



# The Internet of Everything

BCS Northamptonshire Branch

Date: 13th January 2015

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# Agenda

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- Connectivity Levels for IOT (Internet of Everything)
- IOT Device Types
- IOT in the Home
- The IOT Home HUB
- IOT in Business
- Live Demo of Plant Tool Diagnostics
- IOT Mobility
- IP addressing why IPV6 is a must
- Privacy & Security
- Futures

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**Welcome**

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# **Branch Chair**

BCS Northamptonshire Branch

**Barney Duffy**

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# IOT Connectivity Levels

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The Five levels of Connectivity refers to;  
How the device interacts with Other Devices

1. No Connectivity
2. Local (Typically Bluetooth, Radio, NFC, Serial, Relay Contacts, Voltage Based (Analogue))
3. Networked (Layer 2 Typically Ethernet, Wi-Fi, Bluetooth)
4. Hub (Layer 3 Typically HUB functionality using Ethernet)
5. WAN Typically Network Access device (Routing) (Wi-Fi on Train)

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# IOT Device Type

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IOT device split into Three Device Types.

- **Type 1 Devices**

- They have no intelligence and will either (Switch on/off)
- Sensor/Switch type devices that will only return a value/result. Example of these types are;
  - Thermostats (Returns back a value, Voltage)
  - Open shut Contacts (Switching devices on/off) Door/Gate Open/Lock
  - Volume (Returns back a reading/resistance (Value) Typical; Gauge for Petrol Tank)
  - Meter Reading (Returns back a value)

- **Type 2 Devices**

- They are intelligent and can converse with other devices
- They are usually managed by a hub or terminal device

- **Type 3 Devices**

- These are intelligent and converse with other devices and systems
- These device types are capable of independent action (AI)

# IOT in the Home

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- With the availability of Internet connectivity in most homes, the home network has been born, this is due to three technologies
  - Broadband services
  - Wi-Fi Connectivity
  - 3G/4G services
- Typical IT devices in the home, currently Managed on a Point to point basis
- Smart Meters
  - <https://www.eonenergy.com/for-your-home/saving-energy/smart-meters>
- Central Heating Control and Management
  - <http://www.thegreenage.co.uk/intelligent-heating-control-systems-to-replace-traditional-thermostats/>
- Light Management and Control
  - <http://www.usa.philips.com/e/hue/hue.html>
- Home Security
  - <http://www.amazon.co.uk/Wireless-Security-Software-Recording-EyeSpy247F/dp/B0035WLRTS>
- Smart Fridges
  - <http://www.lg.com/us/refrigerators/lg-LFX31995ST-french-3-door-refrigerator>

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# The Home Hub for IOT Devices

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- Currently most home based devices are managed on a point to point basis, generally via a tablet or smart phone.
- Hub type devices are starting to emerge that will manage multiple device types.
  - <http://www.forbes.com/sites/aarontilley/2014/10/24/googles-nest-acquires-smart-home-hub-maker-revolv/>
- **Why is the Home Hub So important.**
  - Managing devices is easy on a point to point basis, however when you want to control Devices in the home remotely, this needs to be done via a hub, as you will need an external IP address.
  - Home Hub becomes a terminal server at home, managing multiple devices, accessed by a single IP address and port on the home Router. This will required Fixed IP addressing for the WAN side of the home router. Most ISP's current use DHCP.

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# IOT in Business

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- Cash Machines
- Intelligent Vending Machines (Contactless Vending)
- Smart Parking (Mobile phone & Contactless payments)
- Smart Train/Bus tickets (Tube)
- Smart lighting
  - Via CAN networks (Controller Area Networks) [http://en.wikipedia.org/wiki/CAN\\_bus](http://en.wikipedia.org/wiki/CAN_bus)
  - Sensor Networks [http://en.wikipedia.org/wiki/Smart\\_Lighting](http://en.wikipedia.org/wiki/Smart_Lighting)
- Security
  - Security (Video)
  - Controlled Access in buildings (RFID)
- Management and Control
  - Smart Control Systems (Heating, Air Conditioning, etc.)



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# Internet of Things

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**M2M Demo**  
**Mobile Tracking and Management**

**David Pink**

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# IOT in Mobility

## Covered Machine to Machine (M2M) in December's session

- Location Based Services (M2M) via the mobile network
  - TomTom Traffic <http://livertraffic.tomtom.com/>
- Asset tracking (M2M) via the mobile network
  - Pet Tracker <http://www.pettracker.com/>
- Smart Vending Machines (M2M) via the mobile network
  - [http://www.inhandnetworks.com/index.php?option=com\\_content&view=article&id=152&Itemid=637&gclid=CNvD1palisMCFYLnwgodIT8ABQ](http://www.inhandnetworks.com/index.php?option=com_content&view=article&id=152&Itemid=637&gclid=CNvD1palisMCFYLnwgodIT8ABQ)
- Contactless Payments (M2M, NFC, RFID)
  - TFL <http://www.tfl.gov.uk/fares-and-payments/contactless>
  - Barclays [http://www.barclaycard.co.uk/business/campaign/pa/search/choose/ntc/face-to-face?WT.mc\\_id=C036L011N91&WT.srch=1](http://www.barclaycard.co.uk/business/campaign/pa/search/choose/ntc/face-to-face?WT.mc_id=C036L011N91&WT.srch=1)
- In Car Services (M2M)
  - BMW Cars <http://embedded-m2m-solutions.tmcnet.com/topics/embedded-m2m-solutions/articles/389937-vodafone-bmw-getting-together-drive-connected-car-development.htm>
- E-health (NFC, RFID, M2M)
  - Mobile and home monitoring <http://www.wirelesslogic.com/sectors/m-health-solutions/?keyword=m2m%20ehealth&gclid=CLXt3t6KisMCFSfLtAodWi4AGQ>

# IP Addressing why IPV6 is a Must

- Internet access and smart devices will use IP to connect devices, services and Applications.
- IP addressing in the Home is ok using IPV4, as these will be managed via hubs sat behind the Home Router
- IPV4 addressing on the mobile network is ok as the same addresses can be re-used on different networks.
- However as the home and industry starts to automate each home and business will need a number of IPV6 address's to manage the multiple hubs at each location.
- Typical Hubs required for home in the future.(Each hub will require a WAN IP address)
  - Home Automation.
    - <http://www.forbes.com/sites/aarontilley/2014/10/24/googles-nest-acquires-smart-home-hub-maker-revolv/>
  - Security.
    - <http://www.maxmon.co.uk/?gclid=COeO8qKPisMCFQGc2wodeVsAUA>
  - TV, Audio services.
    - <http://www.nowtv.com/?referrer=nowtv&DCMP=KNC-Brand-nowtv-Core-NOWTV-NC-Google>
  - Voice/mobile/Video services
    - <http://www.vodafone.co.uk/business/products-and-services/unified-communication/one-net-enterprise/>

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# Privacy & Security

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Ok so how do you Secure your Home.

- Problems
  - Digital Storage Documents, Photo's, etc.
  - Unauthorised Access to your network.
  - Management of your devices
  - IPV6 to IPV4 (Security Risks)
  - Wi-Fi within the home
- Benefits
  - Electronic Surveillance
  - Stronger Encryption
  - Cloud based encrypted storage

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# Futures, Utopia here we come!

## What could happen, Not what will happen

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- Television and Audio services will be come IP enabled
  - Current Radio frequencies are much too valuable to be used for public broadcasting
  - Telephony services to become IP; Fixed and Mobile to become integrated
  - Broadcasting Services can be provided by anyone, will enable bespoke services
- Public access to network services will disadvantage;
  - The poor who cannot afford the services
  - The remote communities that cannot have access.
- Work will become a process, as more people will work from home
- Cities will become smaller as commuting will become less of a requirement.
- Company Offices will become smaller with less management

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# Questions

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Technical / Business Computing

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**Thank you**

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**Thank you for attending!**

