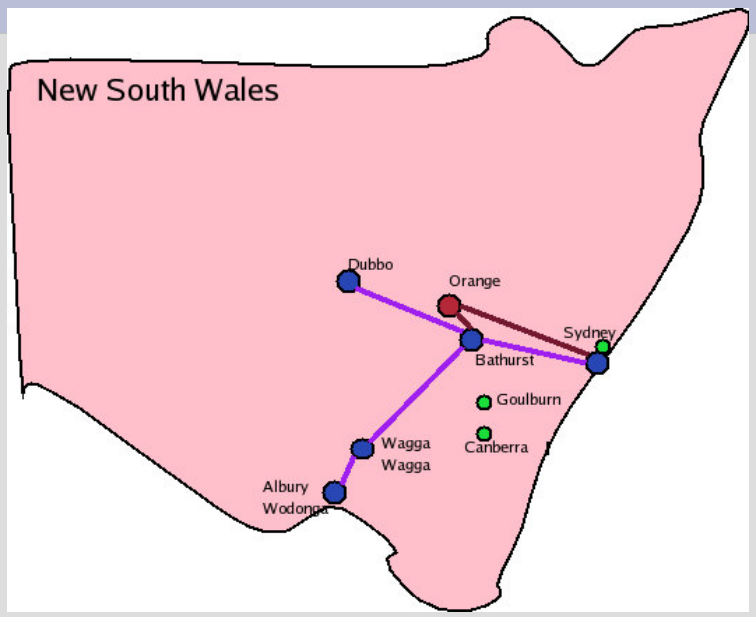
# CSU NetReg

The "Why" and "How"
of registering computers
and charging for network access
at Charles Sturt University.

## CSU NetReg

- System to register & charge computer access
- concept based on some internet projects
  - www.netreg.org
  - www.net.cmu.edu/netreg
- further developed/localised at CSU
- Important drivers:
  - New charging model required computer rentals
  - New Network roll-out
    - complete IP address re-number
    - device/computer names must be maintained

# Charles Sturt University Network




# Comms Recovery Models:

- Full comms cost recovery – no other funding

| | Old Model | New Model |
|---|---|---|
| Phone Charges | | |
| Rental per month | $13.00 | $24.00 |
| Tie Line | $0.25 | $0.00 |
| STD (per minute) | $0.60 | $0.10 |
| Mobile (per minute) | $0.60 | $0.25 |
| IDD (per minute) | $2.00 | $0.60 |
| Data Charges | | |
| Rental per month | $0.00 | $24.00 |
| Download (per Mbyte) | $0.20 | $0.03 |

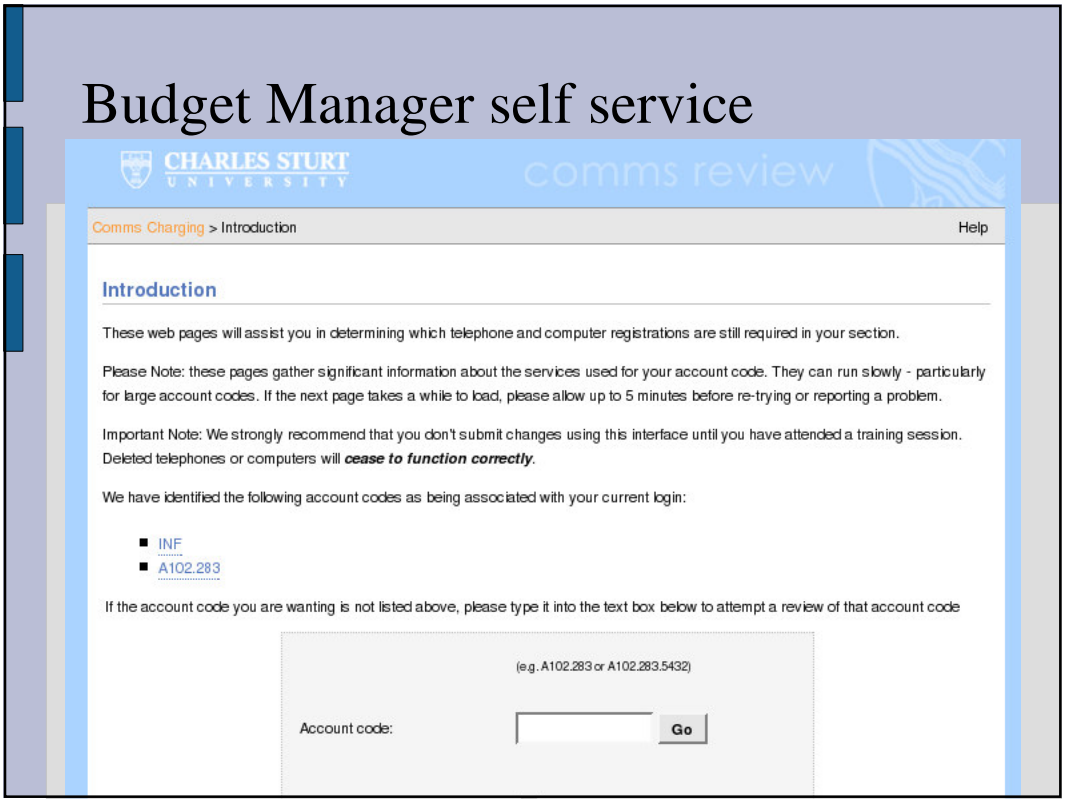
## New model principles

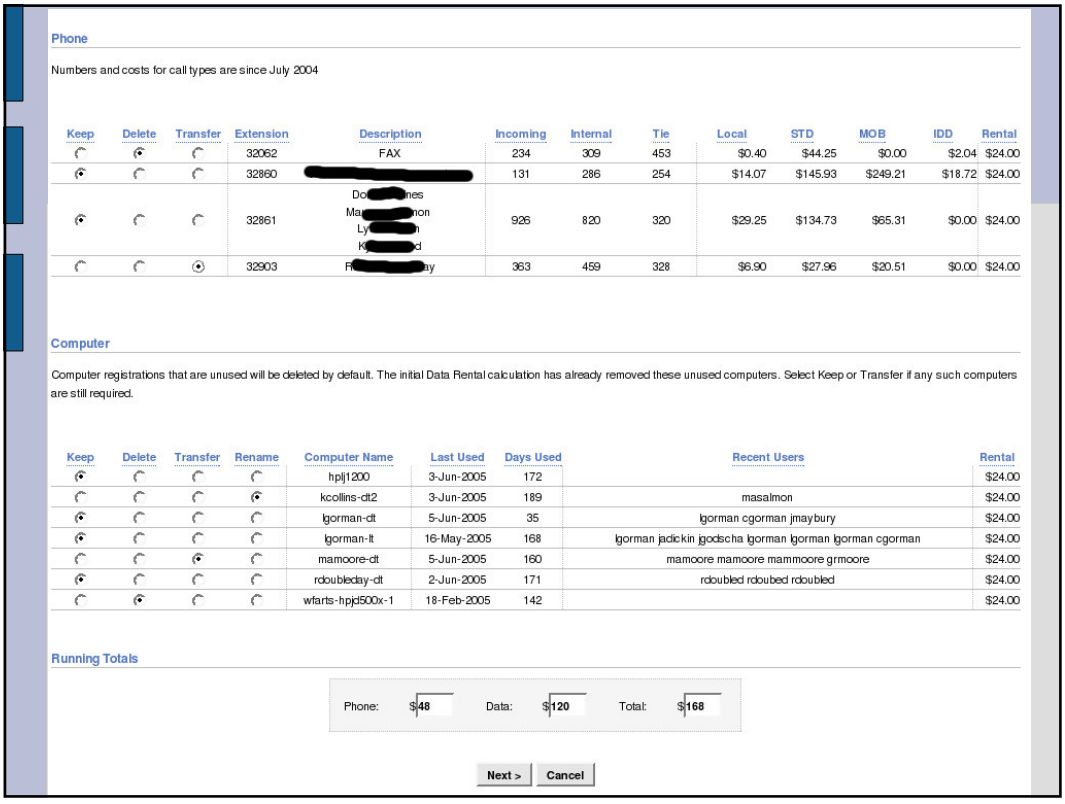
- Variable costs to cover variable costs
  - pass on actual costs for phone calls and internet downloads.
  - no longer inflate call charges to cover fixed costs
- Fixed costs to cover fixed costs
  - need computer rental charge to cover fixed data charges $0 -> $24 :
    - stress & queries from budget managers
    - self-service page for budget managers

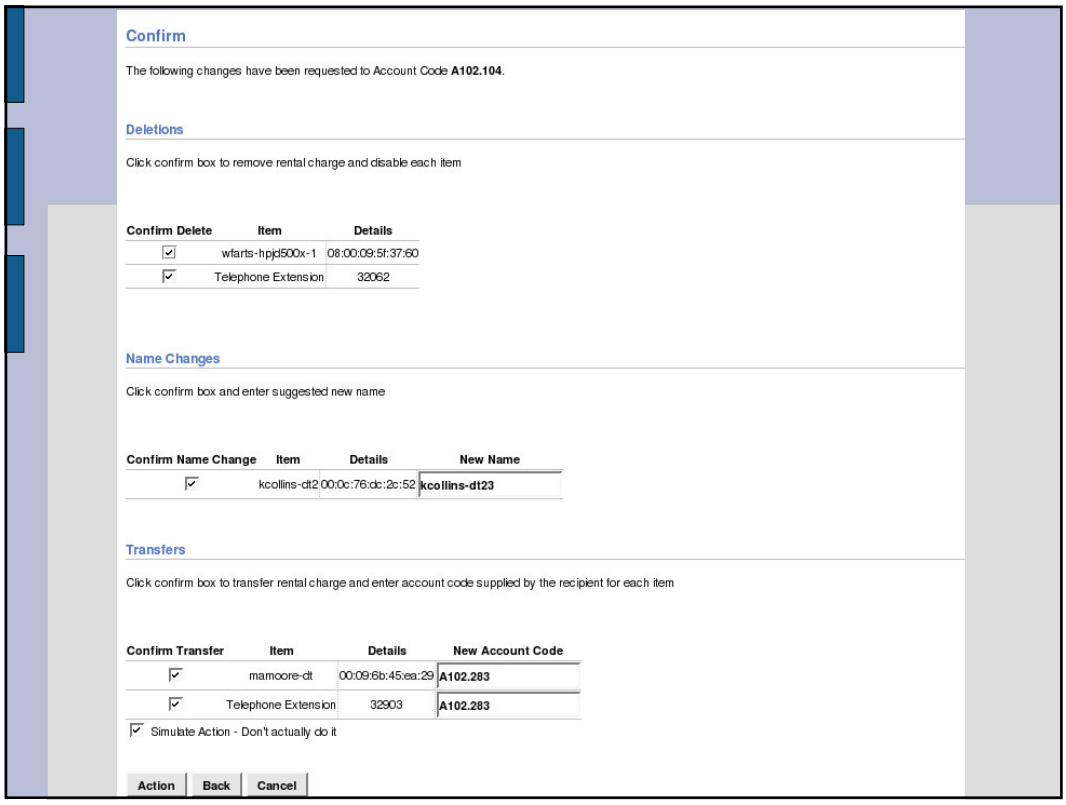
## Budget Manager Interface

- shows usage information for phones & computers
- Telephone Extension Actions
  - Delete an Extension – auto-disables
  - Transfer an Extension – requires a valid account code & informs recipient budget manager by email.
- Registered computer actions:
  - Disable (de-register) a computer
  - Transfer to another account code
  - Rename a computer registration
    - ie. suggest a new name

# Budget Manager self service





## Confirm

The following changes have been requested to Account Code **A102.104**.

### Deletions

Click confirm box to remove rental charge and disable each item

| Confirm Delete | Item | Details |
|---|---|---|
| ☑ | wfarts-hpjd500x-1 | 08:00:09:5f:37:60 |
| ☑ | Telephone Extension | 32062 |

### Name Changes

Click confirm box and enter suggested new name

| Confirm Name Change | Item | Details | New Name |
|---|---|---|---|
| ☑ | kcollins-dt2 | 00:0c:76:dc:2c:52 | **kcollins-dt23** |

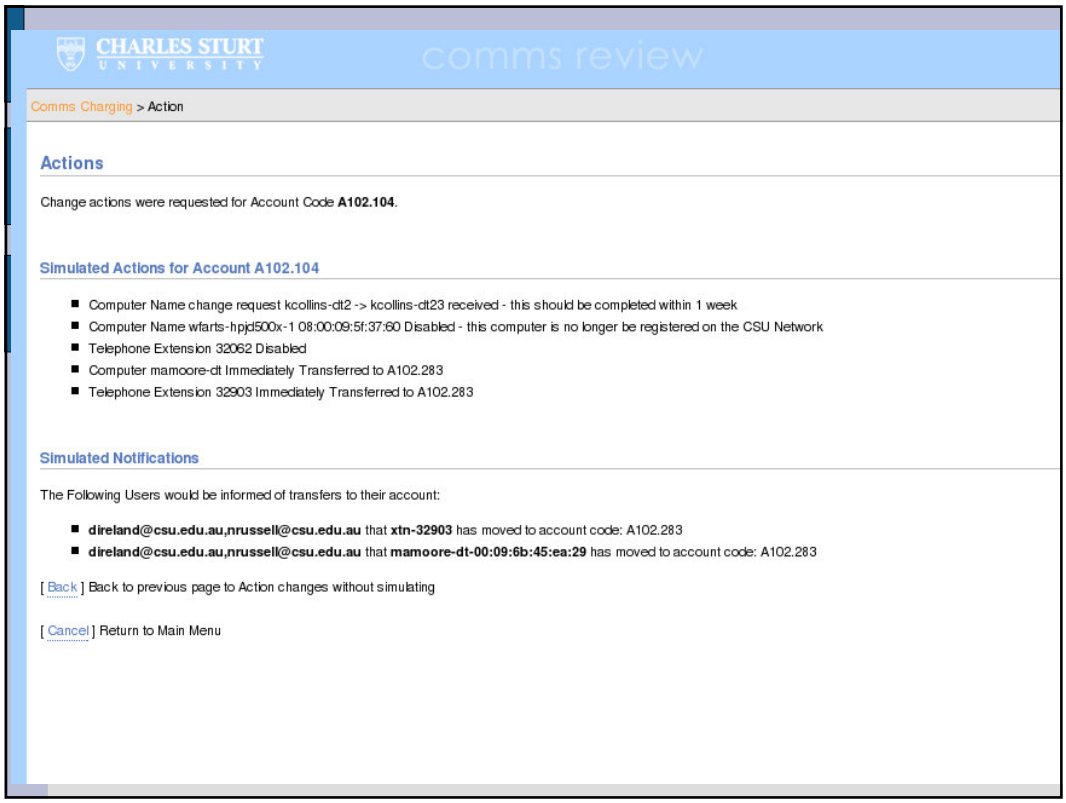
### Transfers

Click confirm box to transfer rental charge and enter account code supplied by the recipient for each item

| Confirm Transfer | Item | Details | New Account Code |
|---|---|---|---|
| ☑ | mamoore-dt | 00:09:6b:45:ea:29 | **A102.283** |
| ☑ | Telephone Extension | 32903 | **A102.283** |

☑ Simulate Action - Don't actually do it

Action | Back | Cancel



CHARLES STURT UNIVERSITY comms review

Comms Charging > Action

## Actions

Change actions were requested for Account Code **A102.104**.

### Simulated Actions for Account A102.104

- Computer Name change request kcollins-dt2 -> kcollins-dt23 received - this should be completed within 1 week
- Computer Name wfarts-hpjd500x-1 08:00:09:5f:37:60 Disabled - this computer is no longer be registered on the CSU Network
- Telephone Extension 32062 Disabled
- Computer mamoore-dt Immediately Transferred to A102.283
- Telephone Extension 32903 Immediately Transferred to A102.283

### Simulated Notifications

The Following Users would be informed of transfers to their account:

- **direland@csu.edu.au,nrussell@csu.edu.au** that **xtn-32903** has moved to account code: A102.283
- **direland@csu.edu.au,nrussell@csu.edu.au** that **mamoore-dt-00:09:6b:45:ea:29** has moved to account code: A102.283

[ Back ] Back to previous page to Action changes without simulating

[ Cancel ] Return to Main Menu

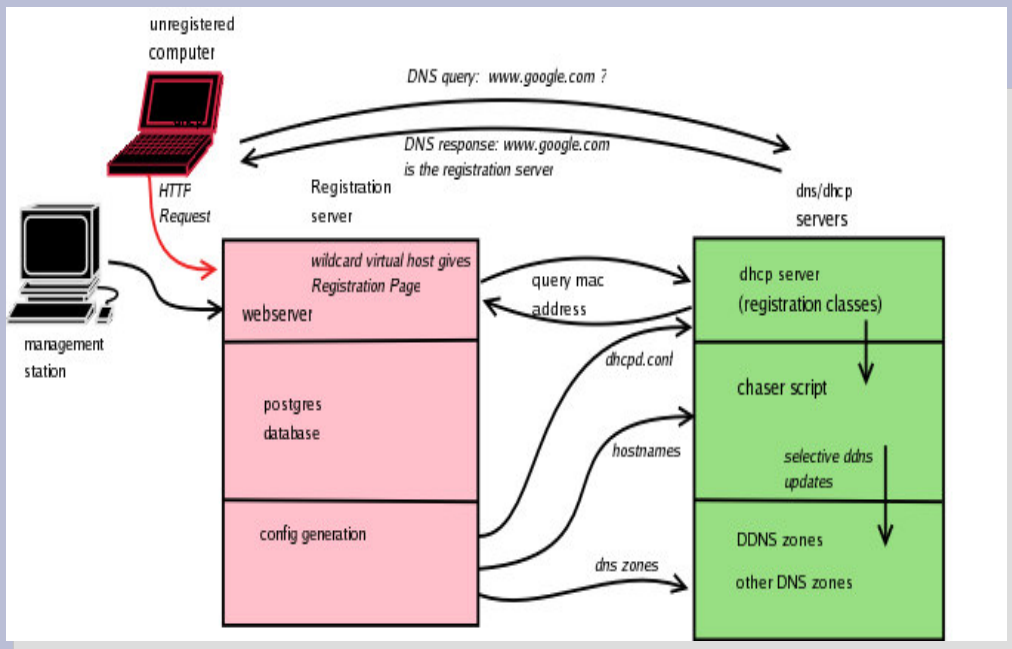
## NetReg Concepts

- ideas from NetReg projects on the Net
- Relies on DHCP for IP address assignment
  - doesn't actively prevent manual IP assignment, though we plan to investigate router dhcp snooping
- Pool of addresses in each subnet for unregistered machines
- Bogus dns server returned to clients in the unregistered pool.
- Web browsing to any site from unregistered machine reaches registration page

## CSU NetReg localisation

- Use our regular dns servers
- Up to 3 address pools per subnet
- DDNS updates using registered names
- supports controlled machine namechanges
- dovetails with Budget manager interface
- Track account codes for billing
- permit staff to self register for ad-hoc access
- special behaviour for res, student, radio vlans

# NetReg Architecture



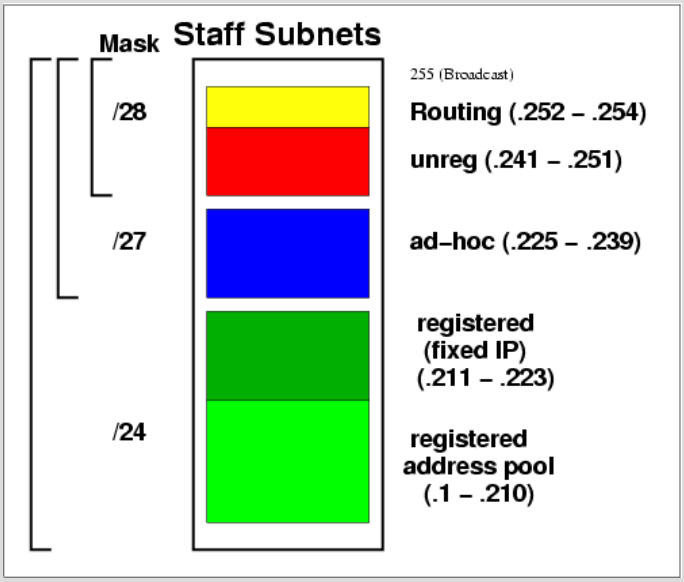

# Chaser script updates DDNS

- Handles clients that don't do DDNS
  - NT4, print servers
- Updates with registered name
  - default ensures correct naming for print servers
  - uses client supplied name if namechange pending.
- Residences vlans – updates with username
  - Improves student traceability
  - residences student machine names stay out of DNS

# NetReg Implementation

- Registration Server
  - linux (Fedora Core 3) – dual Xeon
  - Apache, mod_perl, postgresql database
  - dhcp & dns propagation scripts use perl
- DNS/DHCP Servers (1 per major campus)
  - Sun E420 or v440 – solaris 9
  - ISC bind version 9.2
  - ISC dhcpd version 3.0
  - chaser script uses perl

# Staff subnet Address Pools



## Netreg behaviour: unregistered

- Unregistered
  - only sees router and other unregistered machines
    - falsely small netmask
  - dns server returns registration server for all queries
  - ACLs prevent access to other machines
  - can't infect registered machines or servers with worms.

## Netreg behaviour: ad-hoc

- CSU staff can self-register from unreg state
  - only sees router and other ad-hoc registered machines on subnet
    - falsely small netmask
  - dns server returns true results
  - ACLs prevent access to most other machines
    - select services & internet available to ad-hoc machines
  - can't infect registered machines or servers with worms.
  - Incurs $2 per day computer rental charge

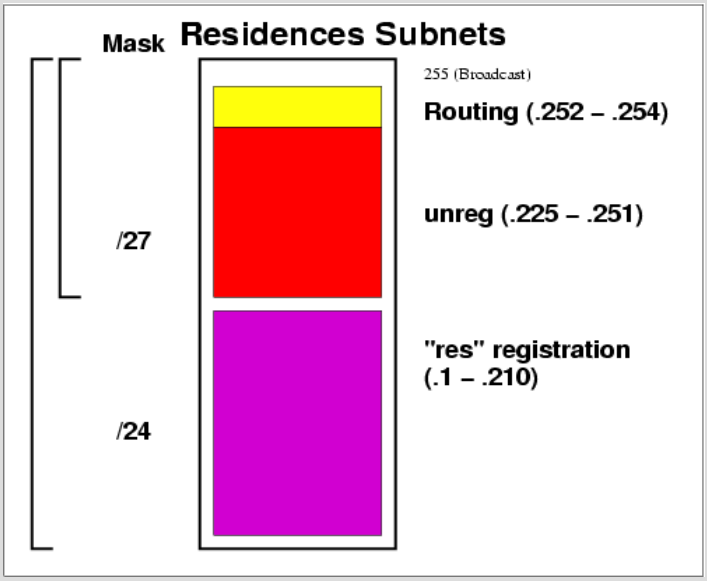
## Netreg behaviour: registered

- registered machines
  - normal network access – true netmask
  - dns server returns true results
  - IT staff confident of patch/Anti-virus status.
  - Incurs $24 per month computer rental charge
  - Large dynamic pool on each subnet
  - A few static IPs for QoS, special ACLs or server use.
  - Registration valid for entire CSU Network.

## Netreg behaviour: residences

- residences registration
  - similar access to ad-hoc pool on staff networks
  - dns server returns true results
  - DDNS updates performed with student username
    - username.res.csu.edu.au
  - Yearly rental charge included in room rental
  - Registration valid for entire residence Network.
  - Residence registration will grant ad-hoc access on student vlans

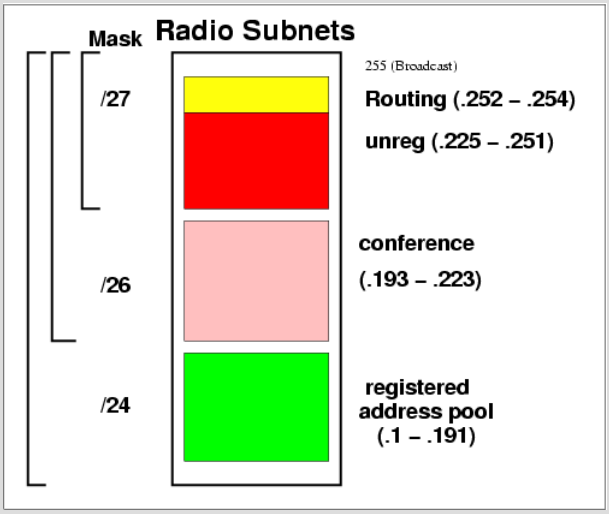
# Residence subnet Address Pools



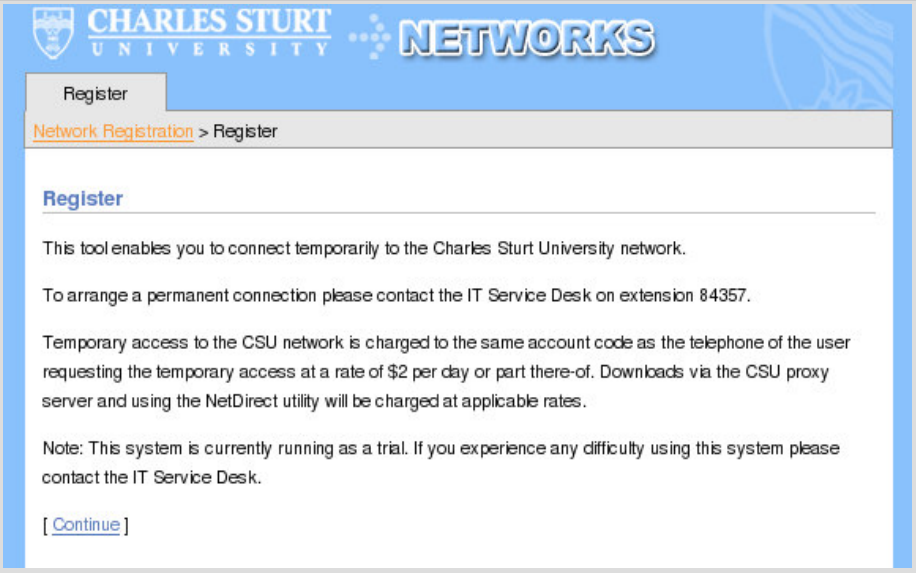

# Netreg behaviour: radio

- radio: registered machines
  - Address pool can only access VPN
    - simple approach to radio security
    - may relax as radio security techniques further mature
  - Separate radio mac address tied to existing registrations
    - single $24 per month rental for machines with both wired & wireless access
- radio: conferences (radio-direct)
  - conference username/password with valid dates
  - direct & easy Internet access
  - usage charges billed to the conference

# Radio Subnet Address Pools




# NetReg user pages



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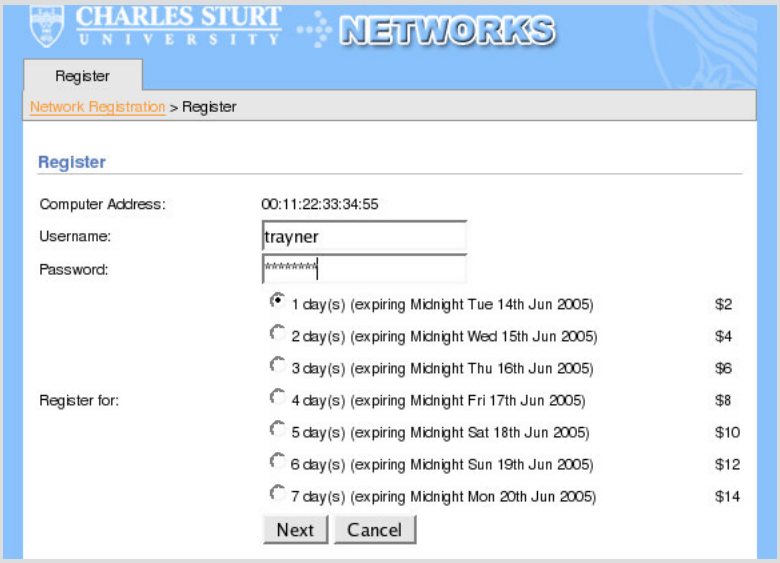


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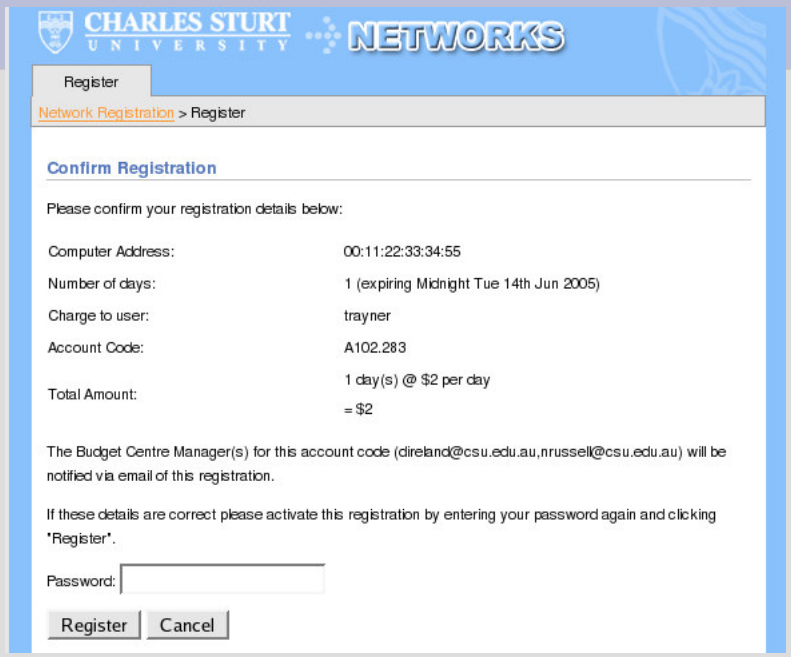
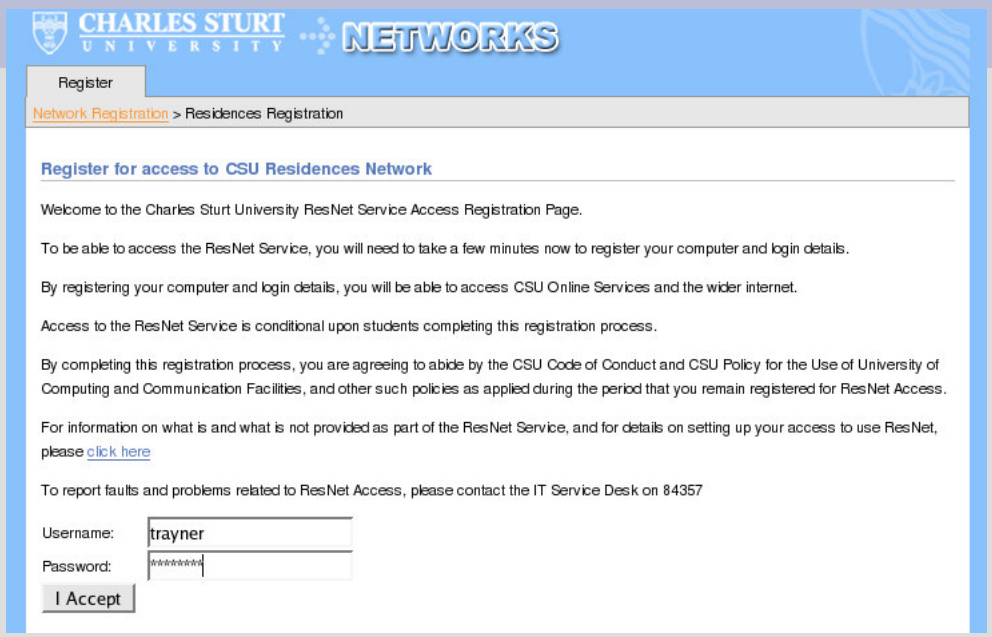


# NetReg Residences user pages

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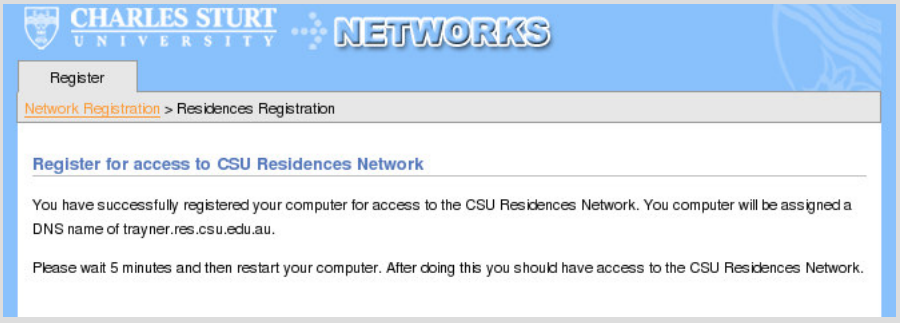
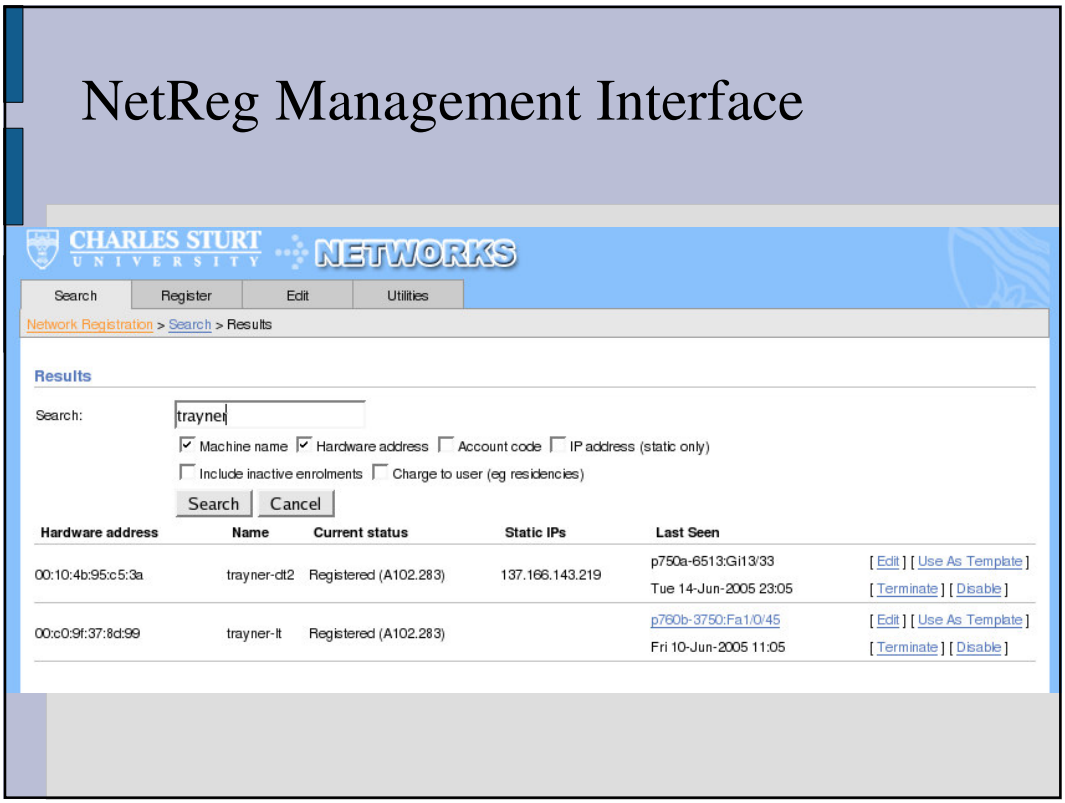
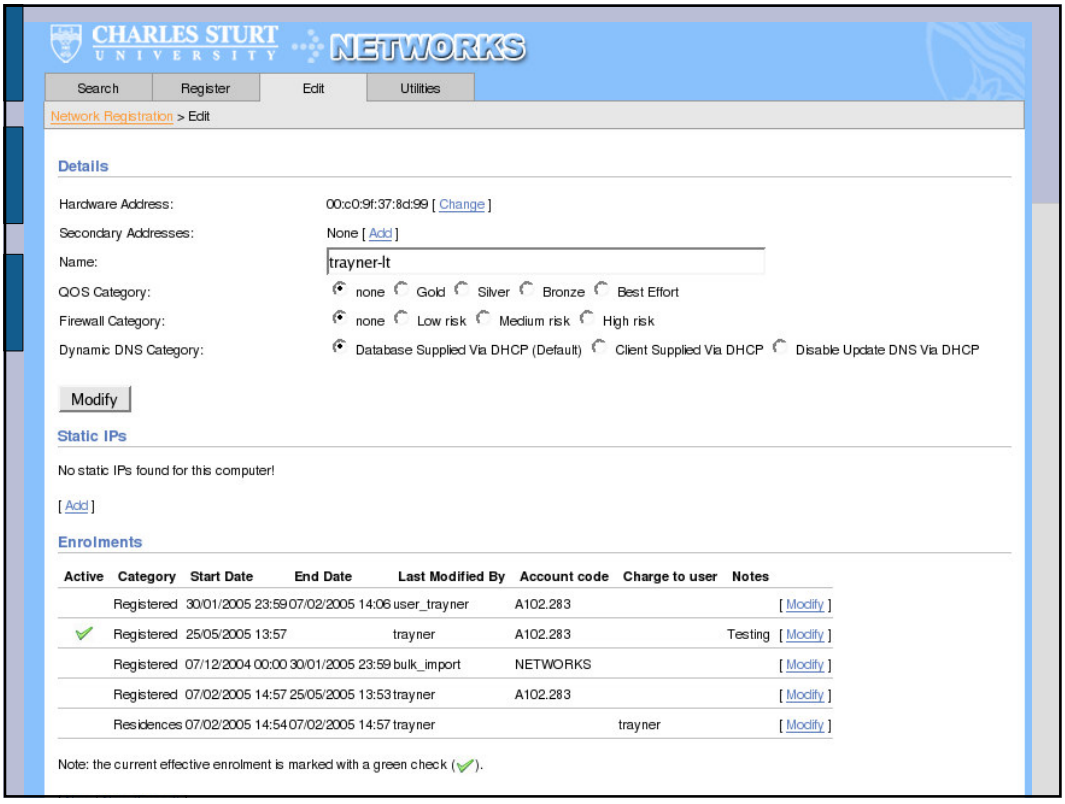


# NetReg Management Interface



## registration classes & vlans

| vlan Class | Staff | student | res | radio |
|---|---|---|---|---|
| registered | FULL | FULL | LIMITED | VPN Only |
| ad-hoc | LIMITED | LIMITED | LIMITED | VPN Only |
| res | NONE | LIMITED | LIMITED | NONE |
| radio_direct | NONE | NONE | NONE | Direct Internet |
| unregistered | re-direct to staff registration page -> ad-hoc | staff/student: redirect to staff/res reg. page -> ad-hoc/res | re-direct to res registration page -> res | redirect to radio reg. page conf: -> radio_direct or staff/stud -> ad-hoc/res |

## Lessons learned

- DDNS with Netreg system made IP re-numbering across campuses much, much easier
- DDNS with chaser script gave much more control than we expected
  - DDNS can be better than just clients setting their own A and PTR records in DNS
- a few “gotchas”
  - redundant dhcp servers giving different leases
  - PCs printing to an IP address

## “gotchas” cont.

- client dns caching – remembers old printer IP
- Unregistered worm-infested machines (residences) can load the registration server
  - some kernel tuning (syn_wait)
  - cached results of dhcp server mac-address query
- Unregistered machines needing AD domain authentication can't login to start web browser.
  - can fix if we open domain controllers to worm risk from infected unregistered windows clients.

## The End!

- Questions ?