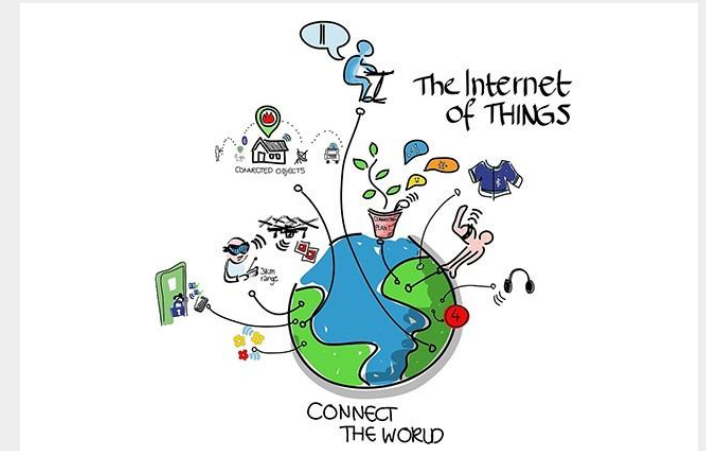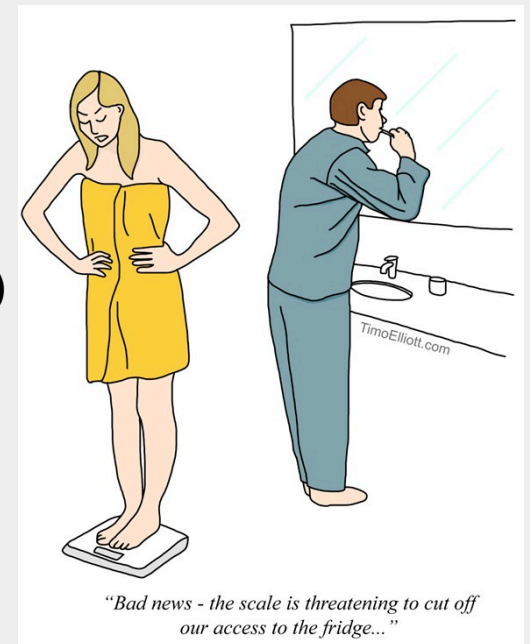# Summary

- Internet of Things (IoT) – Regulation?
    - The Internet and regulation - lessons
- Some regulation topics covered
    - Spectrum access
    - Competition and 'net neutrality'
    - NOT covered – interoperability, security, privacy…..
- Networks Options for IoT Applications
- Access and Competition concerns
- What regulators are doing
- Observations

Internet of Things (IoT) and Regulation?

- Lessons of internet 'regulation' highlights!
  - Global perspective is required
    - Legal enforcement challenge
  - Encourage disruptive innovation
    - Minimise national regulation (the forbearance option)
- Differences with IoT
  - Wide variety of applications
    - Traffic characteristics VERY different
    - Reliability and security requirements
  - Low power and low duty cycle
  - Low cost (& price!)

TimoElliott.com

"Bad news - the scale is threatening to cut off our access to the fridge..."

Network Options for IoT

- **Special purpose network** (eg Taggle)
  - Patented technology
  - Low cost equipment

- **LoRa Alliance (Global)**
  - Use of 'unlicensed' (class spectrum) – not protected ($0)
  - Open LoRaWan standard
  - New Networks in US, France, NZ and Australia (NNN Communications)
    - *note OS carriers Orange and SK Telecom*

- **Mobile Carriers** (eg Verizon in the US)
  - Use licenced spectrum – protected ($$$!)
  - Developments – note supplier corporate marketing!
    - LTE-M - optimised for IoT applications
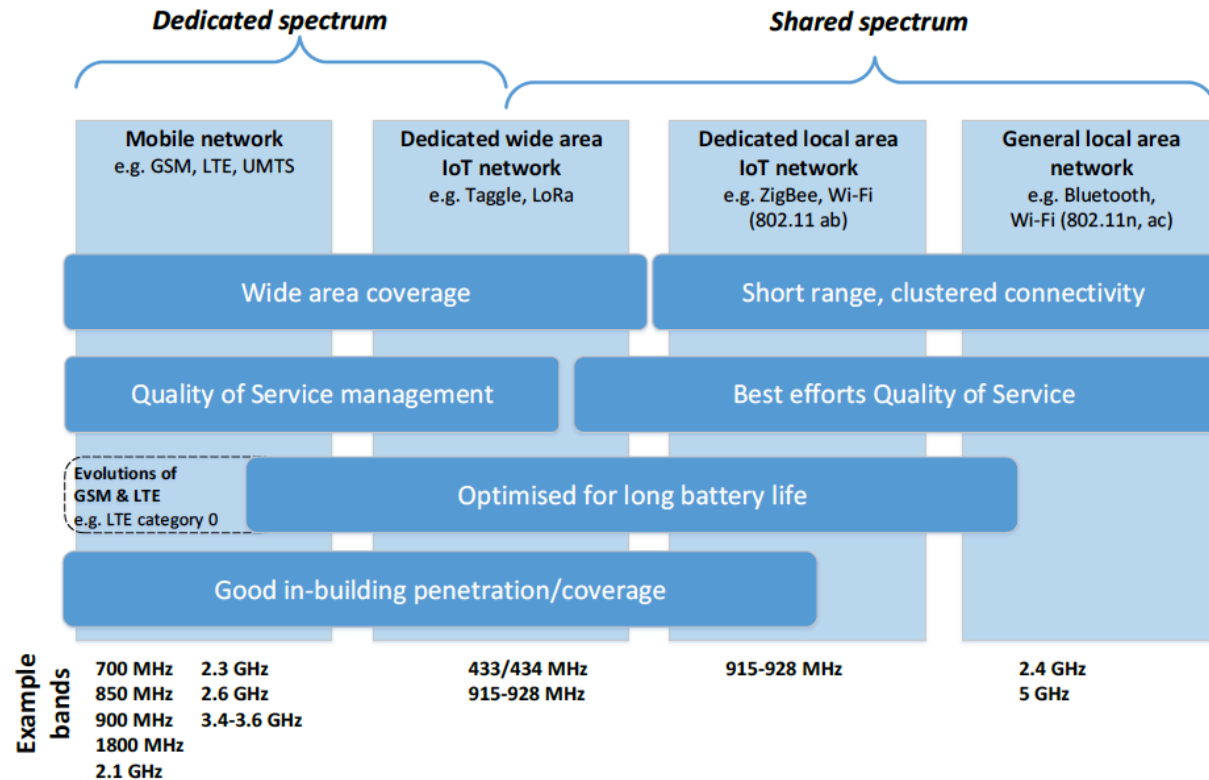   - 5G – low latency plus more

Access & Competition

- The physical layer competitors
  - Single vertical industry networks – initial cost advantages
  - New private LORA network(s) – multiple applications
  - Mobile carriers – scale/reliability advantages
- Areas of concern for regulators
  - Policies for access to spectrum (ACMA)
    - Unlicenced – 'tragedy of the commons'
    - New spectrum for IoT applications only (ie 'private park concepts)
    - Licenciing – potential barrier for innovators
  - Competition impact of bundling strategies (ACCC)
    - Creation of barriers to entry – margin squeeze
    - Network neutrality?

Current Spectrum Bands for IoT

Figure 2: Spectrum identified for IoT applications

Dedicated spectrum		Shared spectrum	
Mobile network e.g. GSM, LTE, UMTS	**Dedicated wide area IoT network** e.g. Taggle, LoRa	**Dedicated local area IoT network** e.g. ZigBee, Wi-Fi (802.11 ab)	**General local area network** e.g. Bluetooth, Wi-Fi (802.11n, ac)

Wide area coverage — Short range, clustered connectivity

Quality of Service management — Best efforts Quality of Service

Evolutions of GSM & LTE e.g. LTE category 0 — Optimised for long battery life

Good in-building penetration/coverage

Example bands

700 MHz 2.3 GHz	433/434 MHz	915-928 MHz	2.4 GHz
850 MHz 2.6 GHz	915-928 MHz		5 GHz
900 MHz 3.4-3.6 GHz			
1800 MHz			
2.1 GHz			

Source: ACMA, based on Ofcom model 2015, updated for Australian spectrum band plans.

What regulators (globally) are doing

- **International ITU**
  - Identifying new spectrum bands for IoT
    - WRC Conference – November 2015

- **UK (Ofcom)**
  - Spectrum consultation – Sept 2015

- **United States (the FCC)**
  - No bottlenecks BUT WiFi being 'maxed out'

- **Australia (ACMA and ACCC)**
  - New spectrum for trials
  - Consultation paper - November 2015

Observations on Australia

- Regulator (ACMA) being proactive
    - Proactive role in CA IoT Think Tank
    - Release of ACMA paper on IoT
        - Spectrum for technology trials
- Wireless network solutions deployment
    - Lagging the US, Europe and Asia – fast follower?
- Innovation in IoT space
    - Patchy, and generally lagging in scale