IP-Over-USB Gateway

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Presentation Outline

- Motivation
- Specification
- Plan & Methodology
- Results
- Conclusion
- Recommendations
Motivation

- Network small devices where RJ-45 (Ethernet) jack is too big.
- Most gadgets will already have USB capabilities for data transfer.
- Prove that USB can be used to implement complex network configurations.
 Specification

**Gateway**
- NAT
- DHCP
- Auto-configuration at boot
- Support multiple clients simultaneously

**Client**
- Plug and play device recognition
- Minimal user intervention for configuration
Plans & Methodology

1. Network traffic over USB
2. Gateway software configuration
3. Automation
HARDWARE OVERVIEW

Legend:
- Green: Ethernet
- Red: USB, A connector
- Red: USB, B connector

CWRUNet

- Ethernet Adapter
- sasha

- USB Gadget Adapter
  - 10.1.1.0/24
  - bruno

- USB Gadget Adapter
  - 10.1.2.0/24
  - borat

- USB Gadget Adapter
  - 10.1.3.0/24
  - Bart's laptop

- USB Gadget Adapter
  - UNUSED

- USB Gadget Adapter
  - UNUSED

- USB Gadget Adapter
  - UNUSED
Results

Functionality

• Gateway is fully functional.
• Auto-configuration works correctly.
• Sacrificed features:
  – Gadget as a client.
  – MAC address collision.
Results

Performance

- USB 2.0 transfer speeds better than 100BaseT Ethernet.
- USB 2.0 latency similar to Ethernet on average.
- USB 1.1 performance was very poor.
- Results make sense based on rated speed of protocols.
Conclusion

- Project was a success.
- USB is a feasible networking medium.
- All necessary drivers ship with the Linux kernel, allowing for easy setup on Linux machines.
- Drivers are available for other OS’s.
- Based on a well documented standard.
Recommendations

- More tests needed to determine true performance of IP-over-USB.
- Create installation scripts to configure desktop as a gateway--total automation.
- Should test a USB gadget.
- Can be scaled down to an embedded device.