



## Praktikum RouterLab SS 2009 Work Sheet 7: Customer Access

This Worksheet covers multiple services starting from vlan tags, pppoe connections to radius authentication. You will focus in the scenario to setting up your Linksys WRT54G to get internet access via pppoe. Furthermore you should be able to run your own pppoe server that uses the common Radius authentication service and your Linksys should be the client, willing to get access.

Have a closer look to the Figure 1 and the shown network setup. Multiple services that we provide for you are running on **loadgen105**, which is connected to the switch port Gi0/21 for ham and Gi0/22 for muc switch **sc1**, respectively. This interface needs to be used in 802.1q trunk mode throughout the assignment. It is your task to configure your switch **sc1** to correctly forward data to that port, using the appropriate VLAN tag. In the Lab room (first floor TEL) you will find a red and a yellow ethernet cable taped on the first desks. Like you can see from Figure 1, the cables give a direct layer-2 link into to SC-1.

Get your WAN port of that Linksys device connected to one of those ethernet cables. You should furthermore attach a client computer (such as your notebook) to the WRT. Further more you need to establish a connection between the appropriate port of switch **sc1** to be able to reach **loadgen105**.

You can configure a monitor port on a router. Here is an example:

```
monitor session 1 source interface Gi0/x
monitor session 1 destination interface Gi0/x+1
```

This will duplicate all traffic going through Port x to Port x+1. You could now run a tcpdump on the machine connected to Port x+1, and see everything that is going on Port x. You could use an extra loadgen for the monitoring.

Table 1: Assignment of devices to groups

Gruppe	Ham-Cloud	Muc-Cloud
Router	ham-rj1	muc-rj1
Switches	ham-sc1	muc-sc1
Infrastructure IP range	10.1.0.0/16	10.2.0.0/16
Dialin IP range	101.1.0.0/16	101.2.0.0/16
DataCenter IP range	106.1.0.0/16	106.2.0.0/16
Loadgens	loadgen102,loadgen103	loadgen102, loadgen103

### Question 1: (10 Points) *Connect your device to our PPP-AC*

To have a working PPPoE client running on your Freifunk Firmware, please install the ipkg paket, which is on the teacher's WRT. Use within a SSH session: "ipkg install [http://10.10.10.254/pppoe/freifunk-pppoe-en\\_1.6.36\\_mipsel.ipk](http://10.10.10.254/pppoe/freifunk-pppoe-en_1.6.36_mipsel.ipk)".

Connect the WAN port (labelled "Internet") of your WRT to appropriate ethernet cable.

Configure **sc2** and **sc1** such that all traffic from your Linksys forwarded to **loadgen105**, VLAN 101.

Now your Linksys should be ready to establish a PPPoE session to the PPP-AccessConcentrator. Configure your Freifunk WRT via the web interface to connect to the "Internet" using PPPoE, username dialin, password dialin. The PPPoe session should be switched to "Keep alive".

Download the website <http://106.1.42.42> (<http://106.2.42.42>) to your Laptop.

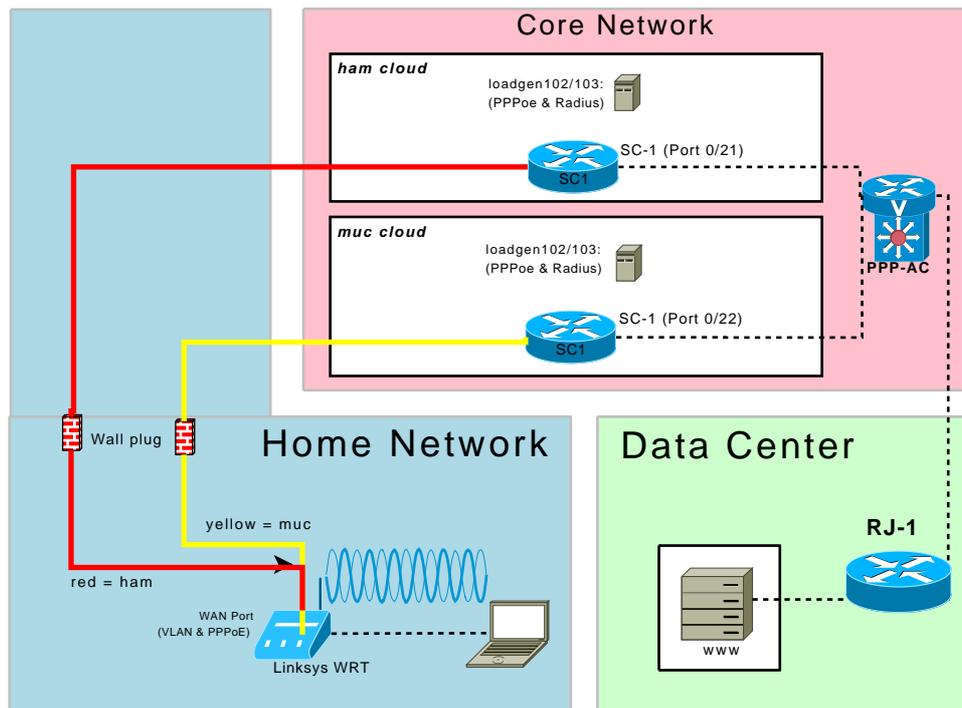


Figure 1: Topology for this assignment

**Question 2:** (15 Points) *Set up your own PPP-AC*

- (a) Set up a PPP-AC on your own loadgen. Install the ppp and pppoe packages using
- ```
apt-get install ppp pppoe
```

This package is configured through the files in `/etc/ppp`. The most important file is the `options` file. Make sure that the lines

```
mtu 1492
mru 1492
```

are in the file and not commented out. You also need to edit the `pap-secrets` file and add

```
user1 * "" *
```

Now generate the user "user1" with the

```
adduser
```

programm, and give it a valid password. Note: Due to the setup of the loadgens `adduser` needs the parameter "`-home /tmp`" to work properly.

You also need to create the file `/etc/ppp/pppoe-server-options` with the following content:

```
auth
require-pap
default-mru
default-asynctest
lcp-echo-interval 60
lcp-echo-failure 5
noipdefault
noipx
nodefaultroute
noproxyarp
noktune
netmask 255.255.255.255
logfile /var/log/pppd.log
```

Now reconfigure the switch to forward the VLAN 101 to your own loadgen102 or 103 only, and bring the respective VLAN-interface up without assigning it an IP Address and start the ppp daemon by entering

```
/usr/sbin/pppoe-server -F -T 60 -I <interface>.<vlan> -N 25 -C ppp-ac -S <service
name> -R 101.(1/2).0.1 -L 101.(1/2).0.254
```

Send one ping packet from your Laptop to the PPP-AC.

- (b) Briefly comment the contents of `/var/log/pppd.log`
- (c) Start a `tcpdump` on the interface and take a trace of the ppp session, including startup, the ping and teardown phase. Explain the purpose and contents of the different packets. Note that you can force the WRT to connect and disconnect in the *Status* tab of the config interface.
- (d) Explain what the `mtu/mru` lines in the configurations do. Explain why they are set to 1492.
- (e) What happens if you configure VLAN 101 to be forwarded to your loadgen10X *and* to loadgen105 at the same time? Take a trace of the PPPoE handshake by setting up a monitoring interface on the switch. Explain the `-S` option of `pppoe-server`. How do you have to configure your WRT to connect to our PPP-AC in this configuration?

### Question 3: (10 Points) *Configure RADIUS Support*

Install a RADIUS Server for proper authentication and accounting support. You need the `freeradius` and `radiusclient1` packages installed on your loadgen for that. You must also make sure that the line

```
127.0.0.1 localhost
```

is in your `/etc/hosts`.

The RADIUS Server is configured by the files in `/etc/freeradius/`. The file `radiusd.conf` contains the main configuration, fortunately it comes with sensible defaults and should not need any changes.

Generate a user named "user2" with password in `/etc/freeradius/users`. Note that you only need to set the `User-Password` attribute. Set a proper RADIUS secret in `/etc/freeradius/clients.conf`. Note: the secret is not used by the user, but by the ppp daemon to authenticate itself at the RADIUS Server.

Add the lines

```
plugin radius.so
plugin radattr.so
```

to the end of the `/etc/ppp/options` file to enable RADIUS Support in ppp.

Add a line for localhost in `/etc/radiusclient/servers` to let the pppd know the RADIUS secret.

Now you can start the RADIUS Server with

```
/etc/init.d/freeradius start
```

and restart your pppoe-server.

Now you should be able to connect the WRT to the PPP-AC using the “user2” account.

- (a) Run one tcpdump each on the loopback and the ethernet interface at the same time, while you establish a ppp connection. Describe what you see. How are the packets related? Hint: look at the timestamps.
- (b) Look at the ppp and RADIUS serverlogs: can you find related entries?

**Question 4:** (15 Points) *Route the dialin traffic to the datacenter*

The datacenter is simulated by a simple webserver running on loadgen105, VLAN 102, IP: 106.1.42.42/16 (106.2.42.42/16 for ham) . Connect rj1 with loadgen105 and configure it appropriately to provide a gateway to the rest of your network. The webserver expects its gateway on 106.1.42.1 (106.2.42.1).

Connect rj1 and your PPP-AC, and make sure that they exchange the routes to the PPP customers and the datacenter via OSPF. Submit a topology map that shows the assigned IP addresses and used VLANs. You’ll have to setup quagga on your loadgen10x for that. By default, Linux machines do not forward IP packets. To enable IP forwarding, use the following command:

```
echo 1 > /proc/sys/net/ipv4/ip_forward
```

- (a) Map the topology of Figure 1 to your devices. Assign VLAN IDs, IP Addresses and whatever else may be needed.
- (b) Download the website <http://106.1.42.42> (<http://106.2.42.42>) to your Laptop.
- (c) After downloading this website look in `/var/log/freeradius/radacct/127.0.0.1/detail-*`. Find the two blocks that correspond to one session. Can you think of a reason why German ADSL sessions are forcibly disconnected after 24 hours? Remember: When that system was build most accounts where billed by traffic volume.

**Submission details: read the FAQ**

[http://www.net.t-labs.tu-berlin.de/teaching/ss09/RL\\_labcourse/faq.shtml](http://www.net.t-labs.tu-berlin.de/teaching/ss09/RL_labcourse/faq.shtml)

Submit the following:

- The physical topology with used *routers*, *switches*, *loadgens* and assigned IP addresses.
- All configuration inputs on routers, switches and loadgens (no trials, only the final ones!), except for the WRT configuration.
- The outputs of the tcpdump, pppoe-server, freeradius programs, the logfiles of these programs, together with the explanations you were asked.

**Due Date: July 21th, 2009, 08:00am**