Using FreeRADIUS with Eduroam

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Eduroam workshop

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Eduroam fundamentals

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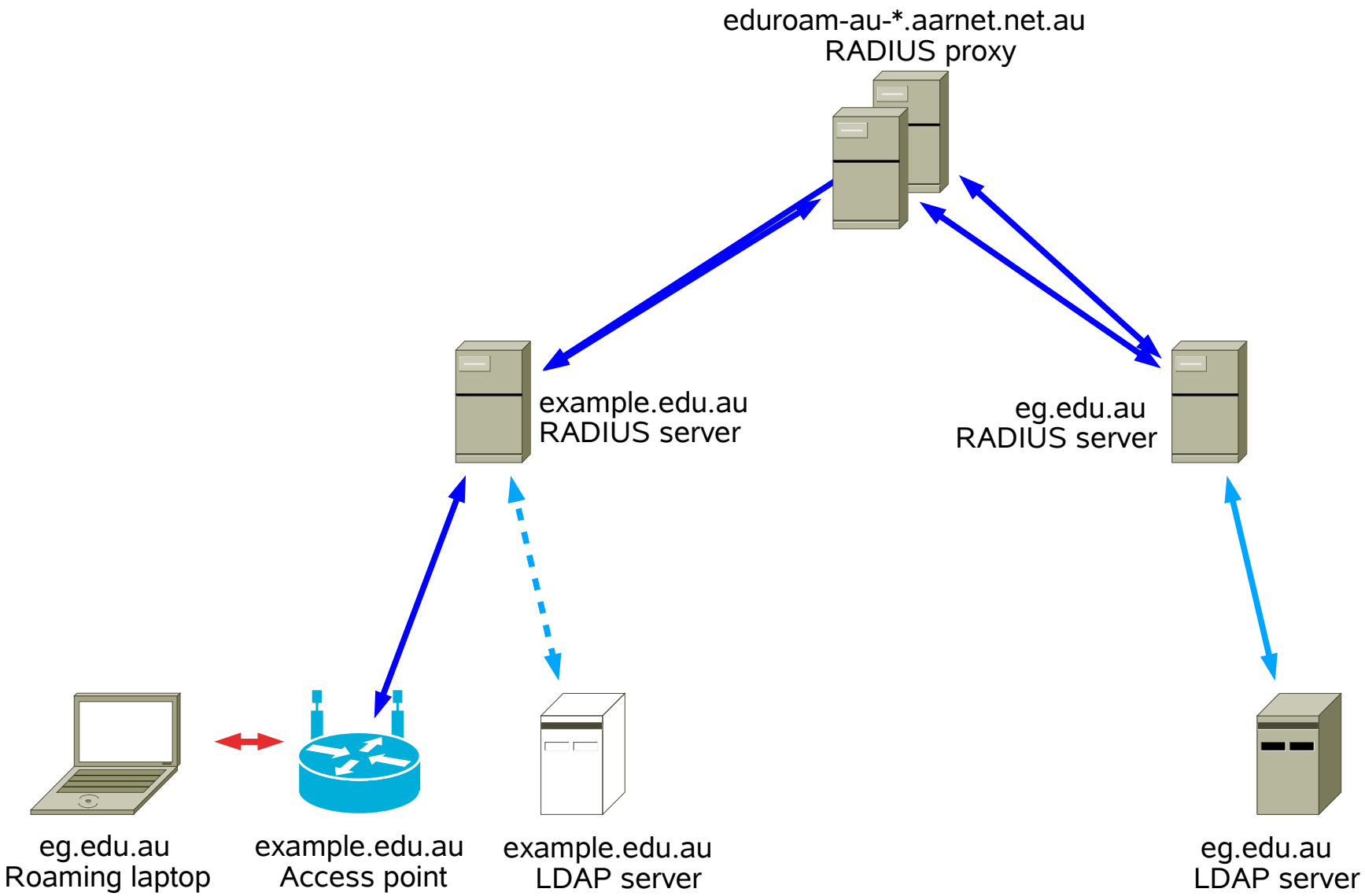
Chain of authentication



Visitor

- User uses 802.1X to communicate with access point
  - Gives a user name of fab@eg.edu.au
- This is converted from 802.1X to RADIUS and sent to example.edu.au's RADIUS server
- The RADIUS for server does not have an authentication clause for @eg.edu.au, the default is to proxy to eduroam-au-*
- eduroam-au-* proxies to eg.edu.au
- eg.edu.au's RADIUS server gateways to LDAP
- which checks the password

Local user

- Two choices
  - Prevent local users from using eduroam
    - example.edu.au's RADIUS server can deny access for *@example.edu.au
  - Map Eduroam users to a different VLAN, within the firewall, applying example.edu.au local user policies
    - example.edu.au's RADIUS server allows access for *@example.edu.au and sets VLAN
- Second is the more interesting choice
  - Only need “eduroam” SSID
  - Client machines are already set up and tested for roaming

802.1X modes

- EAP/PEAP/TTLS/etc

Beginning

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Installation

- www.freeradius.org
- Use the package manager
  - Red Hat, Fedora, CentOS

    # yum install freeradius
    - Doesn't start by default

      # chkconfig radiusd on

      # /etc/init.d/radiusd start
  - Debian, Ubuntu

    # apt-get install freeradius freeradius-ldap
    - Starts immediately, to stop

      # update-rc.d -f freeradius remove

      # /etc/init.d/freeradius stop

Configuration files

- Usual Unix-style configuration file
  - Red Hat
    /etc/raddb
  - Debian
    /etc/freeradius
- Each file collects together related configuration
  - radiusd.conf — Server configuration
  - clients.conf — RADIUS clients
  - proxy.conf — Upstream RADIUS servers
  - snmp.conf — Connection with Net-SNMP

  and so on

Log files

- Red Hat /var/log/radius/radius.log
- Debian /var/log/freeradius/radius.log
- Contains:
  - configuration errors
  - running errors
  - authentication success or failure
- Typical debugging phrase is

```
# tail -f /var/log/*radius/radius.log &
```

SELinux

- Type enforcement of programs and their data
  - a simple way to stop zero-day attacks
- Look for audit messages in /var/log/messages
- Ask for an explanation
  - `sealert -i …`
- Look at SELinux configuration options
  - `getsebool -a`
- Modify policy
  - `audit2allow -M local < /var/log/audit/audit.log > local.te`
    `semodule -i local.pp`

Exercise 1

- Boot CentOS Linux virtual machine
- Record its IP address from DHCP server log
- Install FreeRADIUS
- Start FreeRADIUS
- Examine the log file

Connect access point

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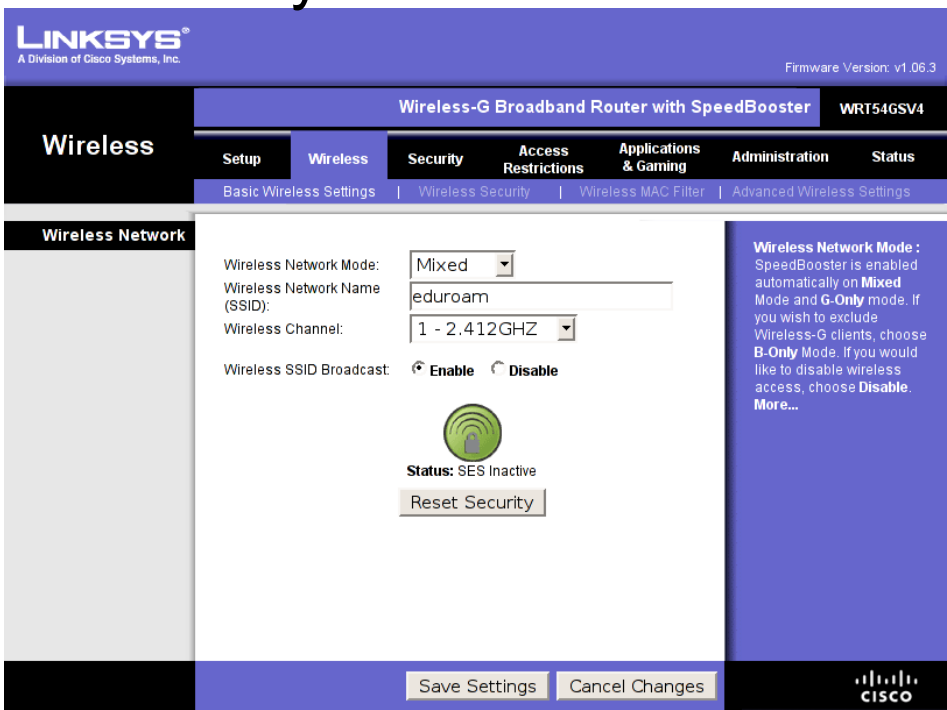
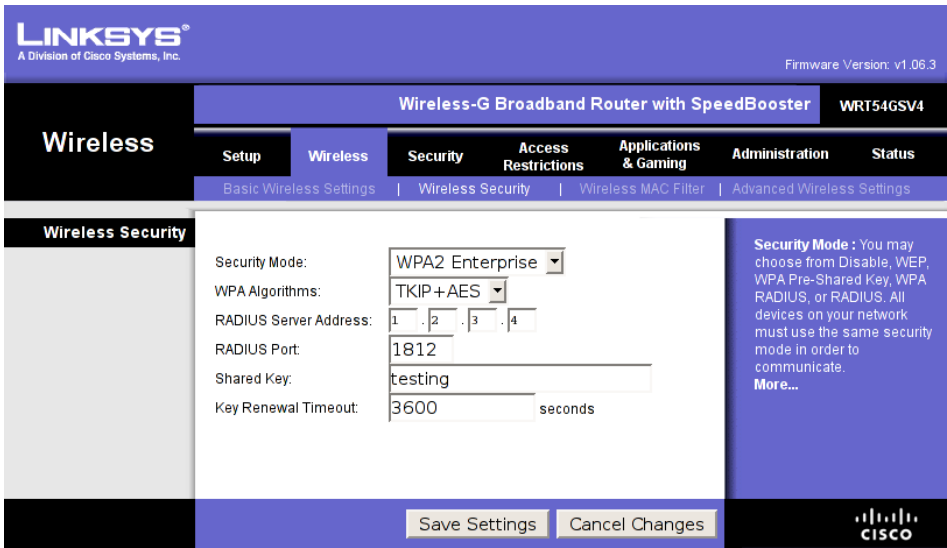
Configure access point — SSID

- Service-set Identifer is “eduroam”
  - ESSID used to retrieve stored configurations
  - If there are multiple networks operating which provide eduroam then use a riff on the name
    - *eduroam-aarnet*
    - *eduroam-UofA*, *eduroam-adelaide* may have been better
- 32 bytes



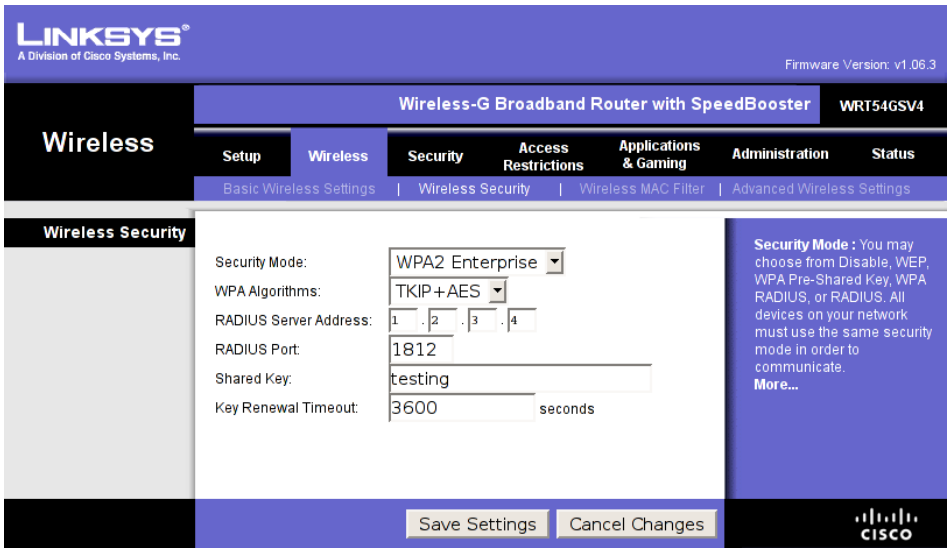
Configure access point — 802.1X

- Transports Extensible Authentication Protocol from supplicant to access point
- Encrypts session
  - Most supported: WPA Enterprise with TKIP
  - Most secure: WPA2 Enterprise with AES



Configure access point — RADIUS

- The most common way to transport EAP from the access point across the IP network to the authenticator is RADIUS
- Configure RADIUS
  - Server IP address and ports
    - Well known port: 1812, 1813; used to be 1645, 1646
  - Secret (“shared key”)



Configure RADIUS server

- clients.conf contains access points
- Configuration phrase is

```
client 5.6.7.8 {
   shortname = cbr-c-12
   secret = testing
}
```

- The shortname appears in the log file, it has no other significance
  - Some riff on the AP's name seems right

Exercise 2

- Configure your access point to use
  - DHCP to obtain an IP address
  - Channel 1
  - A unique SSID
  - NAT routing
- Record its IP address from DHCP server log
- Configure 802.1X and RADIUS on access point
- Configure RADIUS server to connect to access point
- Test

Federate RADIUS server: visitors

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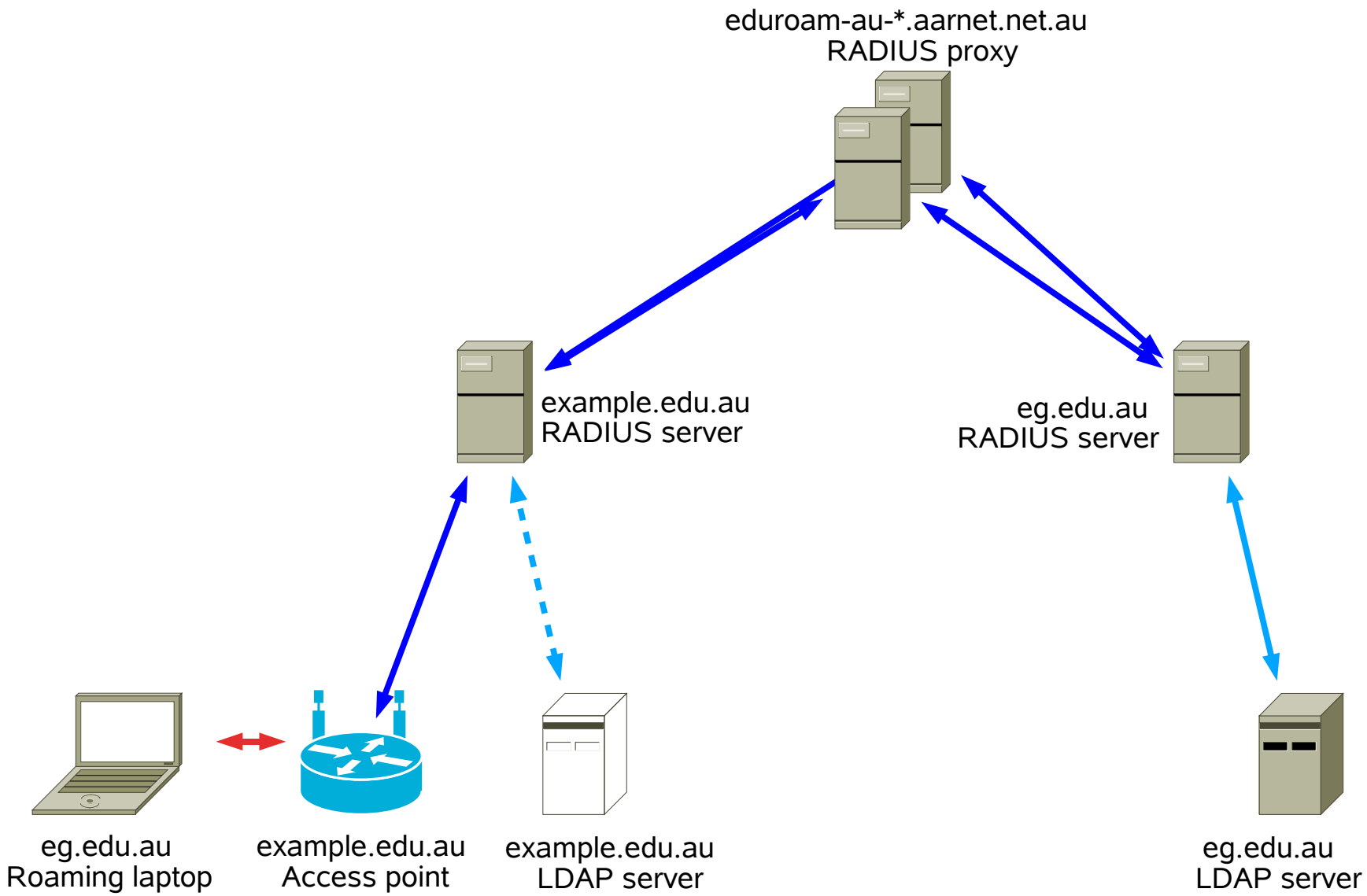
Sending requests to federation



Sending requests to federation

- Requests which are not handled locally are proxied to the Eduroam federation
- proxy.conf
- ```
  realm DEFAULT {
    type = radius
    authhost = eduroam-au-1.anycast.aarnet.net.au:1812
    accthost = eduroam-au-1.anycast.aarnet.net.au:1813
    secret = testing
    nostrip
  }
  realm DEFAULT {
    type = radius
    authhost = eduroam-au-2.anycast.aarnet.net.au:1812
    accthost = eduroam-au-2.anycast.aarnet.net.au:1813
    secret = testing
    nostrip
  }
  ```
  ```

Exercise 3

- Federate your server with the Australian eduroam server
- Use a test account to check to if your RADIUS server and access point with authenticate a foreign user

Local users

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Defining a local user

- users

```
fred   User-Password == “testing”
```

- radiusd.conf

```
authorize {
  preprocess
  mschap
  suffix
  eap
  files
}
authenticate {
  Auth-Type MS-CHAP {
    mschap
  }
  eap
}
```

MSCHAP

- radiusd.conf

```
mschap {
  authtype = MS-CHAP
  use_mppe = yes
  require_encryption = yes
  require_strong = yes
}
```

EAP

- eap.conf
- ```
  eap {
    default_eap_type = …
    timer_expire = 60
    ignore_unknown_eap_types = no
    cisco_accounting_username_bug = no
  ```
- Now configure TLS, PEAP, TTLS
  ```

TLS

- Transport layer security requires certificates
- eap.conf

```
eap{
  tls {
    private_key_password = abcdefg
    private_key_file =  ${raddbdir}/certs/cert-srv.pem
    certificate_file = ${raddbdir}/certs/cert-srv.pem
    CA_file = ${raddbdir}/certs/demoCA/cacert.pem
    dh_file = ${raddbdir}/certs/dh
    random_file = ${raddbdir}/certs/random
    fragment_size = 1024
    include_length = yes
    copy_request_to_tunnel = no
    use_tunneled_reply = no
  }
}
```

PEAP with MSCHAPv2

- eap.conf

```
eap {
  tls {
    …
  }
  default_eap_type = peap
  peap {
    default_eap_type = mschapv2
  }
  mschapv2 {
  }
}
```

TTLS

- eap.conf

```
eap {
  default_eap_type = tls
  tls {
    …
  }
  ttls {
    copy_request_to_tunnel = no
    use_tunneled_reply = no
  }
}
```

Exercise 4

- Create a local user
- Configure your wireless supplicant to authenticate against that local user using PEAP +MSCHAPv2 and TTLS
  - You may need to download the Secure W2 client if using Windows
    - www.securew2.com

Federate RADIUS server: travellers

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The federation makes queries

- Just like access points do
- clients.conf

```
client eduroam-au-1.aarnet.net.au {
  shortname = eduroam-au-1
  secret = testing
}
client eduroam-au-2.aarnet.net.au {
  shortname = eduroam-au-2
  secret = testing
}
```

Integration with organisational directory

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Connect server with authentication

- FreeRADIUS can locally authenticate user IDs and passwords
- FreeRADIUS can proxy the authentication to a database, LDAP, Kerberos and ActiveDirectory
- Authentication servers often provide an LDAP gateway themselves, making LDAP a common ground
  - Oracle Internet Directory
  - Novell eDirectory

LDAP recipe

- Modern LDAP server schema
  - Very different from what ISO intended
  - Easy interoperation with Internet
- http://middleware.internet2.edu/dir/docs/ldap-recipe.htm

- **dn: uid=a12323,ou=people,dc=example,dc=edu,dc=au**
  uid: a12323
  cn: Fred Bloggs
  givenName: Fred
  sn: Bloggs
  eduPersonNickname: Fred
  mail: a12323@example.edu.au
  mailhost: smtp.srv.example.edu.au
  eduPersonAffliliation: staff
  eduPersonPrimaryAffiliation: staff
  eduPersonPrincipalName: s12323@example.edu.au

LDAP and FreeRADIUS

```
• modules {
    ldap {
      server = ldap.srv.example.edu.au
      basedn = “ou=people,dc=example,dc=edu,dc=au”
      filter = “(eduPersonPrincipalName=%{User-Name})”
      dictionary_mapping = ${raddbdir}/ldap.attrmap
      ldap_connections_number = 5
      timeout = 4
      timelimit = 3
      net_timeout = 1
    }
  }
  authorize {
    … ldap …
  }
  authenticate {
    Auth-Type LDAP {
      ldap
    }
    …
  }
```

- If your LDAP Schema doesn't follow the eduPerson recipe then you can use other attributes, such as email addresses, and add an explicit attribute or LDAP group for use of Eduroam

OpenLDAP

- apt-get install slapd
- yum install openldap openldap-clients openldap-servers
- gq is a nice graphical administration tool

Other directories

- The FreeRADIUS Wiki has configs for Microsoft Active Directory

Limiting financial exposure

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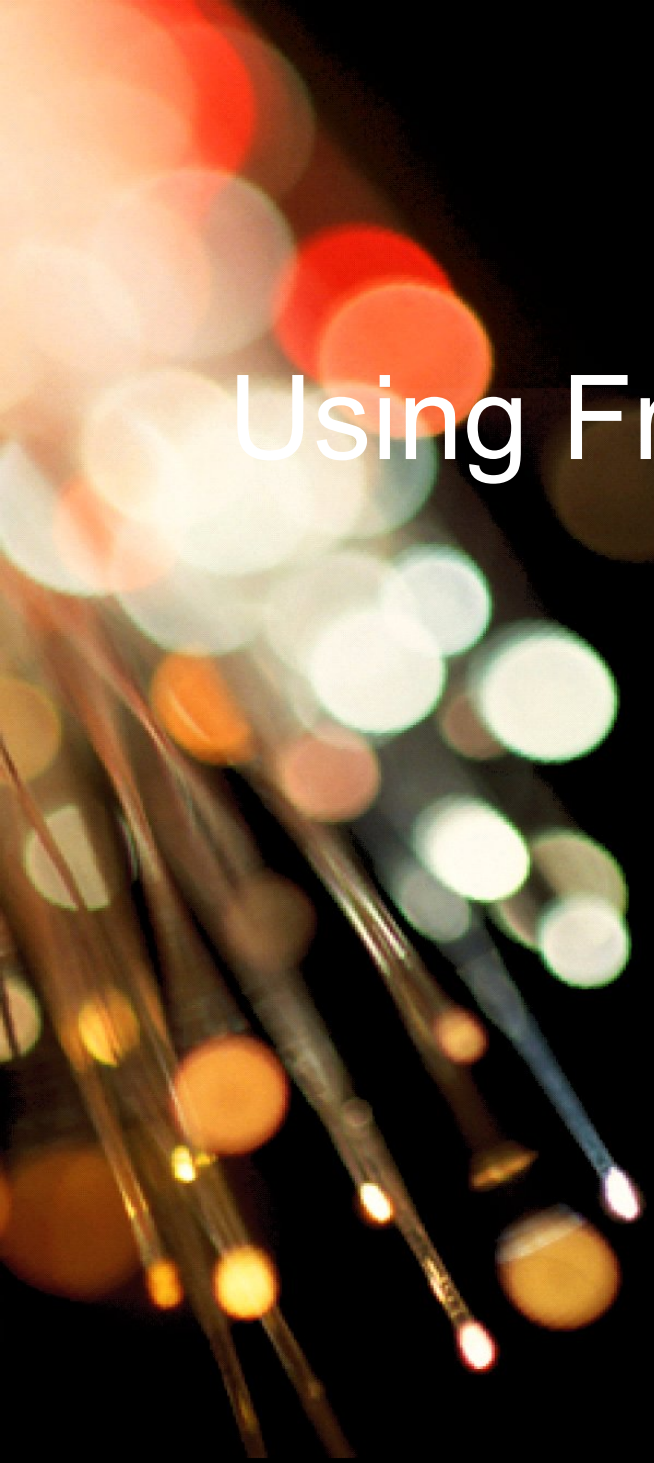
Strategies

- Blocking
- Rate-limiting
- Blocking with multiple routers
- Rate-limiting with multiple routing tables



Using FreeRADIUS with Eduroam

www.gdt.id.au/~gdt/presentations

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