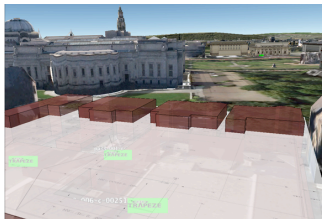


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## Network Management software at Cardiff University



Michael Jorgenson – Socket Architect & Developer  
Jay Perry – Socket Development & Documentation

Network Services Team  
Information Services  
Cardiff University

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## Contents

- Overview of Socket features
- Screenshots of Socket in action
- Statistics and KML
- Live Google Earth demonstration (fingers crossed...)
- Questions

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## What is Socket ?

Socket is a continuously-evolving in house development project used by almost every department in Cardiff University. Socket is used to generate DHCP & DNS configurations and apply configuration changes to the network infrastructure. Fundamentally, Socket is a PostgreSQL database, surrounded by Perl and PHP code. Socket provides IP Address management services, and is accessed via a web browser.

The key features are listed below:

- \*Database-driven network management system, combining network and computer information in a single database, with links to the Estates room database and LDAP authentication
- \*Facilitate migration from legacy campus-spanning VLANs to segmented, localised "L3" networks
- \*Improves usability and delegation of control to schools/departments
- \*DHCP & DNS configuration file generator.
- \*IP Address Reservation & Allocation.
- \*Delegated VLAN & Port config changes.
- \*Network infrastructure configuration tracking.
- \*Wired & Wireless (prototype) location awareness information.

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## How does Socket work ?

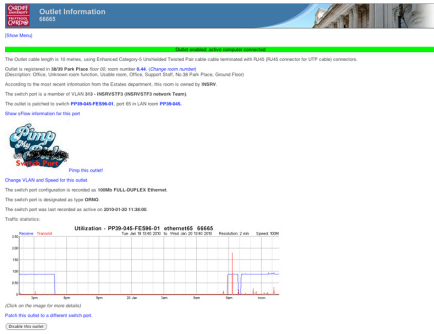
- Socket is built upon open-source software, based on Gentoo GNU/ Linux with PostgreSQL, PHP, Perl, Apache, Net-SNMP, Open-LDAP and GraphViz.
- Integration with Bradford Campus Manager - used at Cardiff University for NAC and computer registration for halls-of-residence networks.
- Integration with Statseeker for display of network interface statistics.
- Integration with InMon Traffic Sentinel for sFlow analysis of traffic.
- Interactive SVG network diagrams (needs Firefox, Safari or Opera browser).
- Visualisation of network information using Google Earth, via dynamically-generated KML.

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## Outlet information




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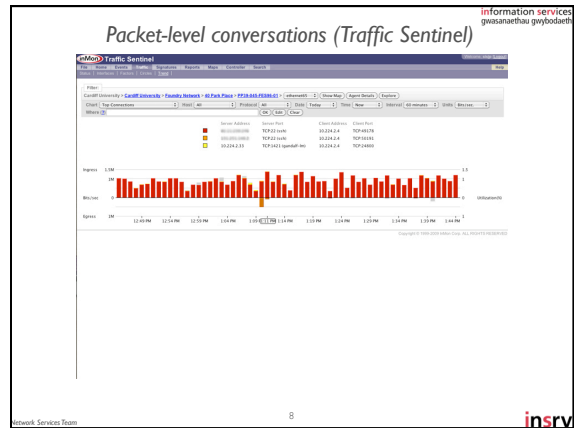
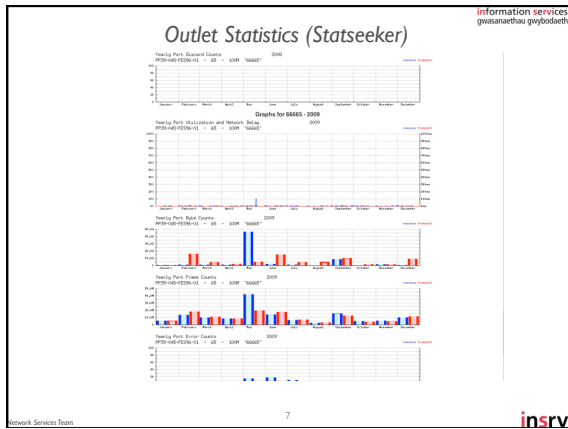
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## Outlet Statistics (Statseeker)



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### Computer registration information

This computer is registered as follows:

IP Address	DNS Name	MAC Address	Owner	Department	Function	Operating System	Outlet	Last used?
10.224.2.101	NB7Total	08:00:20:0A:00:00	Michael Jurgenson (INSRV)	Information Services	University Desktop	MAC OS X iMac	350000	Not recorded (Usage History)
10.224.2.102	NB7Total	08:00:20:0A:00:00	Michael Jurgenson (INSRV)	Information Services	University Desktop	MAC OS X iMac	350000	Not recorded (Usage History)
10.224.2.4	NB7Total	08:00:20:0A:00:00	Michael Jurgenson (INSRV)	Information Services	University Desktop	MAC OS X iMac	350000	2010-01-20
10.224.2.4	NB7Total	08:00:20:0A:00:00	Michael Jurgenson (INSRV)	Information Services	University Desktop	MAC OS X iMac	350000	2010-01-20

This computer has been used on the network recently, as shown below:

MAC Address	Outlet ID	Outlet last used date & time
08:00:20:0A:00:00	350000	2010-01-20 11:38:00
08:00:20:0A:00:00	350000	2010-01-20 13:11:00

This device has the following custom DHCP options defined:

IP Address (DHCP Option) Parameters  
10.224.2.4 DNS Servers (16.13.2.201, 16.14.255.3)

History of registration changes for this device:

Time & Date	Type of change	MAC Address	IP Address	DNS Name	Owner	Function	Outlet Number
2007-11-27 17:37:00	Register Copper Interface	08:00:20:0A:00:00	10.224.2.4	nb7total	Michael Jurgenson (INSRV)	University Desktop	350000
2008-01-03 13:42:00	Register IP Address	08:00:20:0A:00:00	10.224.2.4	nb7total	Michael Jurgenson (INSRV)	University Desktop	350000
2007-07-25 08:18:00	Register Copper Interface	08:00:20:0A:00:00	10.224.2.4	nb7total	Michael Jurgenson (INSRV)	University Desktop	350000

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### Detailed IP information

IP Address Information  
10.224.2.4

IP Address Range Information:  
Name: INSRVSTF3 - INSRVSTF3 network Team  
Network Address: 10.224.2.4  
Subnet: 10.224.2.0/24  
Broadcast: 10.224.2.255  
Netmask: 255.255.255.0 (check VLAN info below)  
Public or Private? This IP is not routed on the Internet - see RFC 1918 for more information.  
Network Info:  
- Core: 4040 Department INSRV - Default DNS Name suffix: insrv  
DNS Info:  
- Shared servers: 16.13.2.201, 16.14.255.3 - Authoritative servers: 16.13.2.201, 16.14.255.3 for zone of ca.ac.uk  
DHCP Info:  
- DHCP Enabled: DHCP configuration type: cardell  
- DHCP Info: Lease time (seconds): 30000 default, 45000 maximum  
- Dynamic DHCP mobility support: Disabled  
- PXE Booting: Enabled - Server: Fileserve /  
- Zeroconf booting: Enabled - Transaction Server: 16.240.77.2  
Directory services information:  
- Grouping Container: DefaultWorkstations, INSRV, MAN, CF, SLP Servers: 16.13.2.201, 16.14.255.3, 16.13.2.201, 16.14.255.3  
- NRPDC/FIA  
- HTTP Cache URL: http://www.insrv.ac.uk  
- ZeroConf Search Domain: insrv.ac.uk  
VLAN Information:  
VLAN 313  
INSRVSTF3 - INSRVSTF3 network Team

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### Detailed IP information

Mobile Information:  
This device is permitted to use the following VLANs:

VLAN ID	Name	Description
30	CU-MAN	Cardell University Academic Network
31	WIRELESS-STAFF	Staff-owned wireless devices
32	WIRELESS-STUDENT	Student-owned wireless devices
33	WIRELESS-GUEST	Guest Wireless users
313	INSRVSTF3	INSRVSTF3 network Team
3600	CU-UK-100-RESELAN-USER	100-RESELAN-USER VLAN 3600
3601	PP40-017-RESELAN-USER	PP40-017-RESELAN-USER VLAN 3601

Split DNS:  
This IP Address does not have a Split DNS registration. Proceed to Split DNS.

Custom DHCP Options:  
This IP Address has the following custom DHCP options defined:  
IP Address (DHCP Option) Parameters  
10.224.2.4 DNS Servers (16.13.2.201, 16.14.255.3)

ARP entries:  
This IP Address has been recorded as used on the following MAC Address(es):  
08:00:20:0A:00:00

This IP Address belongs to the following registration:

IP Address	DNS Name	MAC Address	Owner	Department	Function	Operating System	Outlet	Last used?
10.224.2.101	NB7Total	08:00:20:0A:00:00	Michael Jurgenson (INSRV)	Information Services	University Desktop	MAC OS X iMac	350000	Not recorded (Usage History)
10.224.2.102	NB7Total	08:00:20:0A:00:00	Michael Jurgenson (INSRV)	Information Services	University Desktop	MAC OS X iMac	350000	Not recorded (Usage History)

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### Customised report - Apple products

Summary of Apple Computer Registrations  
Cardell University - Network Management and Registration System

Choose dates for registration query:  
Start date: 2009-01-01 | Stop date: 2010-01-31 | (Clear filters)

Query to process for information between 2009-01-01 and 2010-01-31. Please wait or change dates and press Change button below...

Number of new Apple registrations for this time period:  

Mac OS X	841
Mac OS X iMac	38
iMac OS X	1486
Culture Campus	34
Health Campus	94
Other on UWCIM class-2	0
Other on UWCIM class-3	0
Other on UWCIM class-4	0
Other on UWCIM class-5	0
Other on UWCIM class-6	0
Other on UWCIM class-7	0
Other on UWCIM class-8	0
Other on UWCIM class-9	0
Other on UWCIM class-10	0
Other on UWCIM class-11	0
Other on UWCIM class-12	0
Other on UWCIM class-13	0
Other on UWCIM class-14	0
Other on UWCIM class-15	0
Other on UWCIM class-16	0
Other on UWCIM class-17	0
Other on UWCIM class-18	0
Other on UWCIM class-19	0
Other on UWCIM class-20	0
Other on UWCIM class-21	0
Other on UWCIM class-22	0
Other on UWCIM class-23	0
Other on UWCIM class-24	0
Other on UWCIM class-25	0
Other on UWCIM class-26	0
Other on UWCIM class-27	0
Other on UWCIM class-28	0
Other on UWCIM class-29	0
Other on UWCIM class-30	0
Other on UWCIM class-31	0
Other on UWCIM class-32	0
Other on UWCIM class-33	0
Other on UWCIM class-34	0
Other on UWCIM class-35	0
Other on UWCIM class-36	0
Other on UWCIM class-37	0
Other on UWCIM class-38	0
Other on UWCIM class-39	0
Other on UWCIM class-40	0
Other on UWCIM class-41	0
Other on UWCIM class-42	0
Other on UWCIM class-43	0
Other on UWCIM class-44	0
Other on UWCIM class-45	0
Other on UWCIM class-46	0
Other on UWCIM class-47	0
Other on UWCIM class-48	0
Other on UWCIM class-49	0
Other on UWCIM class-50	0

The information in this report is derived from the list of current registrations, and uses the network query to identify the network as being manufactured by Apple. This may include registrations for computers that are no longer used on the network, but are still registered. This data is subject only using Apple Vendor Codes for the first six bytes of the MAC Address.

Number of CURRENT registrations per department that have an Apple network card:

Department	CURRENT registrations Active between 2009-01-01 and 2010-01-31
ADMIN	2
INSRV	1

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### Department registrations

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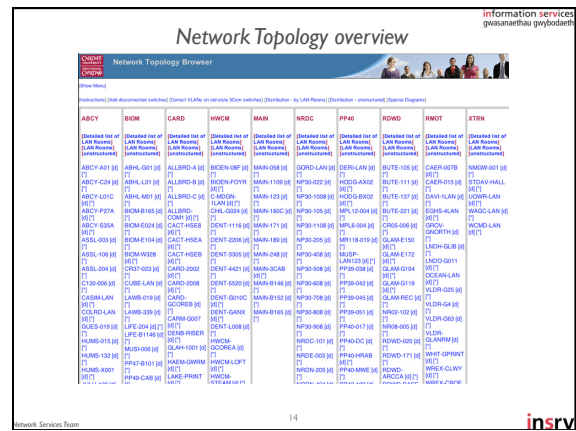
Show Department Registrations for BRASS

To export to a spreadsheet [Click Here](#)

IP Address	DNS Name	MAC Address	Owner	Department	Function	Operating System	Outlet	Last Updated
10.16.0.1 NBT504	10.16.0.1.nbt504	08:00:20:01:00:01	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT504	2010-01-18 11:08:00
10.16.0.1 NBT505	10.16.0.1.nbt505	08:00:20:01:00:02	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT505	2010-01-18 11:08:00
10.16.0.1 NBT506	10.16.0.1.nbt506	08:00:20:01:00:03	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT506	2010-01-18 11:08:00
10.16.0.1 NBT507	10.16.0.1.nbt507	08:00:20:01:00:04	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT507	2010-01-18 11:08:00
10.16.0.1 NBT508	10.16.0.1.nbt508	08:00:20:01:00:05	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT508	2010-01-18 11:08:00
10.16.0.1 NBT509	10.16.0.1.nbt509	08:00:20:01:00:06	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT509	2010-01-18 11:08:00
10.16.0.1 NBT510	10.16.0.1.nbt510	08:00:20:01:00:07	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT510	2010-01-18 11:08:00
10.16.0.1 NBT511	10.16.0.1.nbt511	08:00:20:01:00:08	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT511	2010-01-18 11:08:00
10.16.0.1 NBT512	10.16.0.1.nbt512	08:00:20:01:00:09	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT512	2010-01-18 11:08:00
10.16.0.1 NBT513	10.16.0.1.nbt513	08:00:20:01:00:0A	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT513	2010-01-18 11:08:00
10.16.0.1 NBT514	10.16.0.1.nbt514	08:00:20:01:00:0B	LAN Room (CARBS)	Centre for Business Relationships, Accountability, Sustainability and Society	University Laptop	Windows XP Professional	NBT514	2010-01-18 11:08:00

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### LAN Room information

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LAN Room Inventory  
PFA0-017

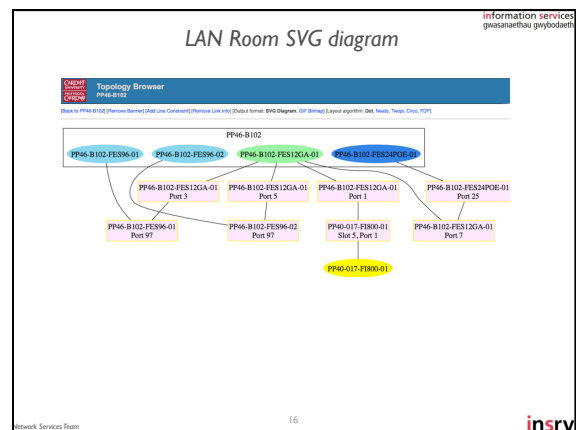
PFA0-017

The following switches are installed in the PFA0-017:

Switch Name	IP Address	Status	Temperature	Model Number	Base MAC Address	Category	Description	Inventory Serial
PFA0-017-PFA001	10.206.80.2	OK	45.0C	PFA001	00:10:00:00:00:00	LAN LAN Switch	Portion Test Switch	AN00210075
PFA0-017-PFA002	10.207.248.4	OK	45.0C	BR-RX-4	00:10:00:00:00:00	Core Switch	PFA0-RELAN Core	903A2E00DA
PFA0-017-PFA003	10.207.248.4	OK	45.0C	BR-RX-4	00:10:00:00:00:00	Core Switch	PFA0-RELAN Core	903A2E00DA
DRUS-001	10.207.248.4	OK	45.0C	CI16386A	00:04:00:14:64:30	Edge Switch	Security Team Switch	
MPP-440	10.207.248.4	OK	45.0C	CI1720A	00:0A:0A:49:20:00	Edge Switch	PFA0 Edge	
PFA0-017-MUSELM	10.207.248.4	OK	45.0C	CI16950	00:30:14:10:04:00	Distribution Switch	PFA0 Edge	
PFA0-017-FES014	10.207.248.4	OK	45.0C	FESX424	00:10:00:00:00:00	Distribution Switch	The Midlevel Zone	FL3805046
PFA0-017-FES015	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES016	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES017	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES018	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES019	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES020	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES021	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES022	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES023	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES024	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES025	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES026	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES027	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES028	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES029	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661
PFA0-017-FES030	10.207.248.4	OK	45.0C	FESX424	00:12:00:00:00:00	Distribution Switch	The Midlevel Zone	FM00070661

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- ### Statistics
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- Network statistics:
    - 94 10Gb ports
    - >8000 1Gb ports
    - >46k 10/100 ports
    - > 1000 switches
    - > 1000 wireless access points
    - ~ 27k active computers (both wired & wireless)
    - 288 LAN Rooms / network locations across 200 buildings
  - Socket statistics:
    - ~36MB network configuration and computer registration information database
    - 250MB bzip2-compressed MAC Address usage history (four years)
    - ~58k lines of PHP code, ~22k lines of Perl code (January 2010)
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### KML - linking Socket to Google Earth

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```

<?xml version="1.0" encoding="UTF-8"?>
<xml xmlns="http://earth.google.com/kml/2.1">
<Document>
<Style uri="#coreMAIN">
<LineStyle>
<width>1.5</width>
</LineStyle>
<PolyStyle>
<color>aa00ff</color>
<colorMode>normal</colorMode>
</PolyStyle>
</Style>
<Folder>
<name>Core Areas</name>
<visibility>1</visibility>
<open>0</open>
<Placemark>
<name>MAIN Area</name>
<visibility>1</visibility>
<open>0</open>
</Placemark>
</Folder>
</Document>
</xml>
    
```

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Google Earth Live Demo...

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Cardiff City - overview

Health Services City  
Cardiff University - Main Building  
Cardiff Millennium Stadium  
Cardiff Bay  
Cardiff School of Art & Design

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Main campus

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Duct Routes

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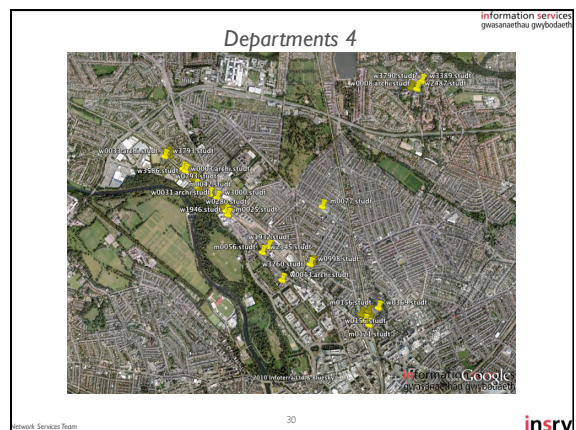
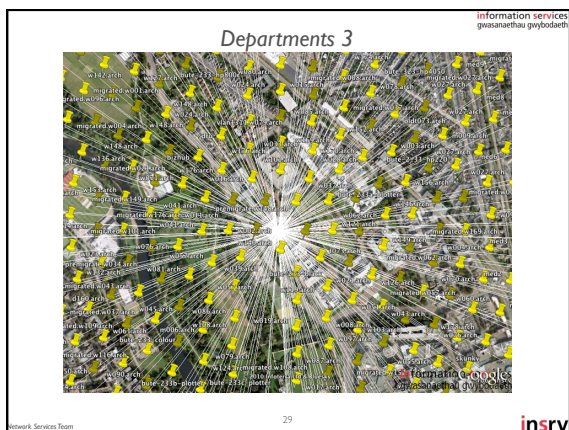
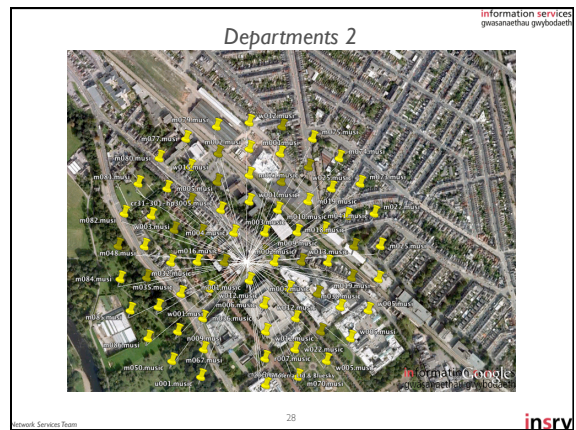
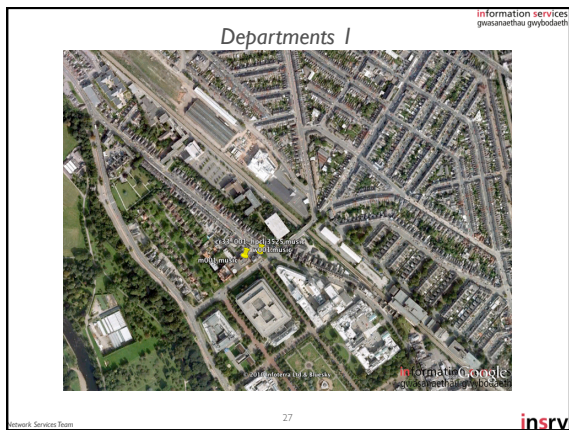
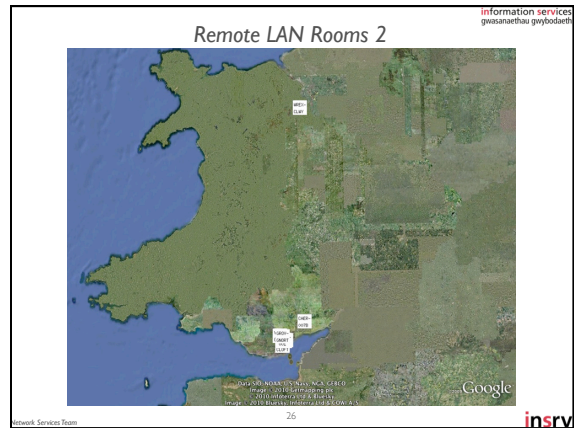
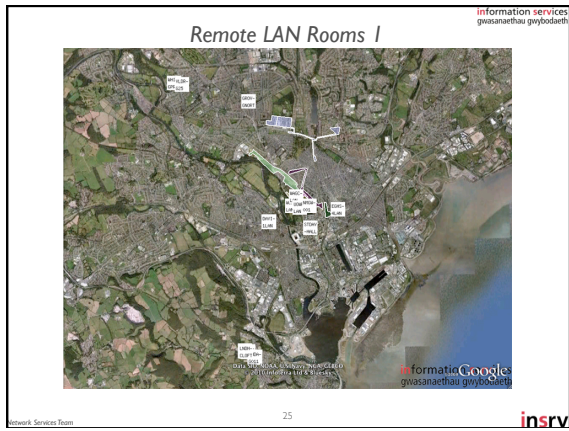
Core Network Areas

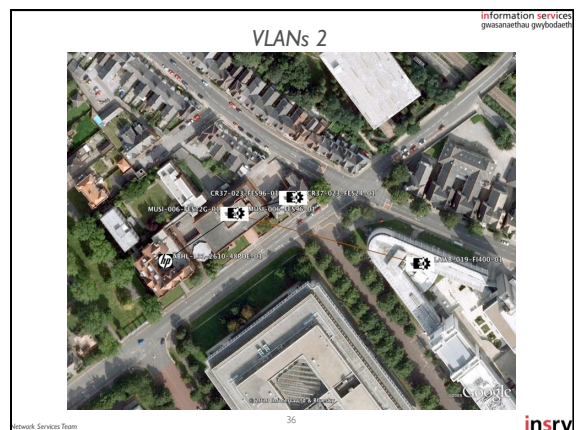
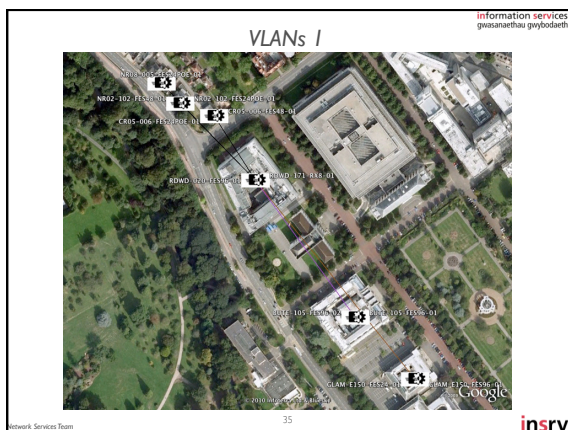
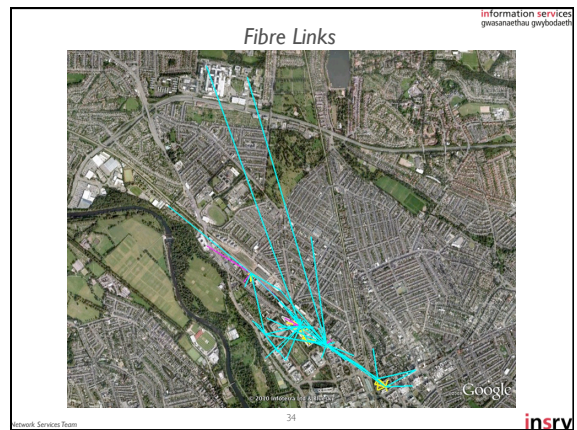
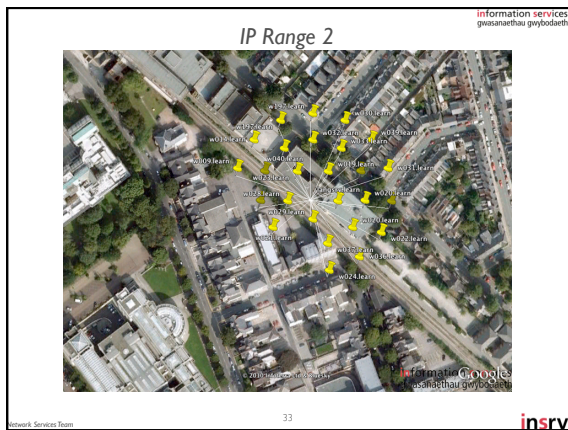
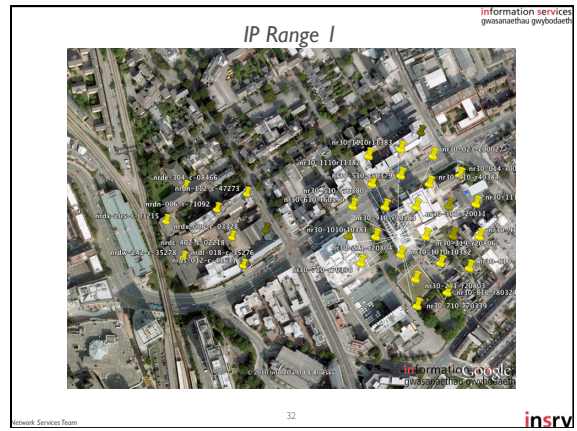
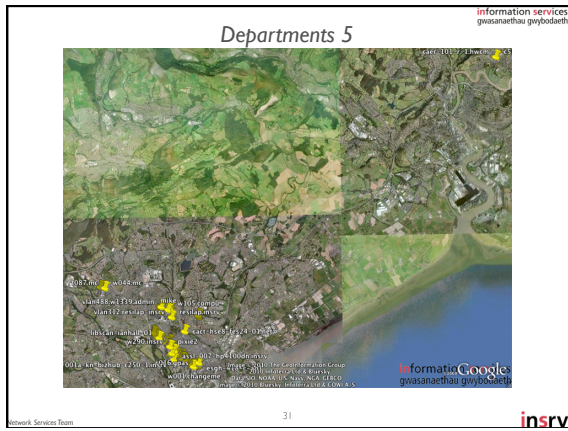
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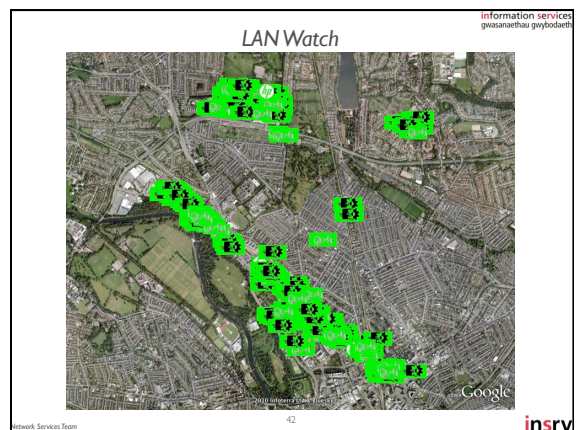
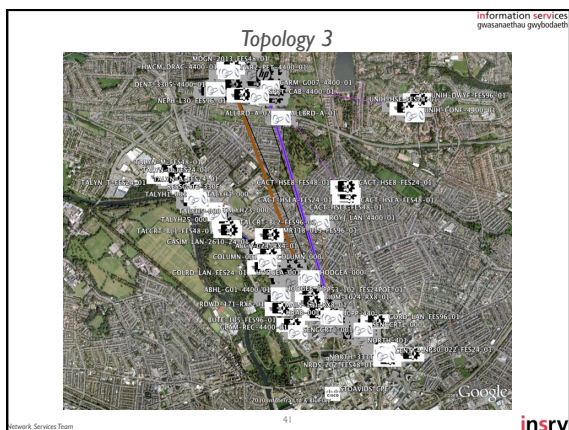
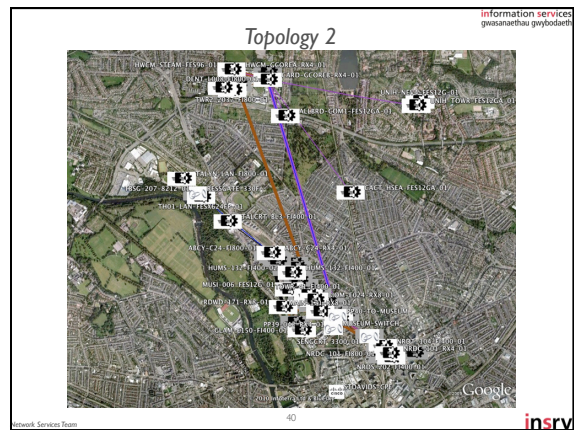
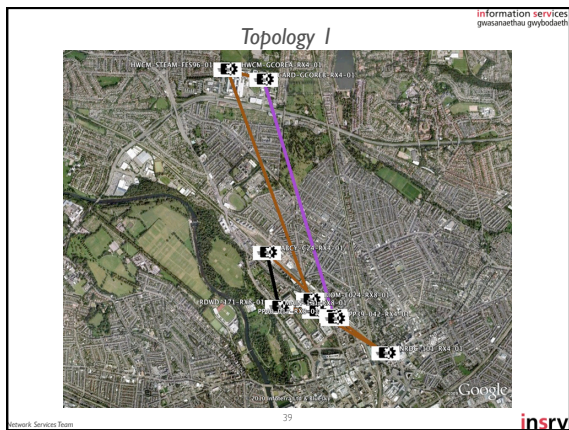
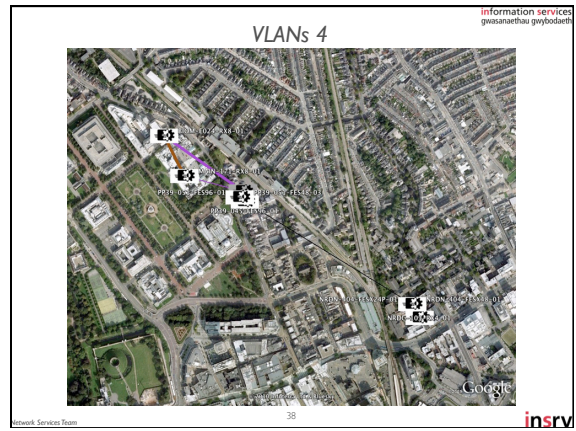
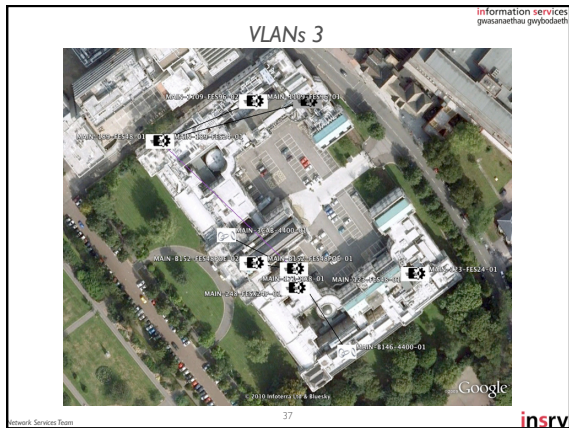
information services  
gwasanaethau gwybodaeth

Core + LAN Rooms

Network Services Team 24 insrv







### AP Watch

information services  
gwasanaethau gwybodaeth

insrv

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### Overlays 1

information services  
gwasanaethau gwybodaeth

insrv

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### Overlays 2

information services  
gwasanaethau gwybodaeth

insrv

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### Overlays 3

information services  
gwasanaethau gwybodaeth

insrv

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Outlet	Network or VLAN	Speed	Switch Name	Port	Computer
10004	1000000000	1000	PF02-01	10	10.10.10.1
10005	1000000000	1000	PF02-01	11	10.10.10.2
10006	1000000000	1000	PF02-01	12	10.10.10.3
10007	1000000000	1000	PF02-01	13	10.10.10.4
10008	1000000000	1000	PF02-01	14	10.10.10.5

### Mashup 1

information services  
gwasanaethau gwybodaeth

insrv

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### Mashup 2

information services  
gwasanaethau gwybodaeth

insrv

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