

# Do your bIT campaign

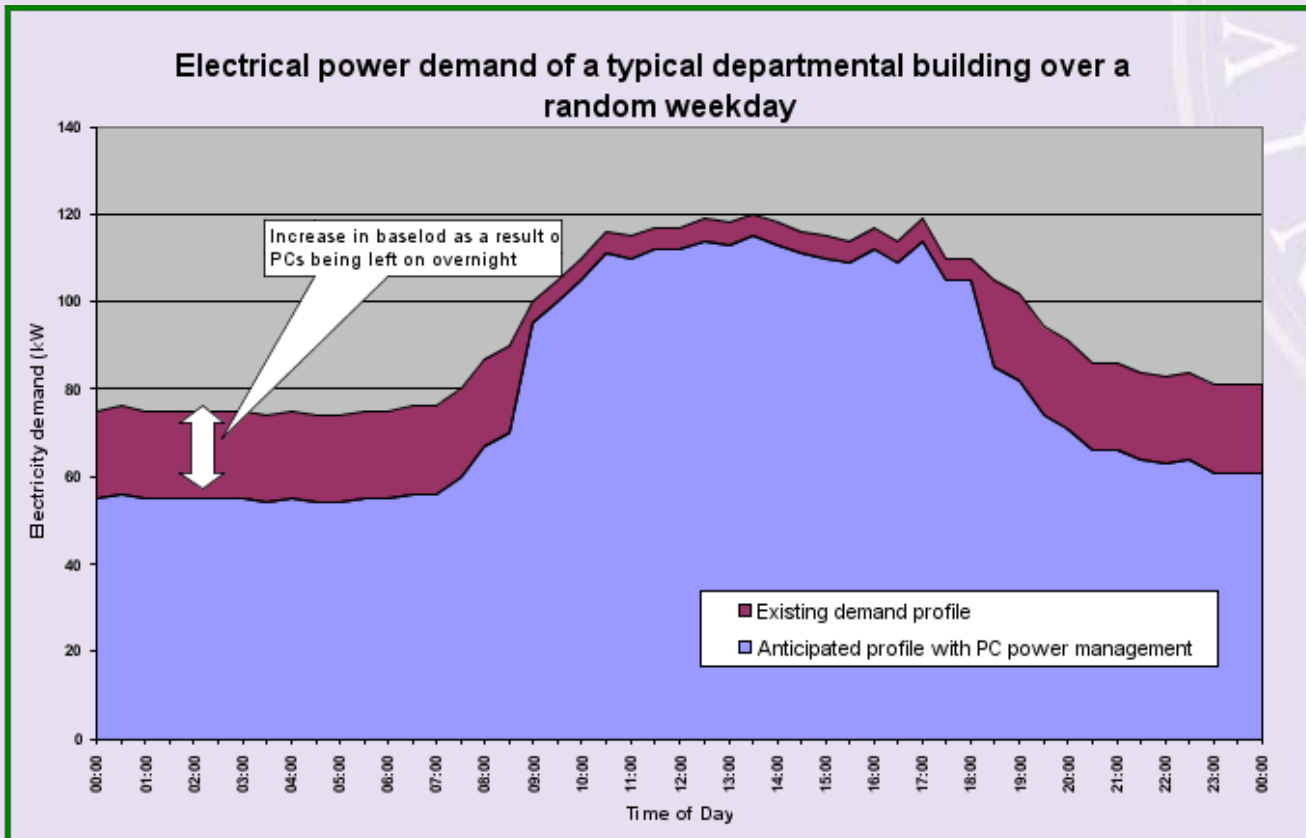
Adrian Parks  
Howard Noble  
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Project supported by:

Joint Information Systems Committee (JISC)  
Oxford University Estates Department  
Oxford Environmental Change Institute (ECI)  
Oxford e-Research Centre (OeRC)  
Oxford University Computing Services (OUCS)

# Desktop computers and energy consumption

Power (kW) x Time (hours) x Number of devices x Cost (£ per kWh)  
 $0.105 \times 8760 \times 16\,000 \times 0.12 = \text{£}1,766,000$   
 $0.105 \times 1808 \times 16\,000 \times 0.12 = \text{£ } 364,000$



# Five steps: Estimate

Scenario A: 100 computers (80W) and monitors (25W) left on all year will consume 92,000 kWh over the next year:

- 49,400 kg CO<sub>2</sub>eq.
- £11,000 (at 12p/kWh)

Scenario B: Same stock switched off at the end of each working day (over night, weekends and 25 days of holiday) will consume 19,800 kWh over the next year:

- 10,600 kg CO<sub>2</sub>eq.
- £2,400 (at 12p/kWh)

# Five steps: Research

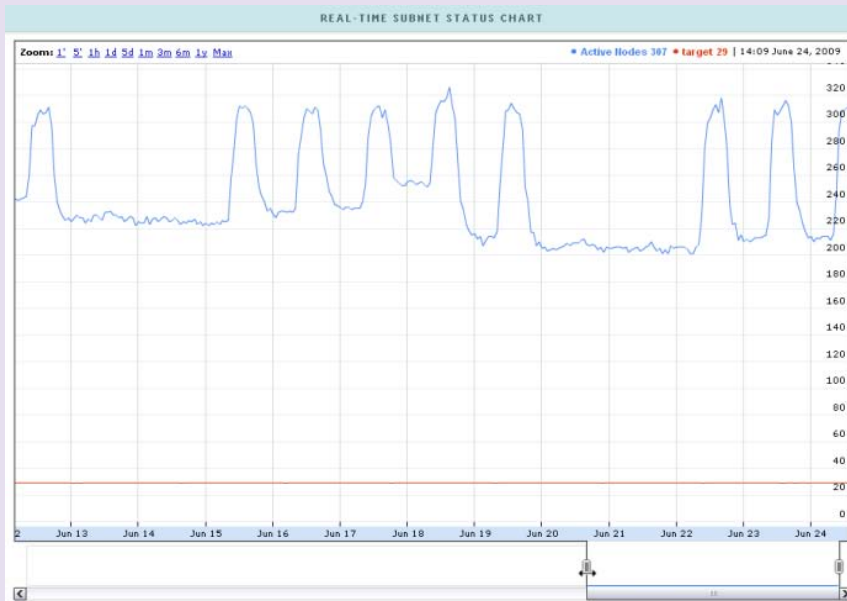
Energy Star has compiled a list of case studies (mostly for US organisations) and we have started to do the same at Oxford e.g. policy at OUCS:

<http://www.oucs.ox.ac.uk/greenit/oucs.xml>

# Five steps: Implement

Three distinct types of tool:

1. Monitor and report








2. Switch computers on remotely

3. Automatically power down computers safely and reliably

# Five steps: Communicate

1. The Carbon Reduction Commitment league table
2. IT-related energy costs
3. Staff morale:

23. How motivated are you to adopt new ways of working with ICTs to reduce the University's impact on the environment?

	Response Percent	Response Count
Very motivated 	31.6%	394
<b>Fairly motivated</b> 	<b>48.7%</b>	606
Neutral 	14.1%	175
Not motivated 	4.4%	55
Extremely unmotivated 	1.2%	15
<b>Please describe any areas of your work that you would or would not be prepared to change for 'environmental reasons'.</b>		205
	<i>answered question</i>	1245
	<i>skipped question</i>	119

It all comes down to protecting the brand of your group and the collegiate University as a whole

# Five steps: Share

Write your approach up so others can learn from your experience.

For more information about the 5 steps:

<http://www.oucs.ox.ac.uk/greenit/desktop.xml>

# Low Carbon ICT Services

- Monitoring Service
- Wake-on-LAN Service

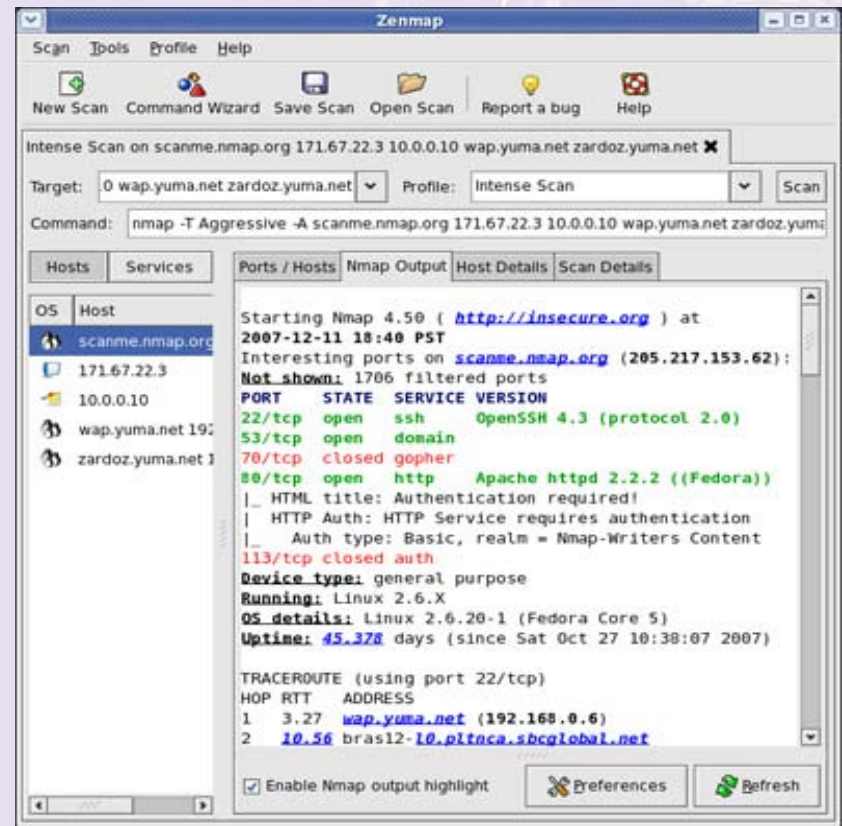




# Monitoring Service

Why bother?

- Nmap/Zenmap
- Net Scanner
- Tcpdump
- WireShark



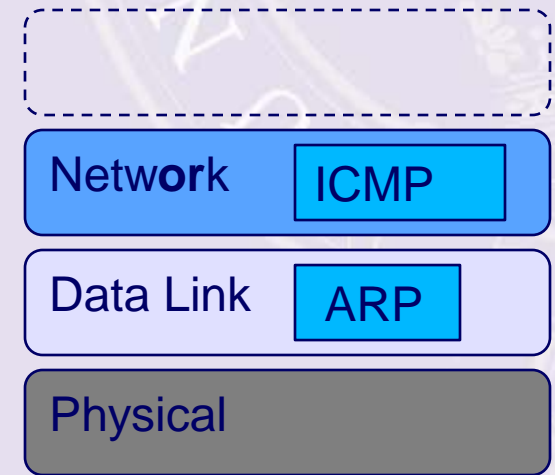
# Monitoring Service



Monitoring utility for everybody!

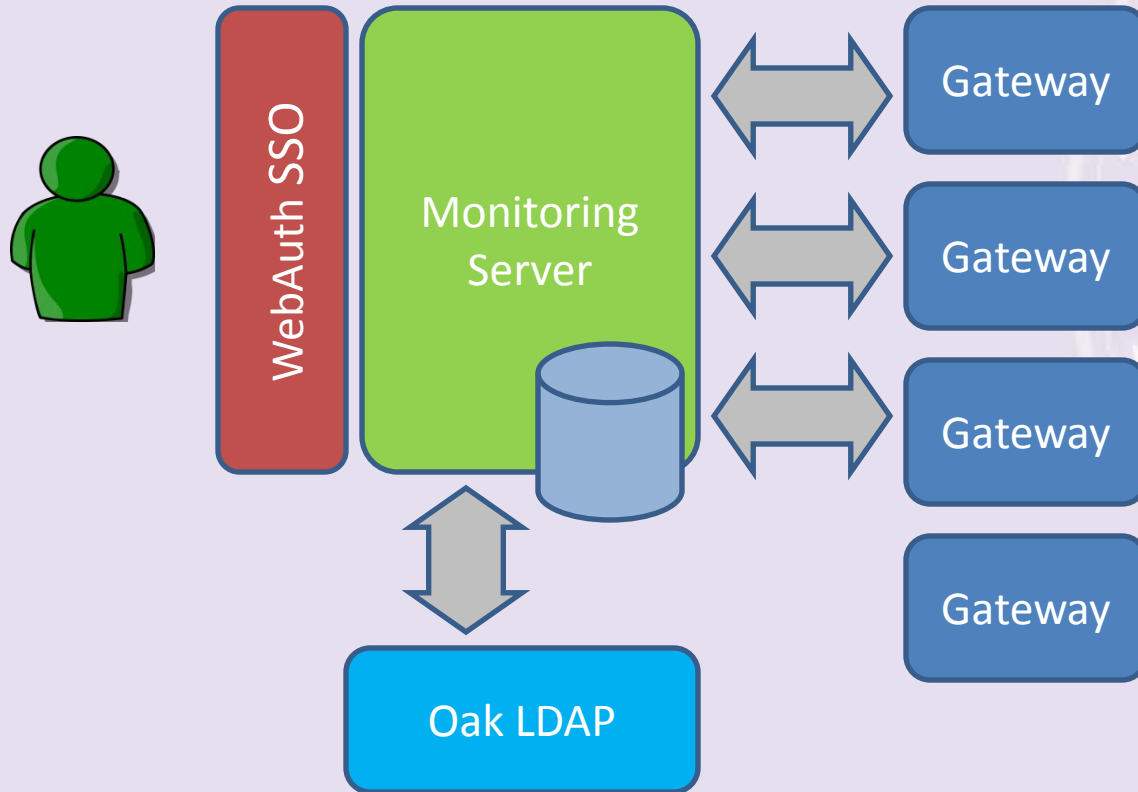
# Monitoring Service

- No installation
- SSO
- Attributes based AuthZ
- Central managed data
- Ping sweep vs. ARP scan

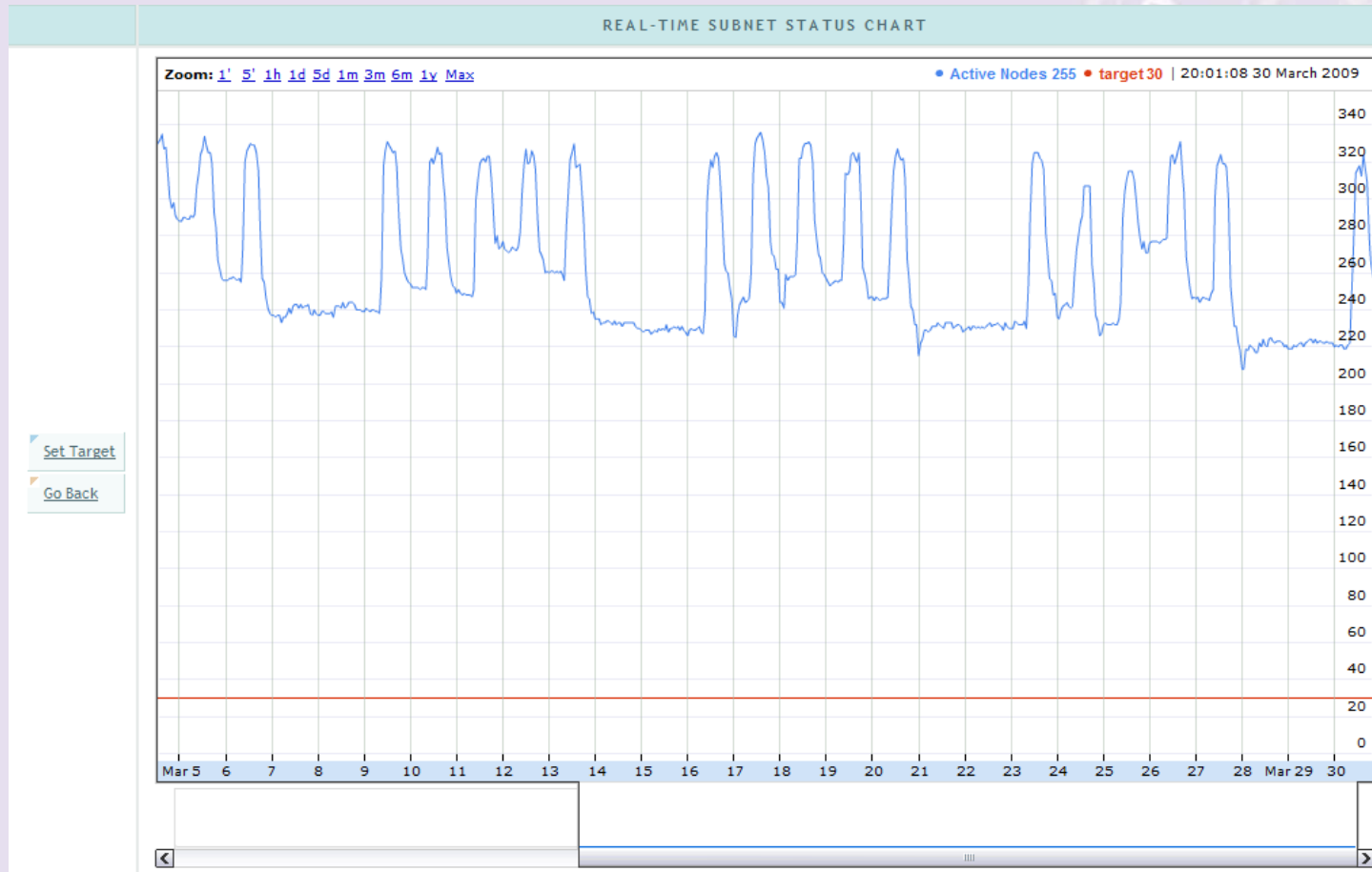


OSI Model

# Monitoring Service



# Monitoring Service



# Monitoring Service

Explore by category

- Desktop
- Server
- Virtual Machine
- Network device
- Other

MAC	TYPE
60:50:40:30:20:10	D
08:00:69:15:1b:d0	D
00:e0:d8:0c:82:73	D
00:e0:81:b2:d8:68	D
00:e0:81:58:17:fe	S
00:e0:81:54:ca:f8	D
00:e0:81:54:39:58	D
00:e0:81:4b:1c:86	N
00:e0:81:47:04:65	D

Management Console

What's the type for selected 3 nodes?

1.Desktop

2.Server

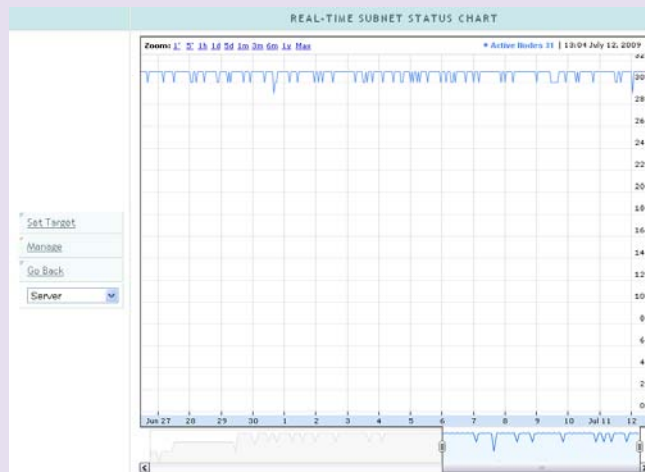
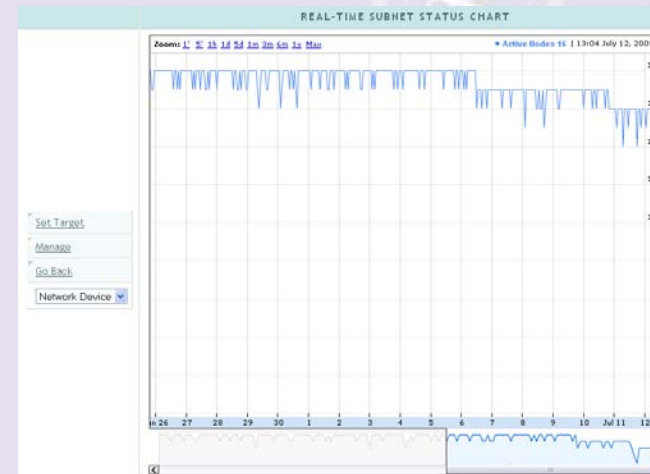
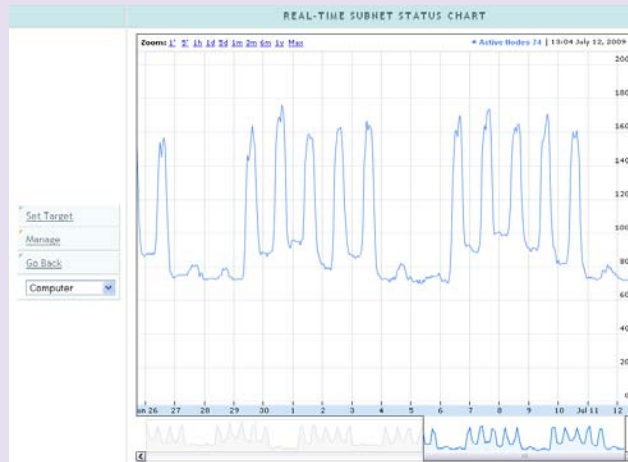
3.Virtual Machine

4.Network Equipment

5.Others

[Go back](#)

# Monitoring Service





# Monitoring Service

What do you need to join?

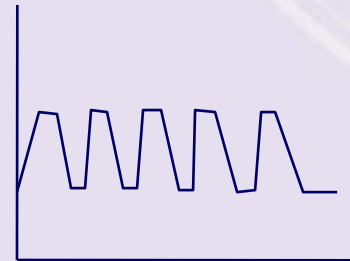
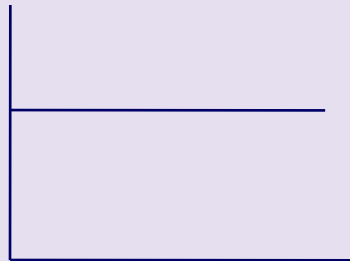
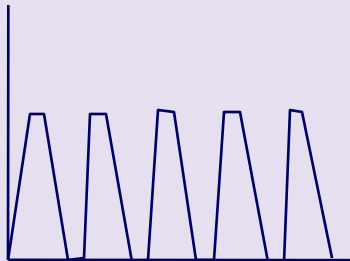
-Gateway server sitting in right place.



# Monitoring Service

Possible results from monitoring

- Everybody turns off their computer
- Nobody turns off their computer
- Somewhere between

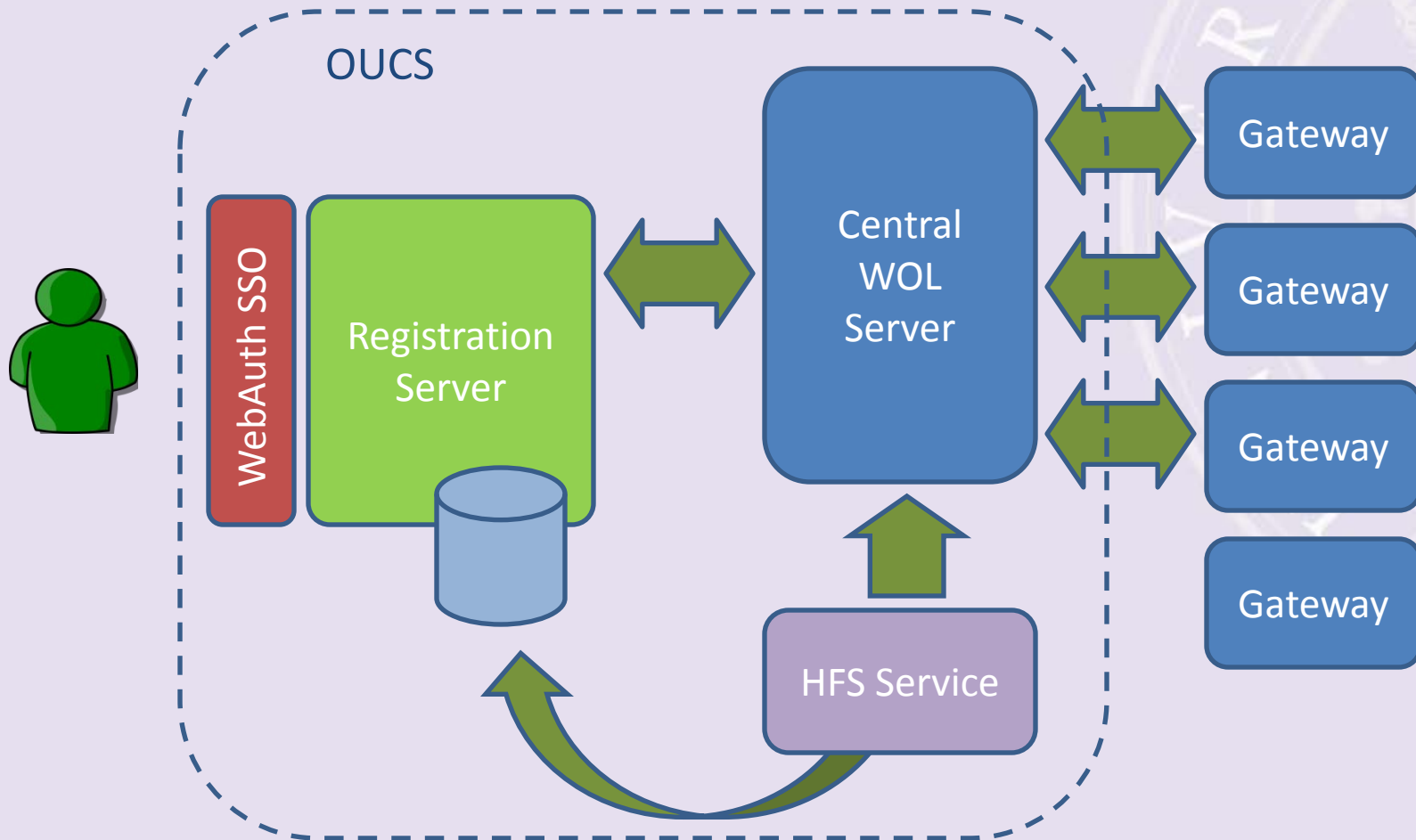


# Wake on LAN Service

- Wake on LAN
- Motivation
- One gateway, two services



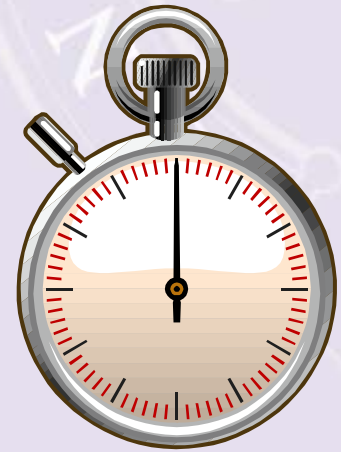
# Wake on LAN Service



# Wake on LAN Service

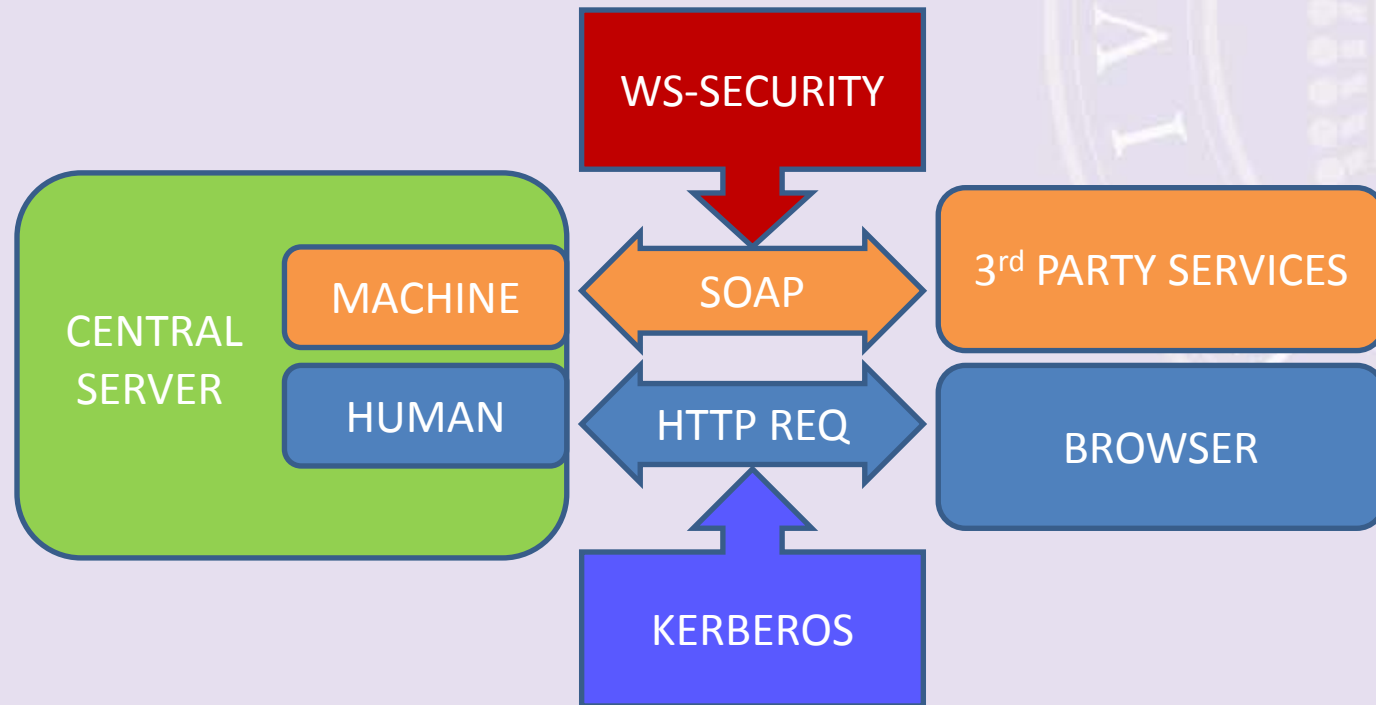
Who can turn on the computer?

- Registered owner
- Scheduled timer
- Third party services



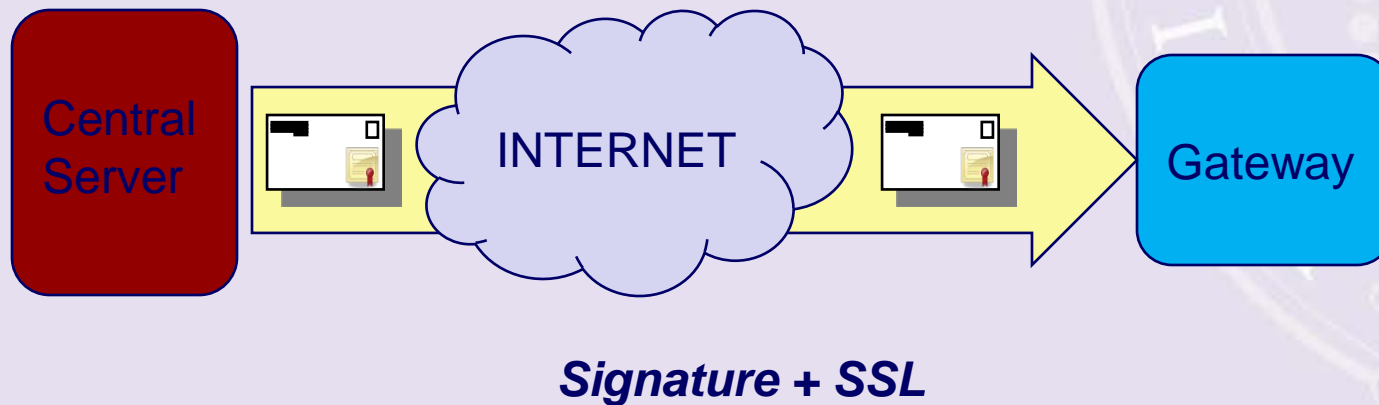
# Wake on LAN Service

## Central server interfaces



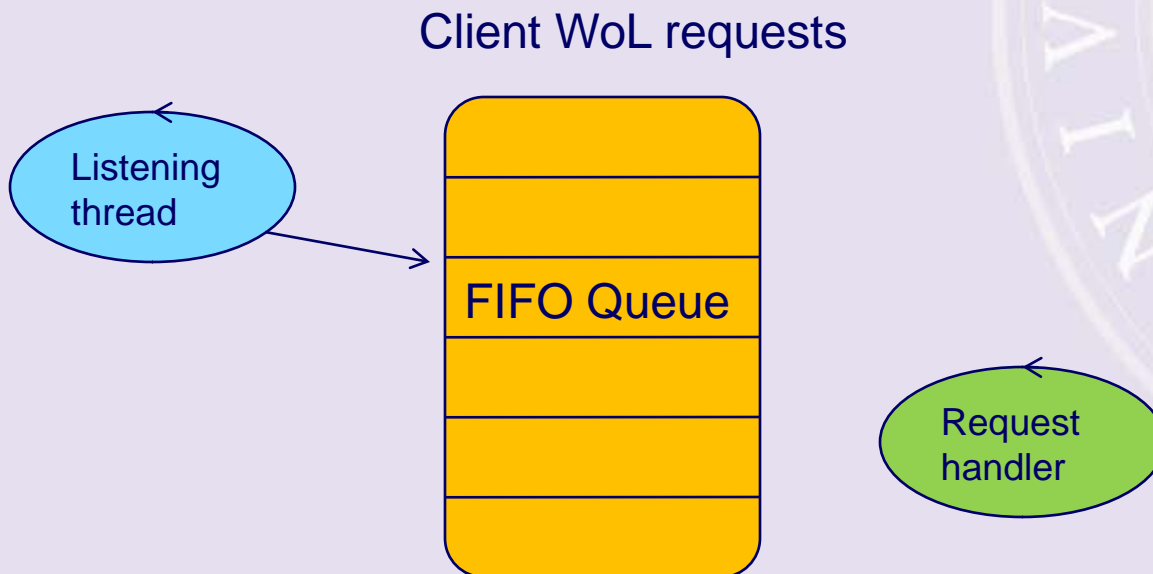
# Wake on LAN Service

## Secured communications



# Wake on LAN Service

## Queue on gateway



# Wake on LAN Service



Oxford University Computing Services

## Update or Wake up a Wake-on-LAN client

v3.61 09-Jul-2009  
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[>>tsm backup](#)  
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Logged in as:  
**Kang Tang**  
*(If you're not Kang  
Tang, click here)*  
Oxford  
username:  
ierc0003  
**Logout**

Please select the system that you want to wake up, update or delete. If you are not the owner of the selected system, you can wake it up, but not update or delete it.

If the system you are currently using is not registered for Wake-on-LAN, click the 'Register' button. If you want to register a different system, you must do so while logged in to that system.

MAC address	Identifier	TSM client name	Scheduled wakeup	Date registered	Owner
<input type="radio"/> 00:02:B3:AA:4E:E9	kangaroo.oerc	(none)	09:00 Mon-Fri	29-may-2009	Yes
<input type="radio"/> 00:18:8B:F7:61:1D	goose	(none)	Not set	03-nov-2008	Yes

[Wake Up](#) [Update](#) [Delete](#) [Register](#) [Cancel](#)

[Self-Registration Home Page](#) [Personal Wake-on-LAN](#) [ITSS Wake-on-LAN](#)



# Deploying a gateway server

- Apply for a GlobalSign certificate
- Decide upon platform
- Install gateway software
- Register gateway

# Deploying a gateway server

## 1. Apply for a gateway certificate

<https://wiki.oucs.ox.ac.uk/itss/CertificateService>

# Deploying a gateway server

## 2. Platform considerations

- Physical or virtual?
- Windows or Linux?



# Deploying a gateway server



1.6GHz Atom CPU  
1 GB RAM  
80 GB SATA-2 HDD  
Gigabit LAN interface and USB 2.0 ports



1.2GHz Marvell Sheeva CPU  
512 MB RAM  
512 MB flash memory  
Gigabit LAN interface and USB 2.0 port.

# Deploying a gateway server

## 3. Install gateway software

Step by step instructions at:

<http://www.oucs.ox.ac.uk/wol/>



# Deploying a gateway server

## 4. Register gateway

Email [greenit@oucs.ox.ac.uk](mailto:greenit@oucs.ox.ac.uk) with:

- Main contact email address for your IT group
- Preferred name of gateway e.g. oucs-offices
- IP address of the gateway server
- Netmask of the subnet where gateway is installed

# Troubleshooting

- Tomcat working?

Check Tomcat log (catalina.log)

- Gateway services up?

Check <https://server.unit.ox.ac.uk:8443/cwolf-gateway/services>

- Packet getting to the workstation?

Check firewall logs, run tcpdump/Wireshark on the workstation

- Enable BIOS and network card for wake on LAN

Otherwise, send an email to [greenit@oucs.ox.ac.uk](mailto:greenit@oucs.ox.ac.uk)

# Troubleshooting

Power State		WoL
G0/S0		-
G1	S1	-
	S2	-
	S3	Yes/No
	S4	Yes
G2/S5		Yes
G3		No





Filter: Expression... Clear Apply

No. .	Time	Source	Destination	Protocol	Info
29	2.208603	HewlettP_de:4f:a0	Broadcast	ARP	who has 129.67.102.15? Tell 129.67.101.202
30	2.913289	Hewlett-_b5:99:73	Broadcast	ARP	who has 129.67.100.2? Tell 129.67.100.179
31	2.940918	HewlettP_26:24:20	Broadcast	ARP	who has 129.67.100.2? Tell 129.67.101.76
32	2.967628	HewlettP_71:f5:e2	Broadcast	ARP	who has 129.67.100.2? Tell 129.67.101.155
33	3.025097	HewlettP_e5:29:f6	Broadcast	ARP	who has 129.67.100.2? Tell 129.67.101.81
34	3.042513	HewlettP_de:4f:a0	Broadcast	ARP	who has 129.67.100.2? Tell 129.67.101.202
35	3.091771	129.67.101.197	255.255.255.255	WOL	MagicPacket for Intel_d9:6b:ae (00:0e:0c:d9:6b:ae)
36	3.091870	129.67.101.197	255.255.255.255	WOL	MagicPacket for Intel_d9:6b:ae (00:0e:0c:d9:6b:ae)
37	3.091964	129.67.101.197	255.255.255.255	WOL	MagicPacket for Intel_d9:6b:ae (00:0e:0c:d9:6b:ae)
38	3.104609	163.1.2.25	129.67.102.69	TLSv1	Application Data, Application Data,
39	3.104733	163.1.2.25	129.67.102.69	TCP	[TCP segment of a reassembled PDU]
40	3.104758	129.67.102.69	163.1.2.25	TCP	62054 > https [ACK] Seq=1094 Ack=2921 win=64240 [TCP CHECKSUM INCORRECT] Len=0
41	3.105846	163.1.2.25	129.67.102.69	TLSv1	Application Data
42	3.108848	163.1.2.25	129.67.102.69	TLSv1	Application Data
43	3.108866	129.67.102.69	163.1.2.25	TCP	62054 > https [ACK] Seq=1094 Ack=4042 win=63119 [TCP CHECKSUM INCORRECT] Len=0
44	3.164039	Cisco_ba:82:87	Spanning-tree-(for-br	STP	Conf. TC + Root = 4097/00:19:56:7e:42:80 Cost = 23 Port = 0x8007
45	3.418603	Cisco_ef:a8:00	Broadcast	ARP	who has 129.67.103.123? Tell 129.67.103.254
46	3.474160	Hewlett-_b5:99:73	Broadcast	ARP	who has 129.67.100.105? Tell 129.67.100.179

Frame 35 (144 bytes on wire, 144 bytes captured)

Ethernet II, Src: Intel\_9b:ec:13 (00:07:e9:9b:ec:13), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Internet Protocol, Src: 129.67.101.197 (129.67.101.197), Dst: 255.255.255.255 (255.255.255.255)

User Datagram Protocol, Src Port: 46705 (46705), Dst Port: discard (9)

Source port: 46705 (46705)

Destination port: discard (9)

Length: 110

Checksum: 0xd837 [correct]

Wake On LAN, MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

Sync stream: FFFFFFFFFF

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

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MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

MAC: Intel\_d9:6b:ae (00:0e:0c:d9:6b:ae)

User Datagram Protocol (udp), 8 bytes

Packets: 86 Displayed: 86 Marked: 0 Dropped: 0

Profile: Default

# What's next?

- If you are interested in experimenting the monitoring and wake on LAN services either:
  - Come speak to us now!
  - Send an email to [greenit@oucs.ox.ac.uk](mailto:greenit@oucs.ox.ac.uk)
- We'll visit you at your site and help you set up the gateway software and work your way through the 5 steps.
- We aim to be able to do this in less than an hour...with practice!