



Connecting the Internet of Things Inside the Home

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www.cir-strategy.com/events

Internet of Things: It's Big



▶ Connecting up more than just the humans

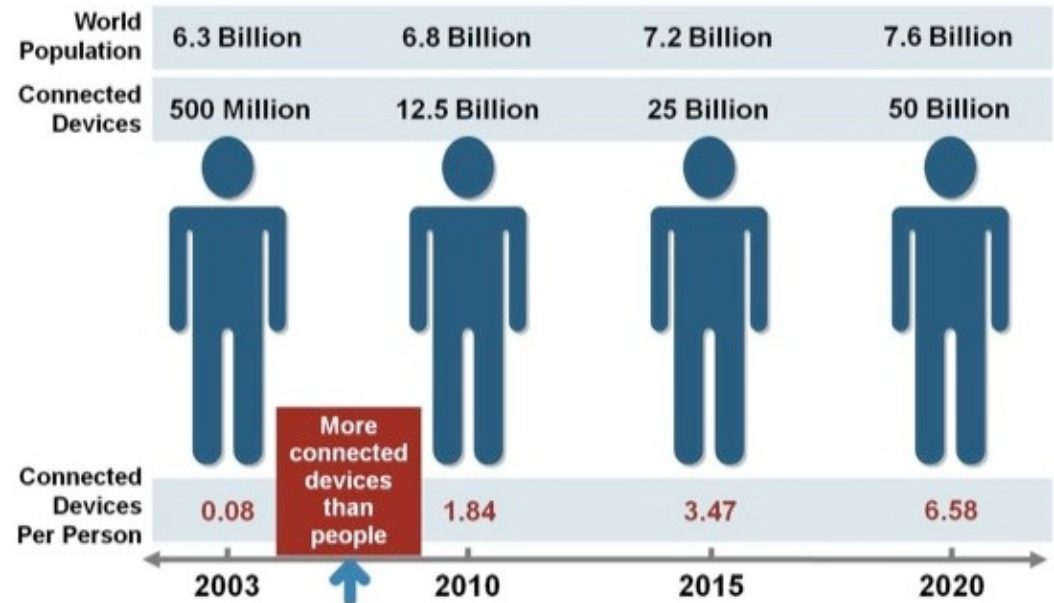
2010: Cisco/IBM: “1 trillion connected devices in 2013”

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

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

▶ What's connected ?

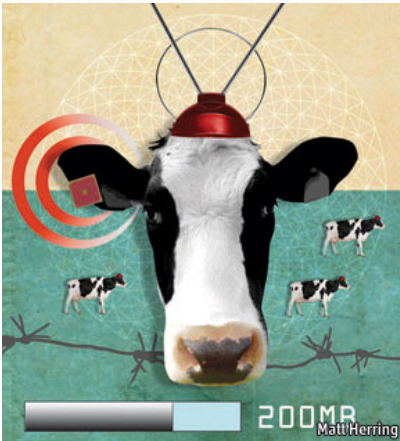
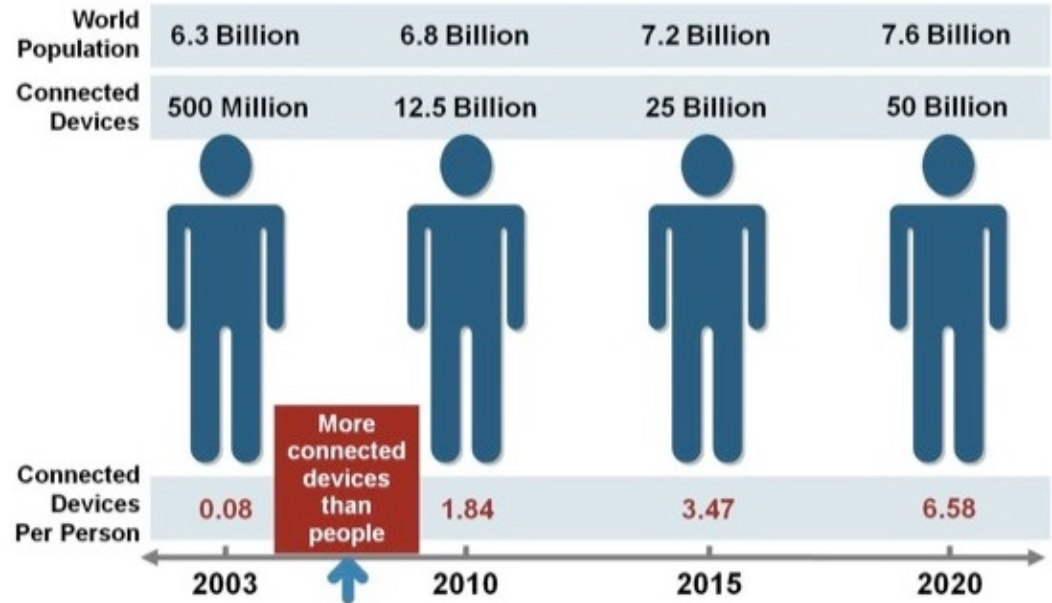
- ▶ Us
- ▶ Our devices
- ▶ Our machines
- ▶ Our world



Internet of Things: It's Big

▶ What's connected ?

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

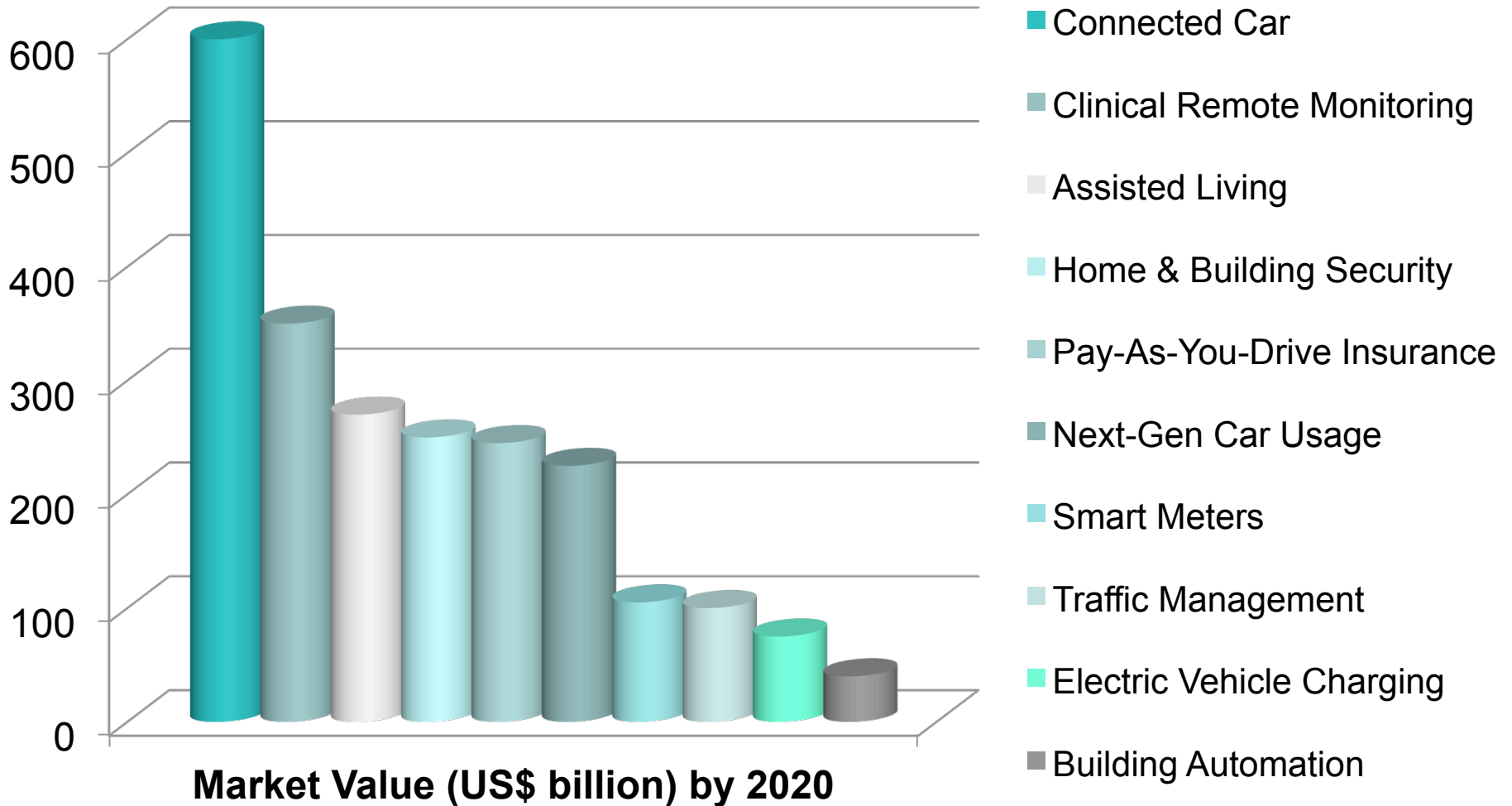


▶ And our livestock

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

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

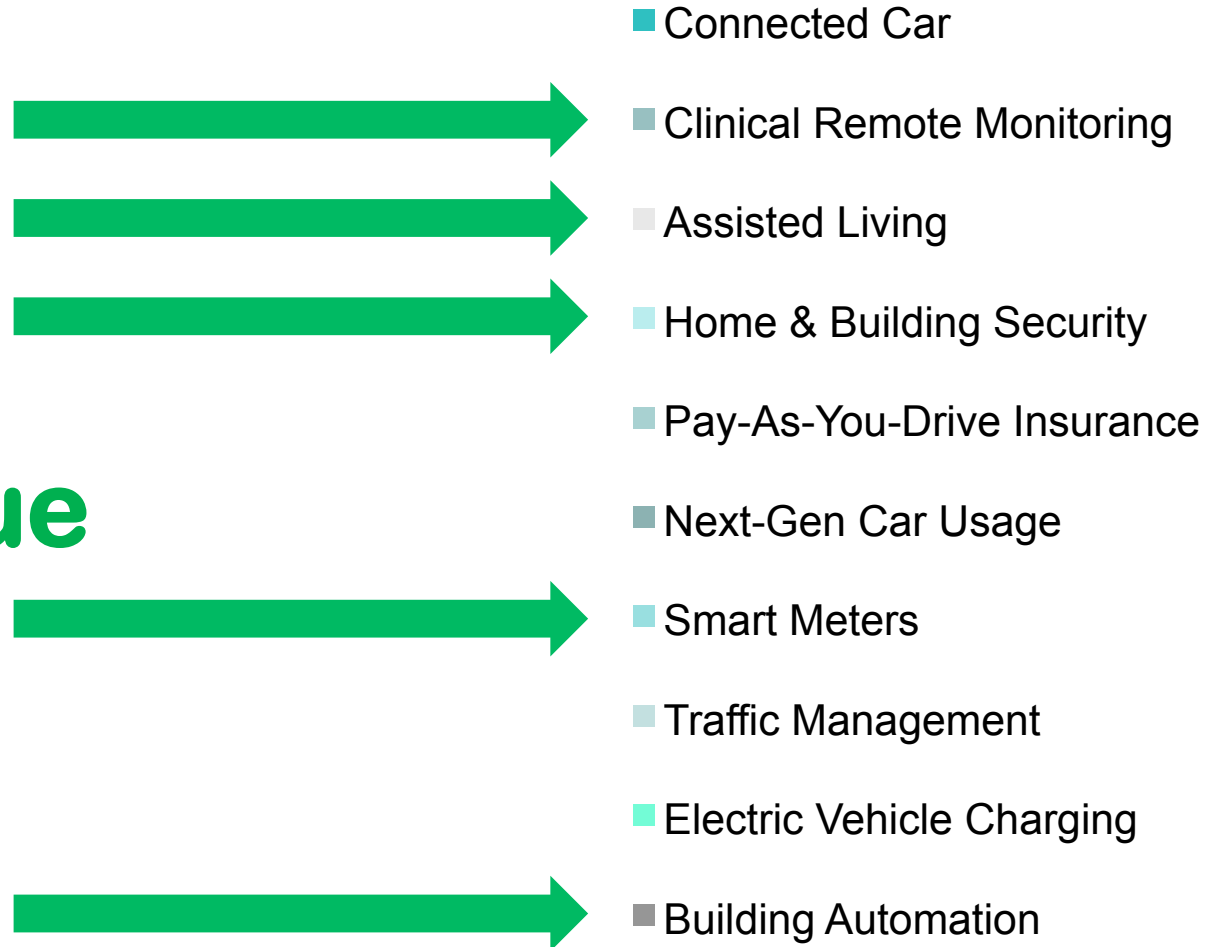
Source: GSMA 2012



“60% of \$4.5tn Value from Ten Apps”

Xsilon

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

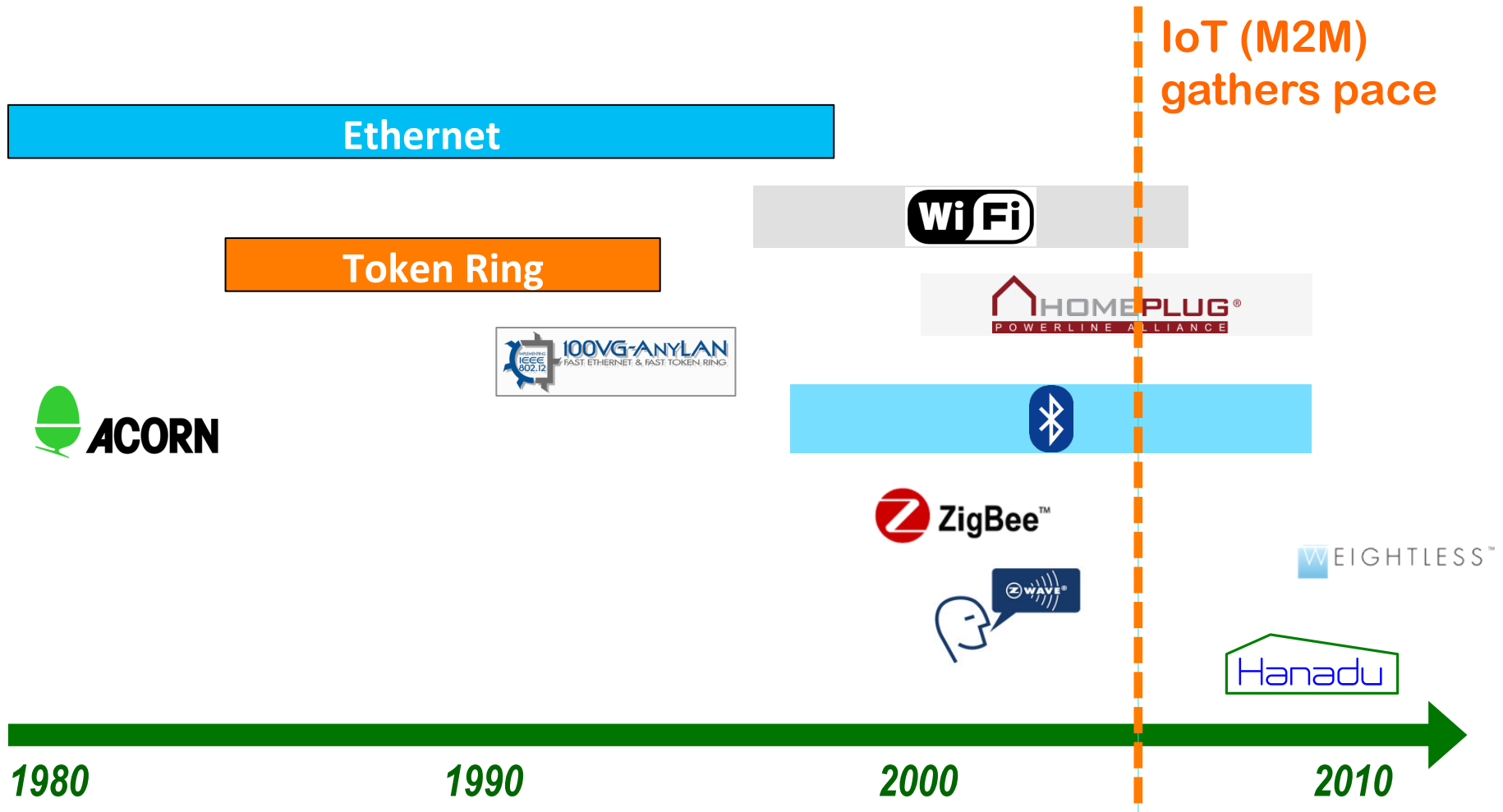


- ▶ Initial M2M momentum comes from cellular operators
- ▶ M2M in the Home cannot guarantee coverage
- ▶ Useful M2M services at home:
 - ▶ Smart metering
 - ▶ Smart appliances
 - ▶ Assisted living
 - ▶ E-Health
 - ▶ Home energy management
 - ▶ Microgeneration monitoring

Connectivity Essentials:

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

Warning! Comms Engineers at Work



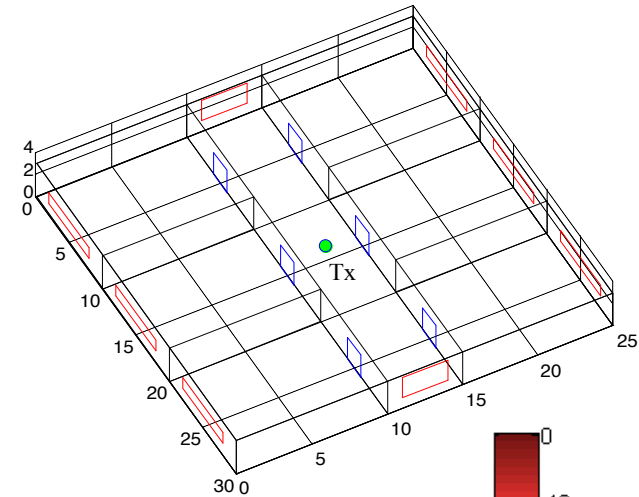
Connectivity in the Home

▶ Key characteristics

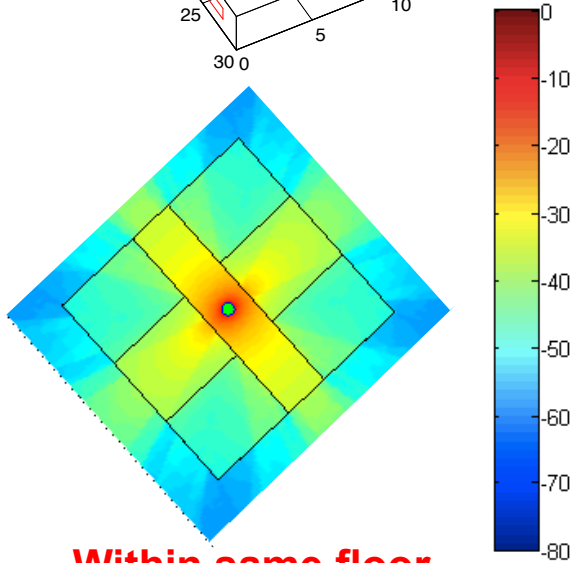
- ▶ Walls and floors are hostile to radio
- ▶ WiFi radio spectrum congested by neighbours
- ▶ Mixture of battery-powered and mains-powered devices
- ▶ Broadband network likely already deployed
- ▶ No IT manager available
- ▶ *Ad hoc* connectivity and repositioning of appliances
- ▶ High sensitivity to cost
- ▶ High sensitivity to privacy and ownership

▶ Compromise around a convenient technology risks a product's mass market relevance

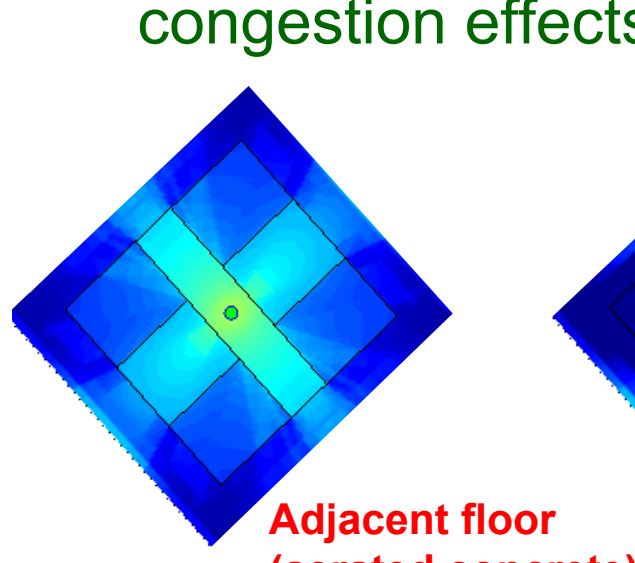
Radio in the Home: WiFi Coverage



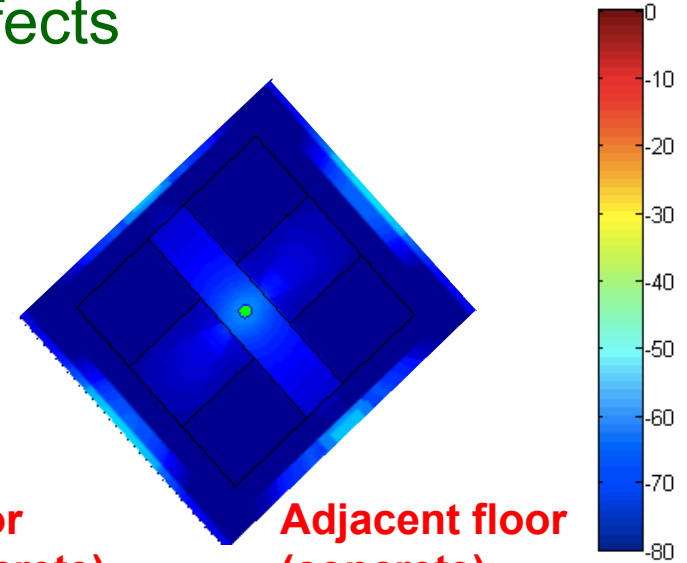
- ▶ Predictions of 2.4GHz (eg WiFi) coverage inside a building with walls and floors
- ▶ Propagation modelling (by Manchester University) ignores spectrum congestion effects



Within same floor



**Adjacent floor
(aerated concrete)**



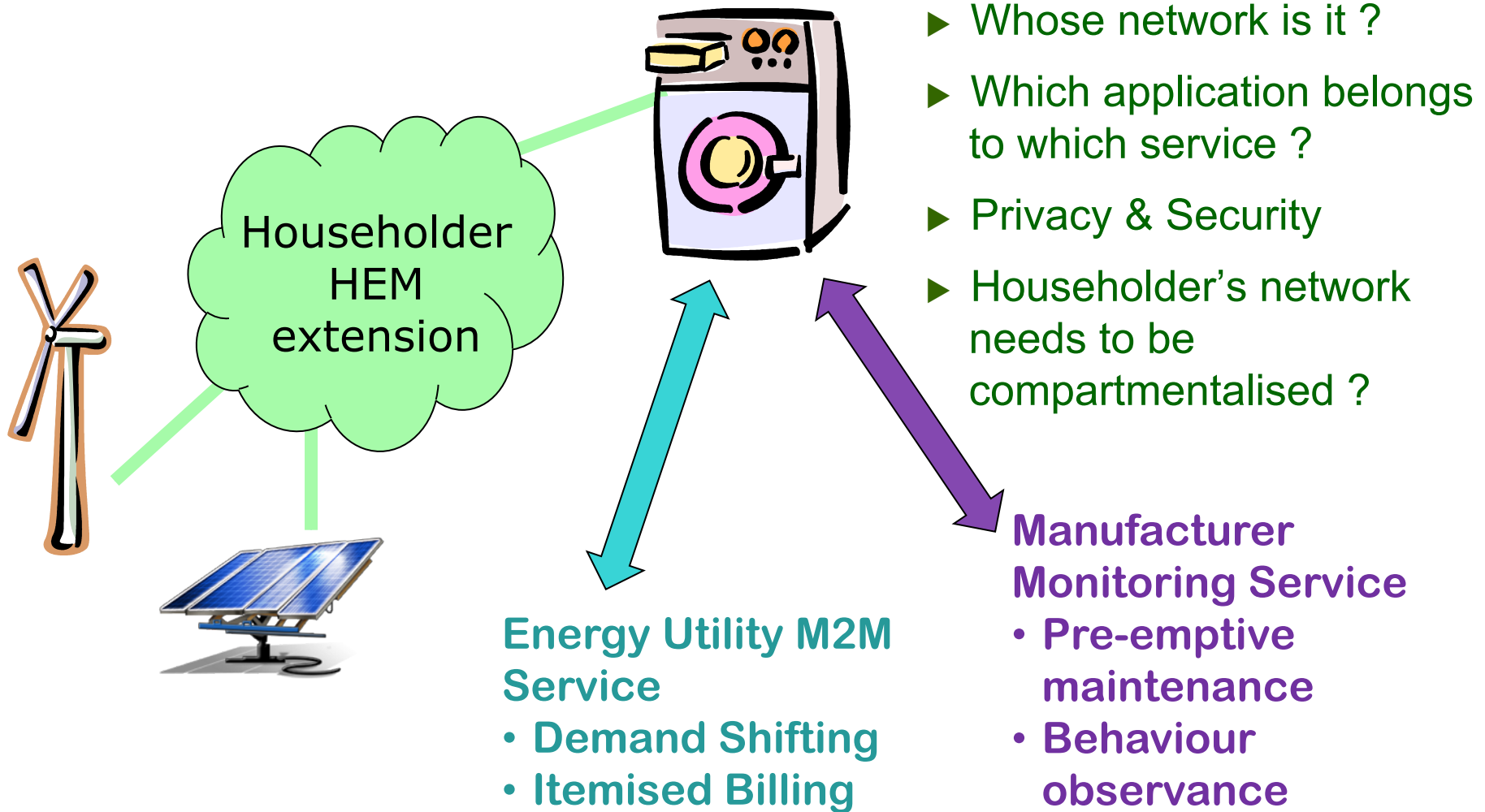
**Adjacent floor
(concrete)**

In-Home M2M Connectivity Options

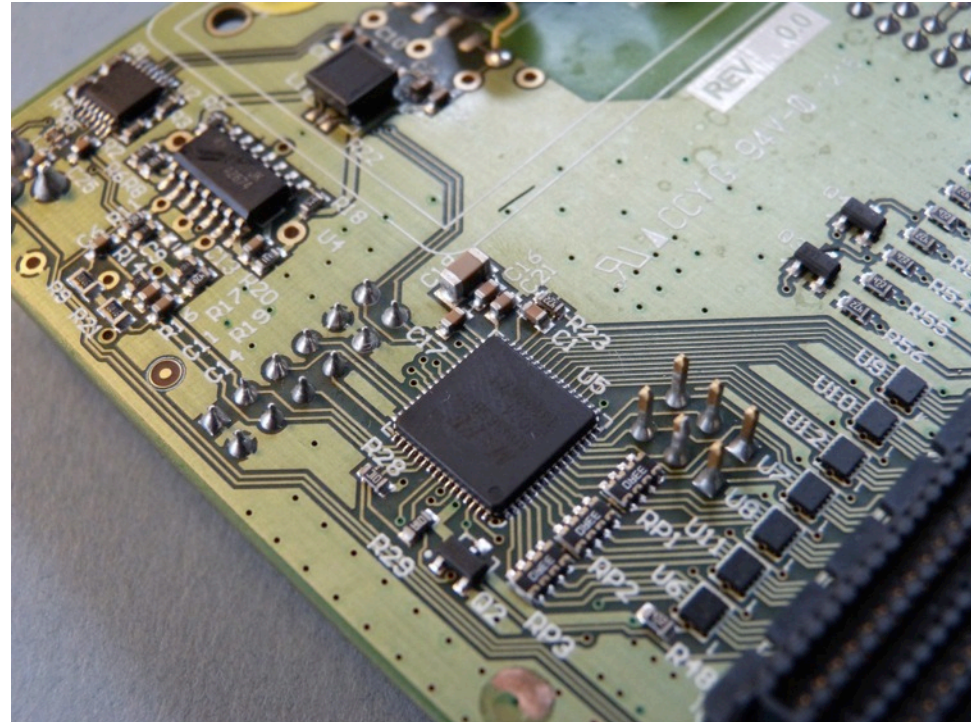


	WiFi	ZigBee	Bluetooth	HomePlug Green PHY	Hanadu
Battery friendly	N	Y	Y	N	N
Whole-house w/o meshing	N	N	N	N	Y
Whole-house w/ meshing	n/a	Y	n/a	n/a	Y
Power usage < 1W	Y	Y	Y	N	Y
High node counts	Y	Y	N	Y	Y
Full "IoT IPv6" (6LP, ZB profiles)	N	Y	N	N	Y
Secure	Sometimes	Y	Y	Y	Y

In-Home M2M: Ownership



- ▶ In 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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