

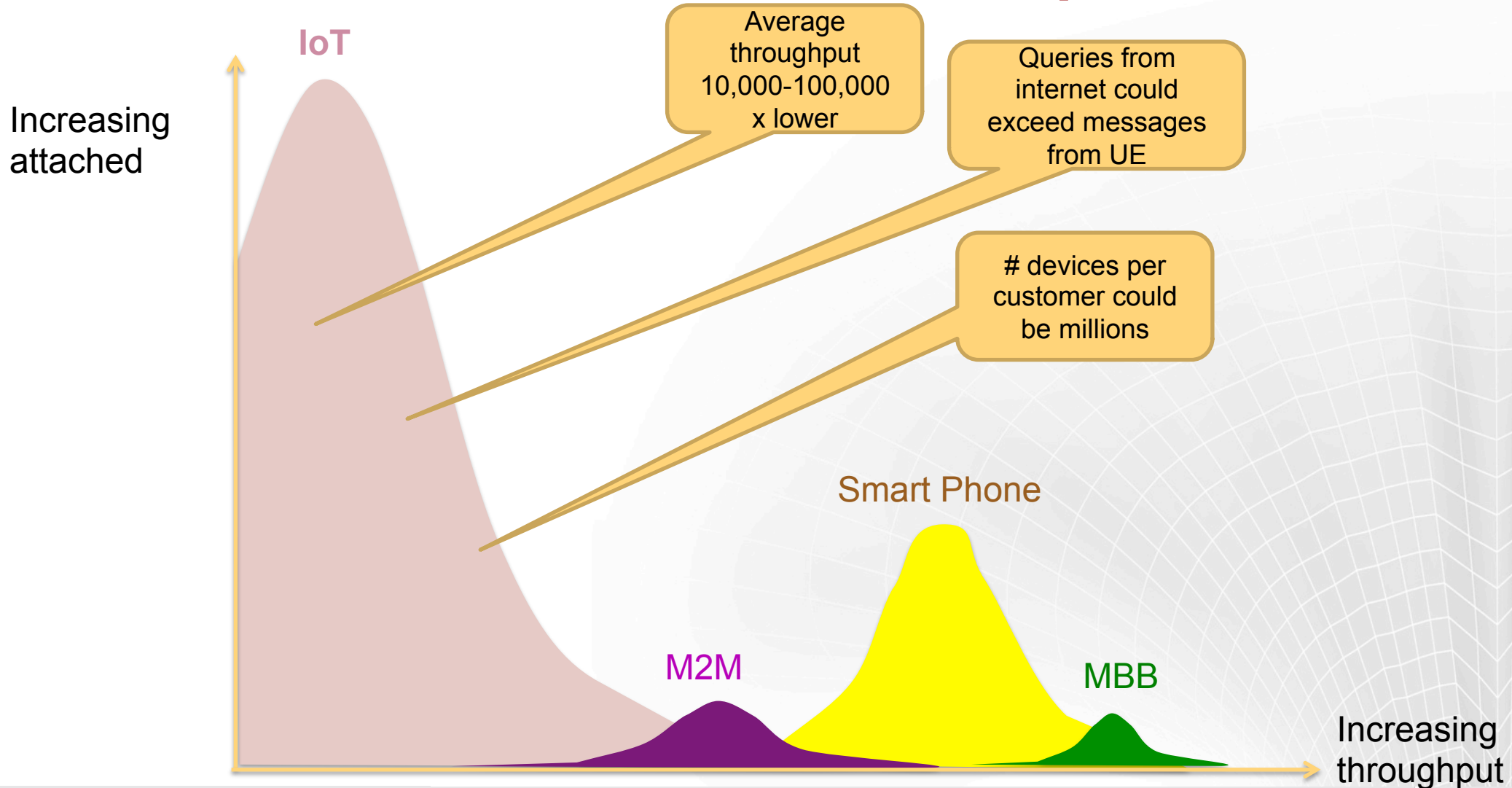
IoT: City-wide networks

October 2, 2014

www.huawei.com



Vast Numbers of Connections Expected



What type of Things will be connected?

- Anything with current going through it



- And a lot of things that don't, today



Literally, almost anything and anyone!

What's needed: WAN 'Internet of Things' air interface

1. System scaleable to billions of devices
2. Very long battery lives: cost of truck rolls >> modules
3. Ultra-cheap user equipment (UE)
4. Longer reach than today's cellular
5. Strong and uniform security
6. Works globally in harmonized spectrum
7. Easy access through cloud-based APIs

Two approaches to achieving this

1. MNOs deploy in cellular spectrum

- › Licensed use, no other interferers
- › Use existing RAN infrastructure
- › Higher permitted power
- › Heavy standardization process

2. Fixed line or private operators deploy in license-exempt spectrum

- › Shared use of spectrum
- › Requires new basestations/backhaul
- › Lower permitted power
- › Duty cycle restrictions
- › Quicker standardization process

Much of the technology can be common and both approaches have a place in the market

Milton Keynes: City-wide IoT

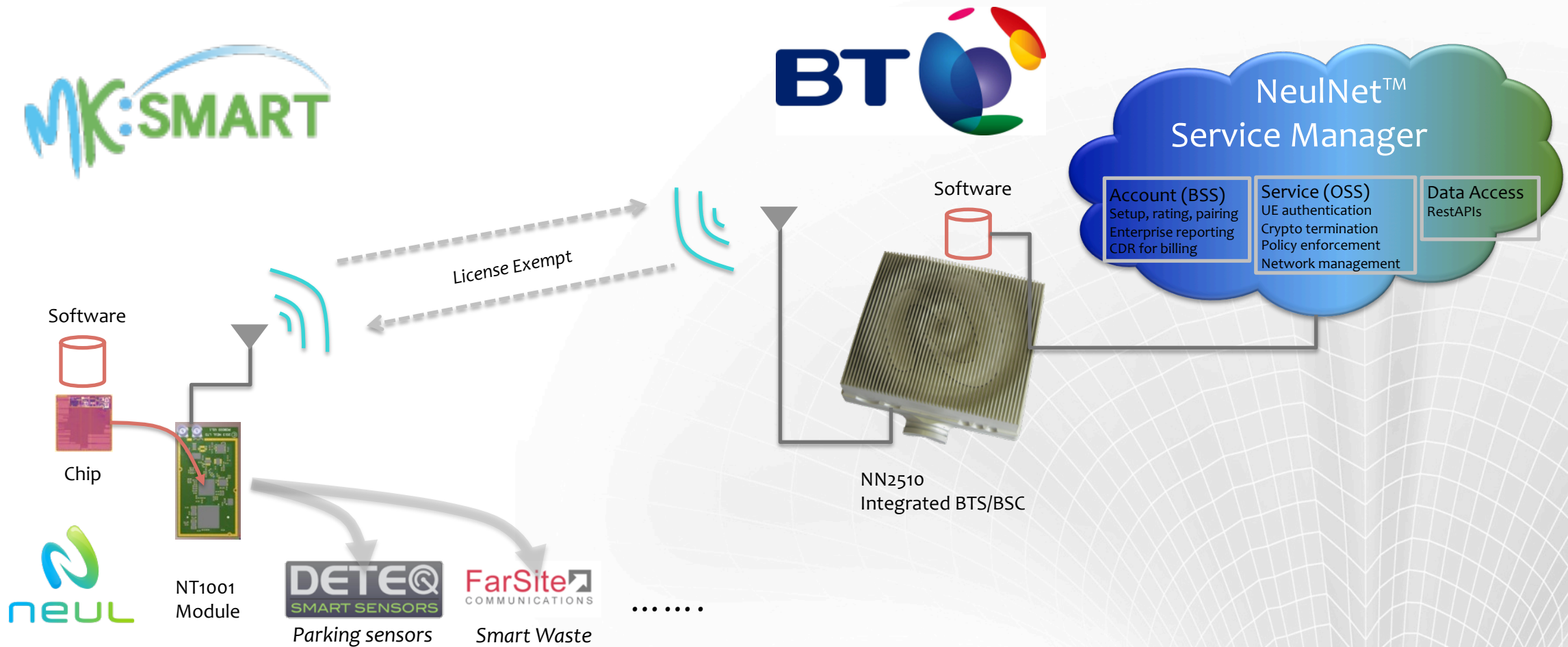


Objective is to spur economic growth

License-exempt wide area network for IoT

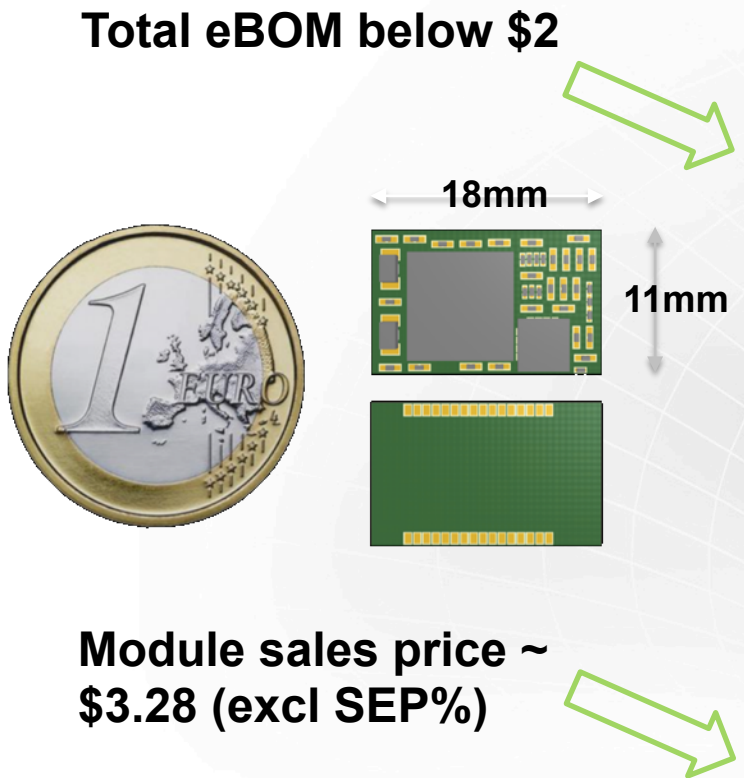
Rory Cellan-Jones for BBC World at One

License-exempt City-Wide Low Power WAN network



Module Costs approaching \$3 (1Mu 2016)

	2013 Final Module	2016 Final Module (est)
GPRS	\$8.19	\$5.00
LTE-MTC	\$14.60	\$9.00



eBOM	2016 Estimates
Boudica single chip RF/BB/security	\$0.90
PA/switch module	\$0.40
26MHz XO	\$0.18
32kHz XO	\$0.11
RF filter	\$0.14
Other discretes	\$0.20
Total eBOM	\$1.93
Mechanical, Assembly & Test	
PCB (4 layer FR4, 175mm ²)	\$0.13
Shield	\$0.04
Assembly	\$0.40
Test	\$0.10
Yield loss (2%)	\$0.05
Packaging/labelling	\$0.10
Total ex-works cost	\$2.75
OEM value-added	
Freight (shipped)	\$0.14
Allowance for swap/RMA (2%)	\$0.06
OEM margin (10%)	\$0.33
Total expense to MNO or channel	\$3.28

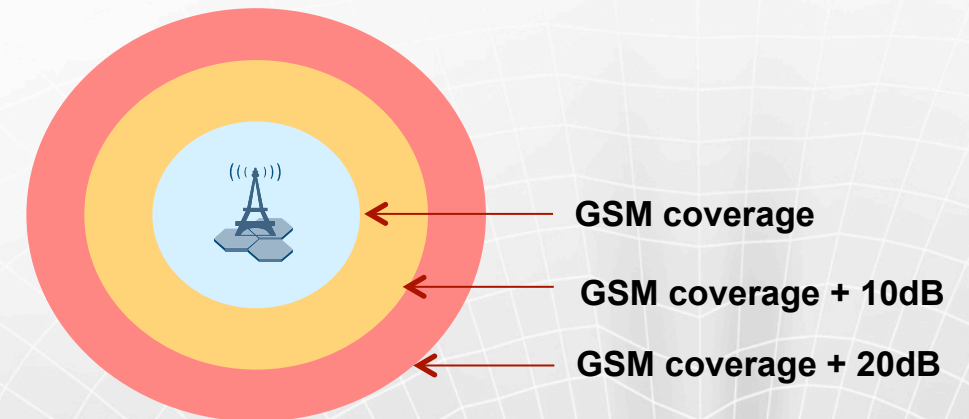
Modules approaching 20 years service lives on 50¢ batteries

	Battery life for 2500 mAH x 3.7V capacity Report = 100 bytes uplink, 20 bytes downlink		
Coverage enhancement vs. GSM	6 reports/hour	1 report/hour	1 report/day
0 dB	6.7 years	> 20 years	> 20 years
0 – 10 dB	3.0 years	14.7 years	> 20 years
10 – 20 dB	0.4 years	2.3 years	> 20 years

eg
parking
sensor

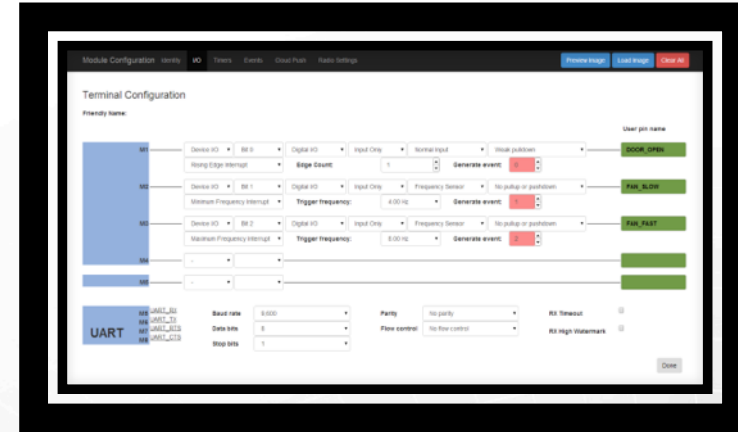
eg
gas or
electric
meter

eg
fire alarm
or water
meter



Dev kit for applications

Web-based configuration tool



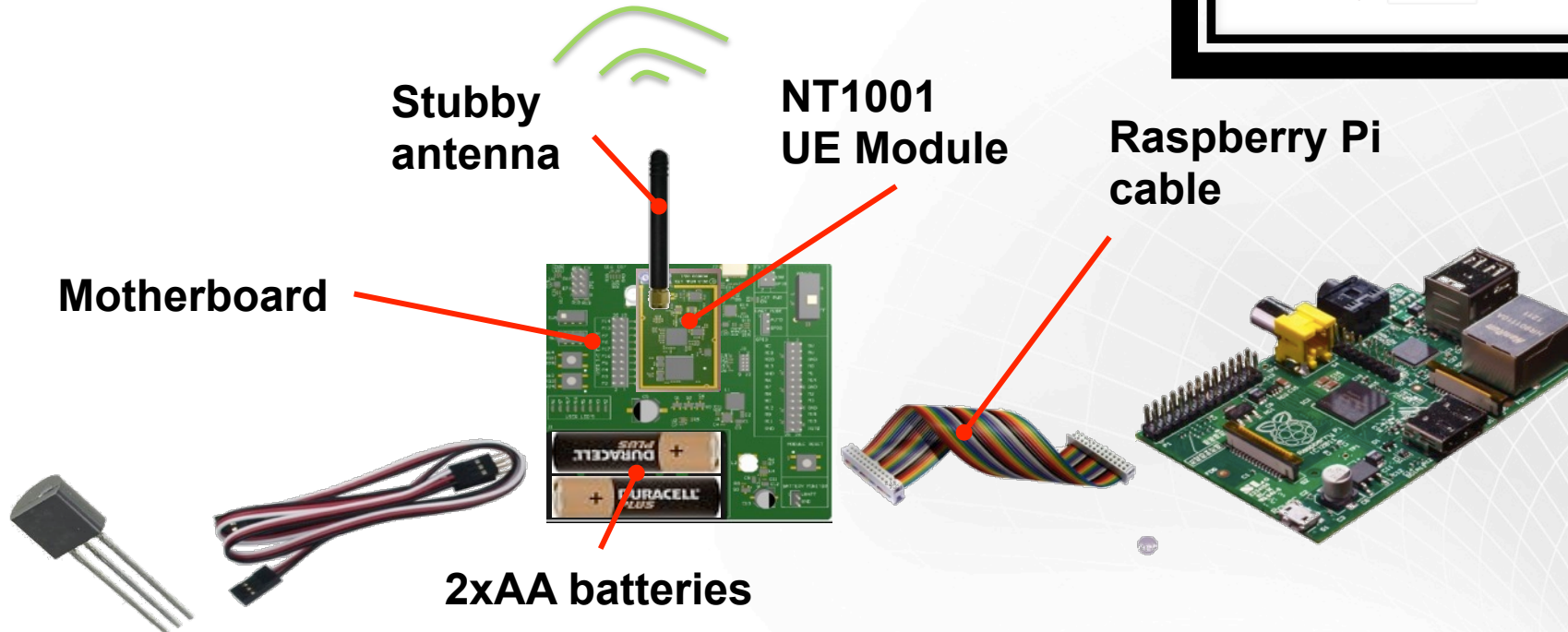
Stubby antenna
NT1001 UE Module

Motherboard

Raspberry Pi cable

2xAA batteries

Example sensor



Initial Applications

netBin Management System
Optimised bin monitoring and collection systems for smarter cities

FarSite
COMMUNICATIONS

Overview

Reduce cost and save time by utilising a Bin Management System (BMS). Automatic monitoring of bins provides timely warning when they are full, permitting intelligent route planning for collections ensuring no visit is wasted and unsightly overflowing bins are a thing of the past.

FarSite's BMS is not just about waste collection - the netBin sensors can be retrofitted to almost any container to monitor its status, whether you need to know how full it is or sending an alert if its on fire, moved or tipped over. The Application software provides an overview of the location and status of the containers together with alerts and route planning support.

The Smartphone app presents bin status and routing planning information, ensuring efficient attendance to only those bins that need attention —vastly reducing collection costs, reducing vehicle journeys, increasing the capacity of the collection fleet and improving the appearance of the city.

1 netBin sensors monitors bins fill level, status transmitted over Weightless.

Communal waste management

iPEST.
The pest control remote monitoring solution

Home Get Started The Unit Web Service Pricing Contact

The iPEST Web Service... intelligent pest control

The iPEST web service allows you to manage and monitor your pest control solution across all of your customer sites.

You will save time and money by only visiting units and sites that need your attention. Plus you can provide your customers with an improved level of service including regular site reports and analysis.

Put simply : Save time, save money and improve your customer service.

Location, location, location...

Using our web portal you can create as many different locations as you wish using either a UK or Worldwide mapping service.

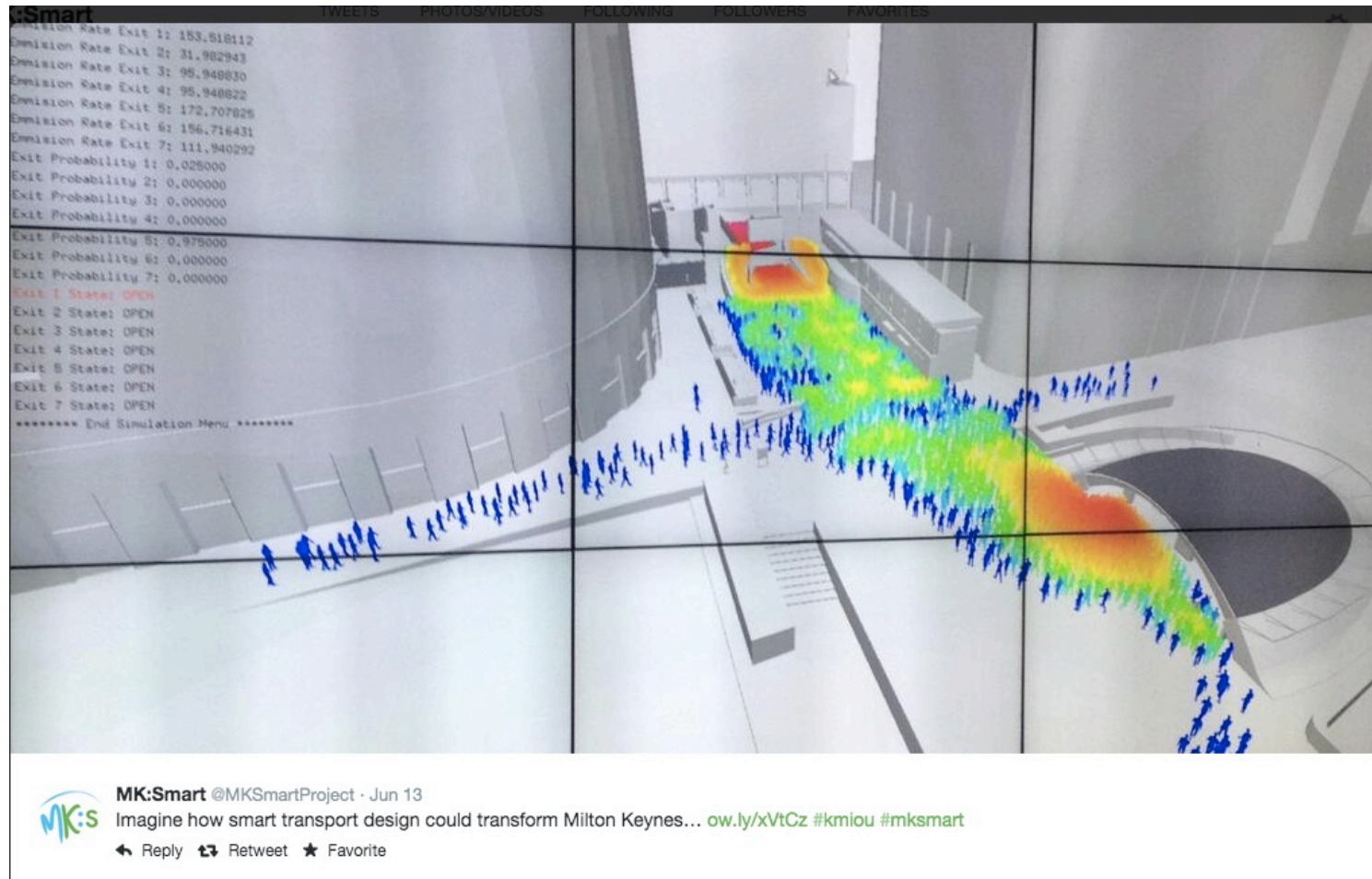
Our service enables you to zoom in to a high level of accuracy, have multiple levels (or floors) for each site and create your own unique features on each site.

Observations, site notes, COSH forms and other important information can be created and stored by the iPEST System.

UK OS or Worldwide Mapping

Pest control management

Future applications



Traffic management
Parking
Smart Grid
Metering
Buildings HVAC
Buildings security
Asset tracking
Healthcare
Assisted Living
Wearables
Consumer goods

Summary

- **We are at the dawn of a new era**
 - › WAN technologies are emerging fast for IoT connectivity
 - › They are needed and will open up the IoT market for us all
- **UK is at the epicenter of this**
- **Cellular licensed technologies are one way of doing this**
- **Milton Keynes is BT's WAN test bed in the UK for license-exempt systems**
- **Join with us in establishing the necessary standards and eco-systems to ensure UK leadership**