HOWTO
–
BANDWIDTH MANAGEMENT FOR ADSL WITH OPENBSD

OPENBSD 4.6 BASED ROUTER WITH BANDWIDTH MANAGEMENT
FOR PPPOE-BASED INTERNET CONNECTIONS LIKE ADSL

INTRODUCTION

DISCLAIMER

Following this Howto, you will loose all data on the target systems harddisk drive. For this and all other things that may be going wrong, the author is not responsible. The only one responsible for what you are doing, are you.

THIS HOWTO IS ABOUT…

MORE COMMON

Building an OpenBSD based router for a small flat-sharing community with four residents. The router should manage the available bandwidth fairly between the paying users and their guests. For the residents it should be possible to use incoming ports for services like Skype or Emule.

The Howto basically addresses IT-Professionals with a rough idea what OpenBSD is about.

MORE TECHNICAL

Building an OpenBSD based router for PPPOE-based internet connections including bandwidth management for four users and additional guests. The router will be prepared with static incoming port forwarding for all four users to a fixed range from the IP addresses 192.168.0.10 to 192.168.0.13. Also users, especially guests, can receive dynamic IP addresses through DHCP without port forwarding out of the range 192.168.0.100 to 192.168.0.200. The routers internal interface will be determined to 192.168.0.1.

This Howto assumes an i386 system with two network cards and one harddisk installed, which will be totally used for the new OpenBSD system. For the Howto to completely fit with the described examples OpenBSD 4.6 is needed, but it will work with some adaptations with OpenBSD 4.5 to 3.7 and hopefully future releases of OpenBSD.

WHAT THIS HOWTO IS NOT ABOUT…

The Howto is no OpenBSD beginners guide to a highly secured system. And it will not explain the world of OpenBSD.

At second it will not disclaim to guide you to the most stable and hardened OpenBSD system ever build. In fact this Howto does not refer to any OpenBSD hardening possibilities at all (like removing unused parts from the kernel, unnecessarily running daemons, …).

NEW VERSIONS

When a new version of this document is available, you will find it at: http://www.benjaminheckmann.de/howto/

INSTALL YOUR OPENBSD SYSTEM

PREPARATIONS: HARDWARE AND INSTALL-CD

Prepare your systems hardware as you need. At least you should have:

- Two Network Cards (One for the Internet Connection, the other for your Local Area Network)
- One Hard Disk Drive with at least 5 GB capacity (recommended, to be able to update your installation)
- Bootable CD-ROM drive
- The other stuff (like a CPU, memory and …; for further details see http://www.openbsd.org/faq/faq1.html#Platforms)

Afterwards install your OpenBSD depending on your needs. Recommended install sets for this Howto:

- base4x.tgz
- bsd
- comp4x.tgz
- etc4x.tgz
- man4x.tgz

Also it is recommended to provide the content of the packages for future OpenBSD Updates:

- src.tar.gz
- sys.tar.gz

Also suggested: create a bootable CD using the "floppy4x.fs" as your 1,44 MB floppy image and store all the above mentioned files onto.

See http://www.openbsd.org/faq/faq4.html, if you need some advice to prepare your OpenBSD installation media.

INSTALLING THE BASIC OPENBSD SYSTEM

INITIALIZING INSTALLATION

Boot your system from the prepared bootable CD with your preferred install sets.

- Select "i" for install
- As your "kbd(8) mapping" you may want to select your keyboard layout type, e.g. for a German layout "de"
- Name your system

NETWORK SETUP

- You want to initialize the first provided default adapter “<dev1>”
    - As IPv4 address enter “192.168.0.1”
    - As netmask enter the default “255.255.255.0”
- Next you do not want to configure the second provided default adapter “<dev2>” by entering “done”
- Default IPv4 route is “none”
- Enter your domain name
- Select “127.0.0.1” as your dns server
- Select default “n” for no further network configuration

BASIC CONFIGURATION

- Enter your root account password twice
- Select default “y” to start the SSH daemon
- Select default “n” not to start the NTP daemon
- You do not expect to run a X window system, so select “n”
- Select default “n” not to change the default console
- Choose “n” to not setup a user

DISK SETUP

- Select your harddisk drive, by choosing the default (“wd0” or “sd0”, which depends on your type of hardware)
- Select “y” to use all of the harddisk for OpenBSD
- Keep auto-allocated disk layout

BASIC INSTALLATION

- Select “cd” as the location of your OpenBSD sets
- Accept default “cd0” as the CD-ROM location (or in your case any other drive)
- Select “/” as pathname to your OpenBSD sets (or in your case any other path on your CD)
- “y” ignore the missing INSTALL.i386 textfile and use sets anyway
- As all sets are selected by default, enter “done” to accept
- Select default “y” to install the sets
- Ask for other set locations, enter “done”

- Choose your timezone, e.g. for a German system “Europe/Berlin”
- Enter “reboot” to restart your new OpenBSD system

See http://www.openbsd.org/faq/faq4.html, if you need some more advice for the OpenBSD installation.

PROVIDE OPENBSD SOURCES

After booting your new OpenBSD system, log in, mount your CD-ROM and extract the OpenBSD sources for future updates in “/usr/src“. This will take **at least 2 GB disk space in “/usr/src”**, so be prepared.

SHELL

```
mount_cd9660 /dev/cd0c /mnt
cd /usr/src
tar xvzf /mnt/src.tar.gz
tar xvzf /mnt/sys.tar.gz
```

CONFIGURE BASIC ROUTER SERVICES

AUTOMATIC SERVICE STARTUP PREPARATIONS

After the basic OpenBSD system is set up, configure the basic router services. First activate IP Forwarding in the kernel. While editing “/etc/sysctl.conf” also activate the routing of GRE packages for PPTP VPN tunnels.

/ETC/SYSCTL.CONF

```
...
net.inet.gre.allow=1
net.inet.ip.forwarding=1
...
```

Then allow the firewall to start in “/etc/rc.conf.local”. Also activate the nameserver, timeserver, ftp proxy and DHCP server. And as we are already there: deactivate quotas, inetd and sendmail, as we will not need them.

/ETC/RC.CONF.LOCAL

```
named_flags=""
ntpd_flags=""
dhcpd_flags=""
ftpproxy_flags=""
sendmail_flags=NO
inetd=NO
check_quotas=NO
```

Edit your crontab to deactivate the sendmail cronjob.

SHELL

```
crontab -e
```

CRONTAB

```
...
#*/30   *       *       *       *       /usr/sbin/sendmail -L sm-msp-queue -Ac -q
...
```

NETWORK SERVICE CONFIGURATIONS

All services are prepared for their autostart. Now each of them needs to get configured before starting it. First prepare the nameserver by creating the file "/var/named/named.boot".

/VAR/NAMED/NAMED.BOOT

```
options forward-only
forwarders <ip1> <ip2> <...>
```

Where <ip1>, <ip2> and so on has to be replaced by at least one of your providers official name servers. For the German provider Arcor you could use these four IPs "145.253.2.11 145.253.2.75 195.50.140.114 195.50.140.252", for example.

Also check the configuration in "/etc/resolv.conf".

/ETC/RESOLV.CONF

```
lookup file bind
nameserver 127.0.0.1
```

Then prepare the timeserver to get the accurate time. This is useful, if you wish to use automated tasks, e.g. for updating your OpenBSD and also if you provide the accurate time to your network clients. Edit the file "/etc/ntpd.conf" and initially set the accurate time (if you already got internet connectivity).

/ETC/NTPD.CONF

```
...
listen on *
servers pool.ntp.org
...
```

SHELL

```
rdate -ncv pool.ntp.org
```

Now be ready to edit "/etc/dhcpd.conf" to configure the DHCP server. Here we assume the internal interface of this router got the IP address 192.168.0.1 and the DCHP clients should get IP addresses from the range 192.168.0.100 to 192.168.0.200.

/ETC/DHCPD.CONF

```
...
shared-network LOCAL-NET {
        option  domain-name "wg.local";
        option  domain-name-servers 192.168.0.1;

        subnet 192.168.0.0 netmask 255.255.255.0 {
                option routers 192.168.0.1;
                option time-servers 192.168.0.1;

                range 192.168.0.100 192.168.0.200;
        }
}
...
```

After all the PPPOE connection to your internet service provider has to be established. This is done via creating the file "/etc/hostname.pppoe0" and "/etc/hostname.<dev2>".

/ETC/HOSTNAME.PPPOE0

```
inet 0.0.0.0 255.255.255.255 0.0.0.1 pppoedev <dev2> \
      authproto pap authname <user> authkey <password> up
!/sbin/route add default 0.0.0.1
```

/ETC/HOSTNAME.<DEV2>

```
up
```

Just replace the string <dev2> with your network cards device name for one of your cards, also replace <user> and <password> with your account data from your provider.

FIREWALL CONFIGURATION WITH BANDWIDTH MANAGEMENT INCLUDED

Now to get to the core of the matter: the firewall ruleset with its bandwidth management rules. To implement some rules for your routed traffic edit the file "/etc/pf.conf".

PART 1: DEFAULT SETTINGS FOR PF

First define some basics, like the interfaces as macros, known user hosts, reserved user port ranges, bandwidth, some network address sets and some commonly used ports you want to use in your ruleset. Then define the default block policy, your logging interface and skip all traffic on the internal interfaces.

Don't forget to insert your network cards device name from the currently unused card instead of the string <dev1> and your upstream and downstream bandwidth. Fill in your bandwidth size for <upstream> and <downstream> in kilobits **(! bits, not bytes !)**. For example for a standard DSL2000 line in Germany you would use: 192Kb for upstream and 2048Kb for downstream.

/ETC/PF.CONF → PART 1

```
### MACROS & TABLES ###
#
#Define all interfaces
#
if_ext="pppoe0"
if_int="<dev1>"

#
#Define favoured client hosts
#
host_usr1="192.168.0.10"
host_usr2="192.168.0.11"
host_usr3="192.168.0.12"
host_usr4="192.168.0.13"

#
#Define reserved client port ranges
#
ports_usr1="1000:1099"
ports_usr2="1100:1199"
ports_usr3="1200:1299"
ports_usr4="1300:1399"

#
#Define available bandwidth
#
bnd_upstream="<upstream>"
bnd_downstream="<downstream>"

#
#Define privileged network address sets
#
nets_priv = "{ 127.0.0.0/8 192.168.0.0/16 172.16.0.0/12 10.0.0.0/8 }"
```

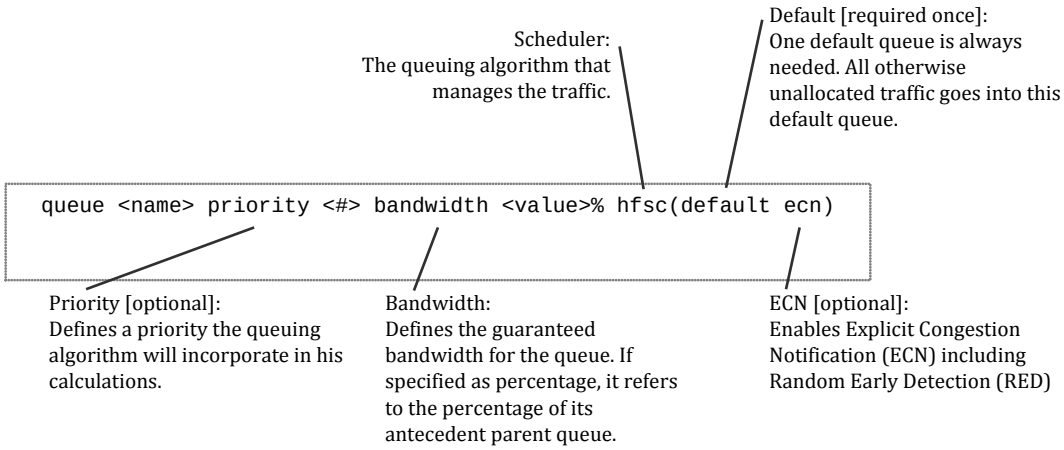
```
#
#Define ports for common internet services
#
ports_web = "{ 80 8080 443 25 110 143 993 995 }"

### OPTIONS ###
#
#Default behaviour
#
##Define default response for block filters
set block-policy drop
##Define statistics logging on
set loginterface $if_ext
##Ignore traffic on internal interfaces
set skip on lo
```

PART 2: THE QUEUING PHASE I

Bandwidth management consists of two phases: In phase one all queues will be defined, so we have something to sort your traffic in.

QUEUING BASICS

Let's take a short look at how queues are defined:



Note: With the hfsc-Scheduler unassigned or unused bandwidth is always split up fairly between all currently active queues, e.g. if just two users are active and they both demand full bandwidth, each of them will get 50% of the whole bandwidth. So at least each user gets what is defined in his queues plus additionally his fair part of all the unused bandwidth currently available from other queues.

If you are more deeply interested in how queuing works, take a look at http://www.openbsd.org/faq/pf/queueing.html and the pf.conf manual pages under http://www.openbsd.org/cgi-bin/man.cgi.

PARENT QUEUES

Let's start with the outgoing and incoming parent queues. Note: **It is technically only possible to manage traffic on its way out of the router.** So we have to manage the outgoing traffic on the external interface (because here this traffic leaves towards the internet). And according to this, we have to manage the incoming traffic on the internal interface (because here this traffic leaves towards your local area network).

Define the queues using the hfsc scheduler. Additionally declare your first line of child queues. In our case we define one default queue and four user queues, each for incoming and outgoing traffic.

CHILD QUEUES

After the parent queues are ready, the individual child queues are planned. Basically each child queue consists of three subqueues. One subqueue for the child default traffic, one for the priorized traffic to often used ports and another subqueue for highly priorized traffic like TCP acknowledges.

/ETC/PF.CONF → PART 2

```
### QUEUEING ###
#
#Define parent queues
#
##Define upstream parent queue
altq on $if_ext hfsc bandwidth $bnd_upstream queue { up_def up_usr1 up_usr2 up_usr3 up_usr4 }
##Define downstream parent queue
altq on $if_int hfsc bandwidth $bnd_downstream queue { dn_def dn_usr1 dn_usr2 dn_usr3 \
      dn_usr4 }

#
#Define upstream child queues
#
##Define default upstream queue
queue up_def bandwidth 20% { up_def_def up_def_web up_def_quick }
 queue up_def_def priority 1 bandwidth 50% hfsc(default ecn)
 queue up_def_web priority 3 bandwidth 25% hfsc(ecn)
 queue up_def_quick priority 6 bandwidth 25% hfsc(ecn)
##Define User1 upstream queue
queue up_usr1 bandwidth 20% { up_usr1_def up_usr1_web up_usr1_quick }
 queue up_usr1_def priority 2 bandwidth 50% hfsc(ecn)
 queue up_usr1_web priority 4 bandwidth 25% hfsc(ecn)
 queue up_usr1_quick priority 7 bandwidth 25% hfsc(ecn)
##Define User2 upstream queue
queue up_usr2 bandwidth 20% { up_usr2_def up_usr2_web up_usr2_quick }
 queue up_usr2_def priority 2 bandwidth 50% hfsc(ecn)
 queue up_usr2_web priority 4 bandwidth 25% hfsc(ecn)
 queue up_usr2_quick priority 7 bandwidth 25% hfsc(ecn)
##Define User3 upstream queue
queue up_usr3 bandwidth 20% { up_usr3_def up_usr3_web up_usr3_quick }
 queue up_usr3_def priority 2 bandwidth 50% hfsc(ecn)
 queue up_usr3_web priority 4 bandwidth 25% hfsc(ecn)
 queue up_usr3_quick priority 7 bandwidth 25% hfsc(ecn)
##Define User4 upstream queue
queue up_usr4 bandwidth 20% { up_usr4_def up_usr4_web up_usr4_quick }
 queue up_usr4_def priority 2 bandwidth 50% hfsc(ecn)
 queue up_usr4_web priority 4 bandwidth 25% hfsc(ecn)
 queue up_usr4_quick priority 7 bandwidth 25% hfsc(ecn)

#
#Define downstream child queues
#
##Define default downstream queue
queue dn_def bandwidth 20% { dn_def_def dn_def_web dn_def_quick }
 queue dn_def_def priority 1 bandwidth 50% hfsc(default ecn)
 queue dn_def_web priority 3 bandwidth 25% hfsc(ecn)
 queue dn_def_quick priority 6 bandwidth 25% hfsc(ecn)
##Define User1 downstream queue
queue dn_usr1 bandwidth 20% { dn_usr1_def dn_usr1_web dn_usr1_quick }
 queue dn_usr1_def priority 2 bandwidth 50% hfsc(ecn)
 queue dn_usr1_web priority 4 bandwidth 25% hfsc(ecn)
 queue dn_usr1_quick priority 7 bandwidth 25% hfsc(ecn)
##Define User2 downstream queue
queue dn_usr2 bandwidth 20% { dn_usr2_def dn_usr2_web dn_usr2_quick }
 queue dn_usr2_def priority 2 bandwidth 50% hfsc(ecn)
 queue dn_usr2_web priority 4 bandwidth 25% hfsc(ecn)
 queue dn_usr2_quick priority 7 bandwidth 25% hfsc(ecn)
##Define User3 downstream queue
queue dn_usr3 bandwidth 20% { dn_usr3_def dn_usr3_web dn_usr3_quick }
 queue dn_usr3_def priority 2 bandwidth 50% hfsc(ecn)
 queue dn_usr3_web priority 4 bandwidth 25% hfsc(ecn)
 queue dn_usr3_quick priority 7 bandwidth 25% hfsc(ecn)
##Define User4 downstream queue
queue dn_usr4 bandwidth 20% { dn_usr4_def dn_usr4_web dn_usr4_quick }
 queue dn_usr4_def priority 2 bandwidth 50% hfsc(ecn)
 queue dn_usr4_web priority 4 bandwidth 25% hfsc(ecn)
 queue dn_usr4_quick priority 7 bandwidth 25% hfsc(ecn)
```

Each user child queue is designed identically, only the default child queue uses less priority for its subqueues.

If you need to take an in-depth look to bandwidth management, try your luck with http://www.openbsd.org/faq/pf/queueing.html or http://www.openbsd.org/cgi-bin/man.cgi?query=pf.conf under chapter 'QUEUEING'.

PART 3: NECESSARY STUFF AS FILLING

Before we proceed with bandwidth management, we need some other stuff coming next. Define your network address translation **(don't forget the brackets around $if_ext)**. Also define redirections, if you need them. In our case, each client gets a fixed range of ports for less administrative overhead. Note: **Traffic addresses get translated or redirected first, then they are matched against the ruleset.**

Afterwards, define to reassemble your traffic travelling through the router. Than create the basic blocking rule for your firewall, as traffic is checked against the set of rules from top to bottom and the **last matching rule determines the fate of the package**.

/ETC/PF.CONF → PART 3

```
### TRANSLATION ###
#
#NAT for the external traffic
#
##Mask internal ip addresses with actual external ip address
nat on $if_ext from $if_int:network -> ($if_ext)
##Anchor for FTP proxy
nat-anchor "ftp-proxy/*"

#
#Redirections
#
##Redirect FTP clients to FTP proxy
rdr on $if_int proto tcp to port 21 -> 127.0.0.1 port 8021
##Anchor for FTP proxy
rdr-anchor "ftp-proxy/*"
##Redirect client ports
rdr on $if_ext proto { tcp udp } to ($if_ext) port $ports_usr1 -> $host_usr1
rdr on $if_ext proto { tcp udp } to ($if_ext) port $ports_usr2 -> $host_usr2
rdr on $if_ext proto { tcp udp } to ($if_ext) port $ports_usr3 -> $host_usr3
rdr on $if_ext proto { tcp udp } to ($if_ext) port $ports_usr4 -> $host_usr4

### TRAFFIC NORMALIZATION ###
#
#Filter traffic for unusual packets
#
match in all scrub (random-id)

### PACKET FILTERING ###
#
#Default filter, as only the last matching rule "wins"
#
block log all
```

PART 4: THE QUEUING PHASE II

Remember: Bandwidth management consists of two phases. After we defined our queues in phase one, here in phase two we use them to fill in the appropriate traffic.

To be able to assign traffic to queues, we need to known how traffic travels through the firewall. Stateful inspection is one thing to consider at this stage as it is the default behaviour of our packet filter. Keeping the state of a connection means, that the initial package of a connection matching a firewall rule is tracked. Any returning packages assumed to belong to this connection are passed without further evaluation. **So we can not assign returning stateful traffic to our queues.**

With this in mind, we start with the rules for the outgoing traffic on the external interface. At first, we're blocking traffic with addresses from privileged networks. Also we're allowing 'ping' requests to our router from the internet. Then we have to allow incoming traffic to our privileged port ranges for our special users (→ downstream). To keep it simple, all traffic travelling out of the external interface is allowed (→ upstream).

/ETC/PF.CONF → PART 4A

```
#
#Filter and queue external interface traffic
#
##Deny incoming or outgoing privileged network address sets
block in quick on $if_ext from $nets_priv
block out quick on $if_ext to $nets_priv
##Allow incoming ping request to router
pass in quick on $if_ext inet proto icmp to ($if_ext) icmp-type echoreq
##Allow incoming traffic to privileged port ranges for special users and keep state
pass in on $if_ext inet proto { tcp udp } to port \
      { $ports_usr1 $ports_usr2 $ports_usr3 $ports_usr4 }
##Assign upstream traffic to queues
pass out on $if_ext
```

We continue with the outgoing traffic, but this time on the internal interface. Note: **It is possible to assign traffic to queues on any interface and in any direction, but the queues themself can only take outgoing traffic for a specific interface**.

So first start to allow incoming traffic from the internal network (→upstream) and assign it to the appropriate default queue. Then we separate the packets to the often used ports for 'up_def_web' from the remainder 'up_def_def' and pipe them in their primed queue. Afterwards we sort out traffic to DNS servers and pipe them into the 'up_def_quick' queue. Additionally we configure PF to pipe highly priorized packets into 'up_def_quick' whenever we queue. In the same way we take care off all packets from our users and pipe them into the appropriate 'up_usr…' queues.

Afterwards care about the outgoing traffic on the internal interface (→ downstream). As before we sort out traffic to often used ports and DNS servers and pipe them into the 'dn_def_web' or 'dn_def_quick' queues. Afterwards we take care off packets addressed to our users and pipe them into the appropriate 'dn_usr…' queues. Additionally we also configure PF to pipe highly priorized packets into 'dn_def_quick'.

/ETC/PF.CONF → PART 4B

```
#
#Filter and queue internal interface traffic
#
##Allow common incoming traffic from internal network and assign to default upstream queue
pass in on $if_int no state queue(up_def_def up_def_quick)
pass in on $if_int proto { tcp udp } to port $ports_web no state \
      queue(up_def_web up_def_quick)
pass in on $if_int proto { tcp udp } to port domain no state queue up_def_quick
##Allow specific incoming traffic from special users and assign to upstream queues
pass in on $if_int from $host_usr1 no state queue (up_usr1_def up_usr1_quick)
pass in on $if_int proto { tcp udp } from $host_usr1 to port $ports_web no state \
      queue (up_usr1_web up_usr1_quick)
pass in on $if_int from $host_usr2 no state queue (up_usr2_def up_usr2_quick)
pass in on $if_int proto { tcp udp } from $host_usr2 to port $ports_web no state \
      queue (up_usr2_web up_usr2_quick)
pass in on $if_int from $host_usr3 no state queue (up_usr3_def up_usr3_quick)
pass in on $if_int proto { tcp udp } from $host_usr3 to port $ports_web no state queue
(up_usr3_web up_usr3_quick)
pass in on $if_int from $host_usr4 no state queue (up_usr4_def up_usr4_quick)
pass in on $if_int proto { tcp udp } from $host_usr4 to port $ports_web no state \
      queue (up_usr4_web up_usr4_quick)
##Allow common outgoing traffic from internal network and assign to default upstream queue
pass out on $if_int no state queue (dn_def_def dn_def_quick)
pass out on $if_int proto { tcp udp } from port $ports_web no state \
      queue (dn_def_web dn_def_quick)
pass out on $if_int proto { tcp udp } from port domain no state queue dn_def_quick
##Assign specific outgoing traffic to special users and assign to downstream queues
pass out on $if_int to $host_usr1 no state queue (dn_usr1_def dn_usr1_quick)
pass out on $if_int proto { tcp udp } from port $ports_web to $host_usr1 no state \
      queue (dn_usr1_web dn_usr1_quick)
pass out on $if_int to $host_usr2 no state queue (dn_usr2_def dn_usr2_quick)
```

```
pass out on $if_int proto { tcp udp } from port $ports_web to $host_usr2 no state \
      queue (dn_usr2_web dn_usr2_quick)
pass out on $if_int to $host_usr3 no state queue (dn_usr3_def dn_usr3_quick)
pass out on $if_int proto { tcp udp } from port $ports_web to $host_usr3 no state \
      queue (dn_usr3_web dn_usr3_quick)
pass out on $if_int to $host_usr4 no state queue dn_usr4_def
pass out on $if_int proto { tcp udp } from port $ports_web to $host_usr4 no state \
      queue (dn_usr4_web dn_usr4_quick)
```

PART 5: ANTISPOFFING RULES

Allow traffic to the ftp proxy server and, to prevent spoofing, create the required rules in your ruleset.

/ETC/PF.CONF → PART 5

```
#
#Anchor for FTP proxy
#
anchor "ftp-proxy/*"

#
#Deny spoofing
#
antispoof for $if_ext
antispoof for $if_int
```

CONFIGURE AUTOMATED UPDATES

CREATE SCRIPTS FOR AUTOMATION

THE CVS SYNCHRONIZATION SCRIPT

First create a script "/root/update_part1.sh" to synchronize your OpenBSD sources with the actual source tree. Change to your source tree directory, set the CVS configuration parameters, start CVS update process, prepare the source tree and log scripts invocation. Ensure that the CVS invocation parameter '-r' matches your OpenBSD version.

/ROOT/UPDATE_PART1.SH

```
#!/bin/csh
cd /usr/src
setenv CVS_CLIENT_PORT -1
setenv CVSROOT anoncvs@anoncvs.openbsd.org:/cvs
cvs -d$CVSROOT up -rOPENBSD_4_6 –Pd
rm -rf /usr/obj/*
cd /usr/src
make obj
cd /usr/src/etc && env DESTDIR=/ make distrib-dirs
date > /root/update_part1.log
```

Note: You will have to authenticate the CVS server upon first execution of the script. So run the script once by hand, before you use it within a cronjob.

THE KERNEL COMPILATION SCRIPT

Than create a script "/root/update_part2.sh" to compile a new kernel from your updated OpenBSD sources. Change to your source tree directory, prepare and start the compilation, exchange the current kernel, log scripts invocation and reboot OpenBSD.

/ROOT/UPDATE_PART2.SH

```
#!/bin/csh
cd /usr/src/sys/arch/i386/conf
/usr/sbin/config GENERIC
cd /usr/src/sys/arch/i386/compile/GENERIC
make clean && make depend && make
cd /usr/src/sys/arch/i386/compile/GENERIC
make install
date > /root/update_part2.log
reboot
```

Note: If you do not use an i386 platform, you should change the according directory paths.

ALL THE REST COMPILATION SCRIPT

Create a script "/root/update_part3.sh" to compile all other system parts from your updated OpenBSD sources. Change to your source tree directory and start the compilation, log scripts invocation and reboot OpenBSD.

/ROOT/UPDATE_PART3.SH

```
#!/bin/csh
cd /usr/src
make build
date > /root/update_part3.log
reboot
```

UPDATE APPLICATION PACKAGES SCRIPT

At least create a script "/root/update_part4.sh" to update installed OpenBSD application packages. Set the path to your preferred mirror server and execute the update command for the application packages.

/ROOT/UPDATE_PART4.SH

```
#!/bin/csh
setenv PKG_PATH ftp://ftp.openbsd.org/pub/OpenBSD/4.6/packages/i386/
pkg_add -ui -F update -F updatedepends
date > /root/update_part4.log
reboot
```

CONFIGURE AUTOMATED SCRIPT EXECUTION

Before we can execute the script, we have to set proper file permissions for all scripts.

SHELL

```
chmod ug+x update_part*.sh
```

Use the cron daemon to automate the script invocation. Edit your crontab to configure script automation.

SHELL

```
crontab -e
```

Invoke the "update_part1.sh" each first of a month at three o'clock a.m.. Accordingly invoke "update_part2.sh" each third of a month and on the fifth "update_part3.sh".

CRONTAB

```
...
0     3       1       *       *       /root/update_part1.sh
0     3       3       *       *       /root/update_part2.sh
0     3       5       *       *       /root/update_part3.sh
0     3       7       *       *       /root/update_part4.sh
...
```

FINISHING UP

Reboot your system to start all newly configured daemons.

ADDING ADDITIONAL TOOLS

Note: For this action your internet connection should be ready for usage.

If you like to improve the monitoring possibilities for PF, add pfTop to your installation. pfTop is a curses-based utility for real-time display of active states and rules for PF. Therefore install the current release of the pfTop packet form an OpenBSD mirror server.

SHELL

```
export PKG_PATH=ftp://ftp.openbsd.org/pub/OpenBSD/4.6/packages/i386/
pkg_add pftop-0.7p3.tgz
```

See http://www.openbsd.org/ftp.html, if you need an overview on current mirror servers for OpenBSD. And take a look at http://www.openbsd.org/4.6_packages/ for the current version of pfTop for your platform.

Note: If you do not use an i386 platform, you should change the according directory paths.

If you like to install more than one package, think about adding the PKG_PATH variable to your profile. So you will not need to specify this every time you are working with packages.

/ROOT/.PROFILE

```
...
PKG_PATH=ftp://ftp.openbsd.org/pub/OpenBSD/4.6/packages/i386/
export PKG_PATH
...
```

MONITORING PF

PFTOP

Show current usage of all queues	pftop -v queue

PFCTL

List usage of all queues	pfctl -vsq

TCPDUMP

Show current PF logging	tcpdump -n -e -ttt -i pflog0
Show PF logfile	tcpdump -n -r /var/log/pflog
Show current traffic on PPPOE-Interface	tcpdump -n -i pppoe0

FAQ

I HAVE GOT LESS USERS/ COMPUTERS AS THE TUTORIAL DESCRIBES?

Than you are perfectly ok with the defaults in the tutorial. Why? Because the queueing algorithem fairly spreads unused bandwidth between the existing users.

I HAVE GOT MORE USERS/ COMPUTERS AS THE TUTORIAL DESCRIBES?

Well, than hopefully you are an experienced computer administrator. Start to understand how the PF configuration in this tutorial works and rewrite it by adding more users and according queues and rules.

Do not ask me to do this for you, except your willing to pay for? ☺

WHAT ARE THOSE RESERVED CLIENT PORT RANGES GOOD FOR?

The reserved port ranges are for incoming ports as they are needed by applications like Emule or Skype. If you're running an application that needs to receive data from other applications directly, they often demand you to specify an incoming port they could use for this communication. For this, just take on of the preassigned ports from the reserved clients port range.

If you can't think of applications using incoming ports, you probably don't need this feature.

POSSIBILITIES FOR IMPROVEMENTS OF THIS HOWTO

In general: If you email your improvements, they can get part of the next version of this Howto.

PF RULES

Feel free to add some more macros to the PF ruleset.

CVS UPDATE MECHANISM

Feel free to describe a more efficient way for your OpenBSD update, especially to avoid compiling the sources, if there was no source update released. Or only compile this part of the sources that actually changed.

MORE USEFUL TOOLS

If someone misses an often used tool for this use case of OpenBSD, please feel free to give me some hint.

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