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***MultiNet**: New approaches to home network configuration*

Anthony Brown

psxab@nottingham.ac.uk

University of Nottingham

Horizon Doctorial Training Centre

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Overview

- Domestic WiFi Networks
- WiFi in context
- Redesigning the Joining Process
- MultiNet Architecture
- MultiNet Evaluation
  - Performance
  - Usability
- Future Direction

Domestic WiFi Networks

Why are they different?

- Predominantly self-managed by residents who are not typically experts in networking
- Home networks tend to be relatively small in size
- All network elements readily accessible and located in the home
- Many devices: desktop PCs, games consoles, Smartphones, printers, digital cameras, televisions and media players
- Ad-hoc construction

Domestic WiFi Networks

Why are they important?

- Home networks are an important part of:
  - Smart home / home automation
  - smart-grid / home energy monitoring
  - Online entertainment
  - Ubiquitous Computing

- Without a configurable, maintainable and sustainable home network deployment a high barrier to adoption for new devices and services will exist

WiFi in context

My mother-in-law

VS

Redesigning the Pairing Process

Problems

- Untrained users
- Devices with constrained interfaces
- Many different interfaces
- Many methods of configuration

Solutions

- Reduce interaction complexity and increase feedback
- Remove the need for the user to configure the device
- Create a lightweight interaction that provides a consistent interaction across all devices

MultiNet: Approach

Constraints

- Clients must not require extra hardware
- We cannot change the client side code to maintain backwards compatibility

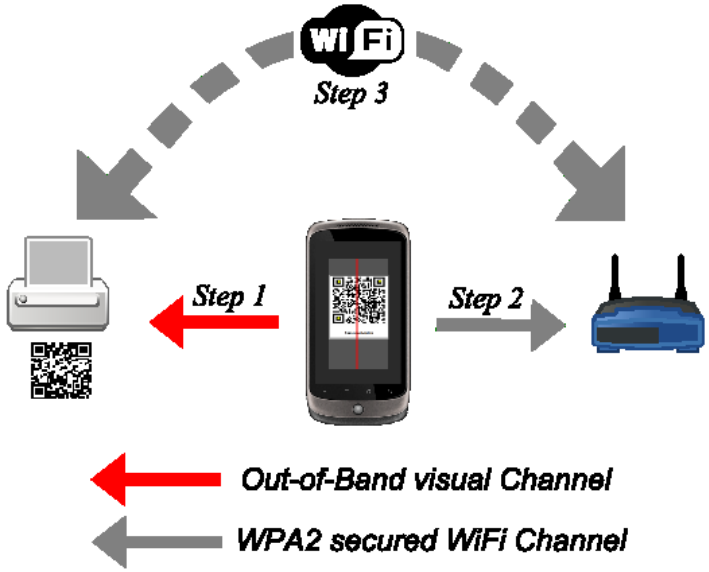
Assumptions

- Devices come with a preconfigured SSID/passphrase from the manufacture

Solution

- Configure the Access Point to the device
- Inverting the traditional method of configuring the device to the Access Point

MultiNet: Our solution



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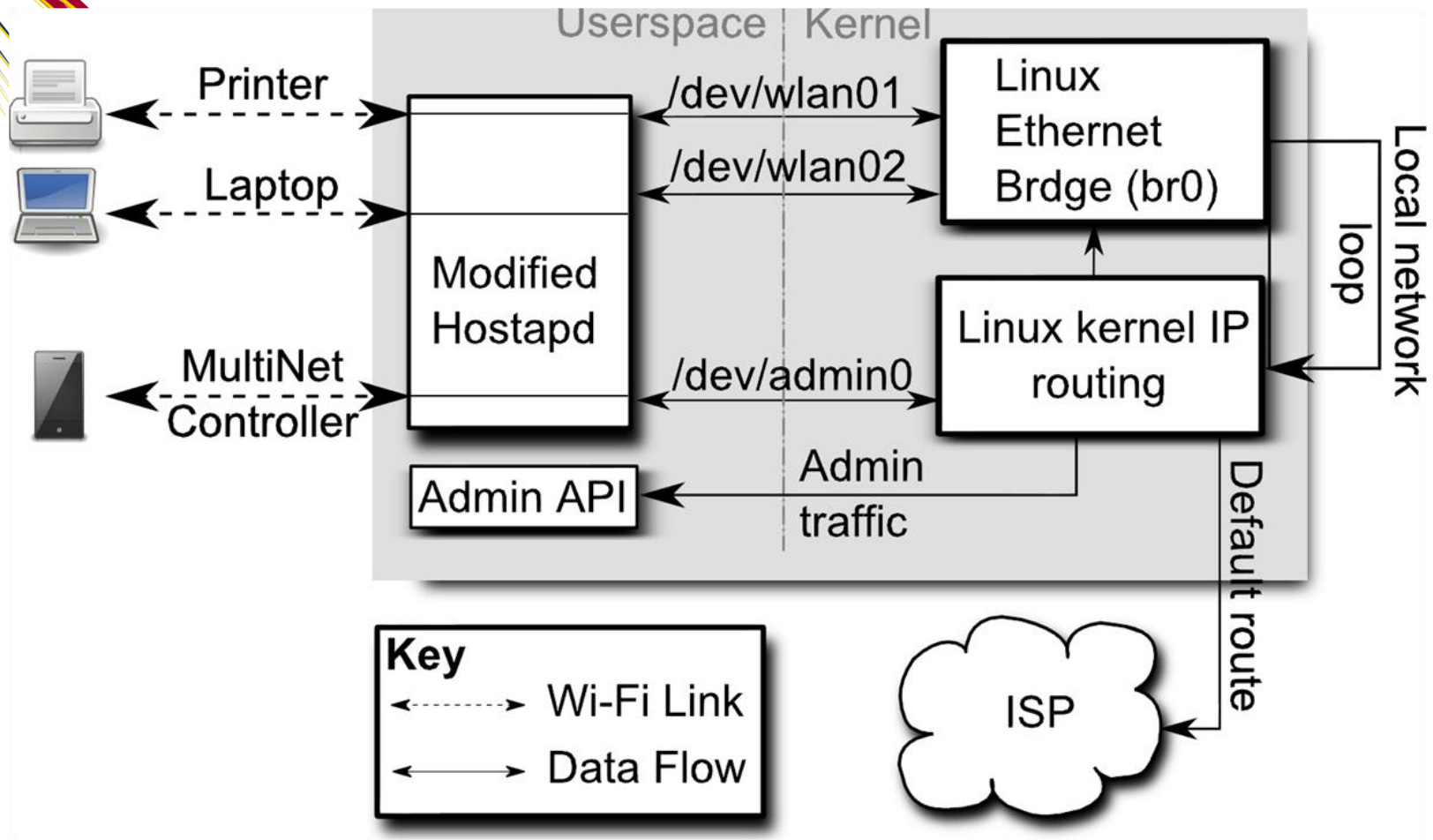
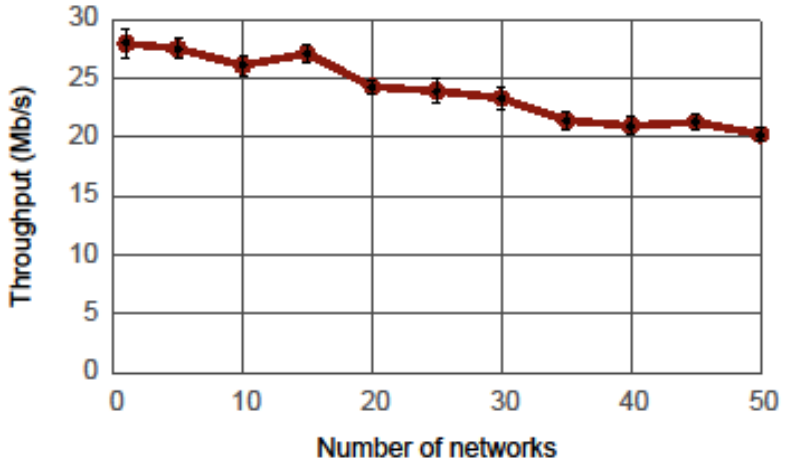
MultiNet: Architecture

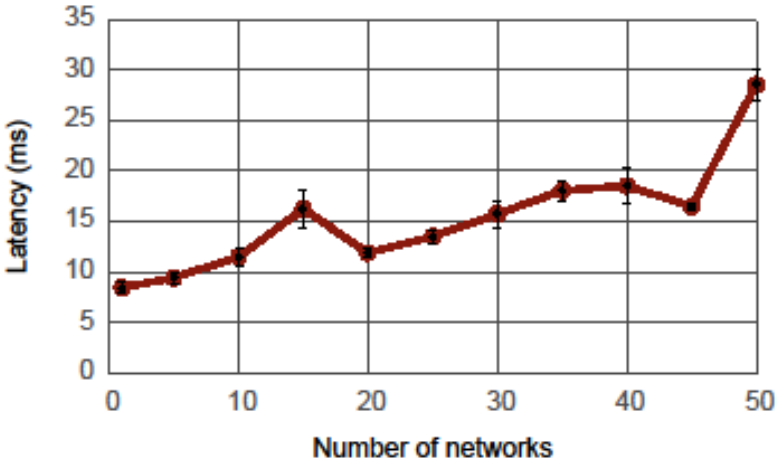


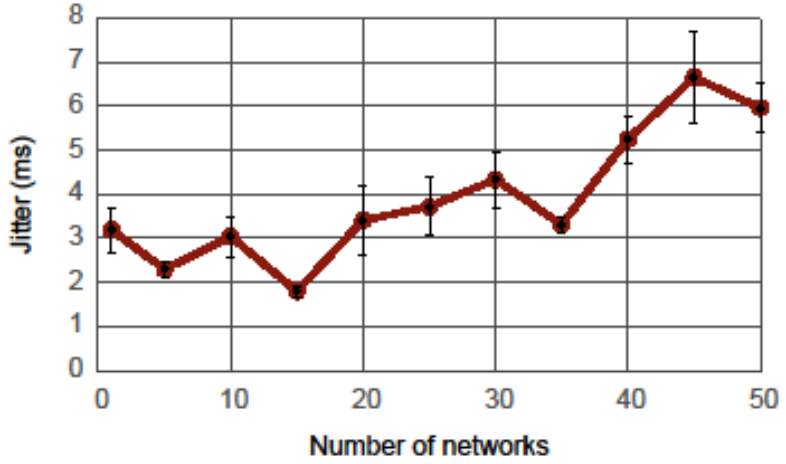
MultiNet: Performance

- Is MultiNet a viable solution?
- What are the performance implications of the changes?

MultiNet: Performance







MultiNet's use of multiple SSIDs does not impose a significant overhead for less than 20 networks.

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MultiNet: Usability

H_1: MultiNet has improved usability over WPS

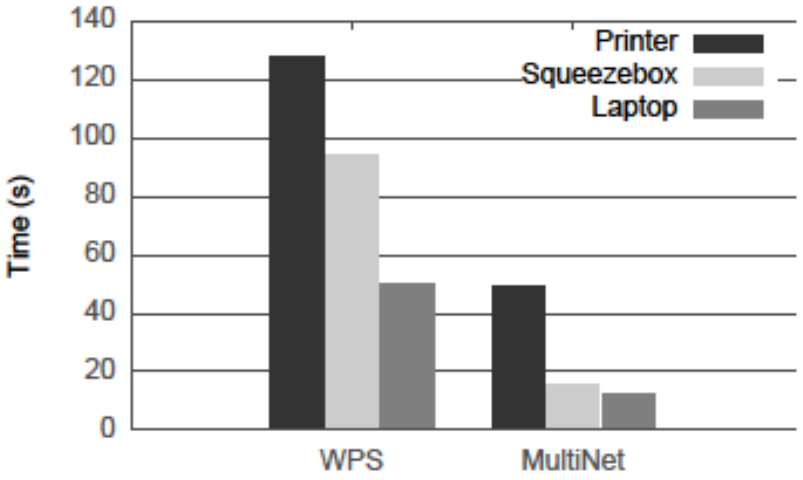
- Task completion time
- Instruction usage
- SUS scales

Study overview:

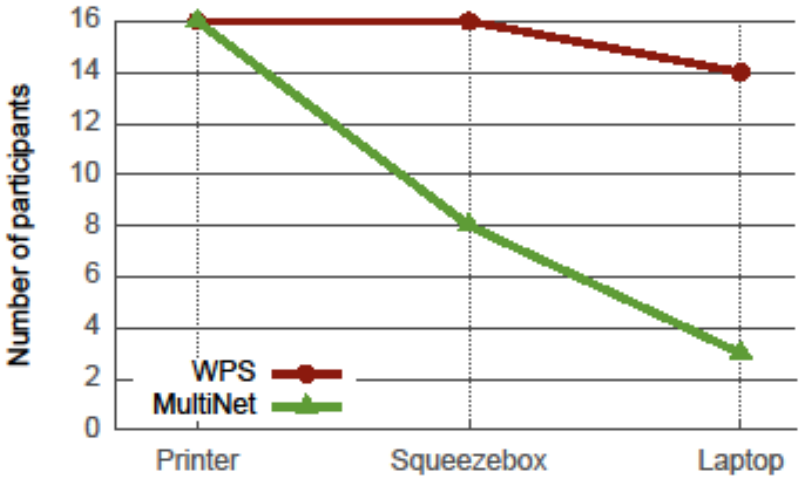
- N = 16 participants
- 1 task 2 conditions
- Lab environment
- Within subjects design

MultiNet: Usability

Configuration Time



Instruction Usage



H_1: MultiNet has improved usability over WPS ✓

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MultiNet: Conclusions

- MultiNet works, although more work is needed to understand it's impact and limitations
- A User centric approach to domestic networking problems produces more usable networks

Future Work

Exploring the capabilities of MultiNet

- Nomadic roaming using dynamically created WPA2 networks and remote authentication
- Slicing Home Networks using MultiNet
  - Per network layer 2 and 3 configuration
  - Per network QoS

Thanks for listening,
Any Questions?

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