



# Connecting the Internet of Things Inside the Home

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[www.cir-strategy.com/events](http://www.cir-strategy.com/events)

# Internet of Things: It's Big

▶ Connecting up more than just the humans

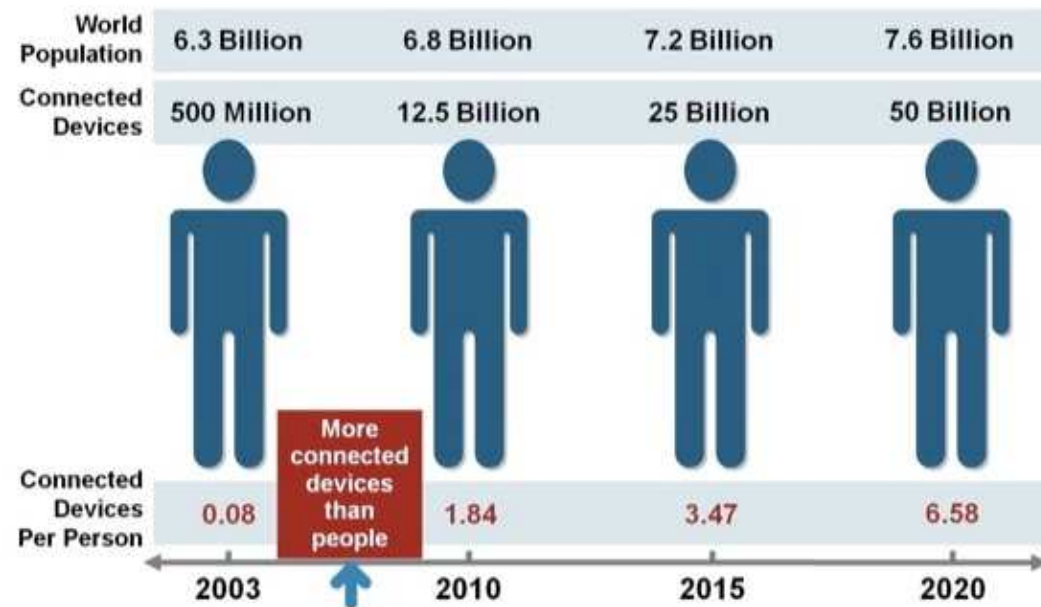
2010: Cisco/IBM: “1 trillion connected devices in 2013”

2011: Cisco/Ericsson: “50 billion connected devices in 2020”

2012: GSMA: “24 billion by 2020 – \$4.5 trillion market value”

▶ What's connected ?

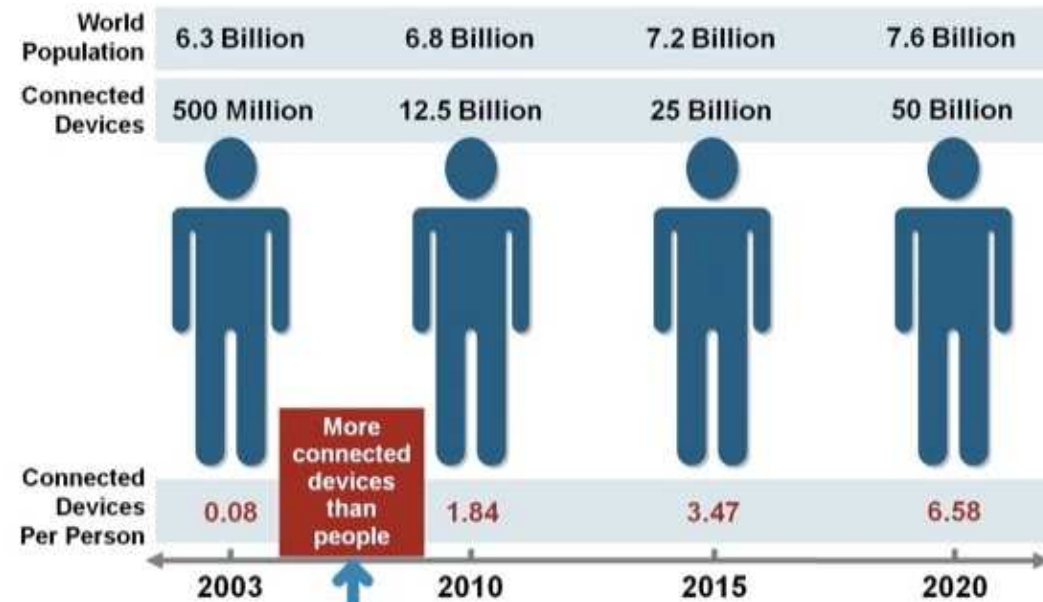
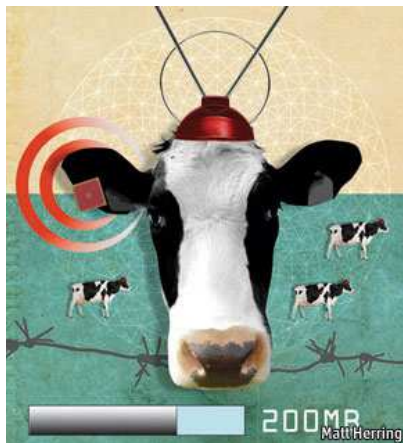
- ▶ Us
- ▶ Our devices
- ▶ Our machines
- ▶ Our world



## Internet of Things: It's Big

### ► What's connected ?

- Us
- Our devices
- Our machines
- Our world



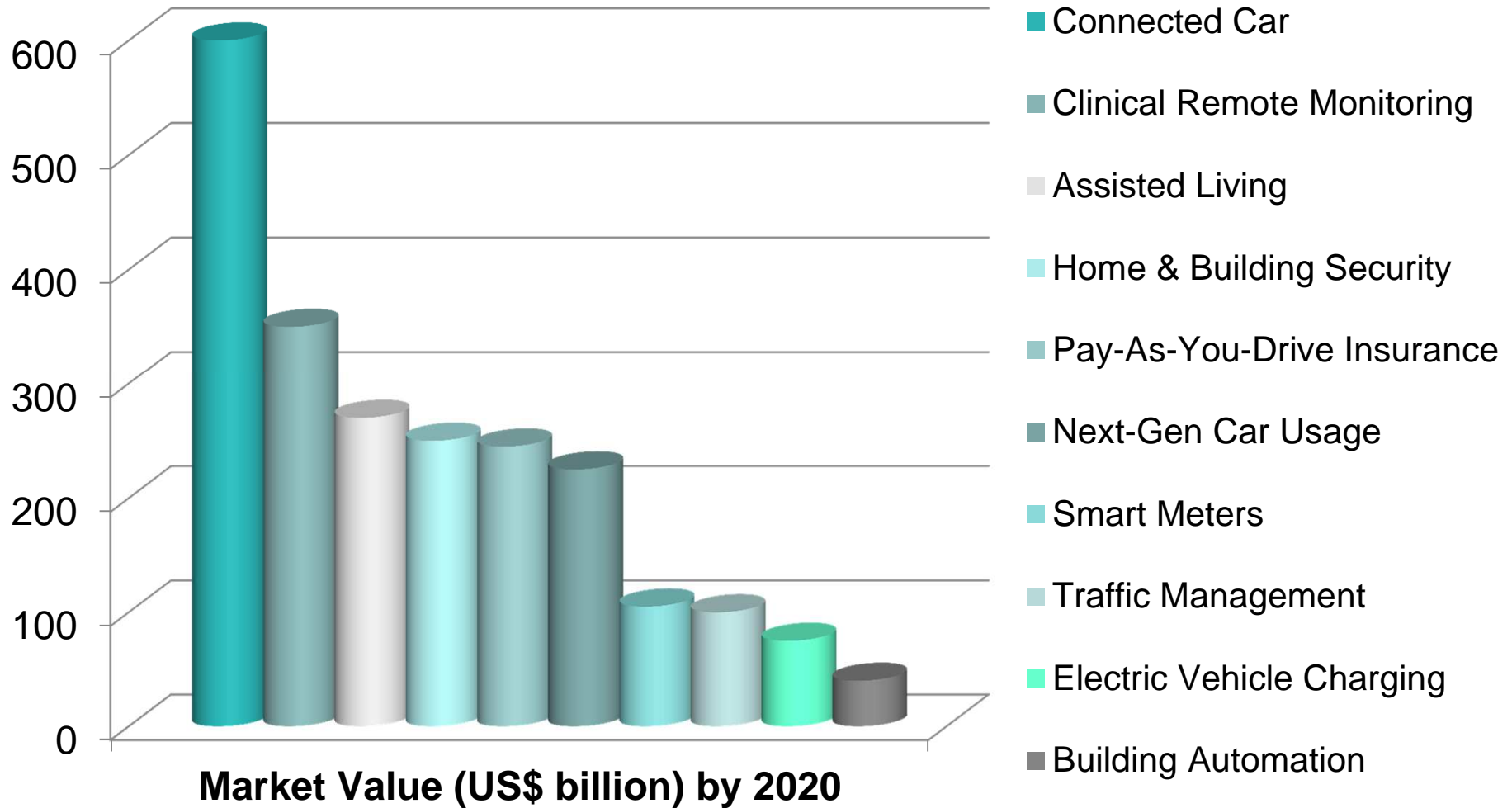
### ► And our livestock

- “The average cow generates about 200 megabytes of information a year”

# “60% of \$4.5tn Value from Ten Apps”



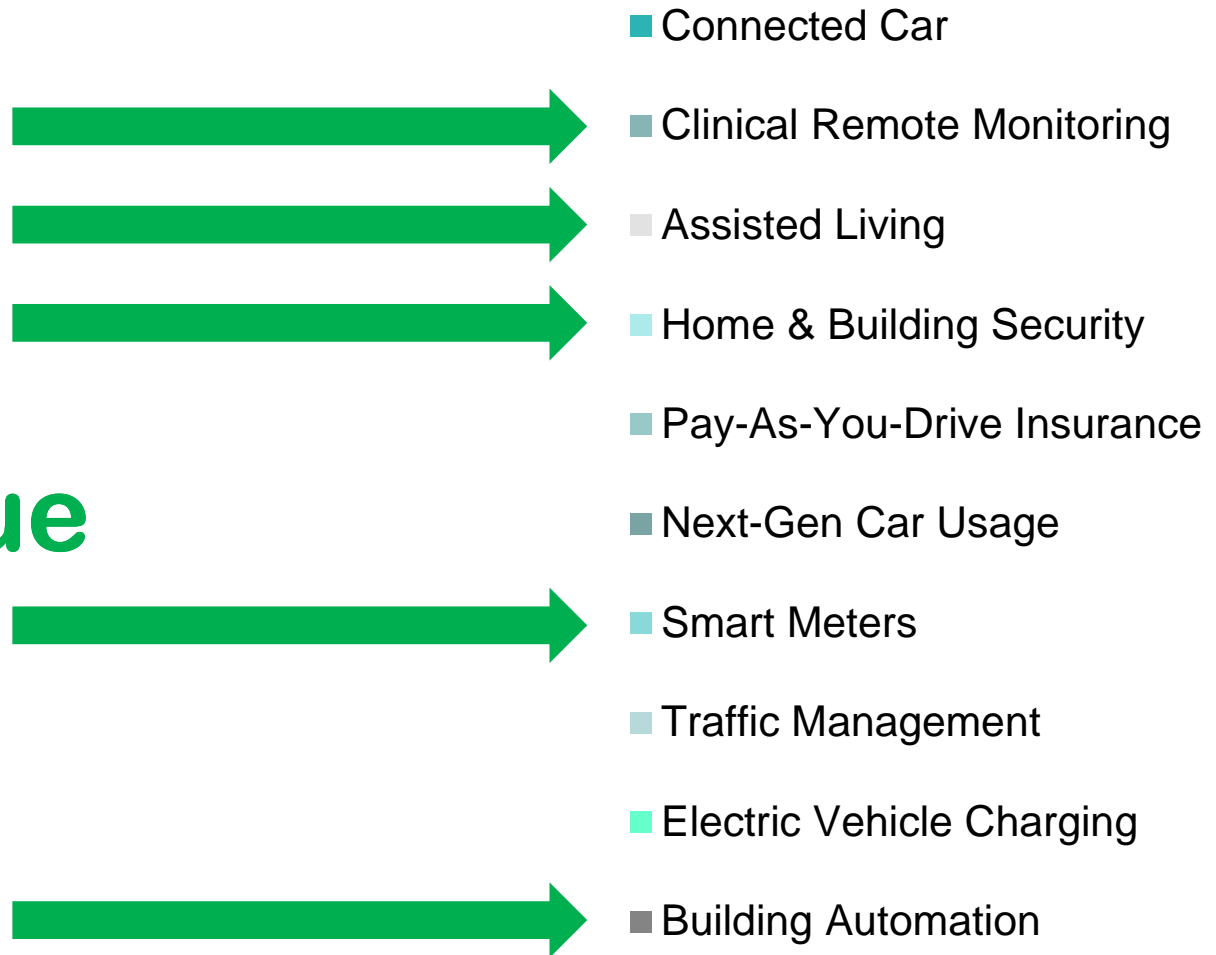
Source: GSMA 2012



“60% of \$4.5tn Value from Ten Apps”



**In-Building  
Market Value  
= \$1.0 tn**



# Machine-to-Machine in the Home

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- ▶ Initial M2M momentum comes from cellular operators
- ▶ M2M in the Home cannot guarantee coverage
- ▶ Useful M2M services at home:
  - ▶ Smart metering
  - ▶ Smart appliances
  - ▶ Assisted living
  - ▶ E-Health
  - ▶ Home energy management
  - ▶ Microgeneration monitoring

## *Connectivity Essentials:*

- ▶ Mass Market installable
- ▶ No more wires
- ▶ Low cost
- ▶ Ubiquitous utility
- ▶ Reliable and Dependable
- ▶ Low power usage

# Warning! Comms Engineers at Work



Ethernet

Token Ring



# Warning! Comms Engineers at Work



Ethernet

Token Ring

WiFi

HOMEPLUG®  
POWERLINE ALLIANCE

100VG-ANYLAN  
FAST ETHERNET & FAST TOKEN RING





# Warning! Comms Engineers at Work



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ACORN

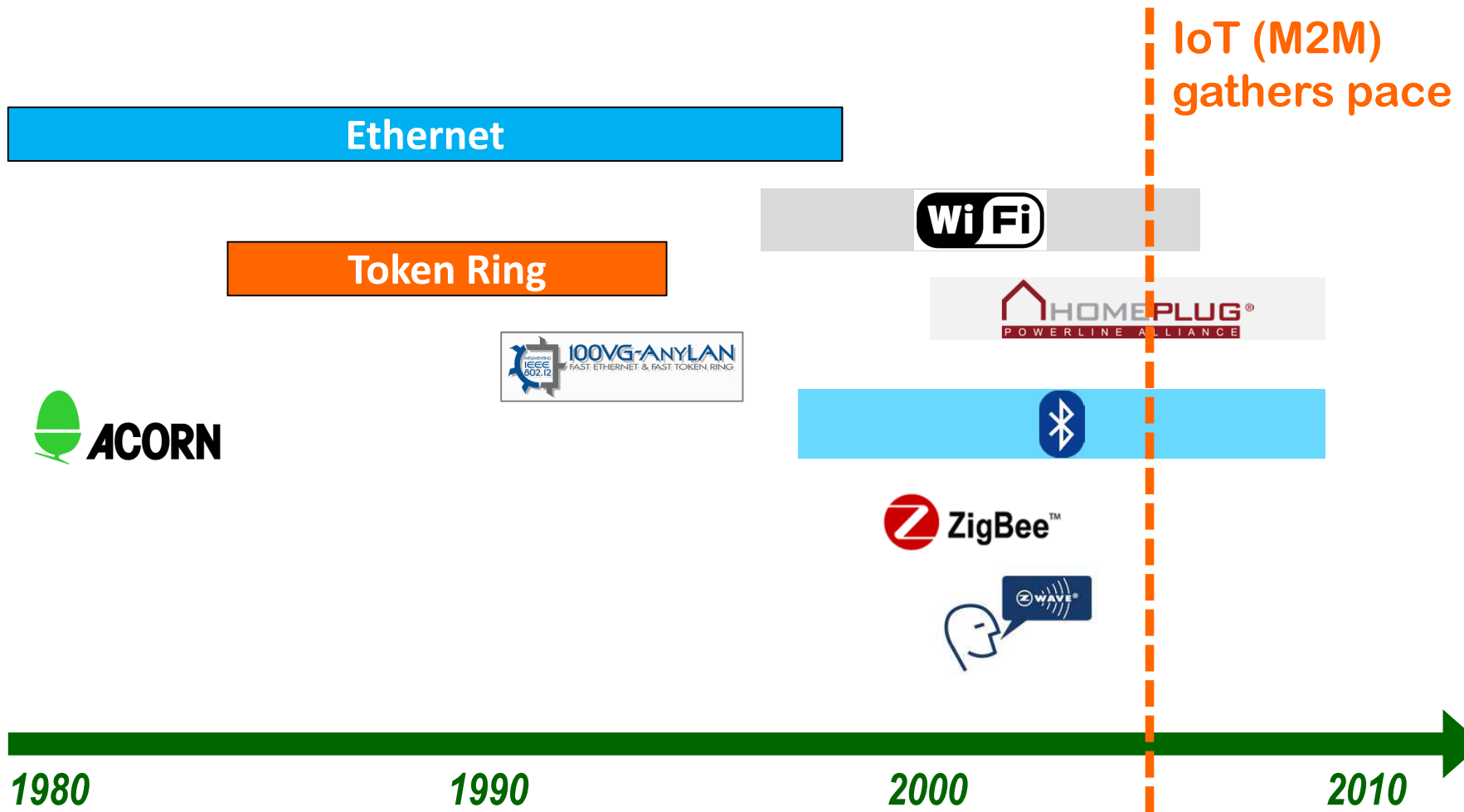
Bluetooth

ZigBee™

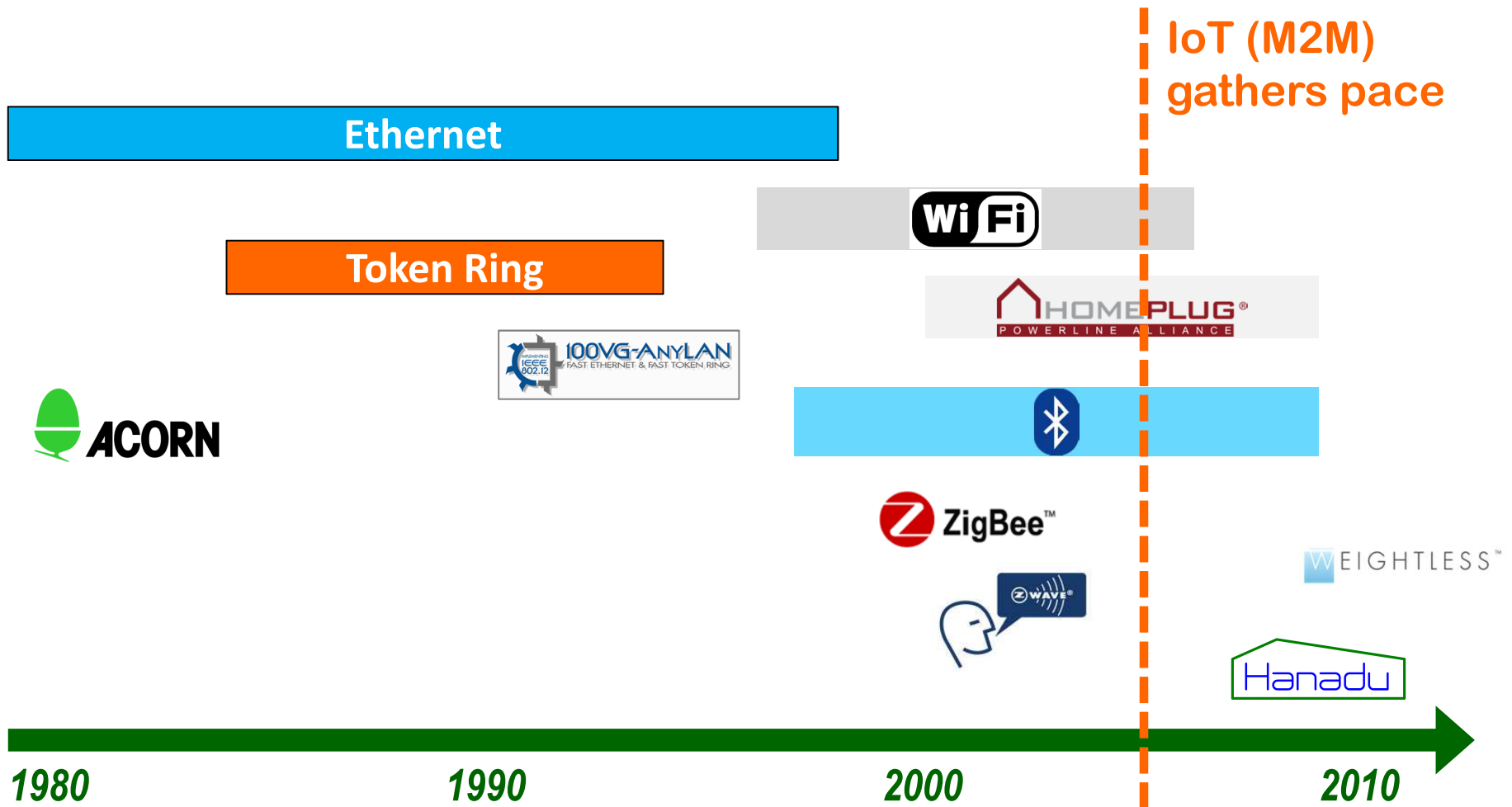
Z-WAVE®



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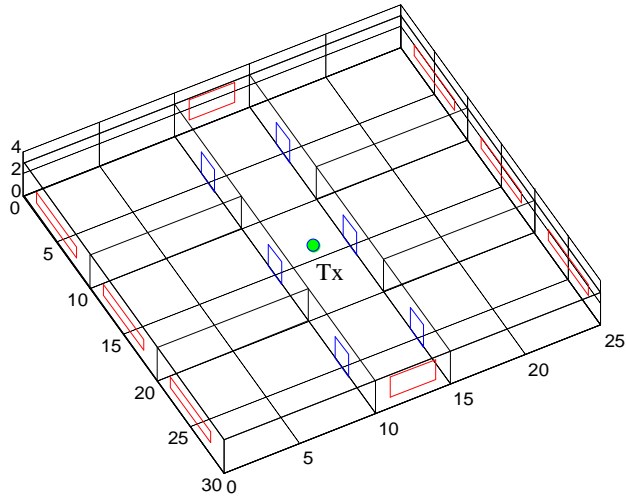


## Connectivity in the Home

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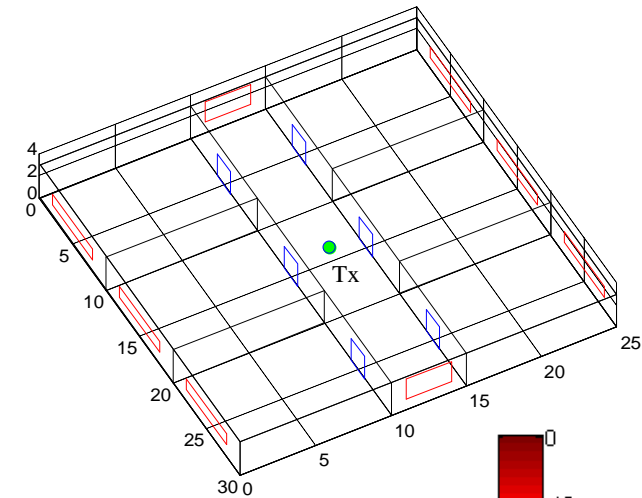
- ▶ Key characteristics
  - ▶ Walls and floors are hostile to radio
  - ▶ WiFi radio spectrum congested by neighbours
  - ▶ Mixture of battery-powered and mains-powered devices
  - ▶ Broadband network likely already deployed
  - ▶ No IT manager available
  - ▶ *Ad hoc* connectivity and repositioning of appliances
  - ▶ High sensitivity to cost
  - ▶ High sensitivity to privacy and ownership
- ▶ Compromise around a convenient technology risks a product's mass market relevance

# Radio in the Home: WiFi Coverage

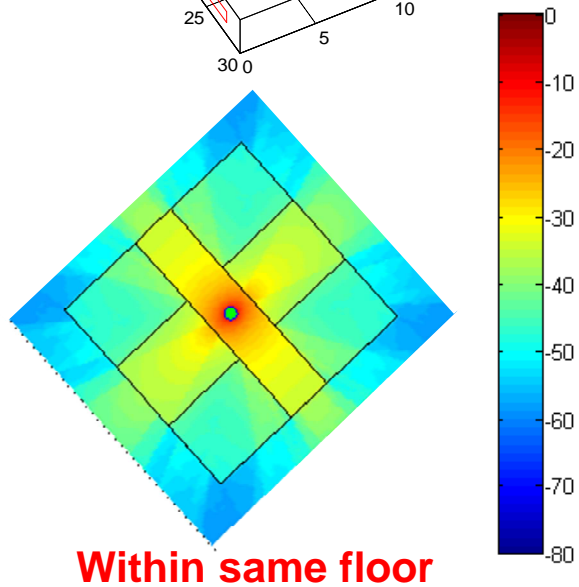


- ▶ Predictions of 2.4GHz (eg WiFi) coverage inside a building with walls and floors
- ▶ Propagation modelling (by Manchester University) ignores spectrum congestion effects

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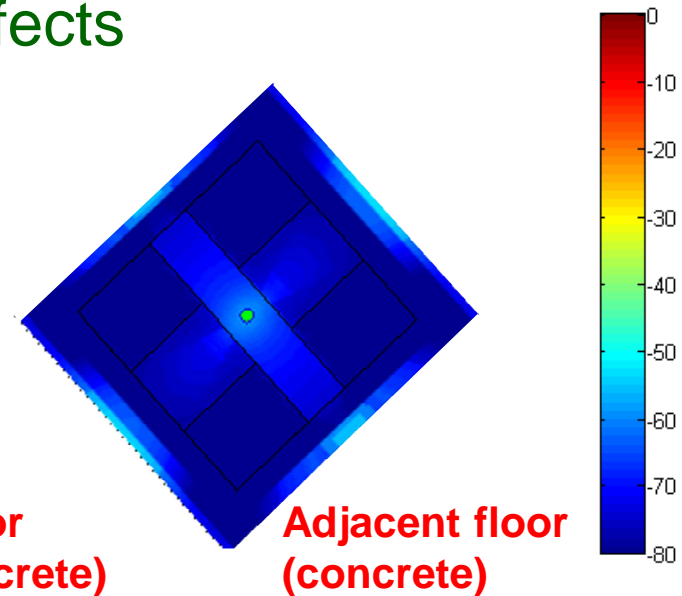
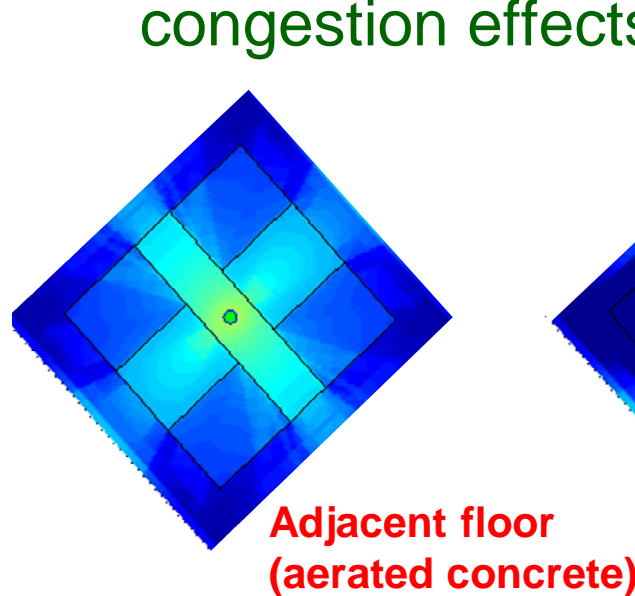
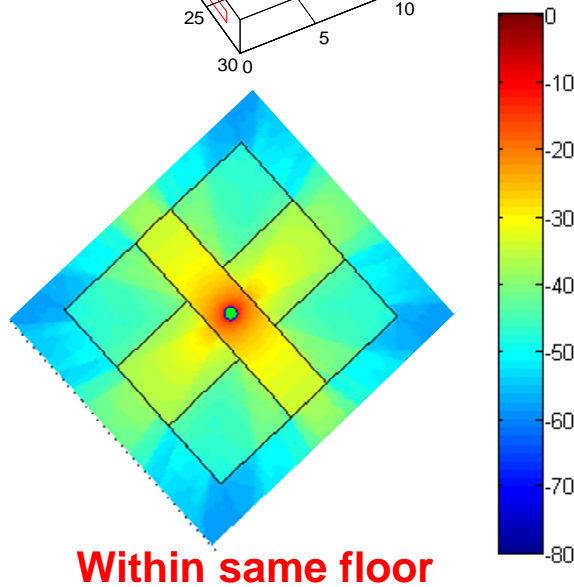
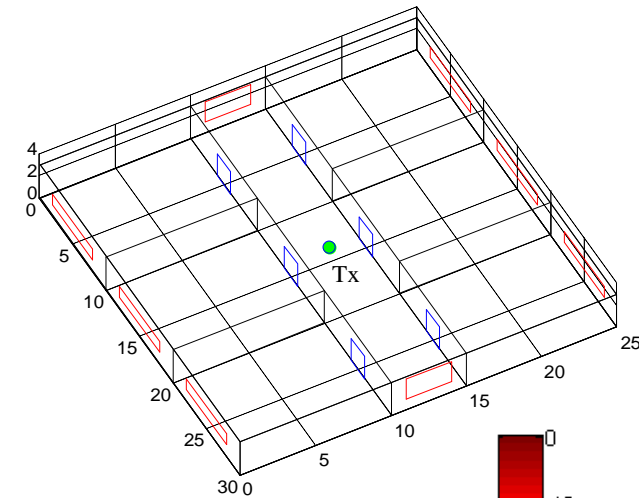
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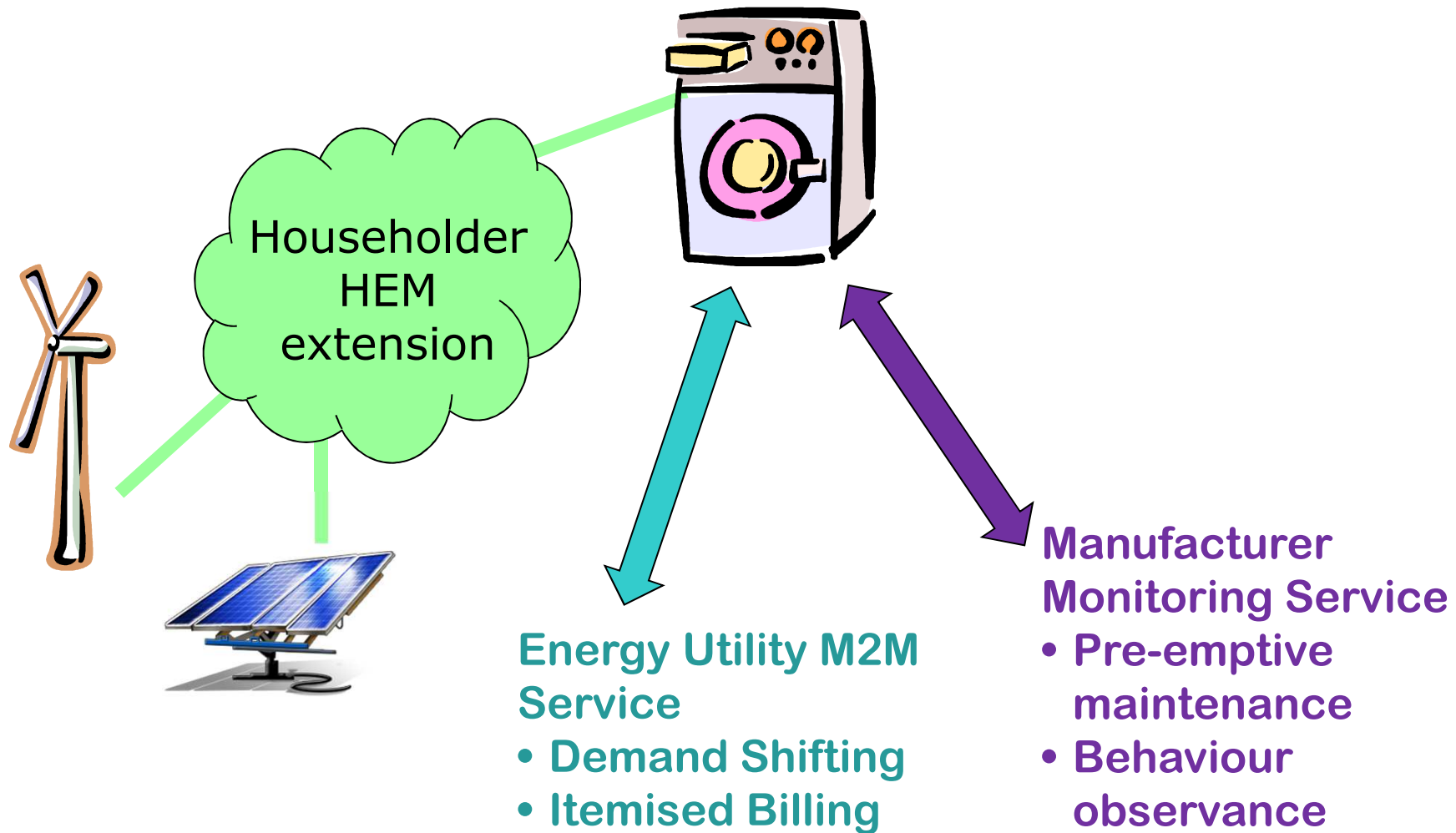
# In-Home M2M Connectivity Options



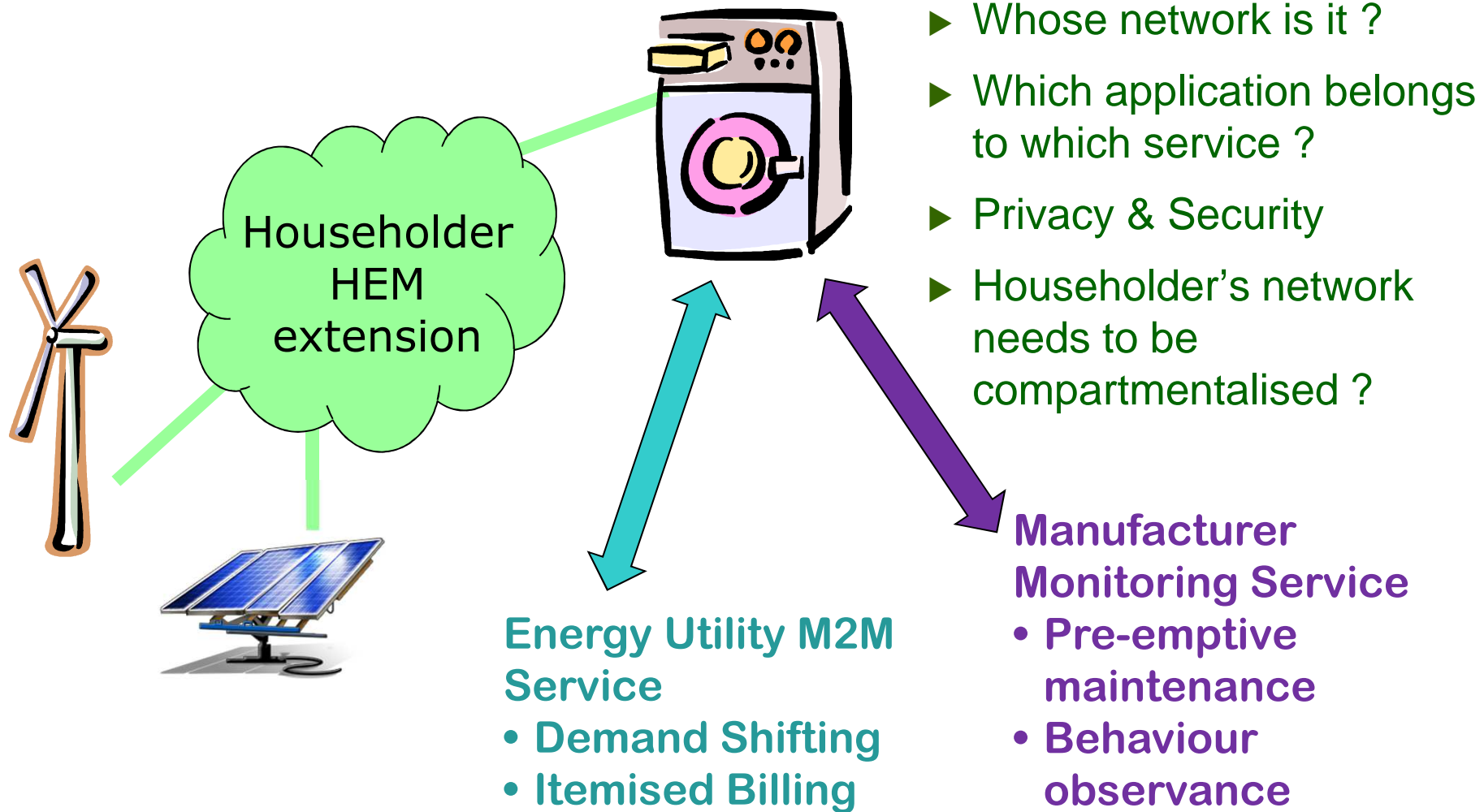
	WiFi	ZigBee	Bluetooth	HomePlug Green PHY	Hanadu
Battery friendly	N	Y	Y	N	N
Whole-house w/o meshing	N	N	N	N	Y
Whole-house w/ meshing	n/a	Y	n/a	n/a	Y
Power usage < 1W	Y	Y	Y	N	Y
High node counts	Y	Y	N	Y	Y
Full "IoT IPv6" (6LP, ZB profiles)	N	Y	N	N	Y
Secure	Sometimes	Y	Y	Y	Y



## In-Home M2M: Ownership



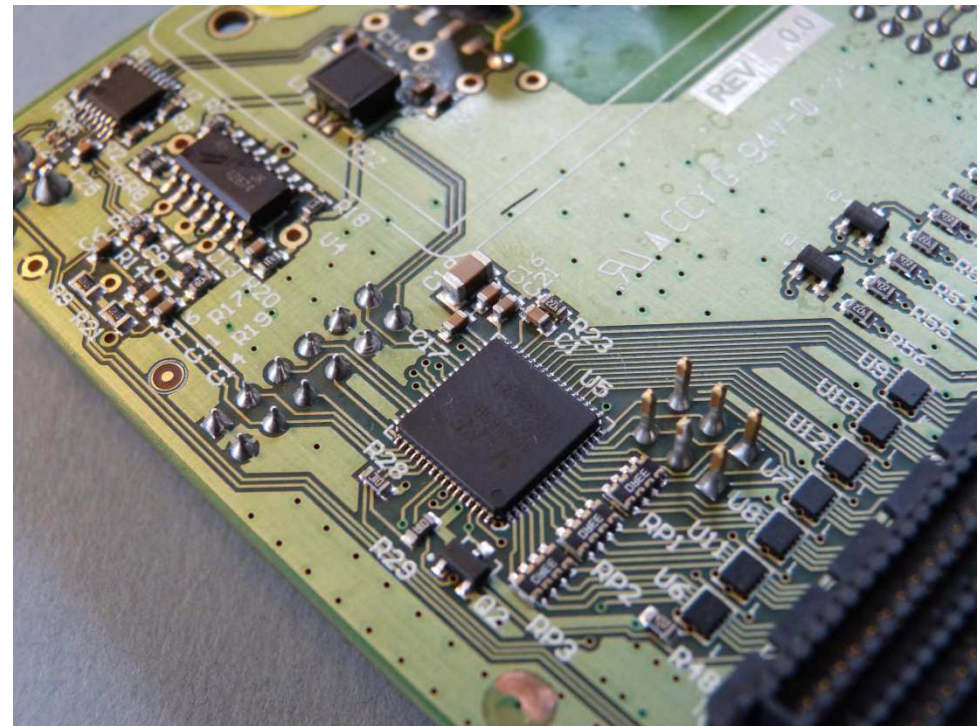
## In-Home M2M: Ownership



# Hanadu



- ▶ In development since 2009 – greenfield approach
- ▶ Powerline complement to ZigBee
- ▶ Proprietary open specification (like ZigBee, Bluetooth, etc.)
- ▶ Ultra-small form factor
- ▶ Sub-500mW power
- ▶ Standards compliant
- ▶ Whole home coverage
- ▶ Co-exists with other powerline solutions
- ▶ Launching in Q3 2012



- ▶ Supporting M2M inside the home presents huge opportunities and scope for unified platforms
- ▶ Re-purposing an old connectivity solution risks being a compromise too far
  - ▶ Mass market solutions have to work for everyone
- ▶ No single technology will work for everything
  - ▶ Hybrid approaches essential eg ZigBee/Weightless/Hanadu
- ▶ In-Home M2M has to be fully forward-looking
  - ▶ Full suite of next-gen IPv6 includes 6LowPAN, ZB profiles, TR069
  - ▶ Consider network compartmentalisation (“virtualisation”)

Thank You

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VP, Business Development & Co-founder