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School of Electronics and Computer Science

Matter & IPv6

UK IPv6 Council Annual Meeting

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Who am I?

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- Electronics/CS Lecturer
- I teach networking to every Soton CS student
- I run networking-related individual student projects
- My PhD involved deploying the world's first IPv6 IoT ESN
- General network pest and IPv6 proponent

What do I mean by IoT?

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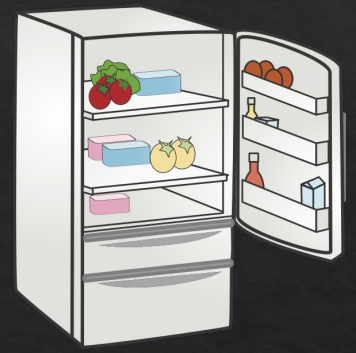
Internet of Things



Things:

- Physical objects that are instrumented/ actuated with a digital presence

Internet:

- and can be interacted with remotely

  (but not necessarily over the Internet)

IoT Connectivity Landscape

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- There are lots of technologies and systems out there…

	Bluetooth	802.11 (WiFi)	GPRS/4G/NB-IoT	Low-power radio
Battery Life	Weeks	Hours	Days	Years
Bandwidth	< 24 Mbps	< 1800 Mbps	< 100 Mbps	< 250 Kbps
Range	< 100m	< 100m	Kilometres	< 100m *

Internet Without an IP Address?

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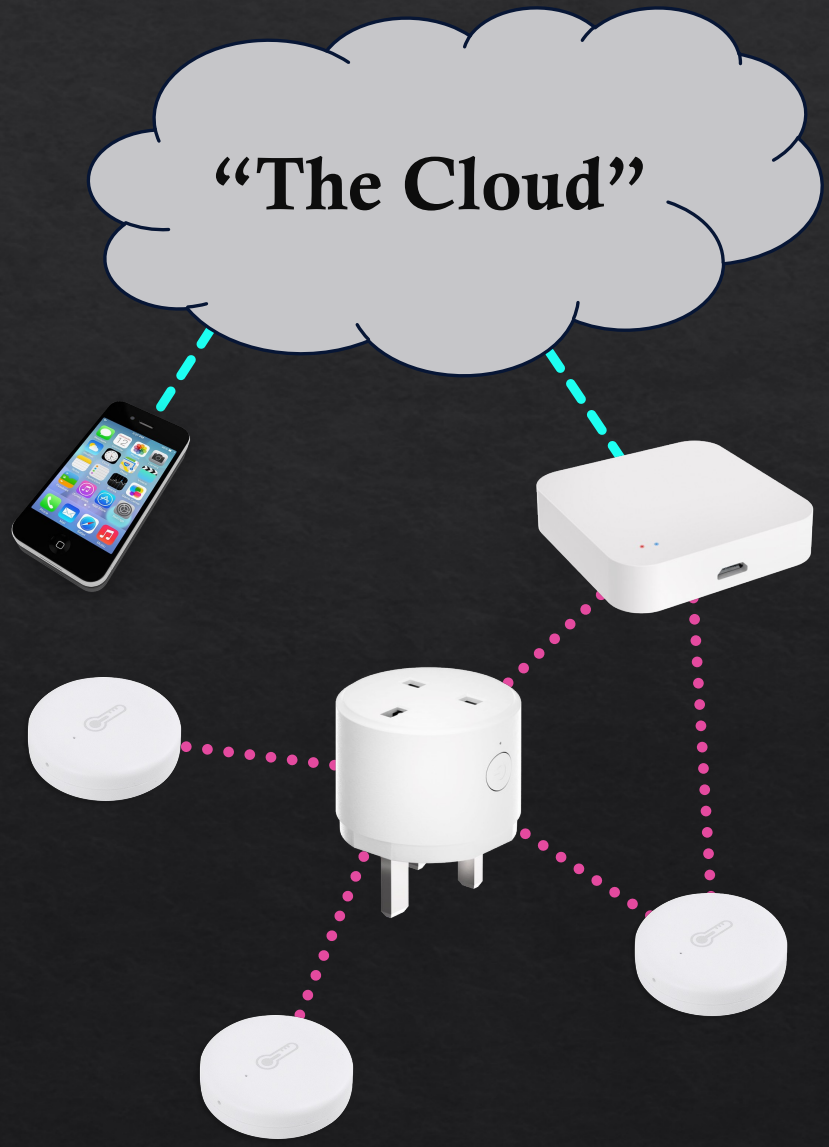
- A lot of technologies used for IoT don't give devices a globally unique ID or address
- Manufacturer-specific hubs with proprietary control software and cloud services are common.
- For many deployments, devices cannot be interacted with directly…



6LoWPAN

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- IPv6 over 802.15.4 radio links.
- 802.15.4 only has 127-byte frames, so 6LoWPAN relies on fragmentation and header compression.
- Header Compression:
  - 48-bytes of IPv6 and UDP headers compress to as little as 6 bytes
  - Relies on defined assumptions and link-layer addresses
- Multi-hop mesh networking is possible with RPL routing

Mountain Sensing

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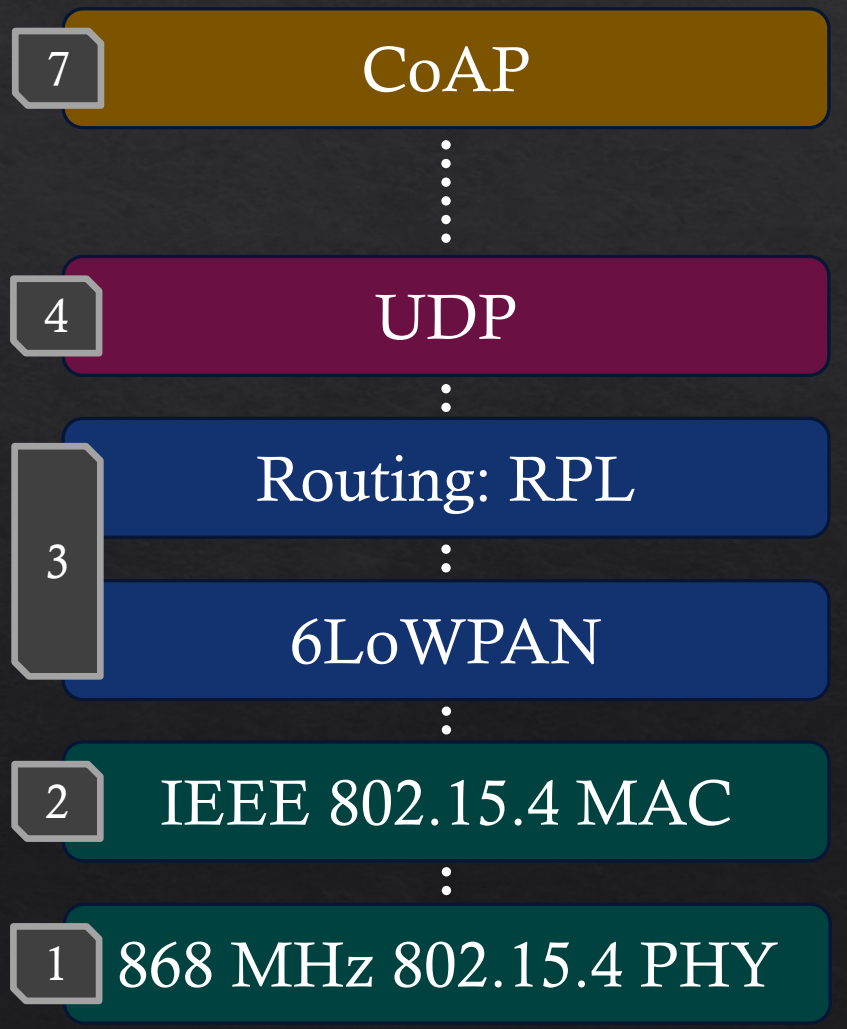
- A 2014/15 NERC-funded proof-of-concept project to deploy an IoT sensor network in the highlands of Scotland.
- Used a standards-based network stack for communication
- Sensor nodes were microcontroller-based and battery powered



Mountain Sensing Deployment

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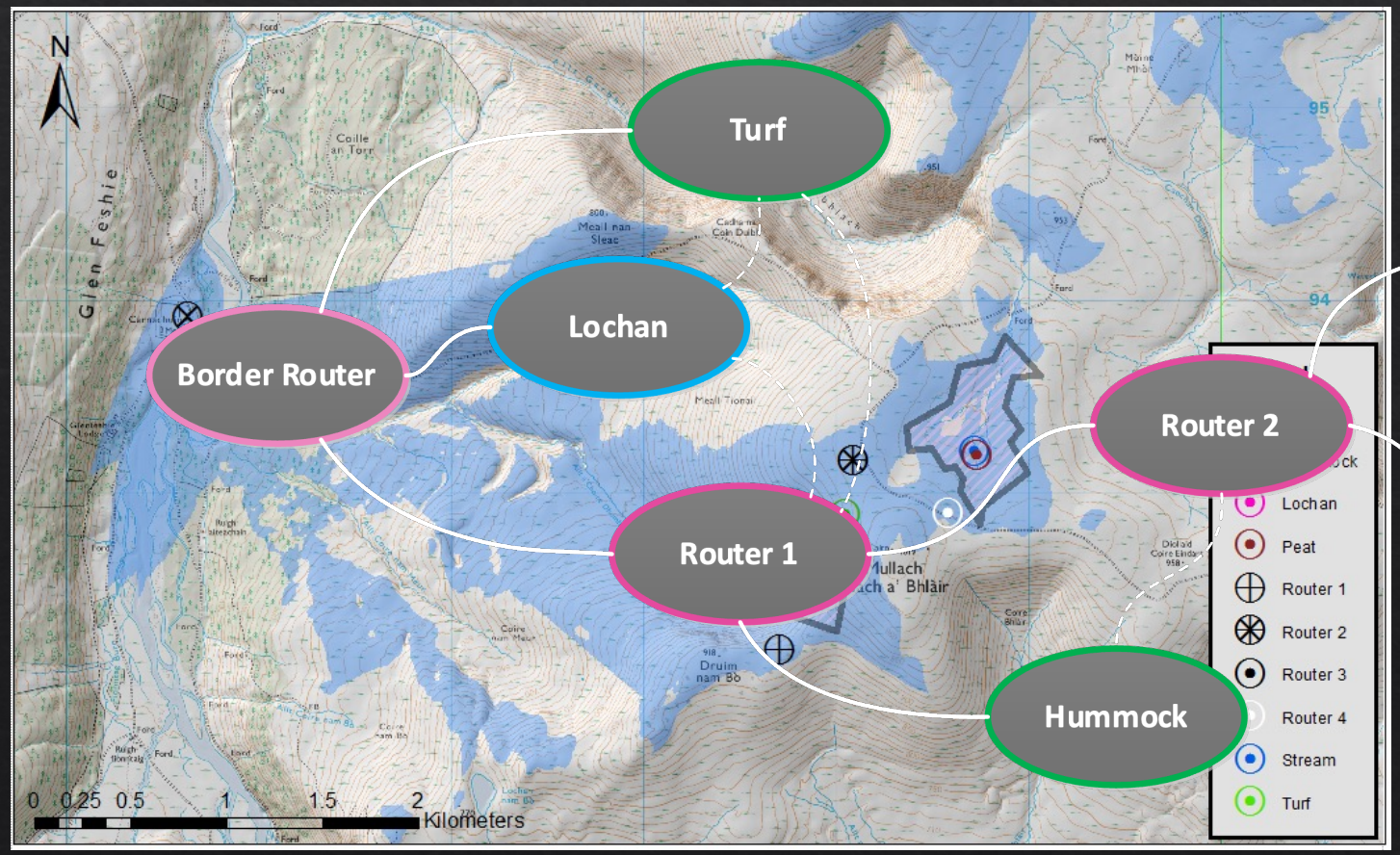
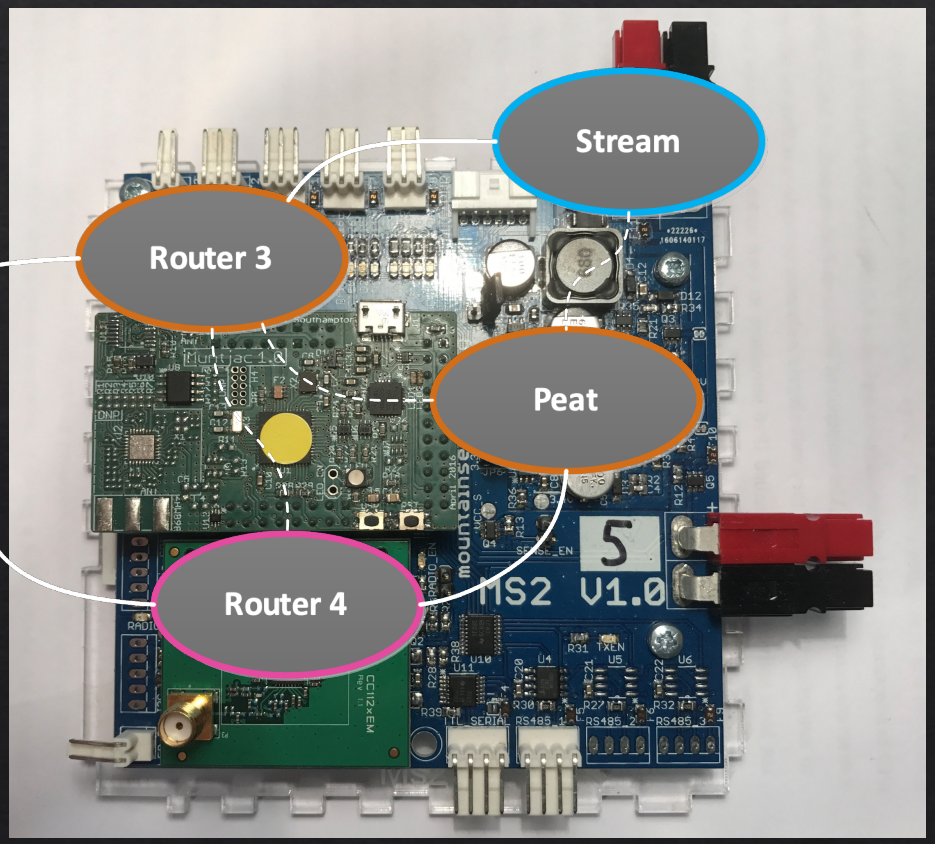
- We achieved 3km+ low-power IPv6 radio links…
- In a deployment ~5km across using microcontrollers and a mesh network





What is Matter?

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- A royalty-free, open-source protocol standard for IoT and smart home.

- Simplifies smart home setup, control and interoperation.
- Already integrated into Amazon Alexa, Apple Home, Google Home, and Samsung SmartThings
- Unifies compliant Wi-Fi, Bluetooth and low-power radio devices in one deployment.

Matter Stack

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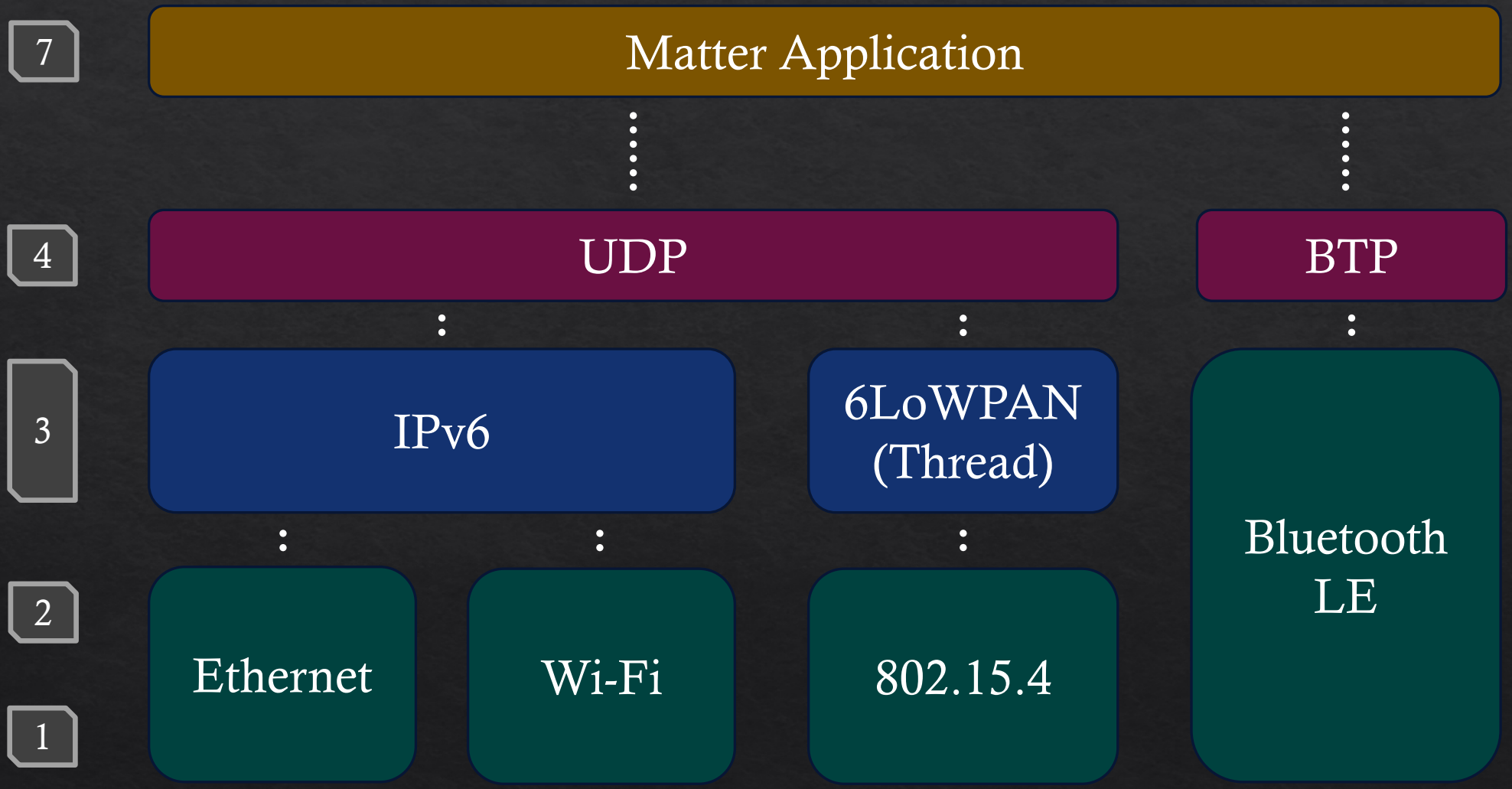

- Google have a Matter primer here: https://developers.home.google.com/matter/primer

Matter Devices

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- Are here!
  - Wi-Fi and Thread based devices are readily available for home automation
- "IPv6 network required"
- Already lots of user confusion

In April I presented a hot-take…

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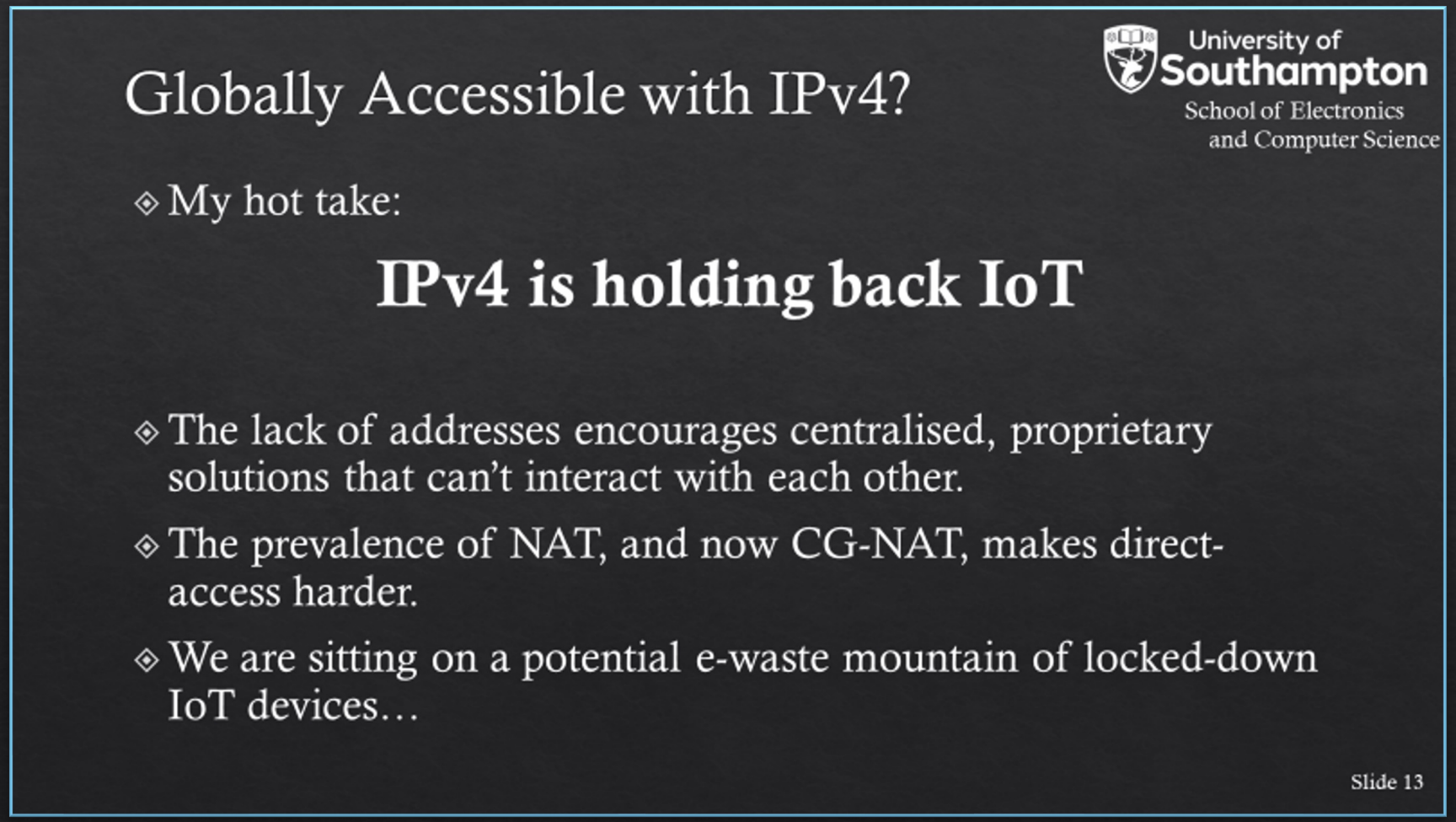

- I still stand by it BUT…
- With Matter being "the latest hot tech" with Apple, Google, Amazon, etc. behind it, IPv4 might be less of a roadblock

Matter: Just Another Standard?

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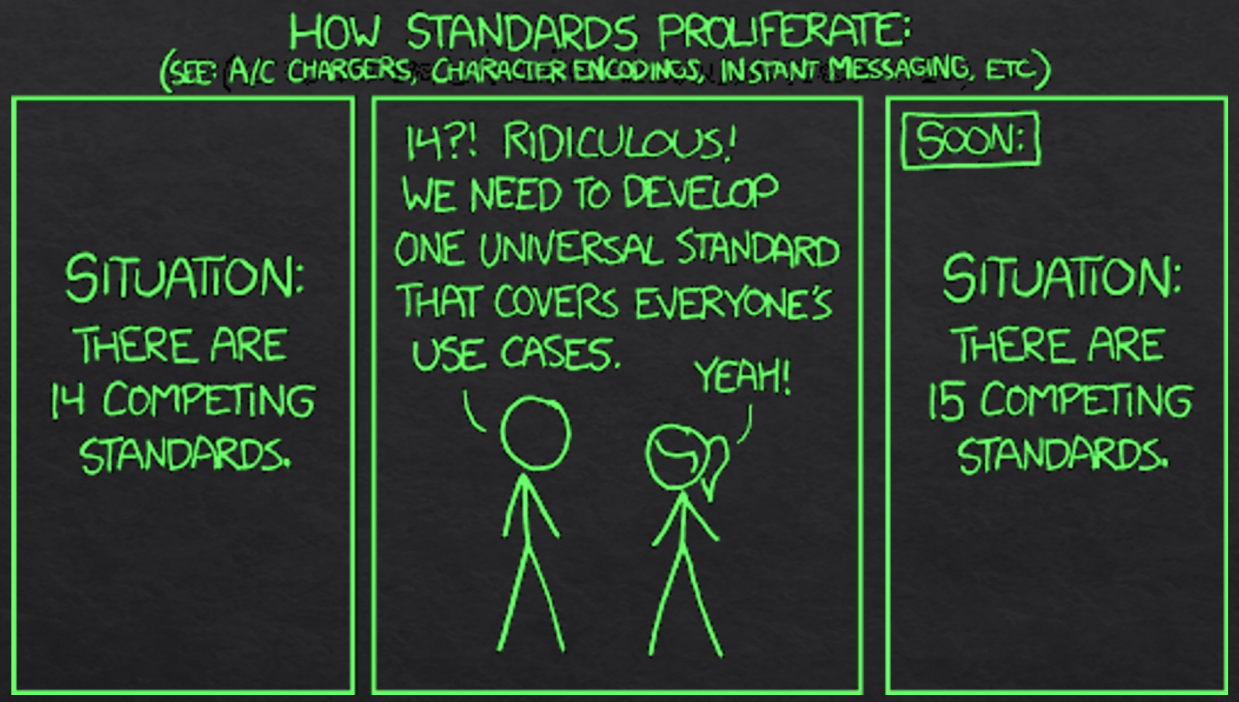

No:

- Matter is a unifying application layer standard that leverages existing communications standards
- Home automation is embracing Matter and saying it ***requires*** IPv6.
- "Disable IPv6" and lack of knowledge is causing real problems with consumer setups.

Fin

Questions?