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- **Linux am Router**

mit einem einführenden Exkurs zu Open Source
Lizenzen.



- Open Source
 - History, Definition, Licenses
- OpenWrt
 - DHCP
 - NetFilter
 - Chillispot
 - OpenVPN
- Wireless Communities
 - Pico Peering Agreement

Open Source History



- 1984: GNU Project
 - GNU: **G**NU's not **U**nix
 - GNU Hurd Operating System
- 1985: Richard M. Stallman (MIT)
 - Free Software
- 1991: GNU/Linux
- 1998: Open Source Initiative (OSI)

Open Source Definition



1. Free Redistribution
2. Source Code
3. Derived Works
4. Integrity of The Author's Source Code
5. No Discrimination Against Persons or Groups
6. No Discrimination Against Fields of Endeavor
7. Distribution of License
8. License Must Not Be Specific to a Product
9. License Must Not Restrict Other Software
10. License Must Be Technology-Neutral

Open Source Licenses



- Apache License
- BSD License
- GNU General Public License (GPL)
- GNU Library or "Lesser" General Public License (LGPL)
- MIT License
- Mozilla Public License (MPL)
- X11 License

GNU General Public License



” The central idea of copyleft is that we give everyone permission to run the program, copy the program, modify the program, and distribute modified versions – but not permission to add restrictions of their own. ”

Richard M. Stallman

GPL Freedoms



- freedom to **run** software for any purpose
- freedom to **redistribute** software
 - same license applies to copied code
- freedom to **modify**
 - same license applies to modified code
 - modified code does not have to be published
- freedom to **copy, study, improve**

GPL Liabilities



- **source code** has to be provided (if requested)
- **no** licensing fee or royalty
- *"...includes any amount of gpl code in another program, that entire program becomes subject to the terms of the gpl."*
 - **viral** license

Compability of OS Licenses



License	may be used with closed source code	modifications have to be free	may be released under new terms
GPL	-	X	-
LGPL	X	X	-
MIT	X	-	-
Public Domain	X	-	X

Links



<http://opensource.org>

<http://opensource.org/osd.html>

<http://opensource.org/licenses>

<http://gnu.org>

<http://gnu.org/licenses/licenses.html>

An historic GPL violation



- 2003-06: Andrew Miklas et al. report Linksys to have violated the GPL (distribution of modified Linux-code without providing the source code)
- 2003-10: Linksys publishes the Linux kernel for the WRT54-G router.
- gpl-violations.org initiated by Harald Welte (NetFilter developer)
 - 2006-06: 100 finished cases, 100 % legal success
- 2004-01: OpenWrt



- a Linux distribution for embedded systems
- GPL
- plenty of ported (ipkg) software packages
 - DNS & DHCP
 - SSH
 - OSLR
 - chillispot
 - openvpn
 - ...

Links



GPL

<http://gpl-violations.org>

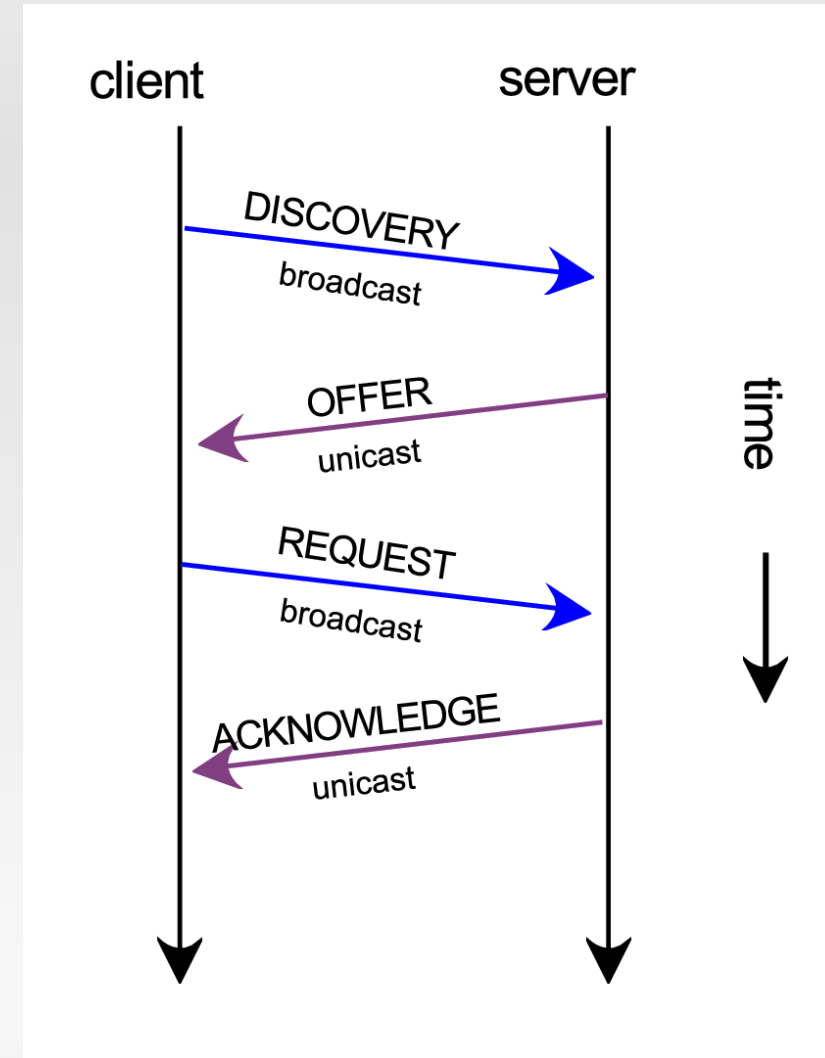
OpenWrt

<http://openwrt.org>

Dynamic Host Configuration Protocol (DHCP)



- DHCP client
 - MAC address of NIC
- UDP broadcast
- DHCP server
- automatic assignments
 - IP, netmask, gateway, etc.
- lease time



Netfilter/IPtables

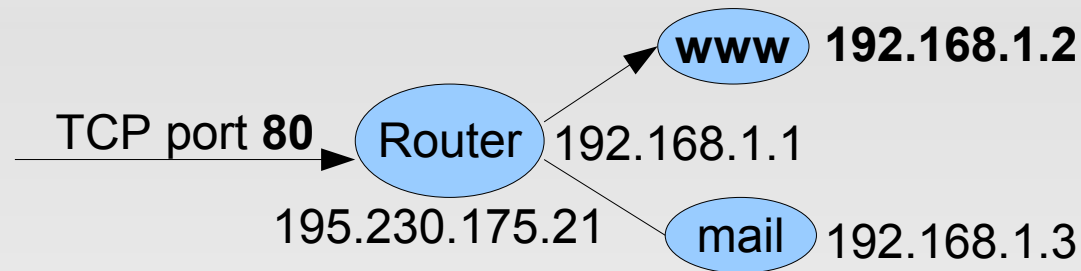


- Firewall (accept, drop, log)
- Routing (forward, DNAT, SNAT, masquerade)
- packet marking for Quality of Service
- GPL

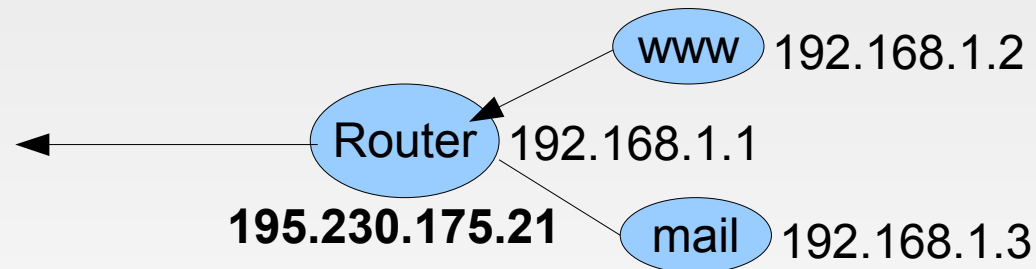
Netfilter/IPtables for routing



- Destination Network Address Translation



- Source Network Address Translation



Netfilter/IPtables



- Shell-Script, Shorewall, Firewall-Builders

File Edit View Insert Rules Tools Help

User Standard

Name

- Objects
- Services
- Firewalls
 - fw
 - eth1
 - eth0
 - lo
 - Policy
 - NAT
- Time

Num	Source	Destination	Service	Action	Time	Options	Comment
00	fw	Any	DNS	Accept	Any		firewall uses DNS server on Inet
01	Any	fw	DNS	Accept	Any		firewall serves as DNS server for LAN
02	Any	broadcast eth0	DHCP	Accept	Any		firewall serves as DHCP server for LAN
03	eth0	Any	DHCP	Accept	Any		firewall serves as DHCP server for LAN
04	Any	hostA	TCP smtp ftp	Accept	Any		mail and ftp server behind the firewall
05	fw	Any	ICMP ping request	Accept	Any		
06	LAN	fw	TCP ssh	Accept	Any		ssh access to firewall from internal LAN
07	Any	Any	Any	Deny	Any		'catch all' rule

Apply Undo



DHCP

<http://tools.ietf.org/html/rfc2131>

NetFilter/IPtables

<http://www.netfilter.org>

<http://shorewall.net>

<http://www.fwbuilder.org>



- turns an access point into a hotspot
- captive portal
 - redirects HTTP requests
 - web based login
 - uses a Radius server for
 - authentication
 - authorization
 - accounting
- GPL





- establishes encrypted tunnels between hosts
- GPL

Alternative to WPA, WEP,...

- Wireless Client = OpenVPN Client
- Wireless Router = OpenVPN Server

Links



<http://chillispot.info>
<http://openvpn.net>

Ad Hoc Wireless Network



- IP subnet
- MAC address
- wireless standard: WLAN 802.11
 - antenna
- mesh routing protocol:
 - Optimized Link State Routing protocol (OLSR)

Wireless Communities



- [FreiFunk.net](#) (Germany)
- [FunkFeuer.at](#) (Austria)
- [La Fédération France Wireless](#) (France)
- [nycwireless.net](#) (New York City, US)
- [ilesansfil.org](#) (Quebec, Canada)
- [Wireless Africa](#)
- ...

Pico Peering Agreement



1. Free Transit
2. Open Communication
3. No Warranty
4. Terms of Use
5. Local Amendments

” The PPA shall be implemented in data readable form following agreed standards in community network node data bases to facilitate automatic interconnection of nodes. ”



OSLR

<http://olsr.org>

<http://www.ietf.org/rfc/rfc3626.txt>

OpenWrt-Distributions

<http://freifunk.net>

<http://dd-wrt.com>

<http://openwrt.picopoint.com>

Pico Peering Agreement

<http://picopeer.net>