home Theater Blinds
- 67° Thermostat

Living Room

- Lamp
- 66° Thermostat

Home Buddy 10:40

Home Buddy

Devices Scenes

Lamp

Off On

66° Thermostat

Heat

68

Fan Commands

Auto

Energy Save

Energy Normal

Home Buddy 10:41

Home Buddy

Devices Scenes

Global

- Garage Door
- VirtualSwitch

Off On

- Wake-on-LAN
- Thinkpad

Wake

Basement

Living Room

Home Buddy 10:42

Home Buddy

Devices Scenes

Global

- \*Lock Down\*
- Heat High
- Heat Low
- Heat Off
- Lights On

Main Entrance

- Open Sesame

# Belkin WeMo

## WeMo APP controls:

WeMo Light Switch



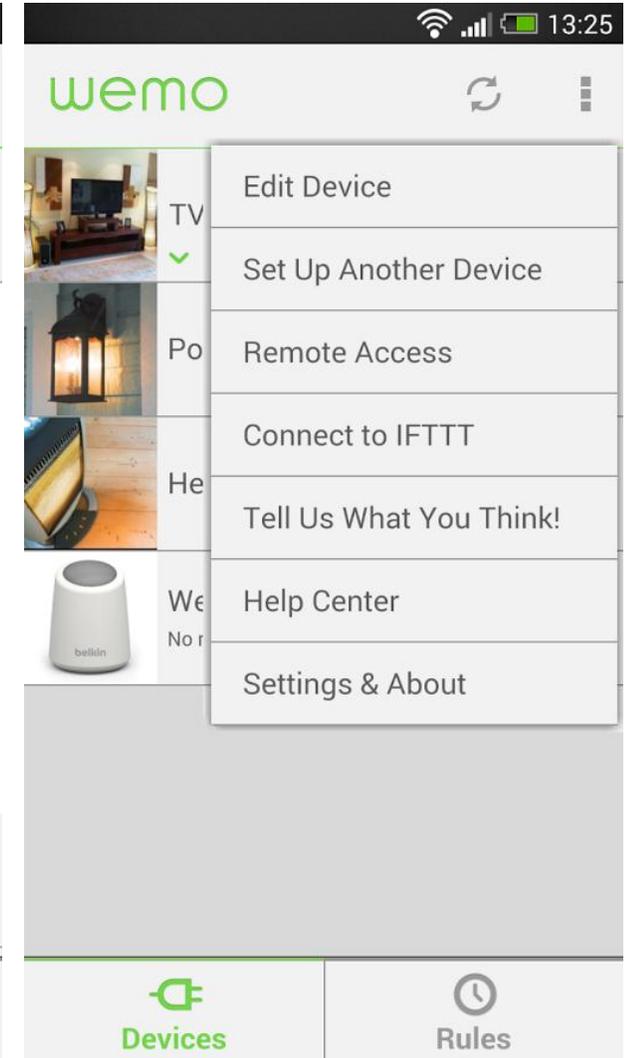
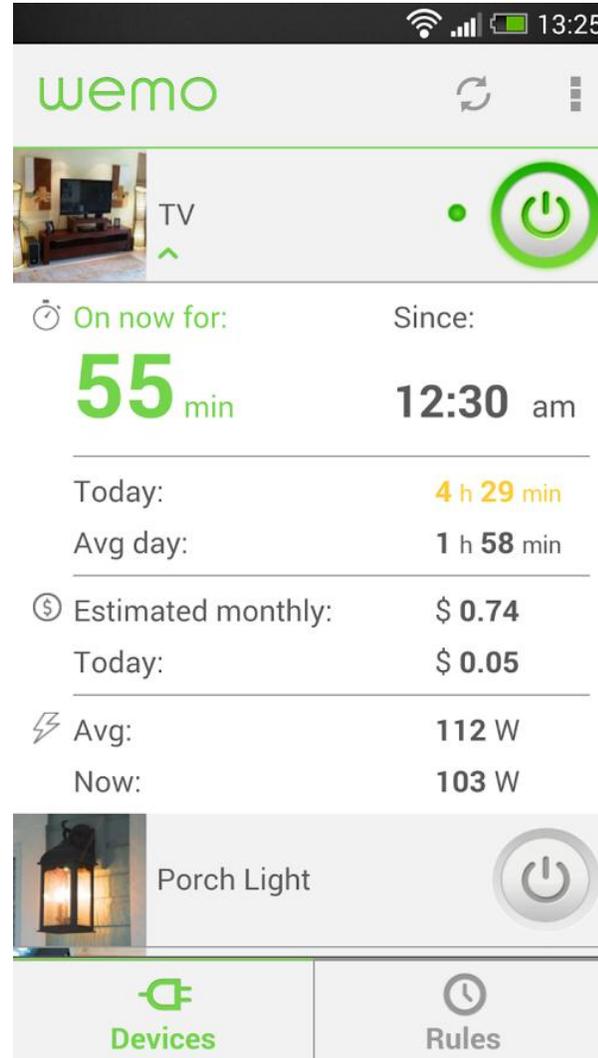
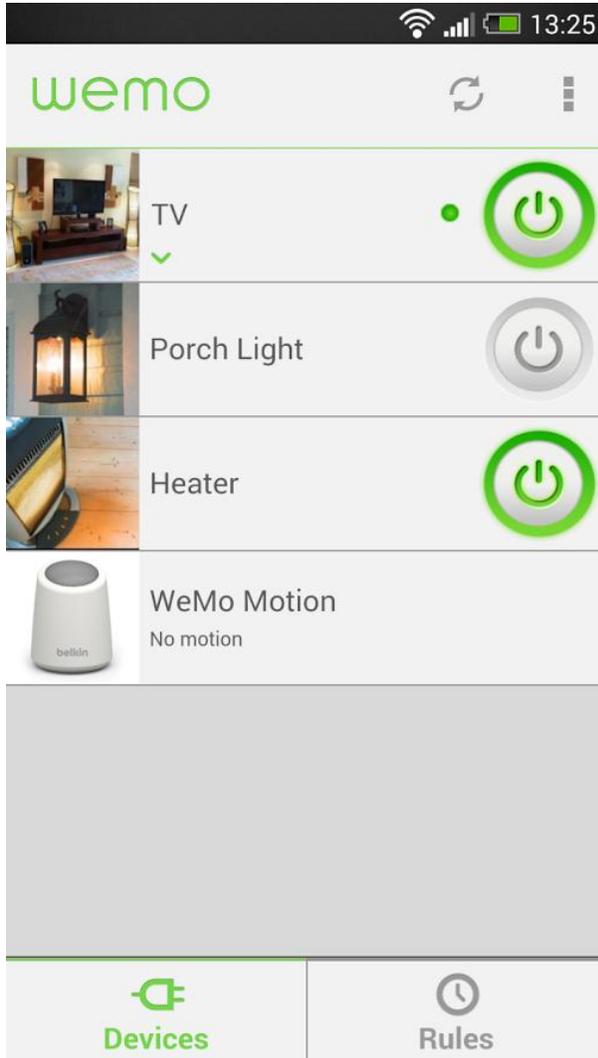
WeMo Switch



WeMo Motion



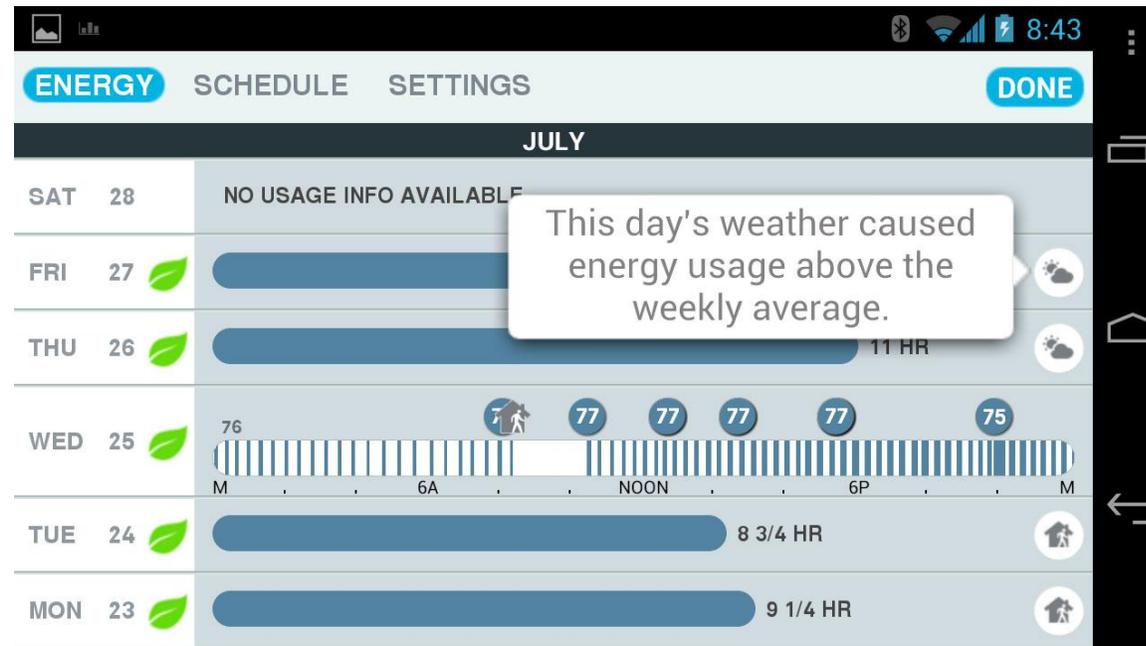
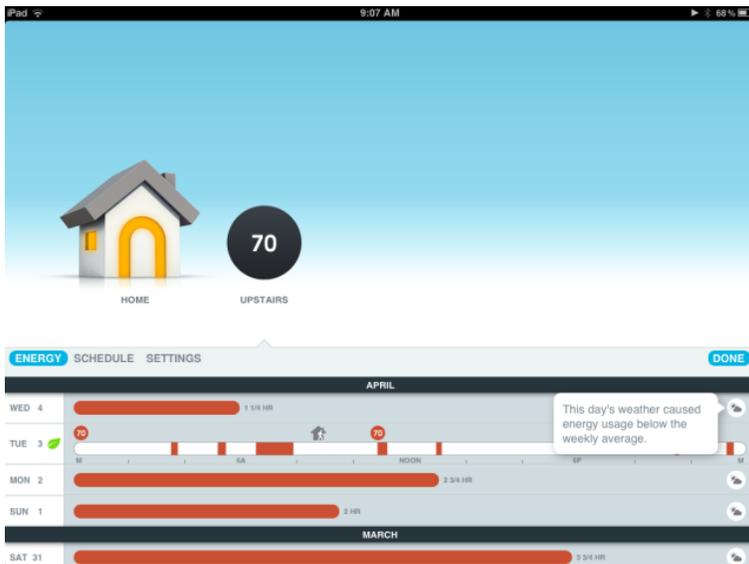
WeMo Insight Switch



# Nest Products



# Nest App



## The Energy History "how-to" guide

Use the info in Nest's Energy History to take control of your energy usage.

Welcome to your Energy History. Turn your device settings to see the new Energy Hub.

Start up and down to save energy.

A Nest Leaf will appear if you've saved for at least an hour this day.

Save up to 10% on your bill by turning off your heat pump or cooling when you sleep.

Top a hot day with a double check. So, to obtain more year-round heat, turn on the heat pump or cooling when you're not home.

Remember to check your temperature settings and adjustments. Heat, it's not easy.

If your energy use is consistently off from these icons, it may be a sign that you need to adjust your settings.

### Know more, save more.

**Change the temperature.**  
Energy History allows you to see your energy use changes. So turn the thermostat 1° colder than 70°. Check Energy History. Here's why: to save on your energy, you need to bring the temperature down just one degree or so at a time.

**Save energy when you're away.**  
Auto-Away usually turns on the heat pump or cooling when you're not home. You'll save on your energy bill and keep your home comfortable. Turn Nest's Auto-Away on.

**Is the weather driving up your bills?**  
You can't control the weather, but you can control your energy use. If other than a cold day, you're seeing a high energy bill, you may be seeing a high energy bill because the weather caused a single change to your energy use.

**Is Auto-Away helping you save?**  
Look for this icon followed by a long white bar. It means that Auto-Away is saving energy. For the biggest savings, turn on Auto-Away when you're not home and a high "hold" temperature.

**Are you making a difference?**  
Nest shows you a list of ways to save energy and what's your share of what. Turn on Auto-Away when you're not home and a high "hold" temperature. You'll save on your energy bill and keep your home comfortable. Turn Nest's Auto-Away on.

**Watch for Leafs.**  
You'll see a Nest Leaf if the thermostat is set to a temperature that's not too hot or too cold. It means you're saving energy. Turn on Auto-Away when you're not home and a high "hold" temperature.

**Don't stop there.**  
In the summer, don't forget to turn off the heat pump or cooling when you're not home. You'll save on your energy bill and keep your home comfortable. Turn Nest's Auto-Away on.

# Tado Smart Thermostat



# Bitron B-Connect



# Bitron B-Connect

bitronhome URNET GROUP

Mein QIVICON

Meldungen (9) | Hilfe | Max Mustermann

Home Verbrauch Räume Automation

B-Connect | Willkommen Zuhause

Rauchmelder

Flur  
Küche  
Schlafzimmer  
Wohnzimmer

Betriebsbereit  
Betriebsbereit  
Betriebsbereit  
Betriebsbereit

Verbrauch gestern: 3,01 €

-21,7%  
weniger

Szenarien

Abwesend Ausführen

Anwesend Ausführen

Im Urlaub Ausführen

Nachtmodus Ausführen

Geräteaktivität

- Bewegungsmelder Flur **Bewegung** vor 22 Minuten
- Bewegungsmelder Flur **Bewegung** vor 26 Minuten
- Bewegungsmelder Flur **Bewegung** vor 29 Minuten
- Bewegungsmelder Flur **Bewegung** vor 34 Minuten
- Tür-Fensterkontakt Küche **offen** vor 36 Minuten



Home Verbrauch Räume Automation

Max Mustermann  
Einstellungen

Feueralarm Aktivieren | Editieren | Löschen | i

Wenn **einer**

Wählen Sie die Auslöser aus, von denen mindestens einer erfüllt sein muss um die Aktion einmalig auszulösen.

Rauchmelder 192 (Rauchmelder) Alarm

Neuen Auslöser hinzufügen +

Dann

Wählen Sie bitte die Aktion aus, die ausgelöst werden soll.

Alarmmeldung ausführen

# Bitron B-Connect

bitronhome  
URMET GROUP

Mein QIVICON

Meldungen (9)

Hilfe

Max Mustermann



Home



Verbrauch



Räume



Automation

B-Connect | Willkommen Zuhause

Tür- und Fenstersensor



Bad  
Küche  
Schlafzimmer  
Wohnzimmer

geöffnet  
geschlossen  
geschlossen  
geöffnet



zu Räume

Aktuelle Last Ihrer Geräte



44 Watt

Bei 2 aktiven Geräten



zu Verbrauch

Szenarien

Abwesend

Ausführen

Anwesend

Ausführen

Im Urlaub

Ausführen

Nachtmodus

Ausführen

zu Automation

Geräteaktivität

- Bewegungsmelder Flur **Bewegung** vor 22 Minuten
- Bewegungsmelder Flur **Bewegung** vor 26 Minuten
- Bewegungsmelder Flur **Bewegung** vor 29 Minuten
- Bewegungsmelder Flur **Bewegung** vor 34 Minuten
- Tür-Fensterkontakt Küche **offen** vor 36 Minuten



bitronhome



Alle Szenarien im Überblick

Abwesend

Ausführen

Alles an

Ausführen

Alles aus

Ausführen

Anwesend

Ausführen

Dimmer AN

Ausführen

# Rocket Home

Logout 'peter' [Settings] [Help]

**ROCKETHOME**

- Kosten 0.00 €
- Strom 0.00 €
- Wasser 0.00 €
- Gas 0.00 €

Zurück [Help]

Gesamtkosten 01.01.-31.12.2012

< 1,768.73 € >

Live Tag Woche Monat Jahr

Kosten: 184.68 € Zeitraum: März 2012

Kosten >

Netzbetreiber 4:13 PM

Computer

Übersicht Einstellungen

Netzbetreiber 3:05 PM

Geräte

Schalter

- Computer
- Stereoanlage
- TV

iPad 12:14 86 %

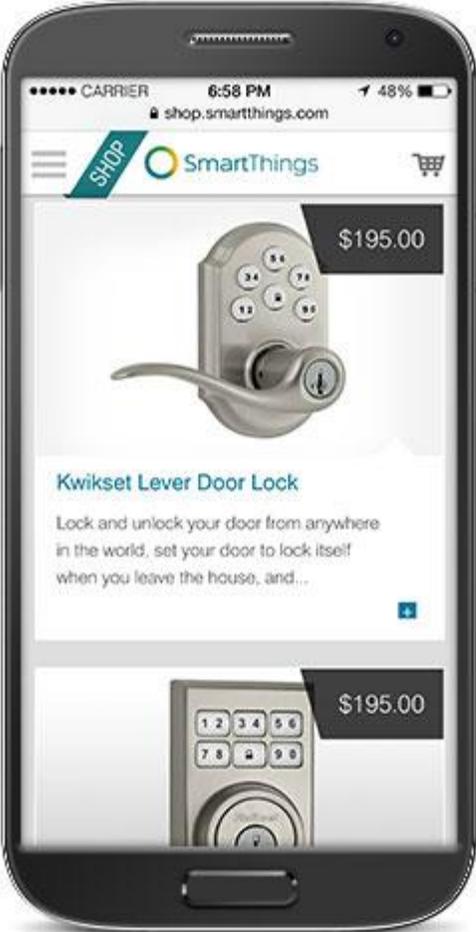
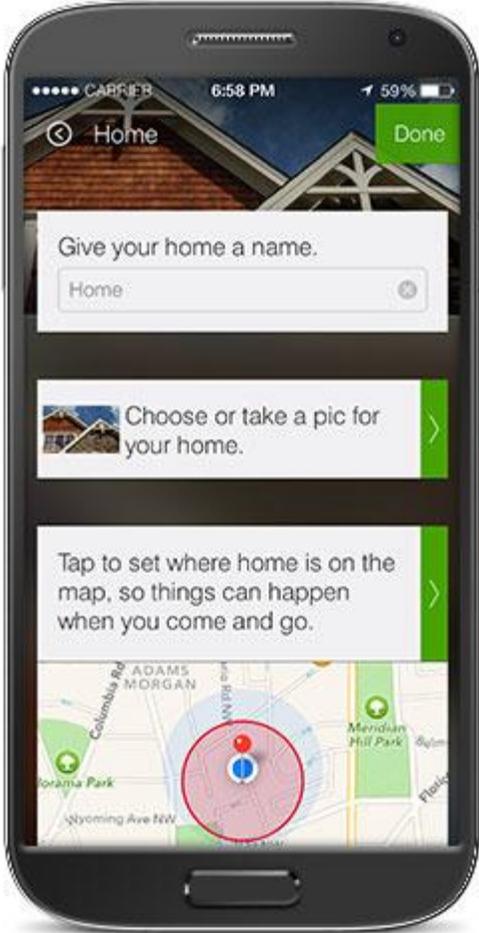
Geräte

Alle Geräte-Typen

- Rauchmelder
- Bewegungsmelder
- Dimmer
- Haustür
- Heizung Wohn...
- Jalousien
- Computer
- Stereoanlage
- Strommesser
- TV



# Smart Things



# Smart Things



I can prevent a costly flood by alerting you as soon as there's excess moisture.

SmartSense Moisture



I ensure that family members aren't accessing dangerous or off-limit items.

SmartSense Multi



Hi.  
We can help you gain peace of mind by letting you interact with these devices.

SmartThings Mobile App & Hub



I can tell you when family members, pets, and cars come and go.

SmartSense Presence

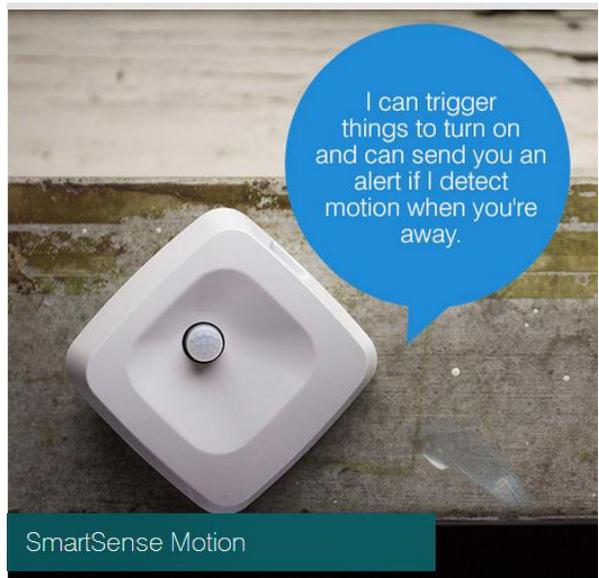


# Smart Things



I can sound a loud alarm and flash a bright light to deter would-be invaders.

FortrezZ Siren Strobe Alarm



I can trigger things to turn on and can send you an alert if I detect motion when you're away.

SmartSense Motion



GE Light & Appliance Plug-and-Control Power Outlet



GE In-Wall Lighting Control On/Off Switch



GE In-Wall Outlet (Duplex Receptacle)



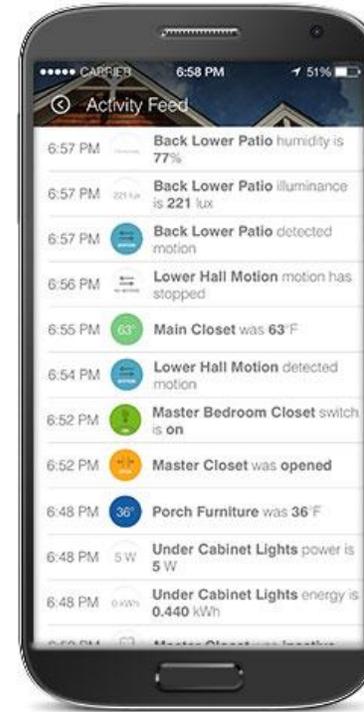
Aeon Labs Door/Window Sensor



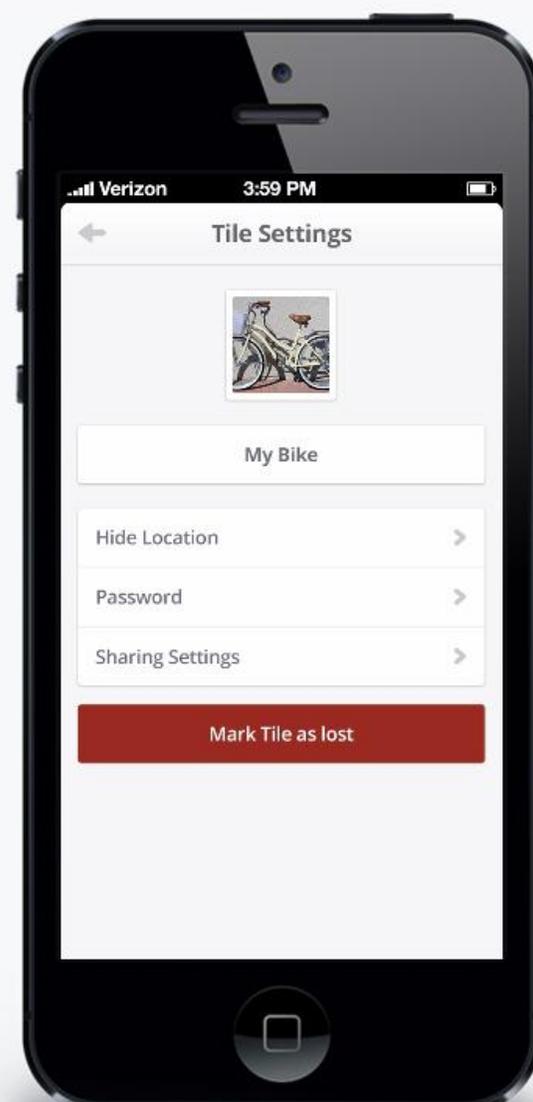
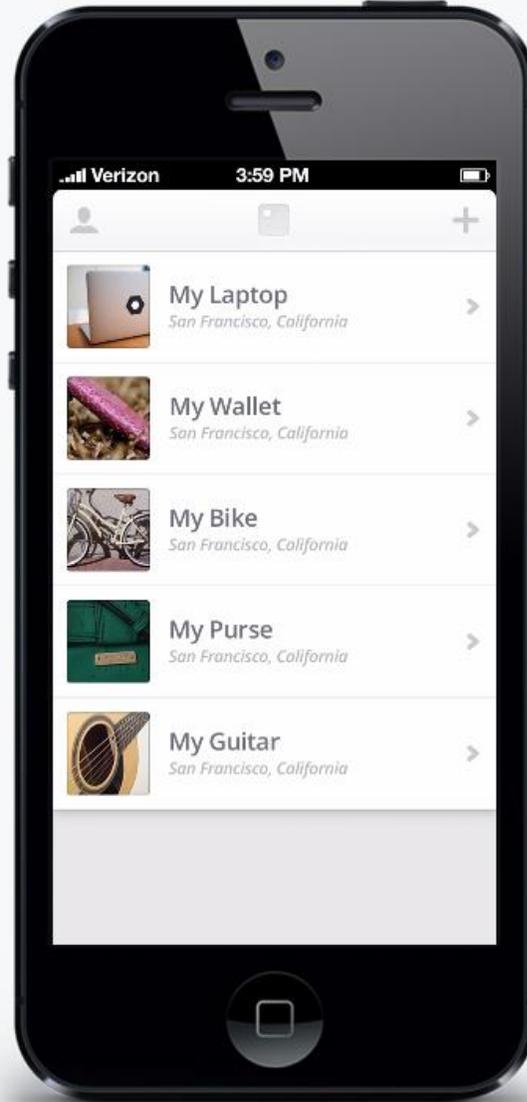
I'll tell you when things open and close, or when valuable items move.

# Smart Things

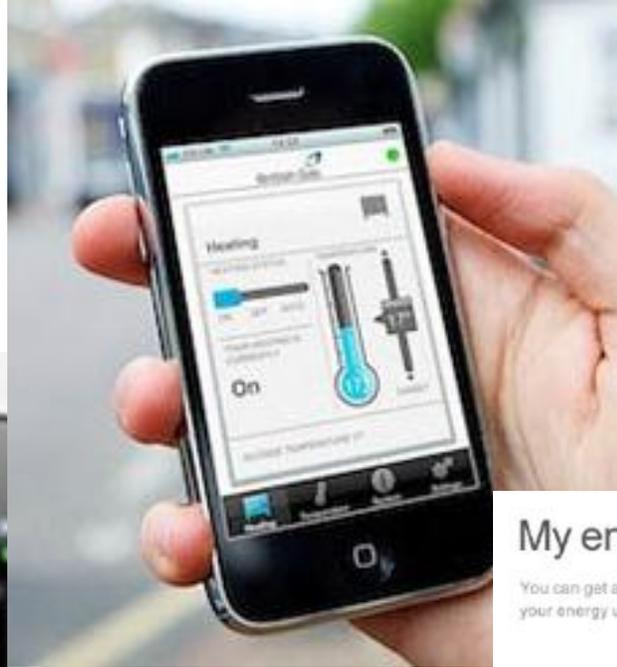
- <http://www.smarthings.com/>
- <http://www.youtube.com/watch?v=5DQfhdk5qMw>



# Tile (Location Tracker)



# AlertMe



## My energy use

You can get a more accurate breakdown by telling us more about your energy use. Simply click on the categories shown below.



-  E20 Heating
-  E18 Lighting
-  E16 Appliances  
>Breakdown
-  E16 Hot water
-  E13 Cooking

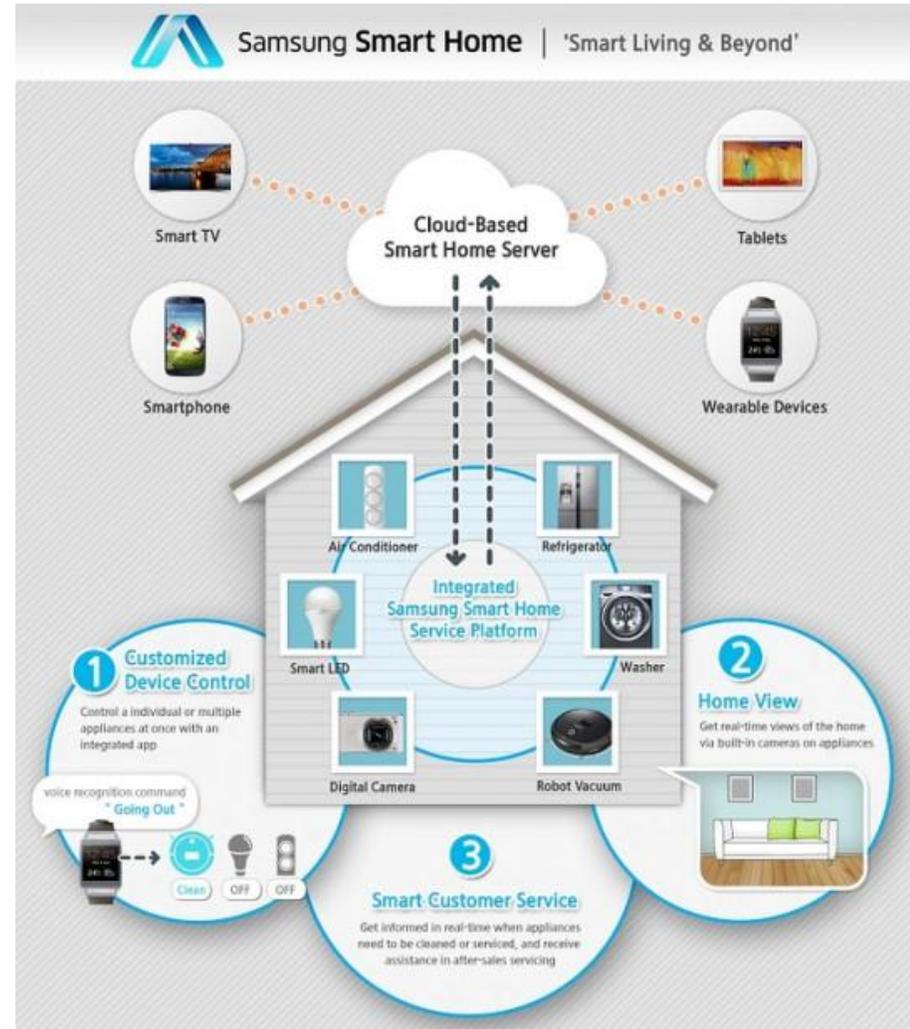
### Maximise the efficiency of your central heating

You are spending 20% more than average on your heating. You could maximise the efficiency of your central heating with a [Tango Radiator Booster](#)



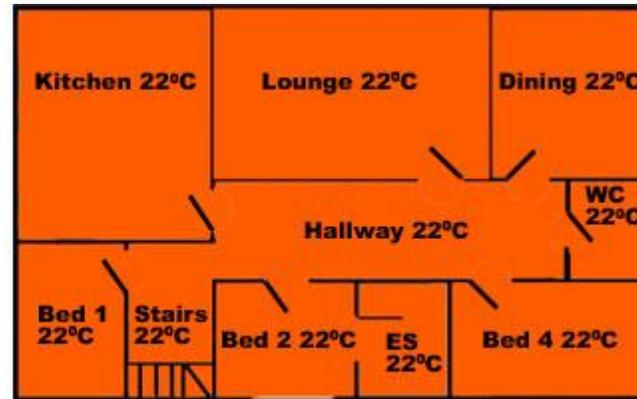
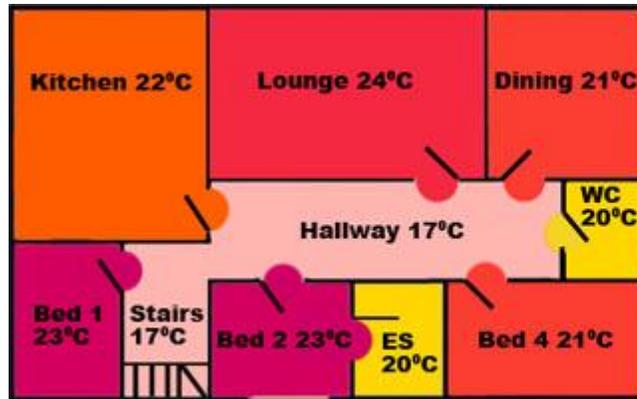
# Samsung Smart Home

- [http://www.youtube.com/watch?v=\\_rhBfh-4a0s](http://www.youtube.com/watch?v=_rhBfh-4a0s)

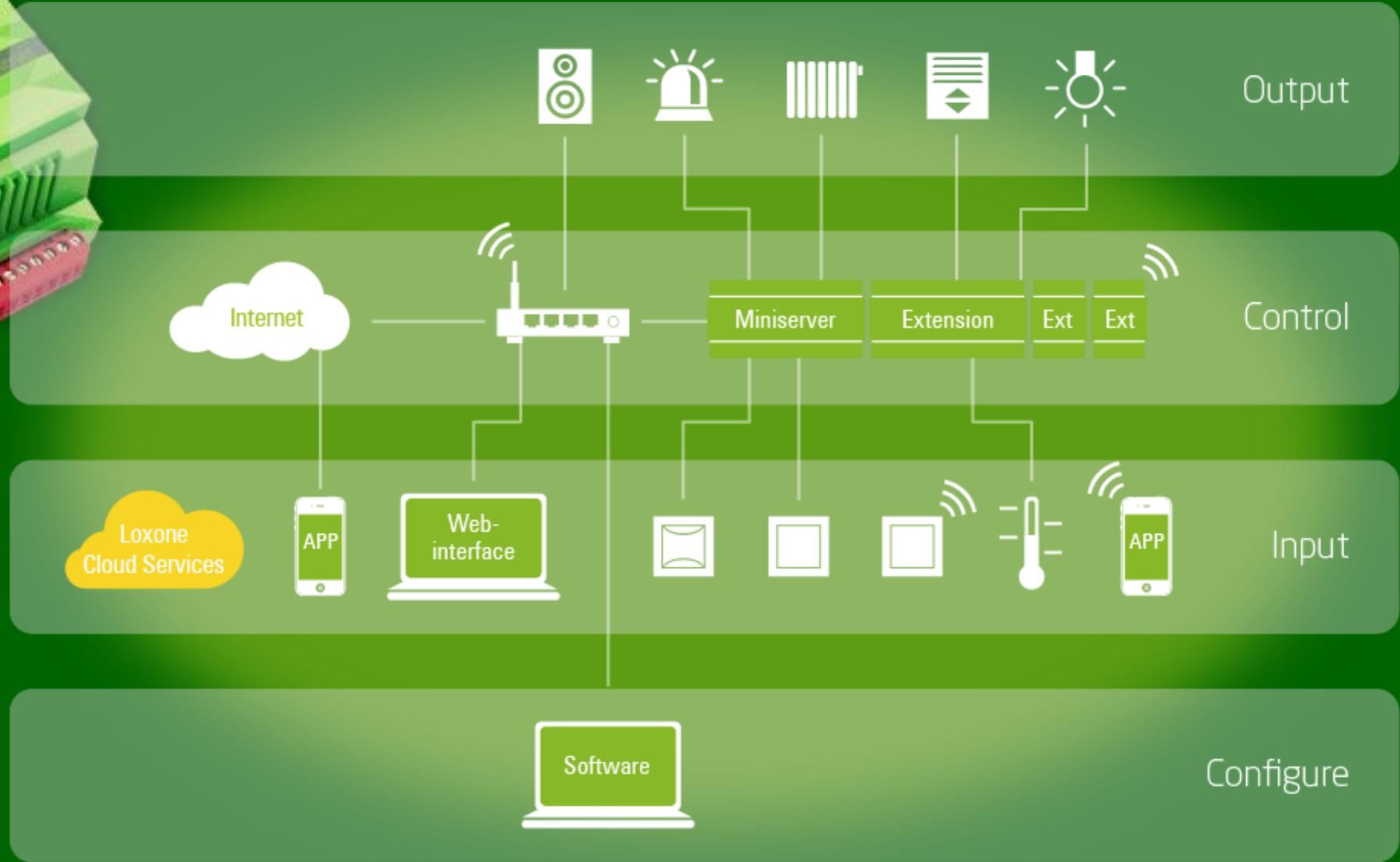


# KNX Smarthome Design

- [http://www.youtube.com/watch?v=\\_rhBfh-4a0s](http://www.youtube.com/watch?v=_rhBfh-4a0s)



# Loxone Miniserver



# Loxone Config

The screenshot displays the Loxone Config software interface. The main workspace shows a configuration for a lighting control scene named "Lichtsteuerung". The scene is titled "Lichtsteuerung" and includes a sub-section "Flur Beleuchtung".

The configuration is organized into two main blocks:

- Lichtsteuerung (Top):** This block contains a large list of digital inputs (I1-I12, AIs, R, S1-S8, DisM, My, D, Dis) and a corresponding list of digital outputs (AQ1-AQ12, RQ, RaQ). It also includes a "Flur Decke" output.
- Bewegungsmelder Szene (Bottom):** This block contains a "Schaltuhr" (timer) and a "Flur Beleuchtung" section with inputs Tr, R and outputs AQ, AQm, Qon, Qoff.

The interface includes a left sidebar with a tree view of the project structure, a top menu bar with options like "Startseite", "Peripherie", "Programm", "Miniserver", "Wartung", "Test", and "Konfig", and a status bar at the bottom showing the file name "Lichtsteuerung\_Szenen\_4.0.R1 - Flur", the date "08.05.2013 09:13:07", and the page number "Seite 5/7".

# Loxone Config

AND IT'S SO EASY...

Example 1: Control lighting with the app

## Step 1: Activate

+ Enable the display and assign it to the specific room and category

Property	Value
<b>(Lighting controller)</b>	
Common	
Name	Lighting controller
Description	
Statistics	none
Compress statistics	Settings from Miniserver
Object colour	 c8d8b3
User interface	
<input checked="" type="checkbox"/> Use	
<input type="checkbox"/> User interface passw...	
Authorized local users	All
Authorized remote users	All
Category	Lighting
Room	Kitchen
Rating	☆☆☆☆☆
Lighting scenes	<a href="#">Click here</a>

## Step 2: Save

+ Save the changes to the Miniserver



75 %



## Step 3: Enjoy!

+ Start the application and control your lighting

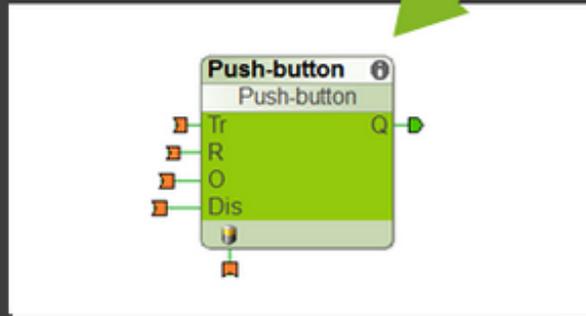
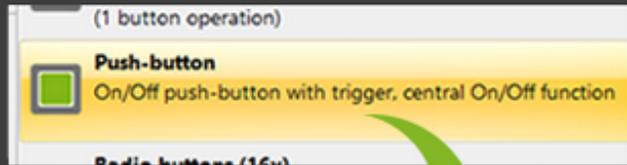


# Loxone Config

## AND IT'S SO EASY... Example 2: Add a button

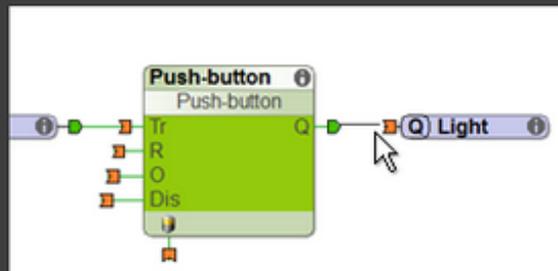
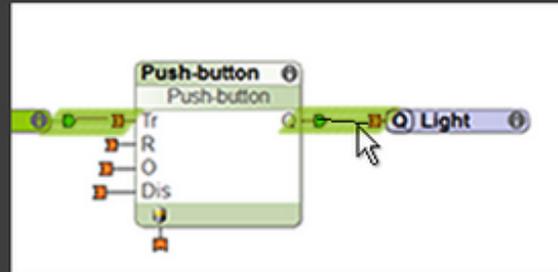
### Step 1: Drag and drop

+ Insert block 'key'



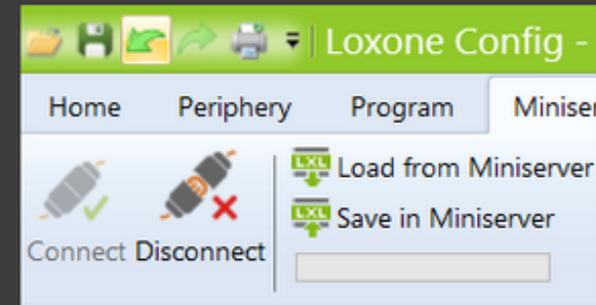
### Step 2: Connect

+ Connect the inputs and outputs



### Step 3: Save

+ Save the changes to the  
Miniserver



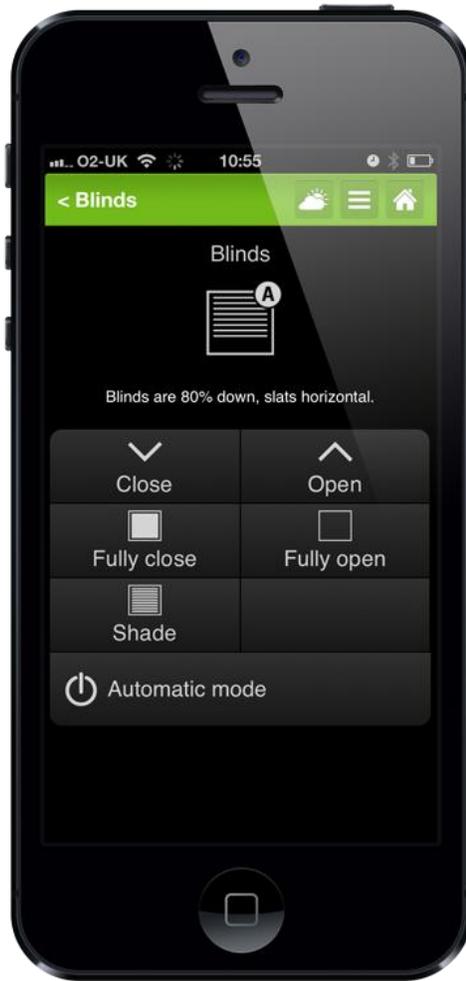
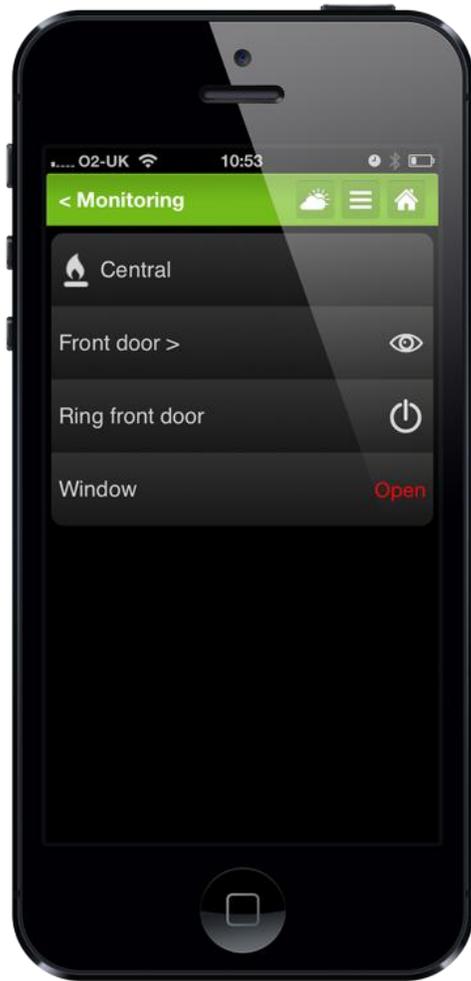
75 %



# Loxone



# Loxone



# Loxone



# Solution Provider

- Crestron: [http://www.crestron.com/markets/home\\_theater\\_and\\_whole\\_house\\_home\\_automation/](http://www.crestron.com/markets/home_theater_and_whole_house_home_automation/)
- Leviton: <http://www.leviton.com>
- InsteOn: <http://www.insteon.com/>
- HomeMatic (Standard wird von QiviCon benutzt): <http://www.homematic.com/>
- QiviCon Smart Home Controller + Software: <https://www.qivicon.com/start/>
- Embedded Automation mHome: <http://www.embeddedautomation.com/>
- Bitron Home (B-Connect): <http://www.bitronvideo.eu/>
- Tado Smart Thermostat: <http://www.tado.com/de/presse>
- RWE SmarHome: <http://www.rwe-smarthome.de/web/cms/de/448330/smarthome/>
- Microsoft HomeOS: <http://research.microsoft.com/en-us/projects/homeos/>
- EnBW Lichtsteuerung: <https://www.enbw.com/privatkunden/tarife-und-produkte/intelligente-haussteuerung/das-kann-ihr-schlaues-zuhause/index.html>

# Technologies

- ZWave Home Automation: <http://www.z-wave.com/>
- InsteOn: <http://www.insteon.com/>
- KNX Home Control Standard: <http://www.knx.org/knx-en/index.php>
- X10 Industry Standard: <http://x10-lang.org/>
- Qivicon <https://www.qivicon.com/start/>
- BACnet Standard - Data Communication Protocol for Building Automation and Control Networks: <http://www.bacnet.org/>
- Modbus Protocol: <http://www.modbus.org/>, <http://en.wikipedia.org/wiki/Modbus>
  
- Energy Sawy <http://www.energysawy.com/>

# ZigBee Products

- <http://www.zigbee.org/Products/ByStandard/ZigBeeHomeAutomation.aspx>
- **SafePlug 1203:** This device plugs into a standard wall outlet and allows you to remotely turn the two outlets on and off individually and remotely.
- **OWLZ-Smart In Home Display:** This device allows you to view your energy usage at a glance and make changes to it based upon your behavioral and usage patterns.
- **AlertMe:** AlertMe is a unique home security product that utilizes a series of unique sensors that connect and report to a keychain-sized remote control unit. **AlertMe Occupancy Sensor** meshes with the AlertMe security system and senses motion in rooms and hallways.
- **Kwikset SmartCode Deadbolt with Home Connect Technology:** As the name implies, this is a deadbolt style door lock for your home.
- **Carrier ComfortChoice Thermostat:** This is a thermostat designed to mesh with the ZigBee Smart Energy network. The thermostat offers full seven-day programmability and a USB port for data uploads and upgrades.
- **CEVA Logic Connected Digital Photo Frames:** Photo Frames connected to the Internet and are able to download pictures from a connected service.
- **SmartPlug:** Allows appliances to be manually or remotely turned off or on. Users can also use Smart Plug to monitor energy usage.

# Platforms

- MiOS Control and Monitoring Platform: <http://www.mios.com/>
- ThingWorkx: <http://www.thingworx.com/>
- Loxone Smart Home Operating System: <http://www.loxone.com/enuk/miniserver/loxone-os.html>
- Microsoft HomeOS: <http://research.microsoft.com/en-us/projects/homeos/>
- Bitron Home B-Connect: [http://www.bitronvideo.eu/?page\\_id=757](http://www.bitronvideo.eu/?page_id=757)
- Mbed Development Platform for Devices: <http://mbed.org/>
- Kepware Advanced Communications and Interoperability Platform <http://www.kepware.com/>
- Sensinode Embedded Web - NanoStack, NanoRouter, NanoService: <http://www.sensinode.com/>
- Arkessa IoT & M2M Platform: <http://www.arkessa.com/>
- Yaler Relay Infrastructure: <https://yaler.net/>

# Platforms

- Sensorcloud APIs - OpenData, FastGraph, Alerts, LiveConnect, MathEngine: <http://www.sensorcloud.com/>
- Xively Connected Cloud: [https://xively.com/using\\_xively/](https://xively.com/using_xively/)
- Nimbits Open Connected Cloud (Raspberry, Arduino): <http://www.nimbits.com/>
- HP Cense Infrastructure: [http://www.hpl.hp.com/research/intelligent\\_infrastructure/](http://www.hpl.hp.com/research/intelligent_infrastructure/)
- AMEE Environmental Information: <https://www.amee.com/pages/company>
- BugLabs SWARM - Dashboard Development: <http://buglabs.net/products/swarm>
- ThingSpeak Open Source Channels & Apps: <https://thingspeak.com/>
- Arrayent Connected Platform: <http://www.arrayent.com/>
- BERG Cloud: <http://bergcloud.com/>
- Ayla IoT Cloud Platform: <http://www.aylanetworks.com/>

# Hardware Sensor & Wireless

- Libelium Developer Kits & Sensors: <http://www.libelium.com/>
- Spark.io Arduino + Wi-Fi + ARM Cortex M3 + wireless programming + REST API (<https://www.spark.io/>)
- Nordic: Ultra-Low Energy Bluetooth & RF Chips: <http://www.nordicsemi.com/>
  
- Microstrain Wireless Sensors (Sensorcloud compatible): <http://www.microstrain.com/wireless>
- Variable CHROMA, NODE: <http://variableinc.com/products/>
- Sensaris Wireless Sensing Solutions: <http://www.sensaris.com/>
- Nanjing IOT Sensor Technology <http://iotsensor.en.china.cn/>

# Smart Things & Products

- Tado Smart Thermostat: <http://www.tado.com/de/presse>
- Tile Location Tracking: <http://www.thetileapp.com/>
- Sen.se Motion Cookies & Mother: <https://sen.se/>
- Ubi Voice Activated Computer: <http://theubi.com/>
- LIFX, controllable Wi-Fi enabled, multi-color, energy efficient LED light bulb. <http://lifx.co/>
- WiFi Hifi: <http://www.sonos.com/>
- Jawbone Up: <https://jawbone.com/up>
- Belkin WeMo Light Switch: [http://www.thewebmag.com/belkin-wemo-light-switch-3/?utm\\_source=dlvr.it&utm\\_medium=twitter](http://www.thewebmag.com/belkin-wemo-light-switch-3/?utm_source=dlvr.it&utm_medium=twitter)
- Philips Hue Intelligent Lightening: <http://www.meethue.com/en-US>
- August Smart Lock: <http://www.august.com/>
- Kolibri Smart Toothbrush
- Mimo Baby Monitor
- Parrot Flower Power, Plant Health Sensor with Mobile App: <http://www.parrot.com/flowerpower/de/>

# Smart Things & Products

- AlertMe: <https://www.alertme.com/>
- DropCam Wireless Mini Camera: <https://www.dropcam.com/>
- StickNFind Location Sticker: <https://www.sticknfind.com/>
- Glow fertility tracker

# Investors

- <http://www.iotworks.com/>
- <https://angel.co/internet-of-things/investors>
- <http://postscapes.com/internet-of-things-investment>

# Controller Apps

- Telekom Smart Home: <https://play.google.com/store/apps/details?id=de.telekom.smarthomeb2c>
- uControl Smart Home Automation: <https://play.google.com/store/apps/details?id=de.ucontrol>
- inControl Home Automation: <https://play.google.com/store/apps/details?id=com.Mls.InControl>
- zHouse HomeControl: <https://play.google.com/store/apps/details?id=org.zhouse.vera>
- Belkin WeMo: <https://play.google.com/store/apps/details?id=com.belkin.wemoandroid>
- Home Buddy: <https://play.google.com/store/apps/details?id=org.rakstar.homebuddy>
- RWE SmartHome: <https://play.google.com/store/apps/details?id=com.rwe.it.sk.smarthome>
- Rockethome: <http://www.rockethome.de>

# Articles & Blogs

- <http://www.myhomeserver.com/>
- <http://www.energie-und-technik.de/smart-energy/artikel/101160/>
- <https://communities.netapp.com/community/netapp-blogs/tim/blog/2013/06/14/the-internet-of-things-and-clustered-data-ontap-82>
- <http://www.digitallanding.com/zigbee-home-delivers-automation/>
- <http://www.digitallanding.com/click-help-home-automation-systems/>
- <http://www.smarthome.com/sh-learning-center-what-technology.html>
- <http://www.osgi.org/Markets/SmartHome>

# Futuristic Scenarios

- Samsung Smart Wall, Samsung Mobilers, Dec 2011 <http://www.youtube.com/watch?v=dOBCDu-0we8>
- Jane's Story: Light Scenario <http://www.youtube.com/watch?v=R5f1m1swxHQ>
- Jane's Story: Dark Scenario: <http://www.youtube.com/watch?v=UW7dunCPxdE>
- Meet the Electrons: Light Scenario <http://www.youtube.com/watch?v=dr2OgiH4DWI>
- Meet the Electrons: Dark Scenario <http://www.youtube.com/watch?v=6EYt-g6Wi-c>
- Becoming Dataware: <http://www.youtube.com/watch?v=qrxkdRA3yu0>

# Application Devolpers

- <http://www.purpledecks.com/>