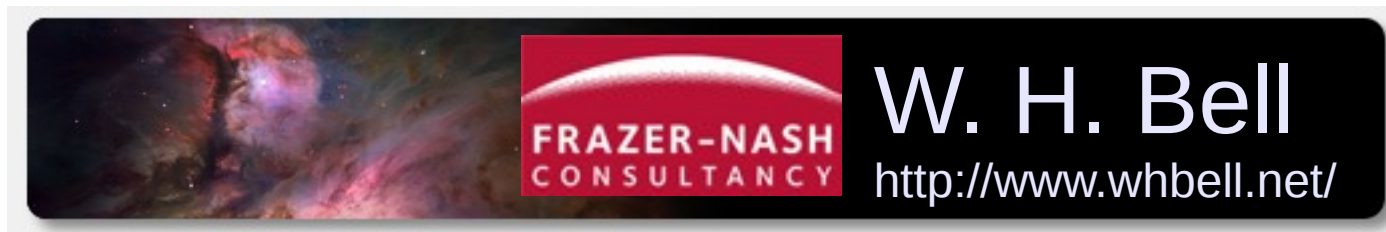


# Deploying the Raspberry Pi

Networking & security in schools



<http://www.fnc.co.uk>

Raspberry Pi Day  
University of Strathclyde  
12/12/2015

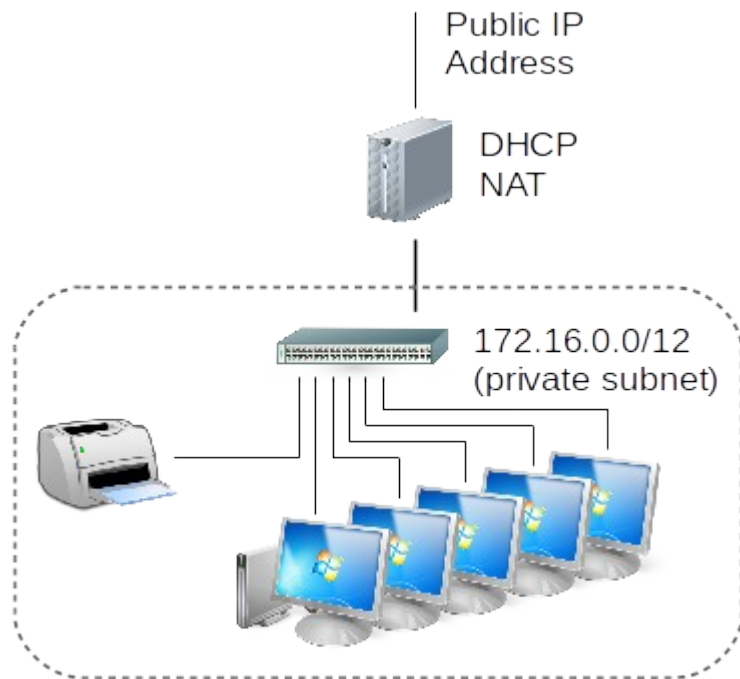
# Overview

- Security considerations
- Typical network layout
- Connecting Raspberry Pis to the network
- Managed Raspberry Pi clusters
- Unique Raspberry Pi projects
- Summary

# Security considerations

- Widely known default password for distributions.
  - Should be changed straight away, before connecting to a network.
- The default user has sudo access without a password
  - SPI, I2C and simple GPIO (in latest Raspbian) do not require sudo to work.
- The sshd daemon is enabled by default
  - This can easily be disabled if needed using raspi-config or standard Debian daemon managing scripts.
- Distributions are configured in this manner to let users get started quickly.

# Typical network layout



Badly configured Internet Explorer or use of USB keys can cause virus related damage.

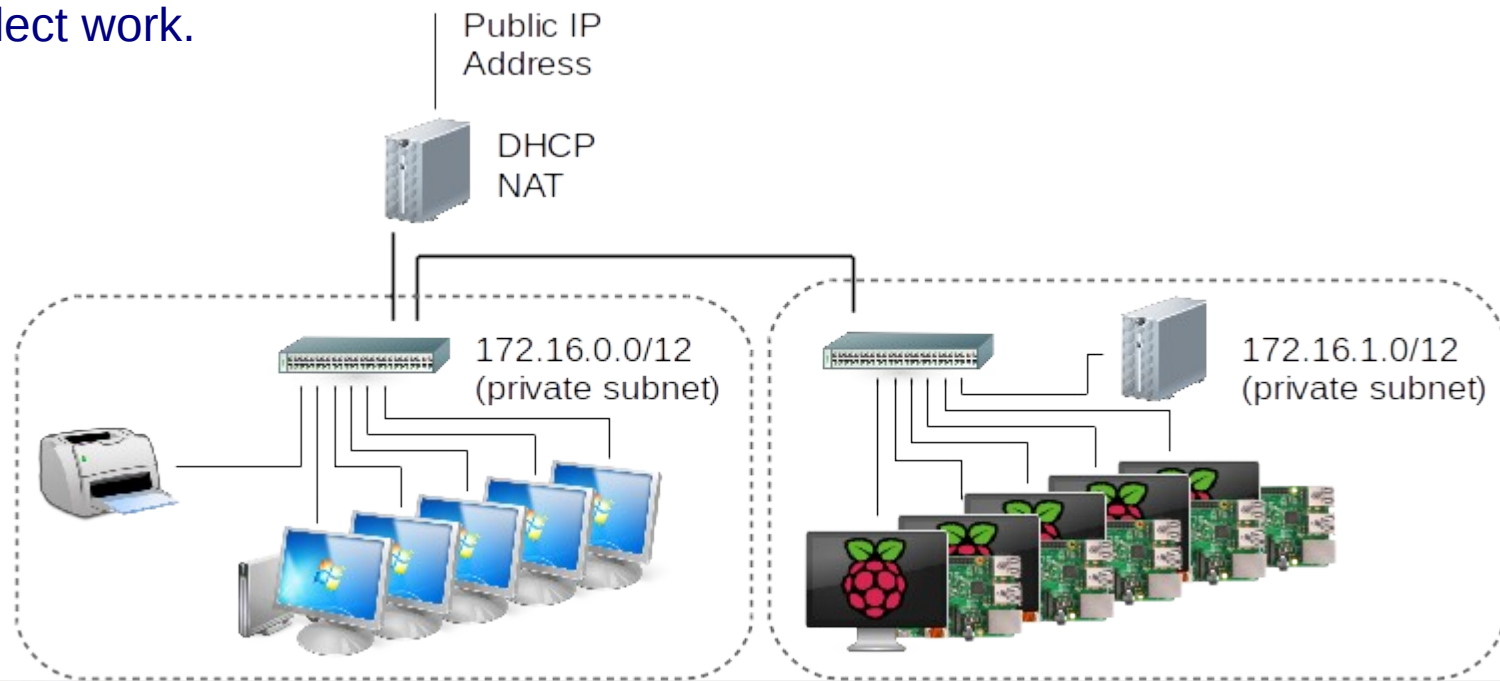
- Computers ask DHCP server for an IP address.
- DHCP server provides a private IP address.
- Private subnet is connected to public IP by network address translation (NAT).
- NAT router may include additional firewall.
- MS Windows PCs remotely managed and locked down.

# Connecting Raspberry Pis to network

- Download software updates
- Download educational resources from the foundation, github, or other sources.
- Collect work that is created or running on individual Raspberry Pis
  - This can be done with an SD card reader and a Bash script, but it is too slow to be practical for many Raspberry Pis.
- Some projects require a network to access them.
  - Weather stations, wildlife monitors, robots.
- With appropriate security measures, it should not be a problem to connect Raspberry Pis to the network
  - No viruses.
  - Worms are unlikely given regular updates.
  - USB memory keys and browsers do not pose security threats.

# With managed Raspberry Pis

- By default, Raspberry Pis ask the DHCP server for an address.
- The DHCP server can be configured to assign an address in a separate private network.
  - Could run on the same copper link, where the NAT might include some different firewall settings for the Raspberry Pis.
- Use Linux file server (NFS or NBD) with Raspberry Pis.
  - Provide updated operating system.
  - Collect work.



# PiNet

<http://pinet.org.uk/>

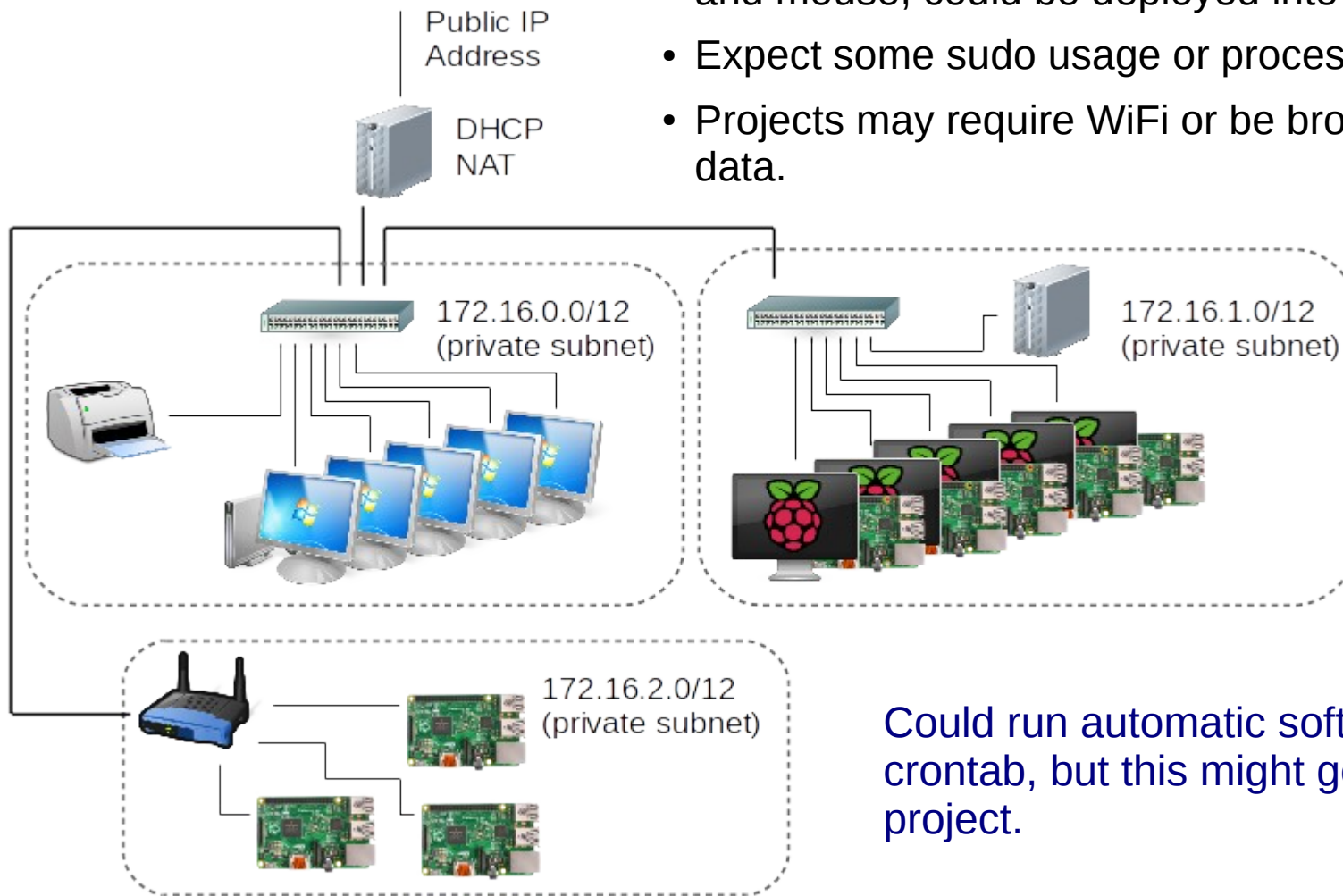


- PiNet is installed on an Ubuntu Linux server.
  - It downloads a copy of the Raspbian Linux operating system.
  - The SD cards contain a minimal image, using compressed NBD or NFS to get rest from Linux server.
- Provides central management of managed Raspberry Pi:
  - User accounts.
  - Software installations.
  - Configuration files.
- Linux server running PiNet could be configured to:
  - Run printer server (CUPS) for Raspberry Pi clients.
  - Run an automatic rsync of project work to a remote file system.

Standard  
Linux features

# With unique Raspberry Pi projects

- Unique projects that do not have an associated keyboard and mouse, could be deployed into third private subnet.
- Expect some sudo usage or processes running as root.
- Projects may require WiFi or be brought in to download data.



Could run automatic software updates using crontab, but this might get in the way of the project.



# Summary

- The Raspberry Pi platform provides an ideal tool to develop programming skills and unique project ideas.
- Connecting the Raspberry Pi to the network has many educational benefits.
- Security concerns can be mitigated by adapting the configuration of DHCP and NAT servers.
- Complete managed solutions can be deployed, where PiNet is an example of this.