

# Configuring Linksys WRT54G and WRT54GS for eduroam

## Introduction

The Linksys WRT54G and WRT54GS are wireless LAN routers designed for home or small office use. They are usually connected to an ADSL modem or to a cable modem. The WRT54G uses one IP address on the "Internet" port and uses network address translation to make all traffic from the wireless LAN and the four switch ports appear to use that address.

The WRT54G and WRT54GS are unusual in having a range of third-party firmware available. [HyperWRT](#) offers a set of useful enhancements to the Linksys software. [Sveasoft](#) offers very enhanced firmware (but see this Wikipedia [article](#) for licensing issues). [OpenWRT](#) offers a minimal Linux distribution, mainly for re-targeting the WRT54G for uses beyond being a wireless router.

The WRT54GS is a good choice for a small office which provides eduroam access to visitors. It is not a good choice for an office which requires multiple access points. It is not a good choice for an office which wishes to run IPv6 with supported firmware. In both these cases wireless access points rather than wireless routers would be a better choice.

## Assign an IP address to the Internet interface

Plug the Internet interface of the WRT54GS into an ethernet switch port. The port should be fast ethernet or better and set for autonegotiation. The port should not belong to a jumbo frame VLAN.

We use DHCP to assign an address to the WRT54GS as it simplifies any future change of IP address, router address or DNS address -- these can be done from the DHCP server rather than by reconfiguring the access point. Since all traffic will use the one public IP address we use a descriptive reverse DNS name for that address, such as *eduroam.adelaide.aarnet.edu.au*.

We manually set the MTU of the Internet interface to 1500, the default for ethernet.

The screenshot shows the 'Internet Setup' page of a Linksys WRT54GS router. On the left is a sidebar with 'Internet Connection Type' and 'Optional Settings (required by some ISPs)'. The main area shows 'Automatic Configuration - DHCP' selected from a dropdown menu. Below this, several fields are filled out: 'Router Name' is 'eduroam', 'Host Name' is 'eduroam', 'Domain Name' is 'adelaide.aarnet.edu.au', 'MTU' is set to 1500 (via a dropdown), and 'Size' is '1500'.

Internet Setup	
Internet Connection Type	Automatic Configuration - DHCP
Optional Settings (required by some ISPs)	
Router Name :	eduroam
Host Name :	eduroam
Domain Name :	adelaide.aarnet.edu.au
MTU :	1500
Size :	1500

## Configure the wireless network's routing

The wireless network uses network address translation. So it may as well use a private network.

We configure as many DHCP addresses for the wireless network as possible. This allows a large number of users without reducing the lease time from one day.

Network Setup	
Router IP	Local IP Address : <input type="text" value="192"/> . <input type="text" value="168"/> . <input type="text" value="1"/> . <input type="text" value="1"/>
	Subnet Mask : <input type="text" value="255.255.255.0"/>
Network Address Server Settings (DHCP)	DHCP Server : <input checked="" type="radio"/> Enable <input type="radio"/> Disable
	Starting IP Address : <input type="text" value="192.168.1.2"/>
	Maximum Number of DHCP Users : <input type="text" value="250"/>
	Client Lease Time : <input type="text" value="0"/> minutes (0 means one day)
	Static DNS 1 : <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/>
	Static DNS 2 : <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/>
	Static DNS 3 : <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/>
	WINS : <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/>

The AARNet network uses UTC.

Time Setting
Time Zone : <input type="text" value="(GMT) England"/>
<input type="checkbox"/> Automatically adjust clock for daylight saving changes

Don't enable DDNS, MAC Address Clone. The Advanced Routing Operating Mode should remain at "Gateway".

## Configure the wireless network's media

Select *Wireless* on the top menu.

Setup	Wireless	Security	Access Restrictions	Applications & Gaming	Administration	Status
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Use a tool to determine which wireless channels are currently being used and select another channel. Try to use channels 1, 6 or 11 (the channels are 5MHz wide but the signal is 30MHz wide so these channels don't overlap).

```
# iwlist eth1 scan
eth1
    Frequency:2.417 GHz (Channel 2)
    Frequency:2.427 GHz (Channel 4)
    Frequency:2.442 GHz (Channel 7)
    Frequency:2.462 GHz (Channel 11)
    Frequency:2.462 GHz (Channel 11)
```

The SSID name must be *eduroam*

and it should be broadcast. Selecting "Mixed" rather than "B-only" or "G-only" supports the widest range of laptops.

Wireless Network	
Wireless Network Mode :	Mixed
Wireless Network Name (SSID) :	eduroam
Wireless Channel :	1 - 2.412GHz
Wireless SSID Broadcast :	<input checked="" type="radio"/> Enable <input type="radio"/> Disable

## Configure the wireless network's security

Eduroam uses Wi-Fi Protected Access to encrypt transmitted data. The algorithm used is Temporal Key Integrity Protocol.

Authentication is done by referring to a remote RADIUS server. The communication with the RADIUS server requires a shared key which is configured into the WRT54GS and the eduroam RADIUS server. Contact your country's eduroam administrator to arrange a shared key for your wireless router.

Wireless Security	
Security Mode :	WPA Enterprise
WPA Algorithms :	TKIP
RADIUS Server Address :	192 . 94 . 63 . 33
RADIUS Port :	1812
Shared Key :	
Key Renewal Timeout :	3600 seconds

Do not enable the Wireless MAC Filter. Do not alter the Advanced Wireless settings.

Select *Security* on the top menu.

Set your security policy as required by your site. At this site eduroam is connected outside the corporate firewall so the settings can be liberal.

Firewall	
Block WAN Requests	Firewall Protection : <input type="radio"/> Enable <input checked="" type="radio"/> Disable
	<input checked="" type="checkbox"/> Block Anonymous Internet Requests
	<input type="checkbox"/> Filter Multicast
	<input type="checkbox"/> Filter Internet NAT Redirection
	<input type="checkbox"/> Filter IDENT(Port 113)
VPN Passthrough	IPSec Passthrough : <input checked="" type="radio"/> Enable <input type="radio"/> Disable
	PPTP Passthrough : <input checked="" type="radio"/> Enable <input type="radio"/> Disable
	L2TP Passthrough : <input checked="" type="radio"/> Enable <input type="radio"/> Disable

Do not alter any of the *Access Restrictions* options. Do not enable Parental Control or limit Internet Access to particular hours.

Do not alter any of the *Applications & Gaming* options.

Select *Access Control* on the top menu.

Tighten down the access to the administrative interface. The option shown here is the most secure. However to reconfigure the WRT54GS requires physical access to a switch port or connection of the switch port to the corporate switch on a unique VLAN.

Router Password	
<b>Local Router Access</b>	Router Password : <input type="password"/> Re-enter to confirm : <input type="password"/>
<b>Web Access</b>	Access Server : <input type="checkbox"/> HTTP <input checked="" type="checkbox"/> HTTPS Wireless Access Web : <input type="radio"/> Enable <input checked="" type="radio"/> Disable
<b>Remote Router Access</b>	Remote Management : <input type="radio"/> Enable <input checked="" type="radio"/> Disable Management Port : <input type="text" value="8080"/> Use https : <input checked="" type="checkbox"/>

Enable Universal Plug and Plug if this is acceptable to your eduroam security policy.

UPnP	
UPnP :	<input checked="" type="radio"/> Enable <input type="radio"/> Disable

## Test

Ensure the eduroam RADIUS server has been configured with the IP address and shared RADIUS key and test the eduroam wireless access.

## Appendix A. Services configuration for eduroam wireless routers

If the WT54GS is configured to learn it's IP address from DHCP then the resulting DHCP options are also passed to clients. This allows NTP and WINS servers to be configured.

An example configuration for the ISC DHCP server is the extract from */etc/dhcpd.conf*:

```
subnet 202.158.193.32 netmask 255.255.255.224 {
    option subnet-mask 255.255.255.224;
    option routers 202.158.193.62;
    option broadcast-address 202.158.193.63;
    # Uses default MTU of 1500, to no need for option interface-mtu
    option domain-name "adelaide.aarnet.edu.au";
    option domain-name-servers 202.158.193.1, 203.21.37.18;
    option ntp-servers 202.158.193.1;
    # Time, Adelaide is UTC + 9:30 = 34200s
    option time-offset 34200;
    # Windows hosts use unicast to WINS server for service discovery
    option netbios-name-servers 202.158.193.1;
    option netbios-node-type 2;
    host eduroam.adelaide.aarnet.edu.au {
        hardware ethernet 00:14:BF:16:34:8B;
        fixed-address 202.158.193.59;
    }
}
```

Note the use of a Windows Networking WINS server. This prevents visiting Windows hosts from sending service broadcasts. These can greatly effect WLAN performance. A minimal Samba configuration is this

complete `/etc/samba/smb.conf`:

```
[global]
workgroup = eduroam
server string = eduroam
# Limit access
hosts allow = 202.158.193.32/255.255.255.224
# Allow anyone to authenticate, we don't offer services
security = share
passdb backend = guest
unix password sync = no
invalid users = root
# We are the master WINS server
local master = yes
domain master = yes
preferred master = yes
os level = 65
domain logons = no
wins support = yes
# No DNS proxy
dns proxy = no
name resolve order = lmhosts wins
# Supply time
time server = yes
# UTC+9:30
time offset = 570
# No default services
load printers = no
```