

Configuring Fedora Core 5 for Eduroam

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1. Introduction

To enable Eduroam[1] to work Fedora Core 5 (FC5)[2] is a relatively simple and straight forward task. Using a madwifi[3] compatible wireless lan card and a private certificate for eduroam authentication this document contains the necessary steps to get connected.

2. Pre-configuration

Although the wireless tools are available in the FC5 repos it is necessary to add the livna[4] repo to provide the kernel modules and support utilities for madwifi. To do this first, add the livna repo to your FC5 installation:

```
rpm -ivh http://rpm.livna.org/livna-release-5.rpm
```

Next, install the madwifi kernel module.

```
yum -y install kmod-madwifi
```

With madwifi installed (kernel modules loaded) there will be another network device ('ath0'). WPA Supplicant[5] is used to perform the supplicant work so ensure this is installed:

```
yum -y install wpa_supplicant
```

3. Wireless Access and DHCP

Configuring a wireless interface is similar to that of a normal Ethernet network interface however due to the wireless environment it is advantageous to tune some of the options to dhclient[6].

Create a configuration file for the wireless interface

`/etc/sysconfig/network-scripts/ifcfg-ath0`

with the following contents:

```
# /etc/sysconfig/network-scripts/ifcfg-ath0
DEVICE=ath0
ESSID=eduroam
BOOTPROTO=dhcp
ONBOOT=yes
PEERDNS=yes
PERSISTENT_DHCLIENT=Y
DHCLIENTARGS=-nw
```

The options are:

- **PEERDNS** (value 'y') defines whether DNS settings learnt through DHCP should be installed into `/etc/resolv.conf`.
- **PERSISTENT_DHCLIENT** (value 'y') forces the `dhclient` process to never give up trying to get a lease.
- **DHCLIENTARGS** (value '-nw') instructs `dhclient` to become a daemon immediately rather than waiting for the first `dhcp` lease.

Using these settings `dhclient` will immediately fork into the back ground (thus not holding up the boot process) and will persistently try and get an address.

The second file is `/etc/dhclient-ath0.conf` that is used to store `dhcp` control statements that are specific to that interface. The contents of this file are self explanatory.

```
# /etc/dhclient-ath0.conf
interface "ath0" {
    # Don't bother with NTP over a radio link
    request subnet-mask, broadcast-address, routers, domain-name, domain-name-servers, host-
name;
}
```

4. WPA Supplicant Configuration

As `wpa_supplicant` is available in FC5 core hence its integration closely follows that of standard services.

The command line configuration options for wpa_supplicant are stored in the sysconfig directory. Edit this file to reflect the wireless interface and the wireless wrapper that is being used.

```
#!/etc/sysconfig/wpa_supplicant
INTERFACES="-iath0"
DRIVERS="-Dmadwifi"
```

For this installation madwifi is used (DRIVERS="-Dmadwifi") with the interface being ath0 (INTERFACES="-iath0").

The final stage is to create the file in which the authentication credentials are stored.

```
#!/etc/wpa_supplicant/wpa_supplicant.conf
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=wheel
ap_scan=1
network={
    ssid="eduroam"
    scan_ssid=1
    key_mgmt=WPA-EAP
    eap=TTLS
    ca_cert="/etc/pki/eduroam/root.pem"
    identity="USERNAME@REALM"
    password="PASSWORD"
    phase2="auth=PAP"
}
```

In this file the following attributes will need to be changed:

- identity - This is your username (ie: greg.wickham@arnet.edu.au) that is presented to your home radius server.
- password – This is the password bound to the above username that is presented to your home radius server.
- ca_cert – This is the PEM encoded public key from the key pair used to secure the authentication exchange.

The final configuration tweak required is to ensure that wpa_supplicant is started at boot:

```
chkconfig wpa_supplicant on
```

5. Conclusion

When your computer is restarted the following events should occur:

- The start script for interface 'ath0' will be return immediately – although it won't have an IP address yet.
- Wpa_supplicant will start.
- Once wpa_supplicant associates with an access point dhclient will try and get an address at the next attempt.

Note that there is no direct association between dhclient and wpa_supplicant. Dhclient persistently tries to get an address (irrespective of whether ath0 is up or down, associated or not associated) hence it may take a minute or so to get an address once association is successful.

6. Acknowledgements

Glen Turner (AARNet) provided the original configuration sample for wpa_supplicant.

7. Debugging

In the event that you have problems here are a couple of hints.

When debugging wpa supplicant the following command can be useful:

```
wpa_supplicant \  
-d \  
-i ath0 \  
-c /etc/wpa_supplicant/wpa_supplicant.conf \  
-D madwifi
```

The important options here are the '-d' (debug messages) and the omission of '-B' ('-B' enables daemon mode).

Additionally the output of the 'iwconfig' command can provide useful information. Specifically it will indicate whether the wireless is in an associated state or not (the presence of an Encryption key indicates association to an access point).

```
ath0 IEEE 802.11g ESSID:"eduroam" Nickname:"localhost.localdomain"  
Mode:Managed Frequency:2.432 GHz Access Point: 00:11:93:45:15:F0  
Bit Rate:5 Mb/s Tx-Power:16 dBm Sensitivity=0/3
```

```
Retry:off   RTS thr:off   Fragment thr:off

Encryption key:D1D1-2FA3-4DD2-8A6F-9867-270C-657A-2CB0   Security mode:restricted

Power Management:off

Link Quality=17/94   Signal level=-78 dBm   Noise level=-95 dBm

Rx invalid nwid:46   Rx invalid crypt:0   Rx invalid frag:0

Tx excessive retries:0   Invalid misc:0   Missed beacon:0
```

8. References

- [1] Eduroam (<http://www.eduroam.org/>)
- [2] FC5 (<http://fedora.redhat.com/>)
- [3] madwifi (<http://madwifi.org>)
- [4] livna (<http://rpm.livna.org>)
- [5] wpa_supplicant (http://hostap.epitest.fi/wpa_supplicant/)
- [6] dhclient (<http://www.isc.org/index.pl?sw/dhcp/dhcp-v2.php>)