LES network als Firewall: pfSense, OPNsense und IPFire im Vergleich

@wefinet
Werner Fischer, Thomas-Krenn.AG

Webinar, 3. Mai 2017

THOMAS KRENN®

Allianz für Cyber-Sicherheit
Partner

LES network als Firewall

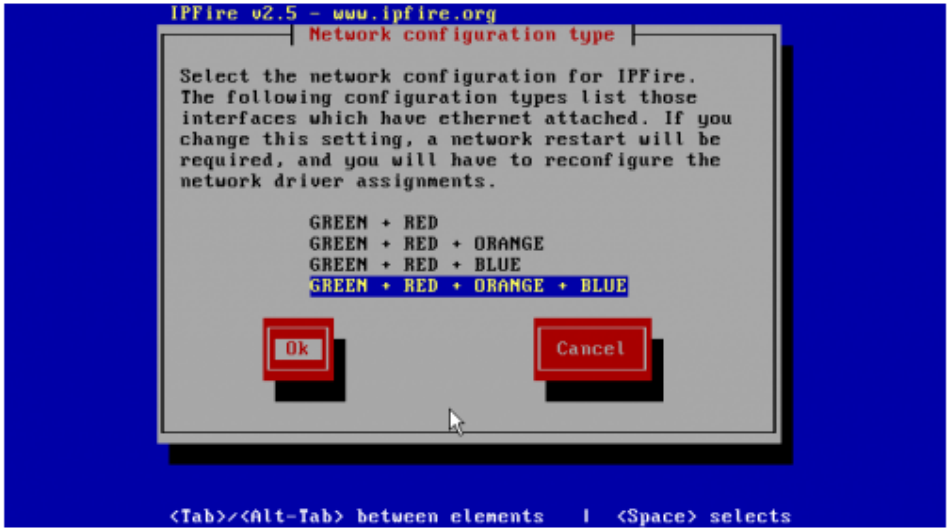
- Software: Open Source Firewall Lösungen im Überblick
- Hardware: LES network vorgestellt
- pfSense®, OPNsense® und IPFire am LES network
- Performance: Was bringt eine CPU mit AES New Instructions (AES-NI) für VPN?

pfSense

OPNsense®

	IPFire 2.19	pfSense® 2.3	OPNsense® 17.1
Basis	Linux® Kernel 3.14	FreeBSD® 10.3	FreeBSD® 11.0
Stateful Firewall	✔	✔	✔
Proxy Cache	✔	✔	✔
VPN	✔	✔	✔
IDS	✔	✔	✔
HA-Cluster		✔	✔
Multi-WAN		✔	✔
Layer 2 (transparent)		✔	✔
Zwei-Faktor-Auth			✔


IPFIRE

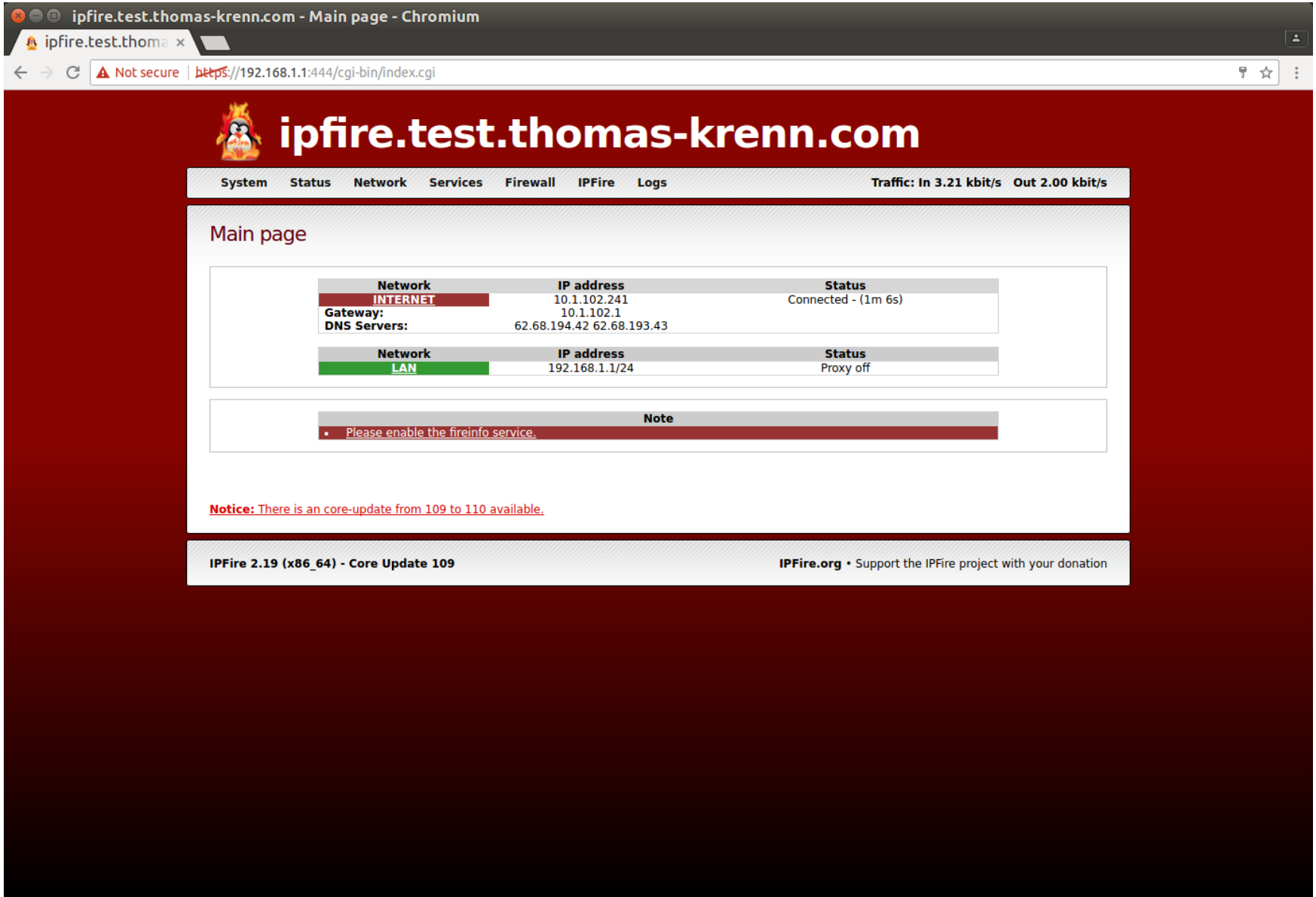


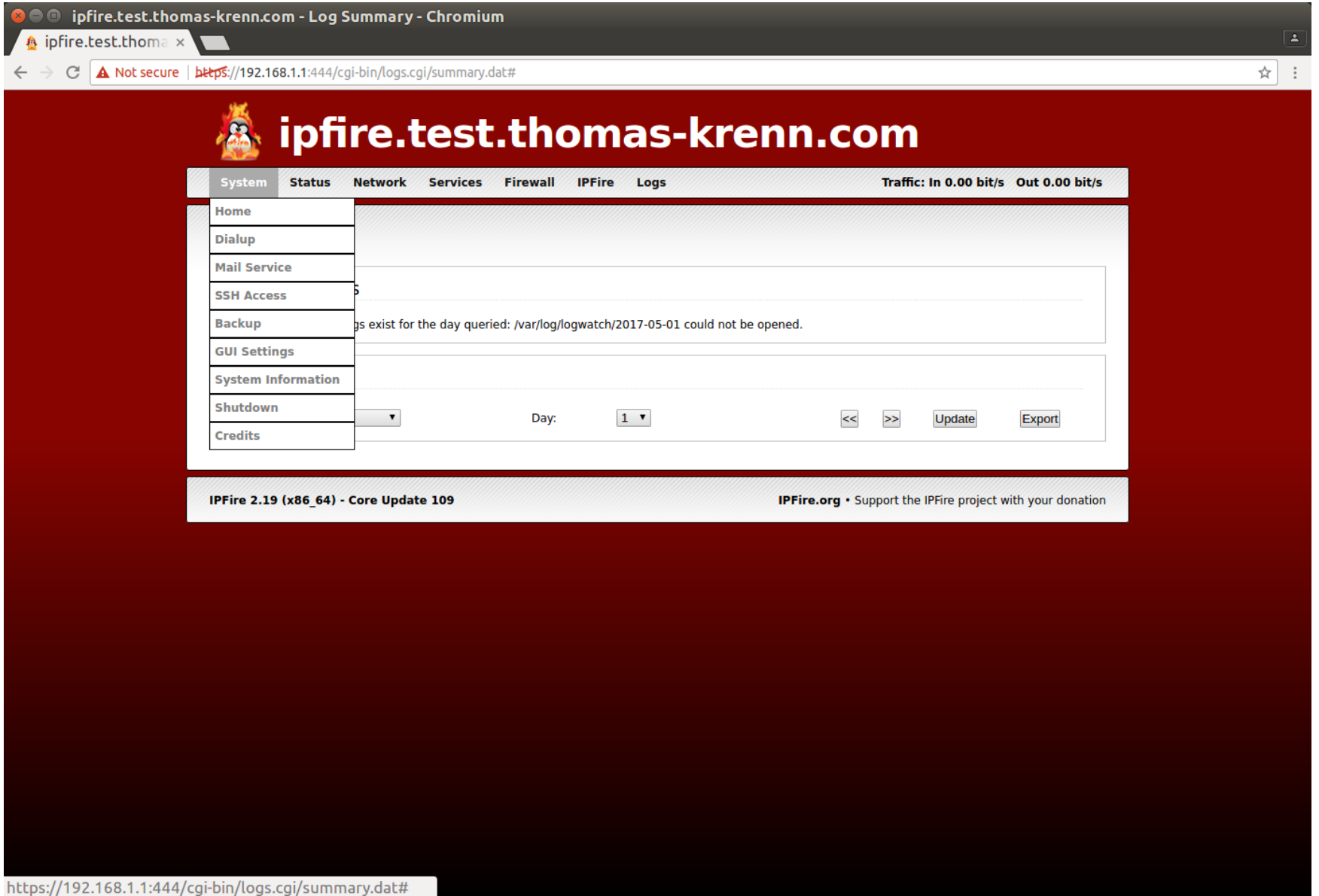
In a standard IPFire installation it is **Green** + **Red**, which means 2 Networks. Typically you have one network for your home computers, your **Green** network, and then an Internet connection for the other network, your **Red** network.

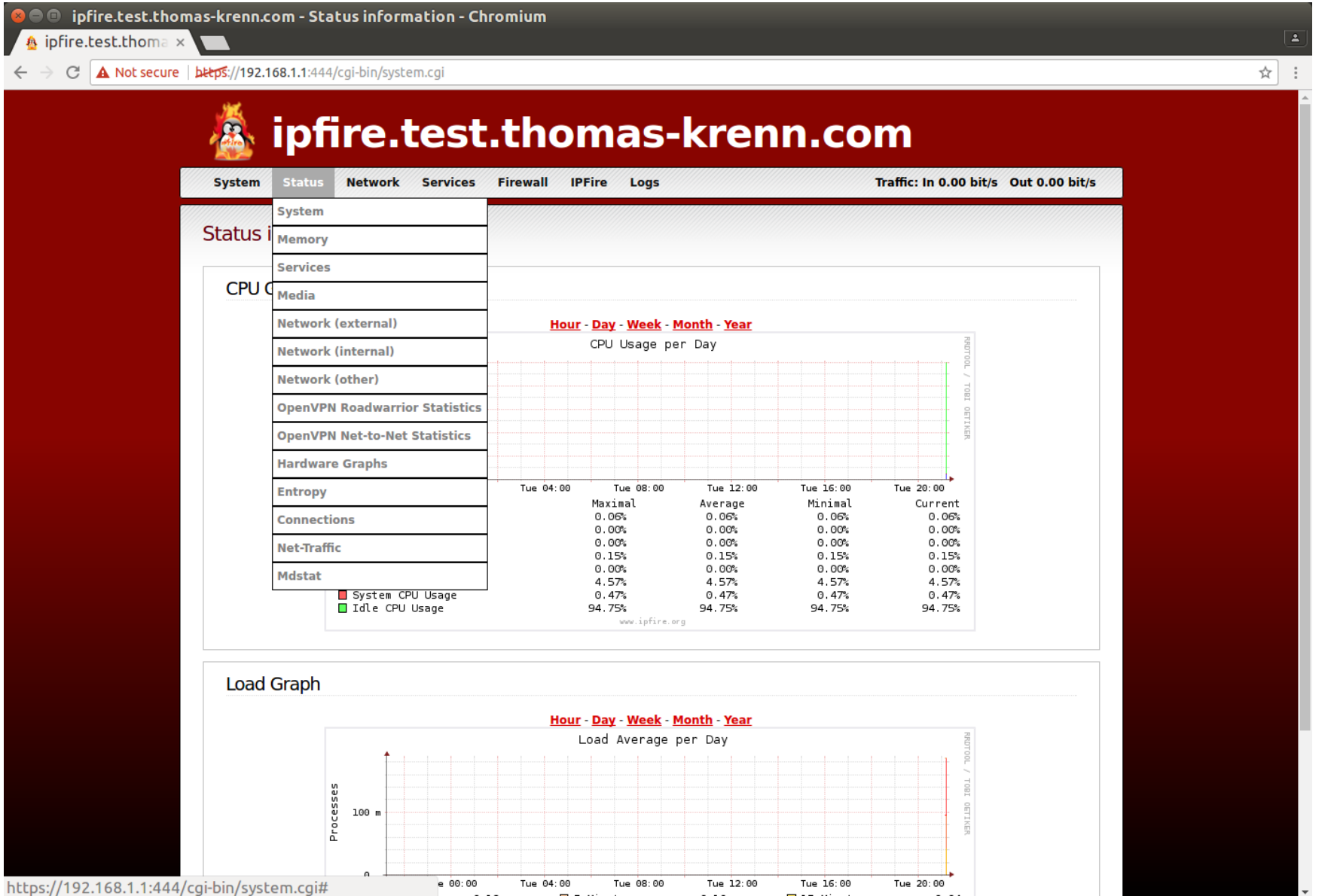
A maximum of 4 networks is possible - namely **Green**, **Blue**, **Orange** and **Red**.

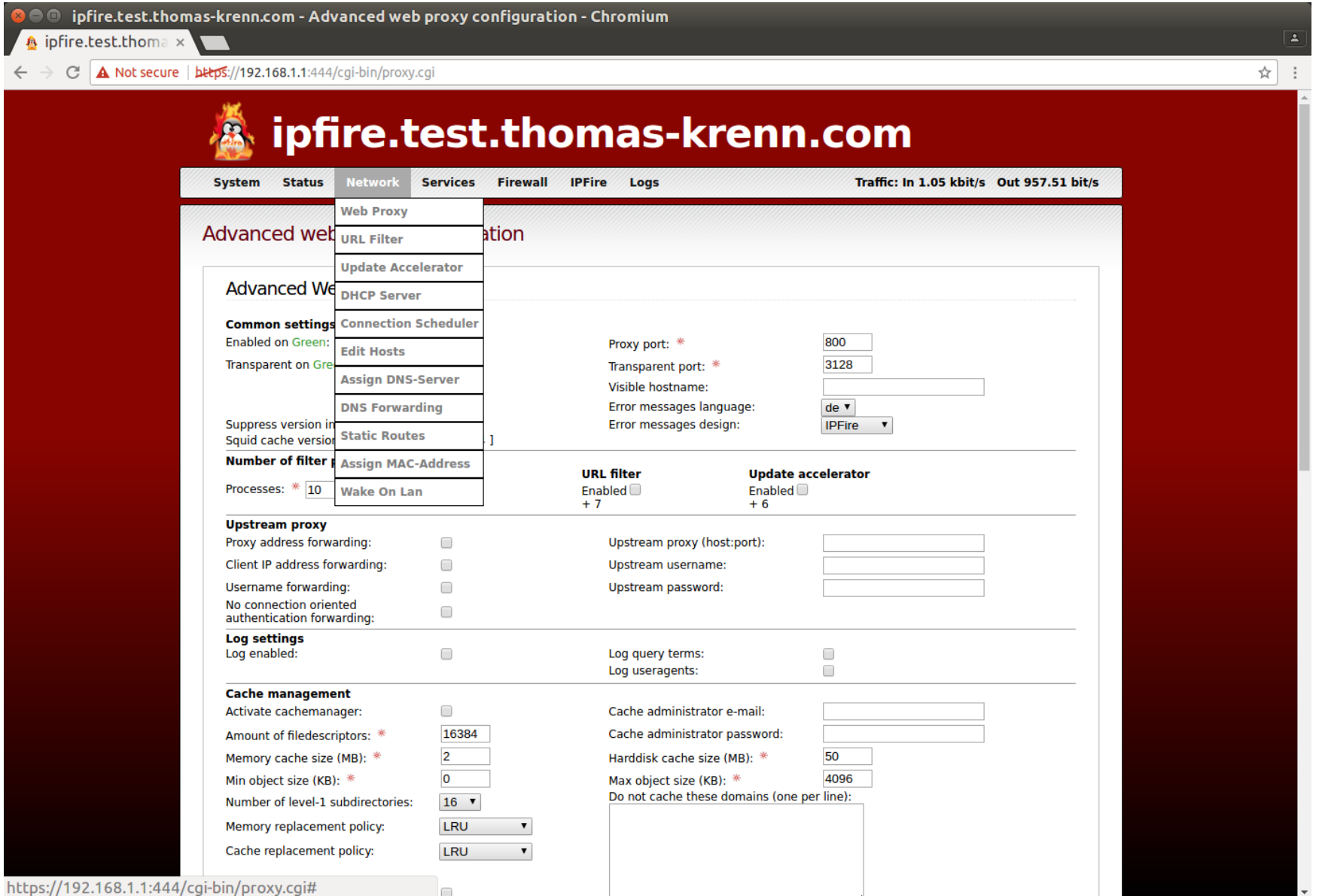
Red	WAN	External network, Connected to the Internet (typically a connection to your ISP)
Green	LAN	Internal/Private network, connected locally
Orange	DMZ	The DeMilitarized Zone, an unprotected/Server network accessible from the internet
Blue	WLAN	Wireless Network, A separate network for wireless clients

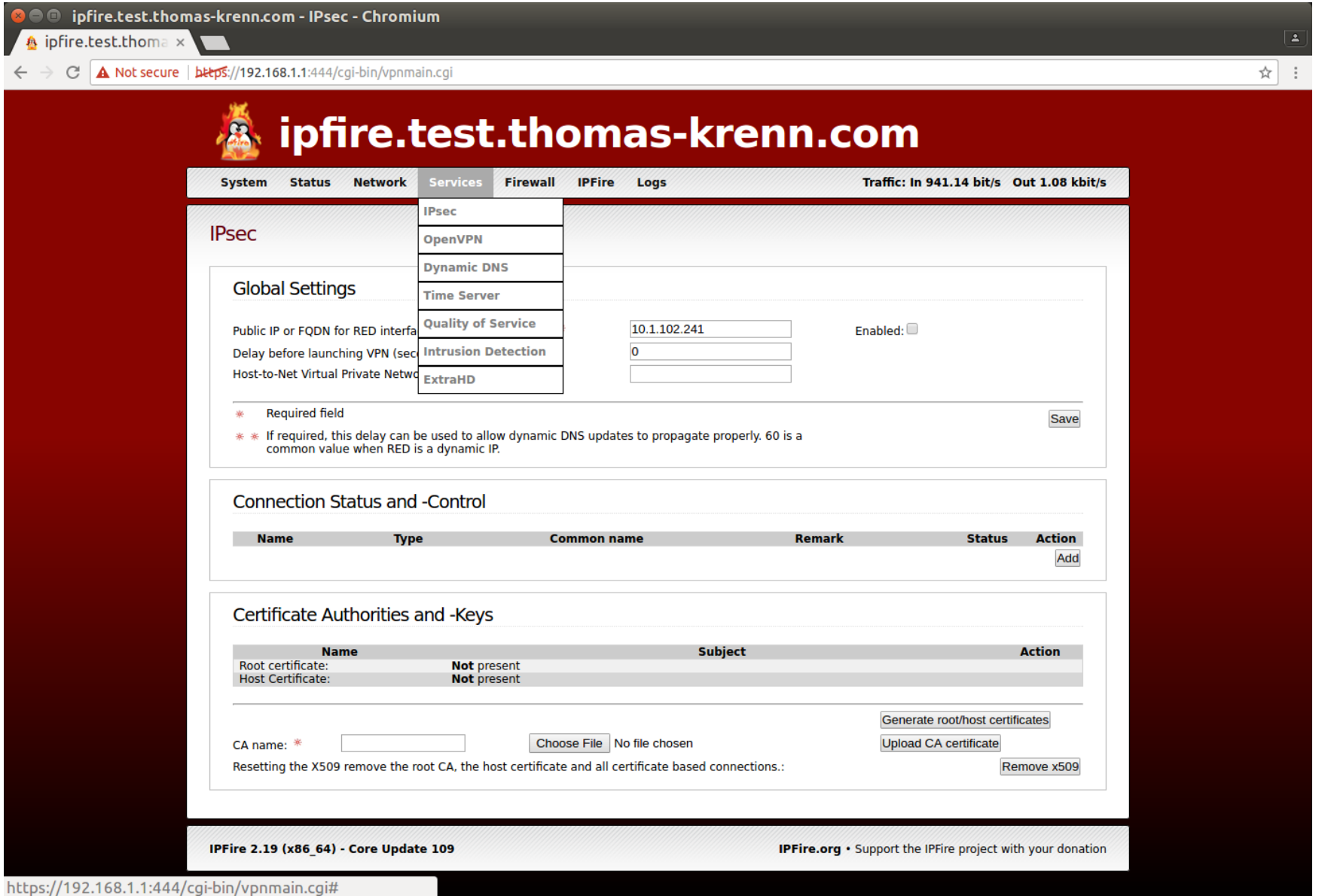
Quelle: http://wiki.ipfire.org/en/installation/step5

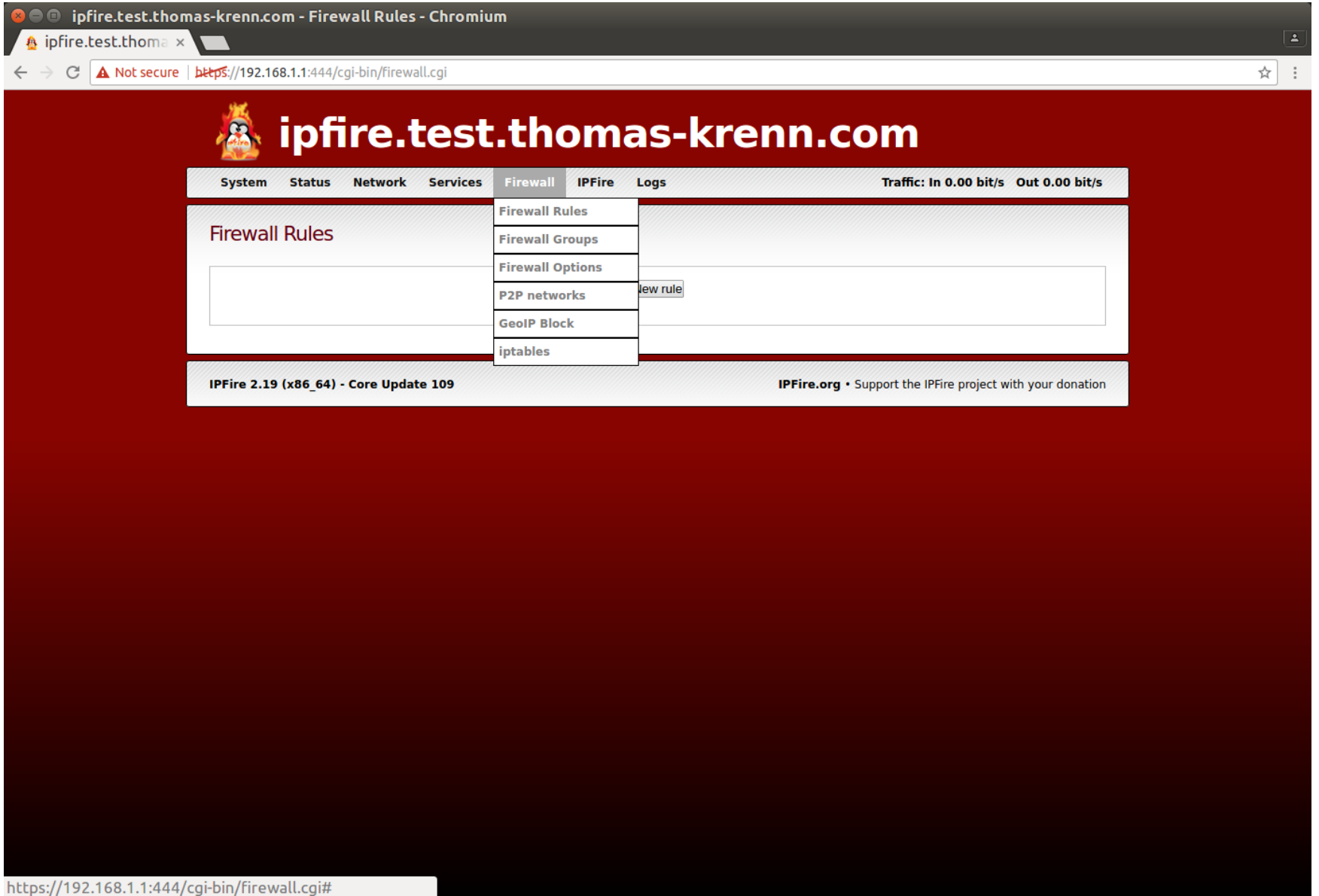

ipfire.test.thomas-krenn.com - Main page - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/index.cgi
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 3.21 kbit/s Out 2.00 kbit/s
Main page
Network
IP address
Status
INTERNET
10.1.102.241
Connected - (1m 6s)
Gateway:
10.1.102.1
DNS Servers:
62.68.194.42 62.68.193.43
Network
IP address
Status
LAN
192.168.1.1/24
Proxy off
Note
Please enable the fireinfo service.
Notice: There is an core-update from 109 to 110 available.
IPFire 2.19 (x86_64) - Core Update 109
IPFire.org • Support the IPFire project with your donation

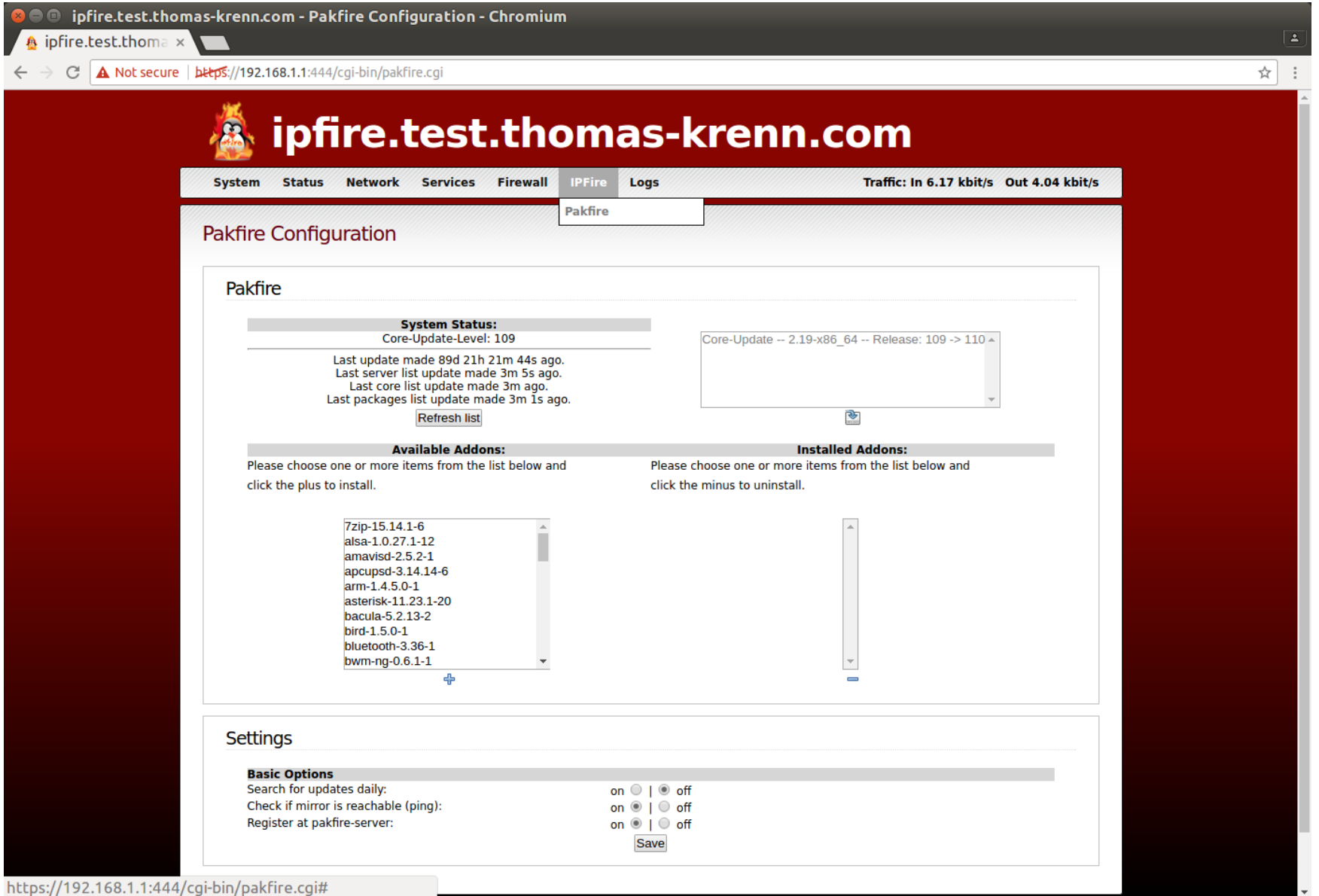

ipfire.test.thomas-krenn.com - Log Summary - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/logs.cgi/summary.dat#
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 0.00 bit/s Out 0.00 bit/s
Home
Dialup
Mail Service
SSH Access
Backup
GUI Settings
System Information
Shutdown
Credits
gs exist for the day queried: /var/log/logwatch/2017-05-01 could not be opened.
Day:
1
<<
>>
Update
Export
IPFire 2.19 (x86_64) - Core Update 109
IPFire.org • Support the IPFire project with your donation
https://192.168.1.1:444/cgi-bin/logs.cgi/summary.dat#

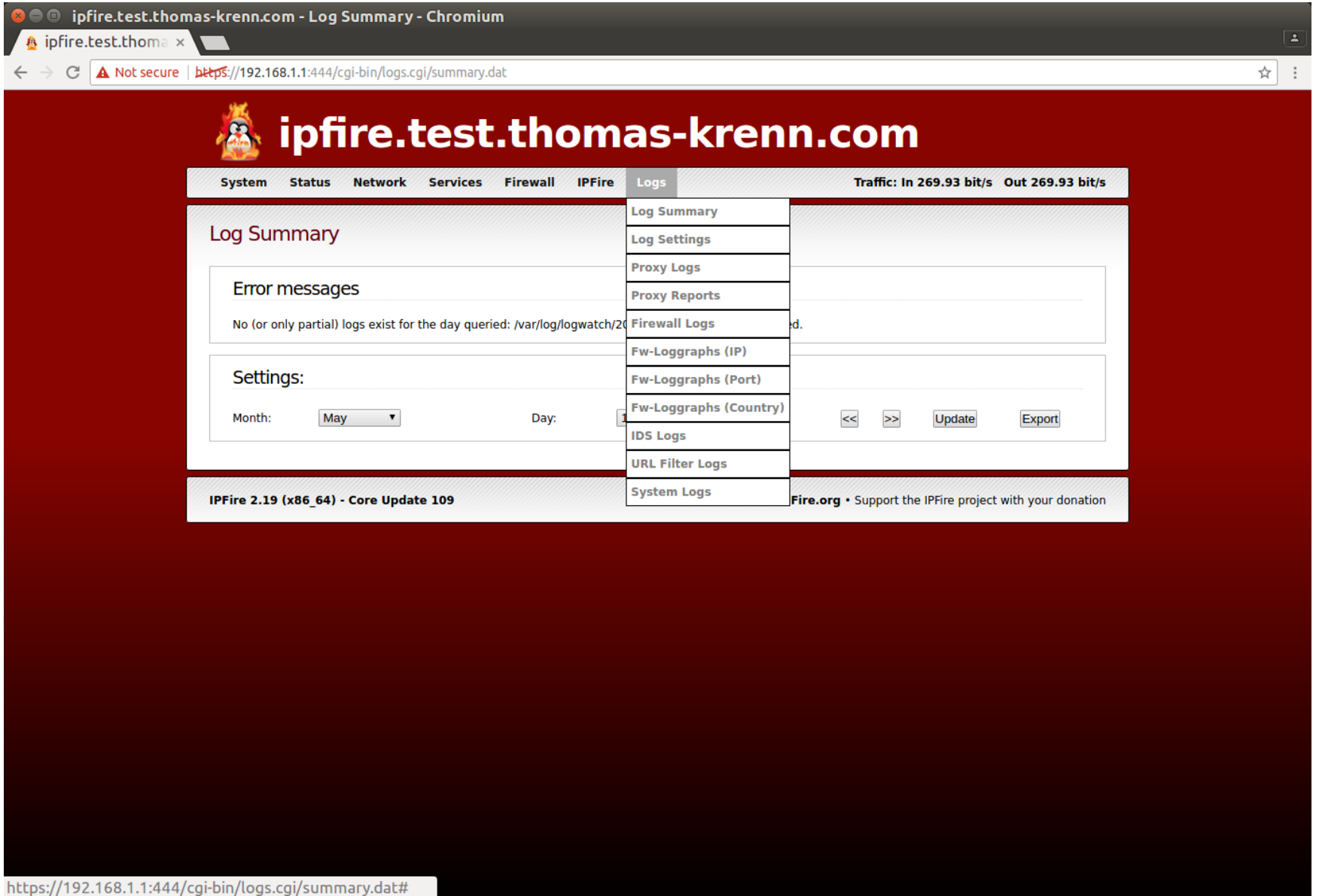

ipfire.test.thomas-krenn.com - Status information - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/system.cgi
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 0.00 bit/s Out 0.00 bit/s
System
Memory
Services
Media
Network (external)
Network (internal)
Network (other)
OpenVPN Roadwarrior Statistics
OpenVPN Net-to-Net Statistics
Hardware Graphs
Entropy
Connections
Net-Traffic
Mdstat
CPU
Hour - Day - Week - Month - Year
CPU Usage per Day
Tue 04:00
Tue 08:00
Tue 12:00
Tue 16:00
Tue 20:00
Maximal Average Minimal Current
0.06% 0.06% 0.06% 0.06%
0.00% 0.00% 0.00% 0.00%
0.00% 0.00% 0.00% 0.00%
0.15% 0.15% 0.15% 0.15%
0.00% 0.00% 0.00% 0.00%
4.57% 4.57% 4.57% 4.57%
0.47% 0.47% 0.47% 0.47%
94.75% 94.75% 94.75% 94.75%
System CPU Usage
Idle CPU Usage
www.ipfire.org
Load Graph
Hour - Day - Week - Month - Year
Load Average per Day
Processes
100 m
0
Tue 04:00
Tue 08:00
Tue 12:00
Tue 16:00
Tue 20:00
https://192.168.1.1:444/cgi-bin/system.cgi#

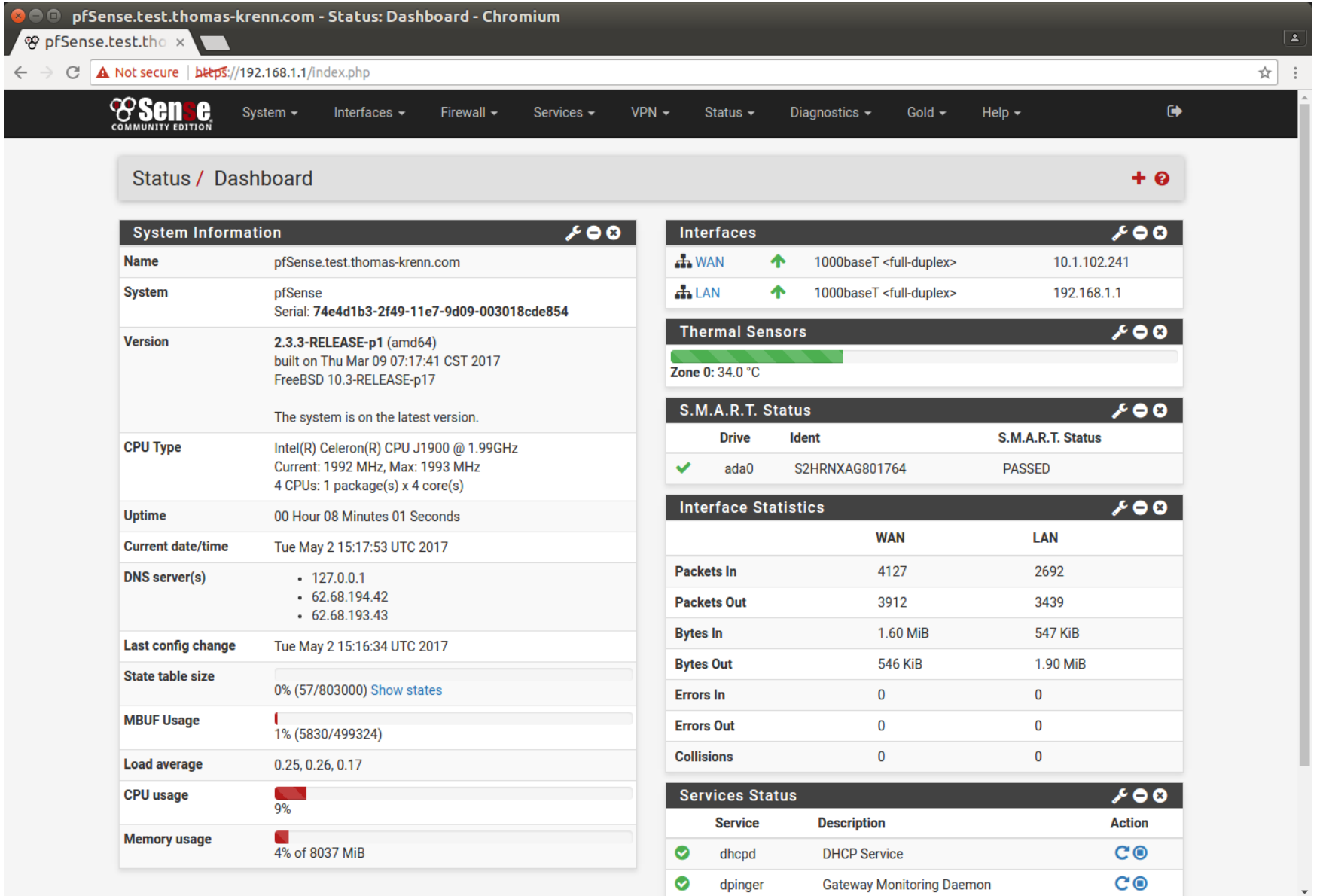

ipfire.test.thomas-krenn.com - Advanced web proxy configuration - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/proxy.cgi
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 1.05 kbit/s Out 957.51 bit/s
Web Proxy
URL Filter
Update Accelerator
DHCP Server
Connection Scheduler
Edit Hosts
Assign DNS-Server
DNS Forwarding
Static Routes
Assign MAC-Address
Wake On Lan
Advanced web ation
Advanced We
Common settings
Enabled on Green:
Transparent on Gre
Suppress version in
Squid cache versio
Number of filter
Processes: * 10
Proxy port: * 800
Transparent port: * 3128
Visible hostname:
Error messages language: de
Error messages design: IPFire
URL filter
Enabled
+ 7
Update accelerator
Enabled
+ 6
Upstream proxy
Proxy address forwarding:
Client IP address forwarding:
Username forwarding:
No connection oriented authentication forwarding:
Upstream proxy (host:port):
Upstream username:
Upstream password:
Log settings
Log enabled:
Log query terms:
Log useragents:
Cache management
Activate cachemanager:
Amount of filedescriptors: * 16384
Memory cache size (MB): * 2
Min object size (KB): * 0
Number of level-1 subdirectories: 16
Memory replacement policy: LRU
Cache replacement policy: LRU
Cache administrator e-mail:
Cache administrator password:
Harddisk cache size (MB): * 50
Max object size (KB): * 4096
Do not cache these domains (one per line):
https://192.168.1.1:444/cgi-bin/proxy.cgi#

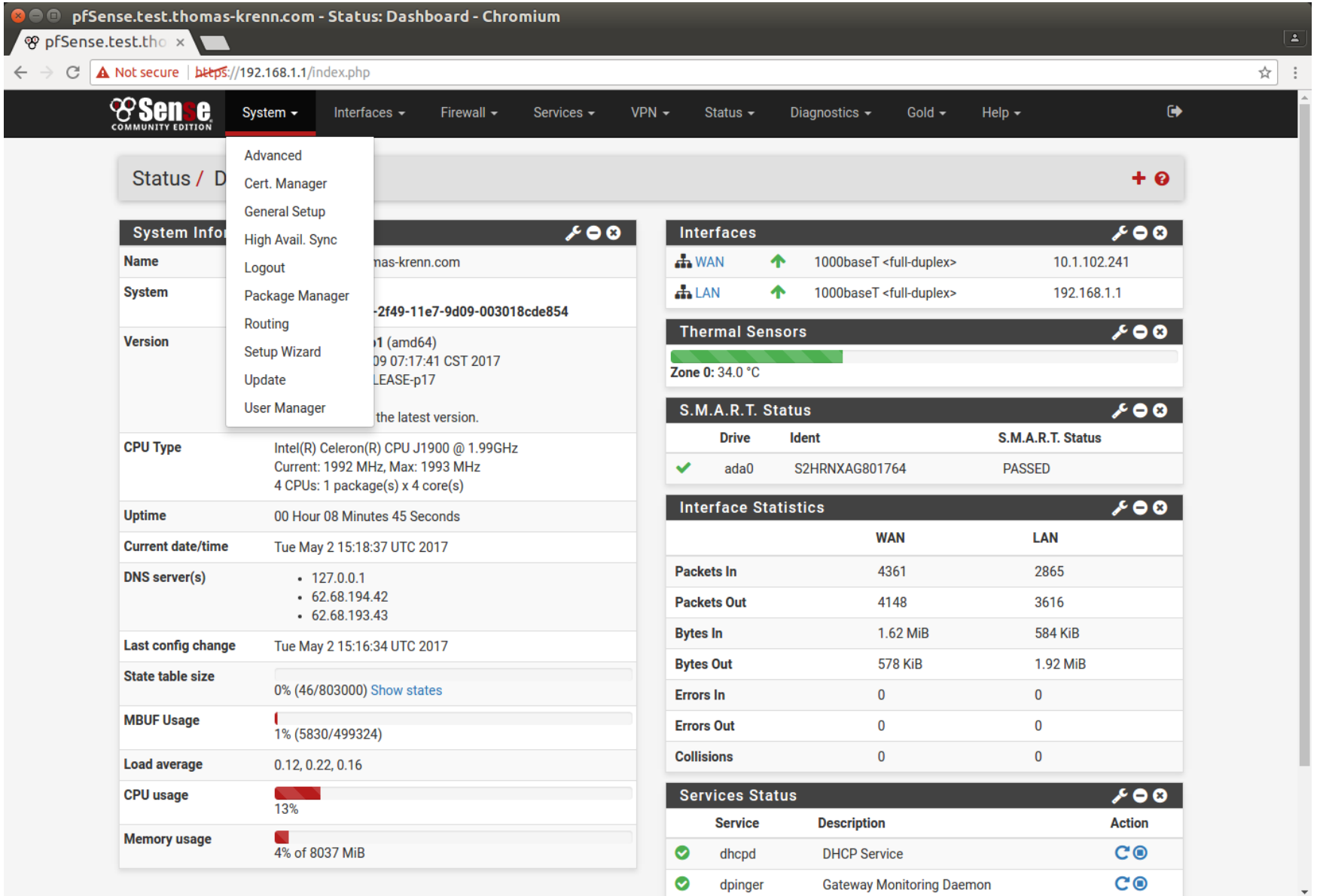

ipfire.test.thomas-krenn.com - IPsec - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/vpnmain.cgi
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 941.14 bit/s Out 1.08 kbit/s
IPsec
OpenVPN
Dynamic DNS
Time Server
Quality of Service
Intrusion Detection
ExtraHD
IPsec
Global Settings
Public IP or FQDN for RED interfa
10.1.102.241
Enabled:
Delay before launching VPN (sec
0
Host-to-Net Virtual Private Netwo
Required field
If required, this delay can be used to allow dynamic DNS updates to propagate properly. 60 is a common value when RED is a dynamic IP.
Save
Connection Status and -Control
Name
Type
Common name
Remark
Status
Action
Add
Certificate Authorities and -Keys
Name
Subject
Action
Root certificate:
Not present
Host Certificate:
Not present
Generate root/host certificates
CA name:
Choose File
No file chosen
Upload CA certificate
Resetting the X509 remove the root CA, the host certificate and all certificate based connections.:
Remove x509
IPFire 2.19 (x86_64) - Core Update 109
IPFire.org • Support the IPFire project with your donation
https://192.168.1.1:444/cgi-bin/vpnmain.cgi#

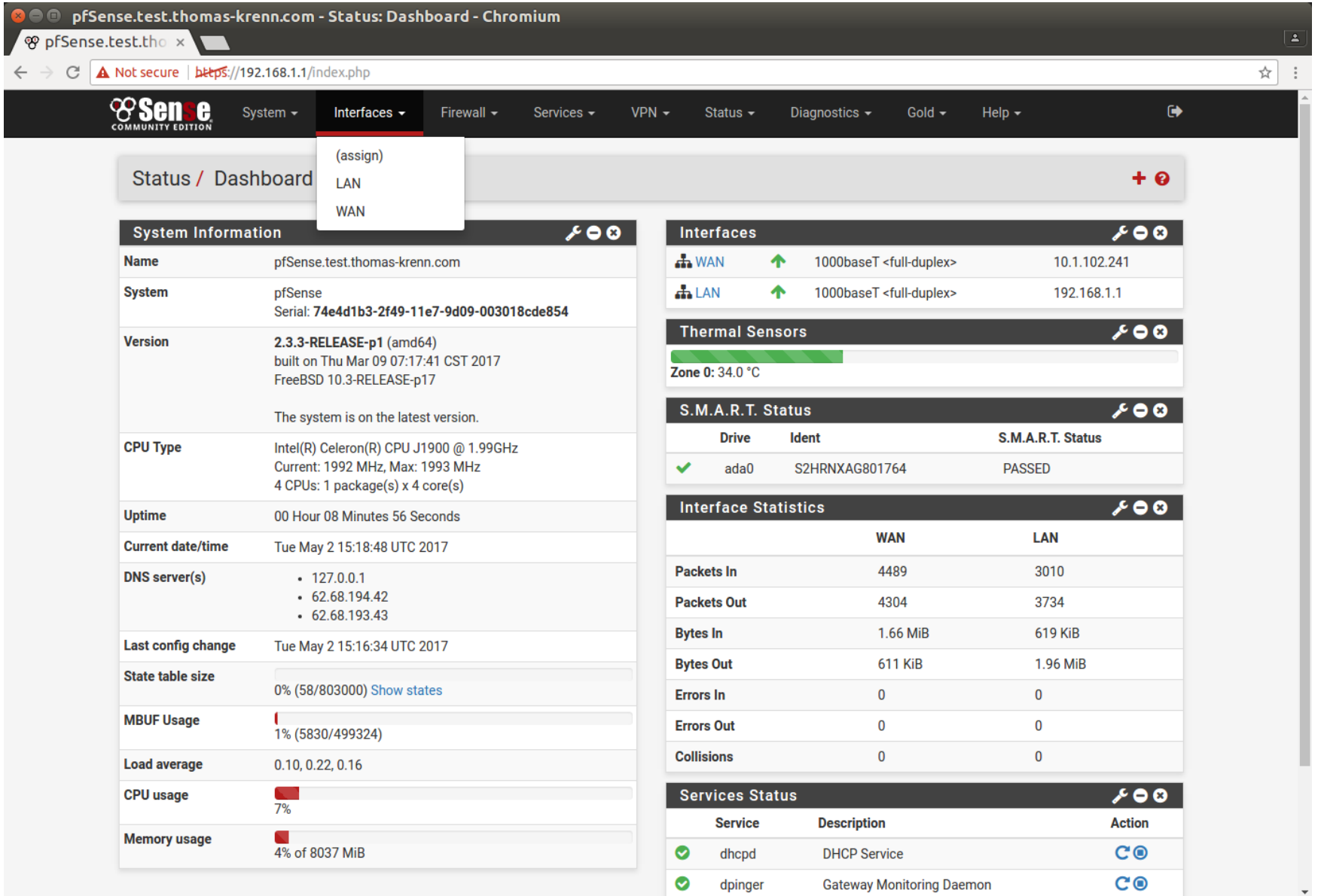

ipfire.test.thomas-krenn.com - Firewall Rules - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/firewall.cgi
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 0.00 bit/s Out 0.00 bit/s
Firewall Rules
Firewall Groups
Firewall Options
P2P networks
GeoIP Block
iptables
lew rule
IPFire 2.19 (x86_64) - Core Update 109
IPFire.org • Support the IPFire project with your donation
https://192.168.1.1:444/cgi-bin/firewall.cgi#

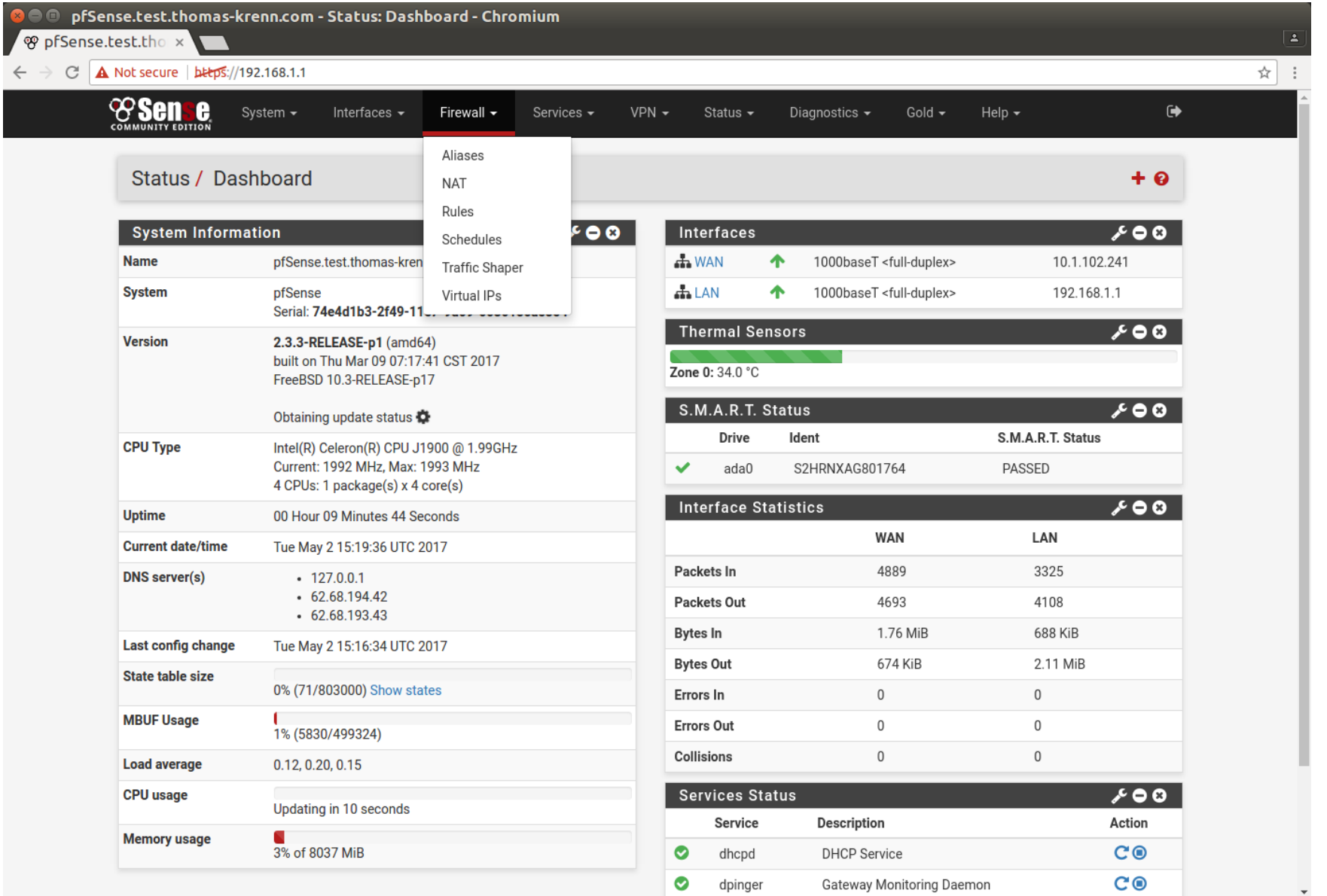

ipfire.test.thomas-krenn.com - Pakfire Configuration - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/pakfire.cgi
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 6.17 kbit/s Out 4.04 kbit/s
Pakfire
Pakfire Configuration
Pakfire
System Status:
Core-Update-Level: 109
Last update made 89d 21h 21m 44s ago.
Last server list update made 3m 5s ago.
Last core list update made 3m ago.
Last packages list update made 3m 1s ago.
Refresh list
Core-Update -- 2.19-x86_64 -- Release: 109 -> 110
Available Addons:
Please choose one or more items from the list below and click the plus to install.
Installed Addons:
Please choose one or more items from the list below and click the minus to uninstall.
7zip-15.14.1-6
alsa-1.0.27.1-12
amavisd-2.5.2-1
apcupsd-3.14.14-6
arm-1.4.5.0-1
asterisk-11.23.1-20
bacula-5.2.13-2
bird-1.5.0-1
bluetooth-3.36-1
bwm-ng-0.6.1-1
Settings
Basic Options
Search for updates daily: on | off
Check if mirror is reachable (ping): on | off
Register at pakfire-server: on | off
Save
https://192.168.1.1:444/cgi-bin/pakfire.cgi#

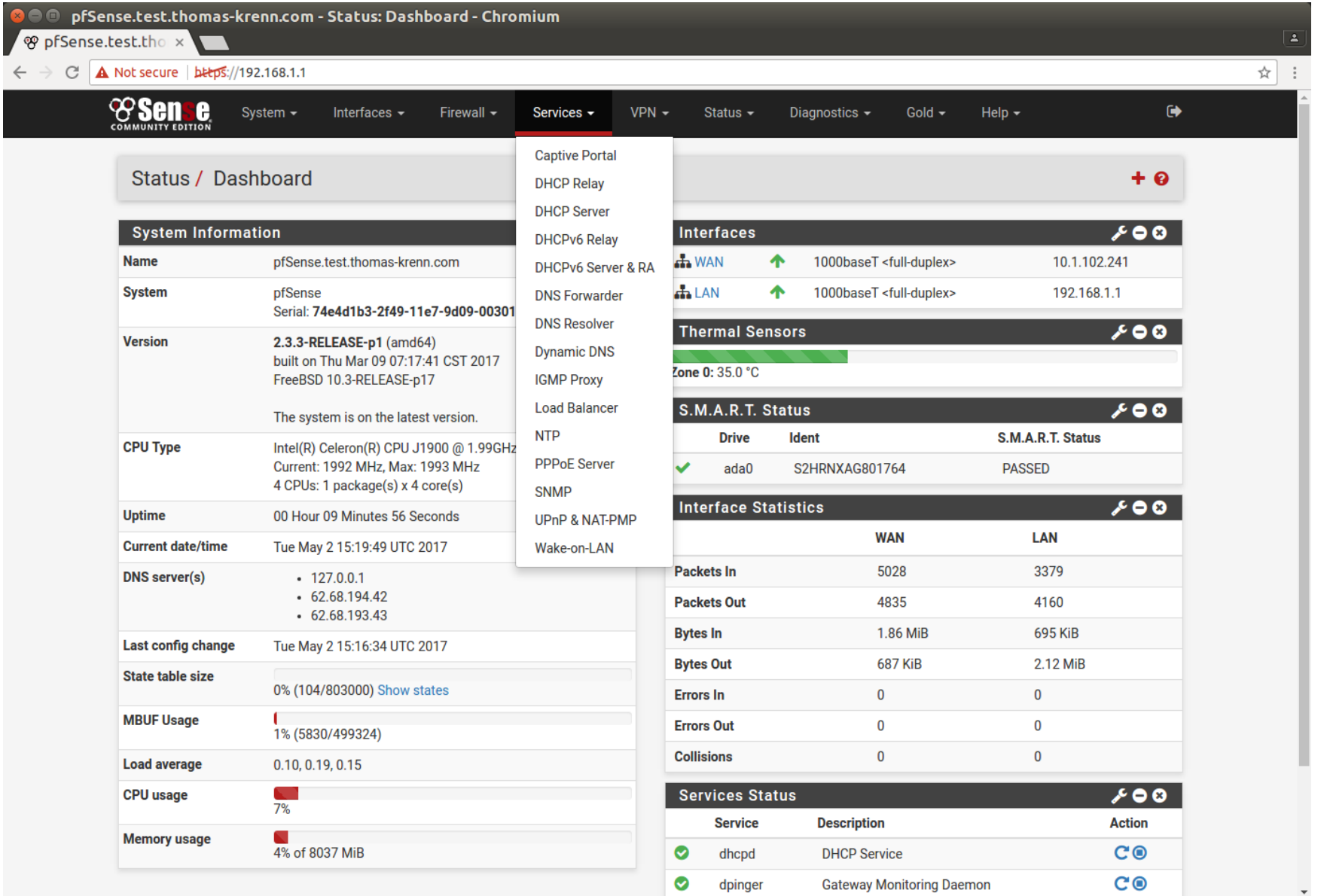

ipfire.test.thomas-krenn.com - Log Summary - Chromium
ipfire.test.thoma
Not secure
https://192.168.1.1:444/cgi-bin/logs.cgi/summary.dat
ipfire.test.thomas-krenn.com
System
Status
Network
Services
Firewall
IPFire
Logs
Traffic: In 269.93 bit/s Out 269.93 bit/s
Log Summary
Log Settings
Proxy Logs
Proxy Reports
Firewall Logs
Fw-Loggraphs (IP)
Fw-Loggraphs (Port)
Fw-Loggraphs (Country)
IDS Logs
URL Filter Logs
System Logs
Log Summary
Error messages
No (or only partial) logs exist for the day queried: /var/log/logwatch/2
Settings:
Month:
May
Day:
<<
>>
Update
Export
IPFire 2.19 (x86_64) - Core Update 109
Fire.org • Support the IPFire project with your donation
https://192.168.1.1:444/cgi-bin/logs.cgi/summary.dat#

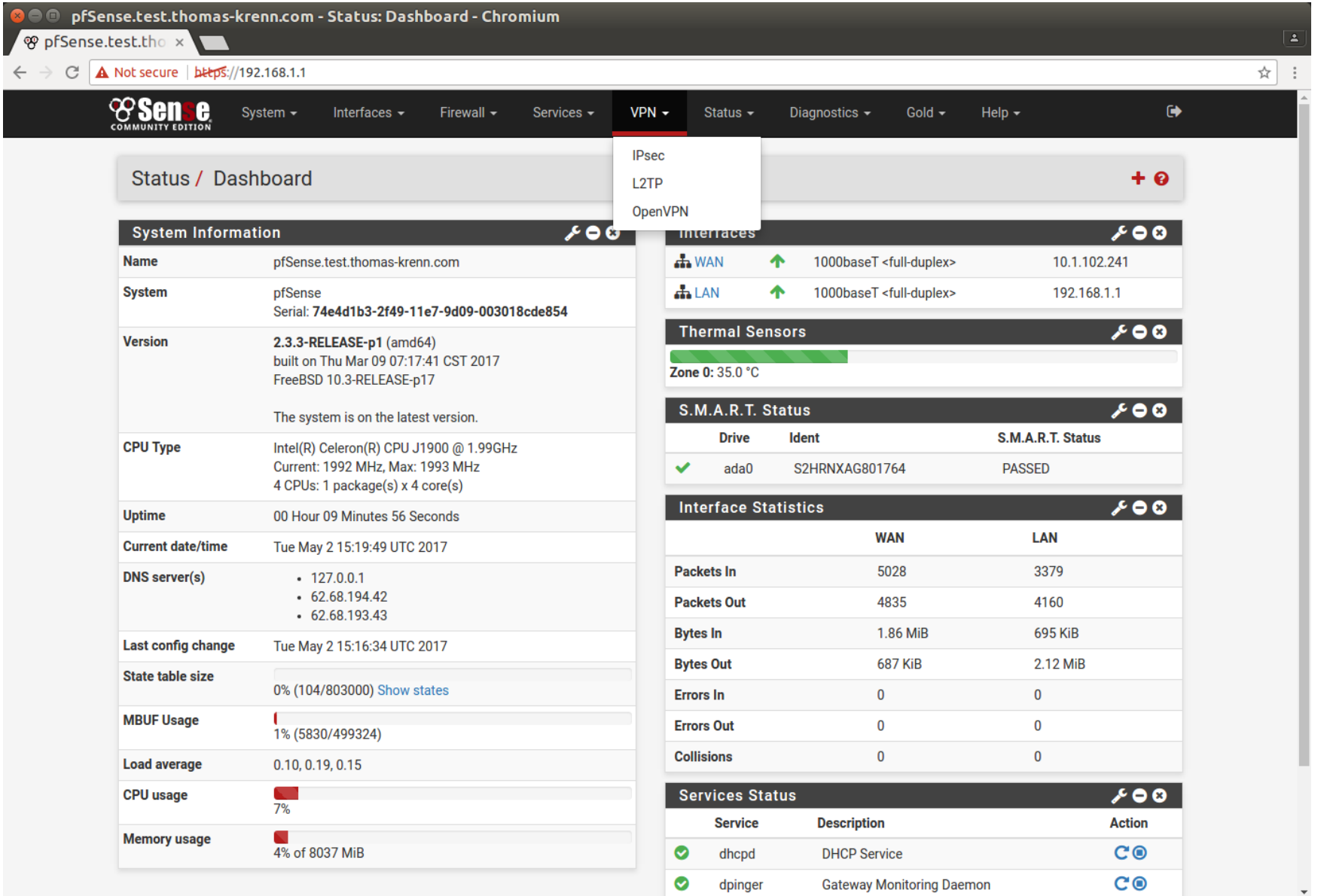

pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1/index.php
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
Status / Dashboard
System Information
Name
pfSense.test.thomas-krenn.com
System
pfSense
Serial: 74e4d1b3-2f49-11e7-9d09-003018cde854
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
The system is on the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 08 Minutes 01 Seconds
Current date/time
Tue May 2 15:17:53 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (57/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.25, 0.26, 0.17
CPU usage
9%
Memory usage
4% of 8037 MiB
Interfaces
WAN
1000baseT <full-duplex>
10.1.102.241
LAN
1000baseT <full-duplex>
192.168.1.1
Thermal Sensors
Zone 0: 34.0 °C
S.M.A.R.T. Status
Drive
Ident
S.M.A.R.T. Status
ada0
S2HRNXAG801764
PASSED
Interface Statistics
WAN
LAN
Packets In
4127
2692
Packets Out
3912
3439
Bytes In
1.60 MiB
547 KiB
Bytes Out
546 KiB
1.90 MiB
Errors In
0
0
Errors Out
0
0
Collisions
0
0
Services Status
Service
Description
Action
dhcpd
DHCP Service
dpinger
Gateway Monitoring Daemon

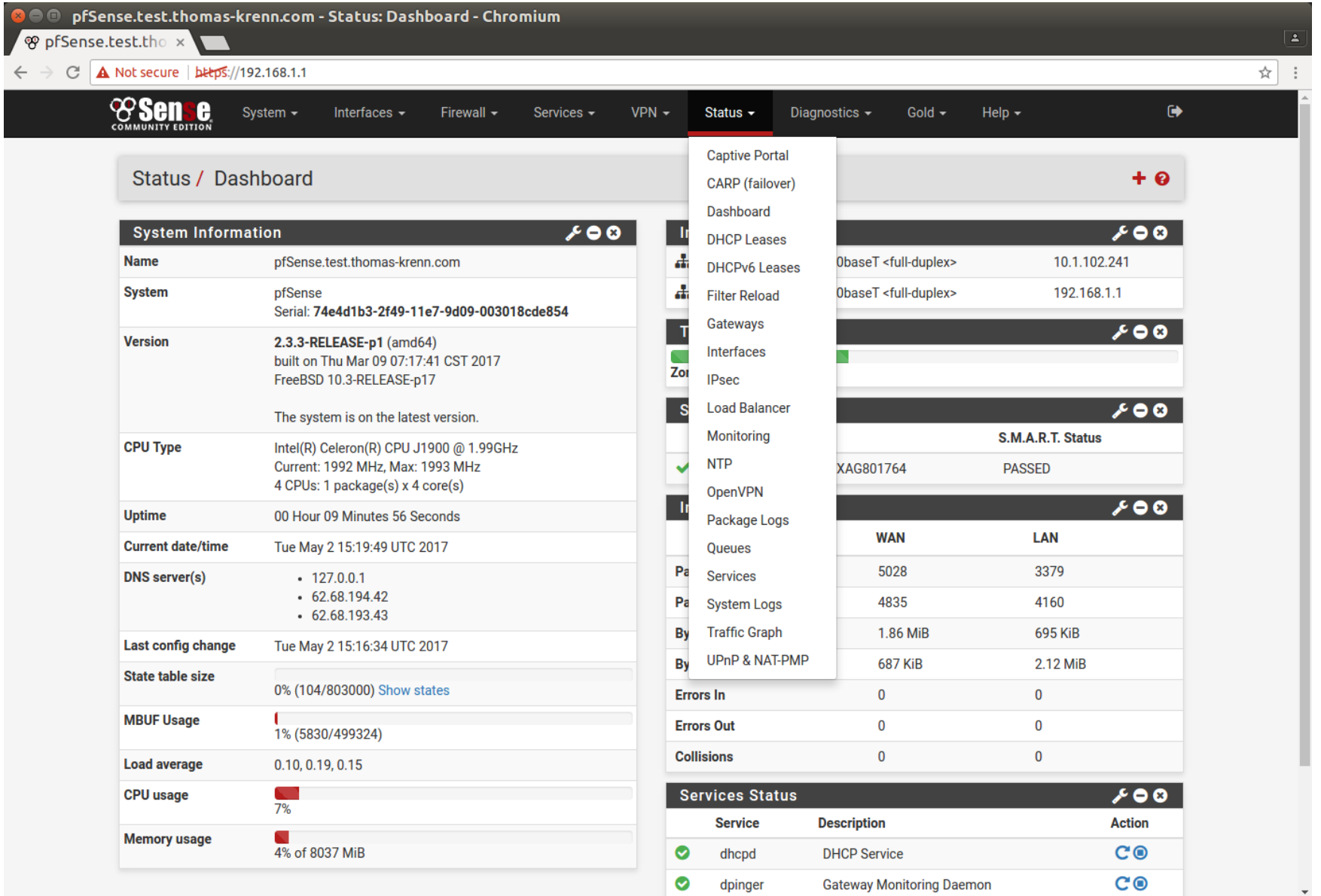

pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1/index.php
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
Advanced
Cert. Manager
General Setup
High Avail. Sync
Logout
Package Manager
Routing
Setup Wizard
Update
User Manager
Status / D
System Info
Name
nas-krenn.com
System
-2f49-11e7-9d09-003018cde854
Version
1 (amd64)
09 07:17:41 CST 2017
LEASE-p17
the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 08 Minutes 45 Seconds
Current date/time
Tue May 2 15:18:37 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (46/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.12, 0.22, 0.16
CPU usage
13%
Memory usage
4% of 8037 MiB
Interfaces
WAN
1000baseT <full-duplex>
10.1.102.241
LAN
1000baseT <full-duplex>
192.168.1.1
Thermal Sensors
Zone 0: 34.0 °C
S.M.A.R.T. Status
Drive
Ident
S.M.A.R.T. Status
ada0
S2HRNXAG801764
PASSED
Interface Statistics
WAN
LAN
Packets In
4361
2865
Packets Out
4148
3616
Bytes In
1.62 MiB
584 KiB
Bytes Out
578 KiB
1.92 MiB
Errors In
0
0
Errors Out
0
0
Collisions
0
0
Services Status
Service
Description
Action
dhcpd
DHCP Service
dpinger
Gateway Monitoring Daemon

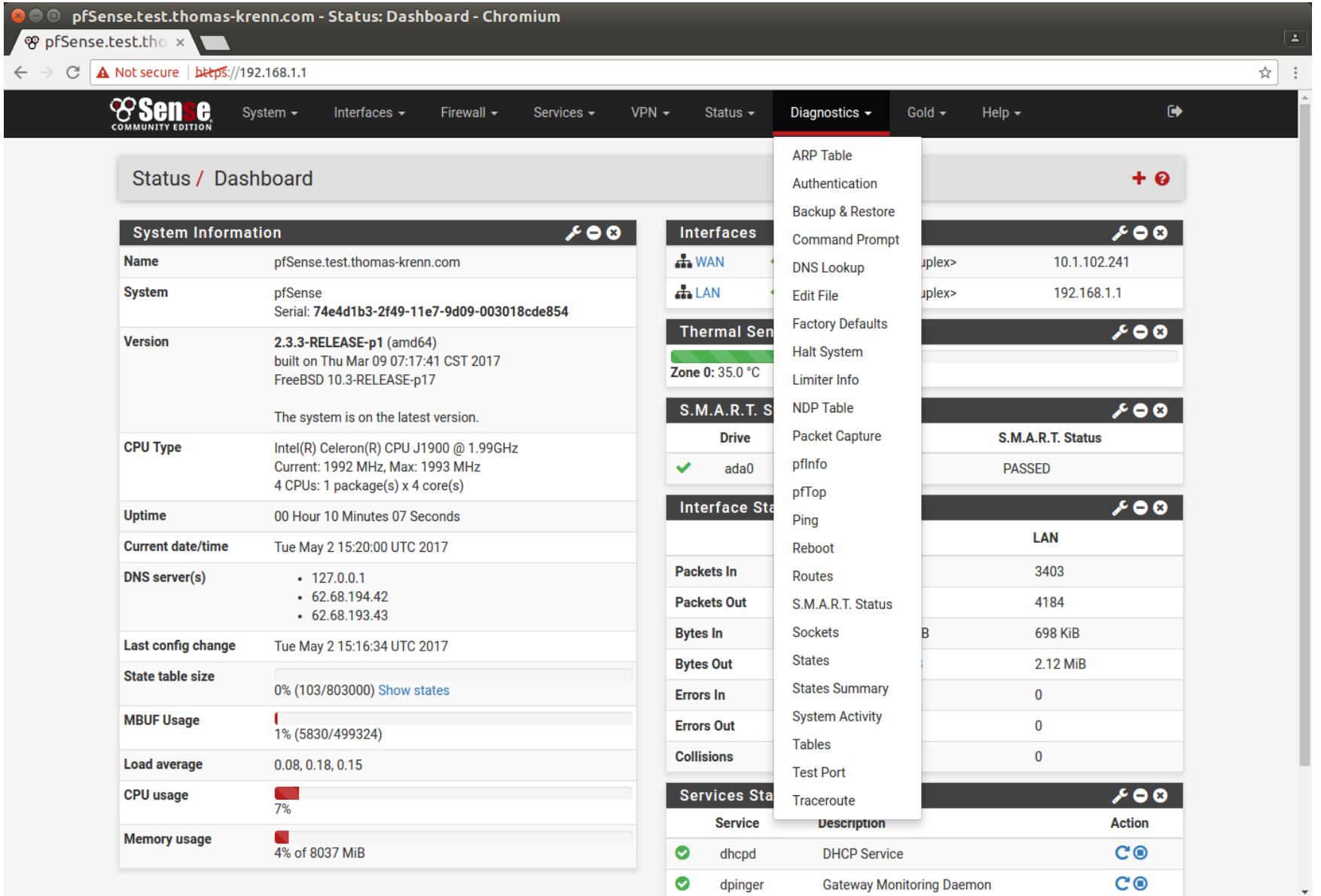

pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1/index.php
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
(assign)
LAN
WAN
Status / Dashboard
System Information
Name
pfSense.test.thomas-krenn.com
System
pfSense
Serial: 74e4d1b3-2f49-11e7-9d09-003018cde854
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
The system is on the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 08 Minutes 56 Seconds
Current date/time
Tue May 2 15:18:48 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (58/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.10, 0.22, 0.16
CPU usage
7%
Memory usage
4% of 8037 MiB
Interfaces
WAN 1000baseT <full-duplex> 10.1.102.241
LAN 1000baseT <full-duplex> 192.168.1.1
Thermal Sensors
Zone 0: 34.0 °C
S.M.A.R.T. Status
Drive Ident S.M.A.R.T. Status
ada0 S2HRNXAG801764 PASSED
Interface Statistics
WAN LAN
Packets In 4489 3010
Packets Out 4304 3734
Bytes In 1.66 MiB 619 KiB
Bytes Out 611 KiB 1.96 MiB
Errors In 0 0
Errors Out 0 0
Collisions 0 0
Services Status
Service Description Action
dhcpd DHCP Service
dpinger Gateway Monitoring Daemon


pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
Aliases
NAT
Rules
Schedules
Traffic Shaper
Virtual IPs
Status / Dashboard
System Information
Name
pfSense.test.thomas-kren
System
pfSense
Serial: 74e4d1b3-2f49-11
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
Obtaining update status
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 09 Minutes 44 Seconds
Current date/time
Tue May 2 15:19:36 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (71/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.12, 0.20, 0.15
CPU usage
Updating in 10 seconds
Memory usage
3% of 8037 MiB
Interfaces
WAN
1000baseT <full-duplex>
10.1.102.241
LAN
1000baseT <full-duplex>
192.168.1.1
Thermal Sensors
Zone 0: 34.0 °C
S.M.A.R.T. Status
Drive
Ident
S.M.A.R.T. Status
ada0
S2HRNXAG801764
PASSED
Interface Statistics
WAN
LAN
Packets In
4889
3325
Packets Out
4693
4108
Bytes In
1.76 MiB
688 KiB
Bytes Out
674 KiB
2.11 MiB
Errors In
0
0
Errors Out
0
0
Collisions
0
0
Services Status
Service
Description
Action
dhcpd
DHCP Service
dpinger
Gateway Monitoring Daemon


pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
Captive Portal
DHCP Relay
DHCP Server
DHCPv6 Relay
DHCPv6 Server & RA
DNS Forwarder
DNS Resolver
Dynamic DNS
IGMP Proxy
Load Balancer
NTP
PPPoE Server
SNMP
UPnP & NAT-PMP
Wake-on-LAN
Status / Dashboard
System Information
Name
pfSense.test.thomas-krenn.com
System
pfSense
Serial: 74e4d1b3-2f49-11e7-9d09-00301
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
The system is on the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 09 Minutes 56 Seconds
Current date/time
Tue May 2 15:19:49 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (104/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.10, 0.19, 0.15
CPU usage
7%
Memory usage
4% of 8037 MiB
Interfaces
WAN 1000baseT <full-duplex> 10.1.102.241
LAN 1000baseT <full-duplex> 192.168.1.1
Thermal Sensors
Zone 0: 35.0 °C
S.M.A.R.T. Status
Drive Ident S.M.A.R.T. Status
ada0 S2HRNXAG801764 PASSED
Interface Statistics
WAN LAN
Packets In 5028 3379
Packets Out 4835 4160
Bytes In 1.86 MiB 695 KiB
Bytes Out 687 KiB 2.12 MiB
Errors In 0 0
Errors Out 0 0
Collisions 0 0
Services Status
Service Description Action
dhcpd DHCP Service
dpinger Gateway Monitoring Daemon


pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
IPsec
L2TP
OpenVPN
Status / Dashboard
System Information
Name
pfSense.test.thomas-krenn.com
System
pfSense
Serial: 74e4d1b3-2f49-11e7-9d09-003018cde854
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
The system is on the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 09 Minutes 56 Seconds
Current date/time
Tue May 2 15:19:49 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (104/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.10, 0.19, 0.15
CPU usage
7%
Memory usage
4% of 8037 MiB
Interfaces
WAN
1000baseT <full-duplex>
10.1.102.241
LAN
1000baseT <full-duplex>
192.168.1.1
Thermal Sensors
Zone 0: 35.0 °C
S.M.A.R.T. Status
Drive
Ident
S.M.A.R.T. Status
ada0
S2HRNXAG801764
PASSED
Interface Statistics
WAN
LAN
Packets In
5028
3379
Packets Out
4835
4160
Bytes In
1.86 MiB
695 KiB
Bytes Out
687 KiB
2.12 MiB
Errors In
0
0
Errors Out
0
0
Collisions
0
0
Services Status
Service
Description
Action
dhcpd
DHCP Service
dpinger
Gateway Monitoring Daemon


pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
Captive Portal
CARP (failover)
Dashboard
DHCP Leases
DHCPv6 Leases
Filter Reload
Gateways
Interfaces
IPsec
Load Balancer
Monitoring
NTP
OpenVPN
Package Logs
Queues
Services
System Logs
Traffic Graph
UPnP & NAT-PMP
Status / Dashboard
System Information
Name
pfSense.test.thomas-krenn.com
System
pfSense
Serial: 74e4d1b3-2f49-11e7-9d09-003018cde854
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
The system is on the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 09 Minutes 56 Seconds
Current date/time
Tue May 2 15:19:49 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (104/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.10, 0.19, 0.15
CPU usage
7%
Memory usage
4% of 8037 MiB
0baseT <full-duplex>
10.1.102.241
0baseT <full-duplex>
192.168.1.1
S.M.A.R.T. Status
XAG801764
PASSED
WAN
LAN
5028
3379
4835
4160
1.86 MiB
695 KiB
687 KiB
2.12 MiB
Errors In
0
0
Errors Out
0
0
Collisions
0
0
Services Status
Service
Description
Action
dhcpd
DHCP Service
dpinger
Gateway Monitoring Daemon


pfSense.test.thomas-krenn.com - Status: Dashboard - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1
pfSense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
ARP Table
Authentication
Backup & Restore
Command Prompt
DNS Lookup
Edit File
Factory Defaults
Halt System
Limiter Info
NDP Table
Packet Capture
pfInfo
pfTop
Ping
Reboot
Routes
S.M.A.R.T. Status
Sockets
States
States Summary
System Activity
Tables
Test Port
Traceroute
Status / Dashboard
System Information
Name
pfSense.test.thomas-krenn.com
System
pfSense
Serial: 74e4d1b3-2f49-11e7-9d09-003018cde854
Version
2.3.3-RELEASE-p1 (amd64)
built on Thu Mar 09 07:17:41 CST 2017
FreeBSD 10.3-RELEASE-p17
The system is on the latest version.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz
Current: 1992 MHz, Max: 1993 MHz
4 CPUs: 1 package(s) x 4 core(s)
Uptime
00 Hour 10 Minutes 07 Seconds
Current date/time
Tue May 2 15:20:00 UTC 2017
DNS server(s)
127.0.0.1
62.68.194.42
62.68.193.43
Last config change
Tue May 2 15:16:34 UTC 2017
State table size
0% (103/803000) Show states
MBUF Usage
1% (5830/499324)
Load average
0.08, 0.18, 0.15
CPU usage
7%
Memory usage
4% of 8037 MiB
Interfaces
WAN
LAN
10.1.102.241
192.168.1.1
Thermal Sen
Zone 0: 35.0 °C
S.M.A.R.T. S
Drive
S.M.A.R.T. Status
ada0
PASSED
Interface Sta
LAN
Packets In
3403
Packets Out
4184
Bytes In
698 KiB
Bytes Out
2.12 MiB
Errors In
0
Errors Out
0
Collisions
0
Services Sta
Service
Description
Action
dhcpd
DHCP Service
dpinger
Gateway Monitoring Daemon

Versionen

Die folgende Tabelle zeigt im Überblick die verfügbaren pfSense Versionen:[1]

Version	FreeBSD Basis	Releases	Release Status	Neuerungen	Weitere Informationen
pfSense 2.3	FreeBSD 10.3	2.3, 2.3.1, 2.3.2, 2.3.3	Current supported release	• Neues webGUI (Bootstrap) • FreeBSD pkg System für einfachere Updates	[1], [2]
pfSense 2.2	FreeBSD 10.1	2.2, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6	Previous stable maintenance/security release	• IPsec stack includes AES-GCM (with AES-NI acceleration) and IKEv2	[3], [4]
pfSense 2.1	FreeBSD 8.3	2.1, 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5	No longer supported	• IPv6 support	[5]
pfSense 2.0	FreeBSD 8.1	2.0, 2.0.1, 2.0.2, 2.0.3	No longer supported		[6]

Für Informationen zu künftigen Versionen ist eine detaillierte Roadmap abrufbar.[2]

m0n0wall

Forum

„...and I encourage all current m0n0wall users to check out OPNsense“ - Manuel Kasper
click to to check it out now OPNsense®

End of the m0n0wall project

Dear m0n0wall enthusiasts,

on this day 12 years ago, I have released the first version of m0n0wall to the public. In theory, one could still run that version - pb1 it was called - on a suitably old PC and use it to control the Internet access of a small LAN (not that it would be recommended security-wise). However, the world keeps turning, and while m0n0wall has made an effort to keep up, there are now better solutions available and under active development.

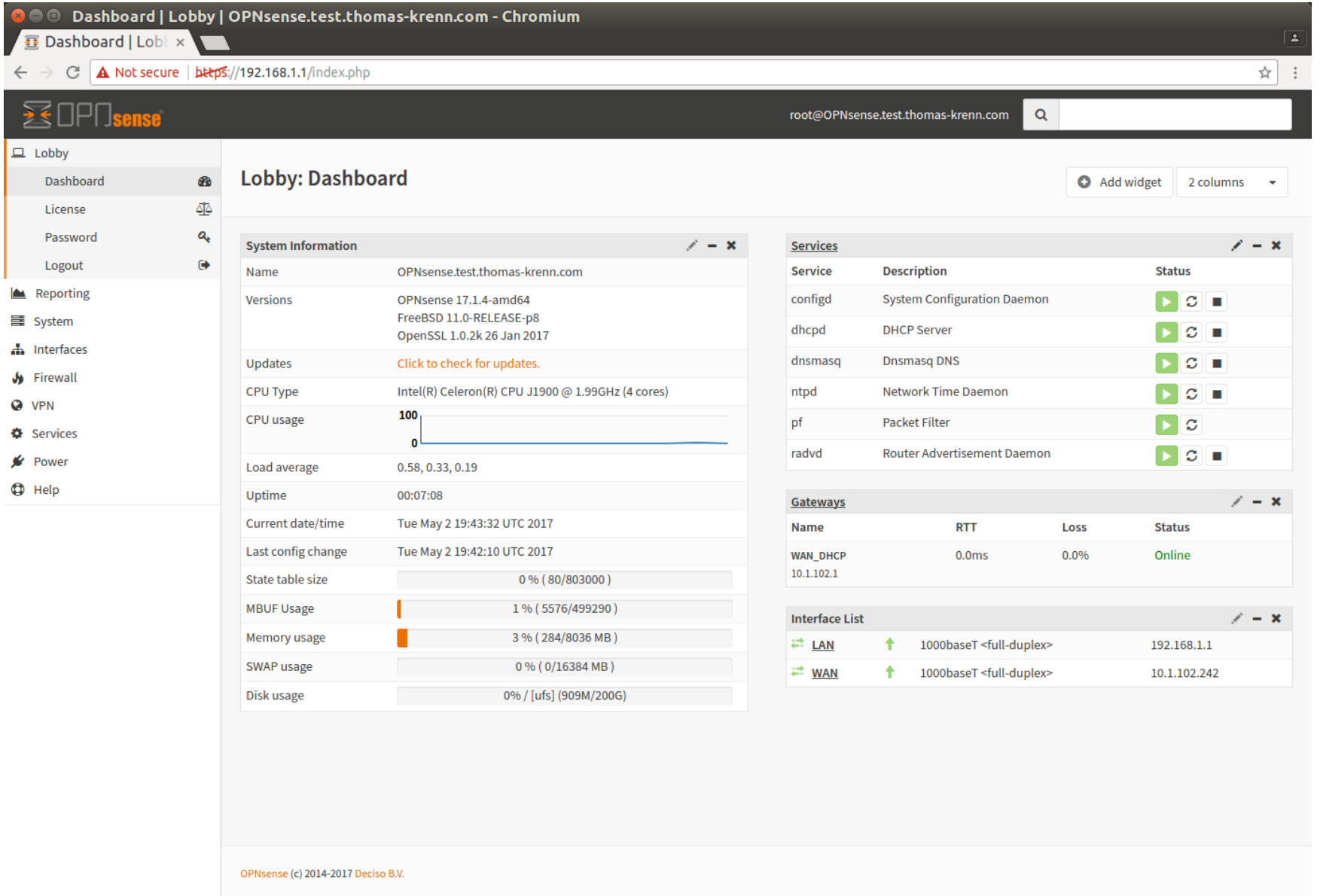
Therefore, today I announce that the m0n0wall project has officially ended. No development will be done anymore, and there will be no further releases.

The forums and the mailing list will be frozen at the end of this month. All the contents of the website, repository, downloads, mailing list and forum will be archived in a permanent location on the web so that they remain accessible indefinitely to anyone who might be interested in them.

m0n0wall has served as the seed for several other well known open source projects, like pfSense, FreeNAS and AskoziaPBX. The newest offspring, OPNsense (https://opnsense.org), aims to continue the open source spirit of m0n0wall while updating the technology to be ready for the future. In my view, it is the perfect way to bring the m0n0wall idea into 2015, and I encourage all current m0n0wall users to check out OPNsense and contribute if they can.

Finally, I would like to take this opportunity to thank everyone who has been involved in the m0n0wall project and helped in some way or another - by contributing code, documentation, answering questions on the mailing list or the forum, donating or just spreading the word. It has been a great journey for me, and I'm convinced that even now that it has come to an end, the m0n0wall spirit will live on in the various projects it has spawned.

Manuel Kasper
15 February 2015


Dashboard | Lobby | OPNsense.test.thomas-krenn.com - Chromium
Dashboard | Lobb
Not secure
https://192.168.1.1/index.php
root@OPNsense.test.thomas-krenn.com
Lobby
Dashboard
License
Password
Logout
Reporting
System
Interfaces
Firewall
VPN
Services
Power
Help
Lobby: Dashboard
Add widget
2 columns
System Information
Name
OPNsense.test.thomas-krenn.com
Versions
OPNsense 17.1.4-amd64
FreeBSD 11.0-RELEASE-p8
OpenSSL 1.0.2k 26 Jan 2017
Updates
Click to check for updates.
CPU Type
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz (4 cores)
CPU usage
100
0
Load average
0.58, 0.33, 0.19
Uptime
00:07:08
Current date/time
Tue May 2 19:43:32 UTC 2017
Last config change
Tue May 2 19:42:10 UTC 2017
State table size
0 % (80/803000)
MBUF Usage
1 % (5576/499290)
Memory usage
3 % (284/8036 MB)
SWAP usage
0 % (0/16384 MB)
Disk usage
0% / [ufs] (909M/200G)
Services
Service
Description
Status
configd
System Configuration Daemon
dhcpd
DHCP Server
dnsmasq
Dnsmasq DNS
ntpd
Network Time Daemon
pf
Packet Filter
radvd
Router Advertisement Daemon
Gateways
Name
RTT
Loss
Status
WAN_DHCP
10.1.102.1
0.0ms
0.0%
Online
Interface List
LAN
1000baseT <full-duplex>
192.168.1.1
WAN
1000baseT <full-duplex>
10.1.102.242
OPNsense (c) 2014-2017 Deciso B.V.

System Health - Chromium

System Health

Not secure | https://192.168.1.1/ui/diagnostics/systemhealth/

OPNsense

root@OPNsense.test.thomas-krenn.com

- Lobby
- Reporting
  - Health
  - Settings
  - Insight
  - NetFlow
  - Traffic Graph
- System
- Interfaces
- Firewall
- VPN
- Services
- Power
- Help

Options

Packets | System | Traffic

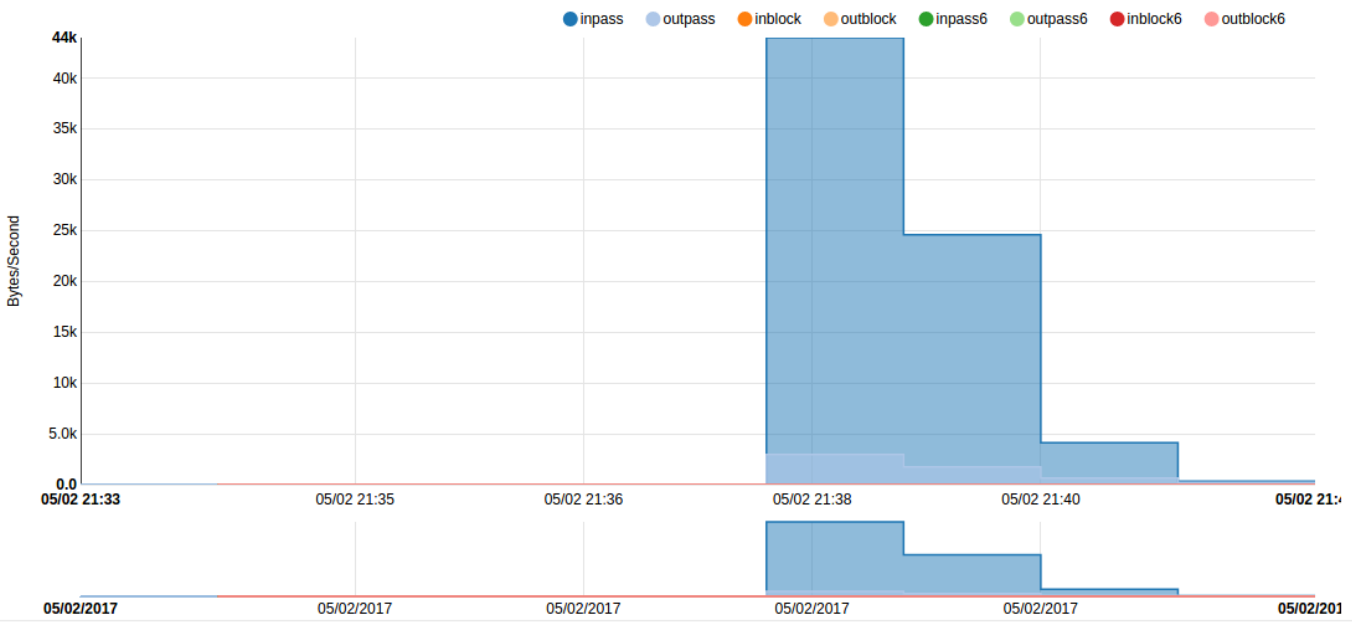
Zoom level: 10 Minutes | 5 Minutes | 0 Minutes | 0 Minutes

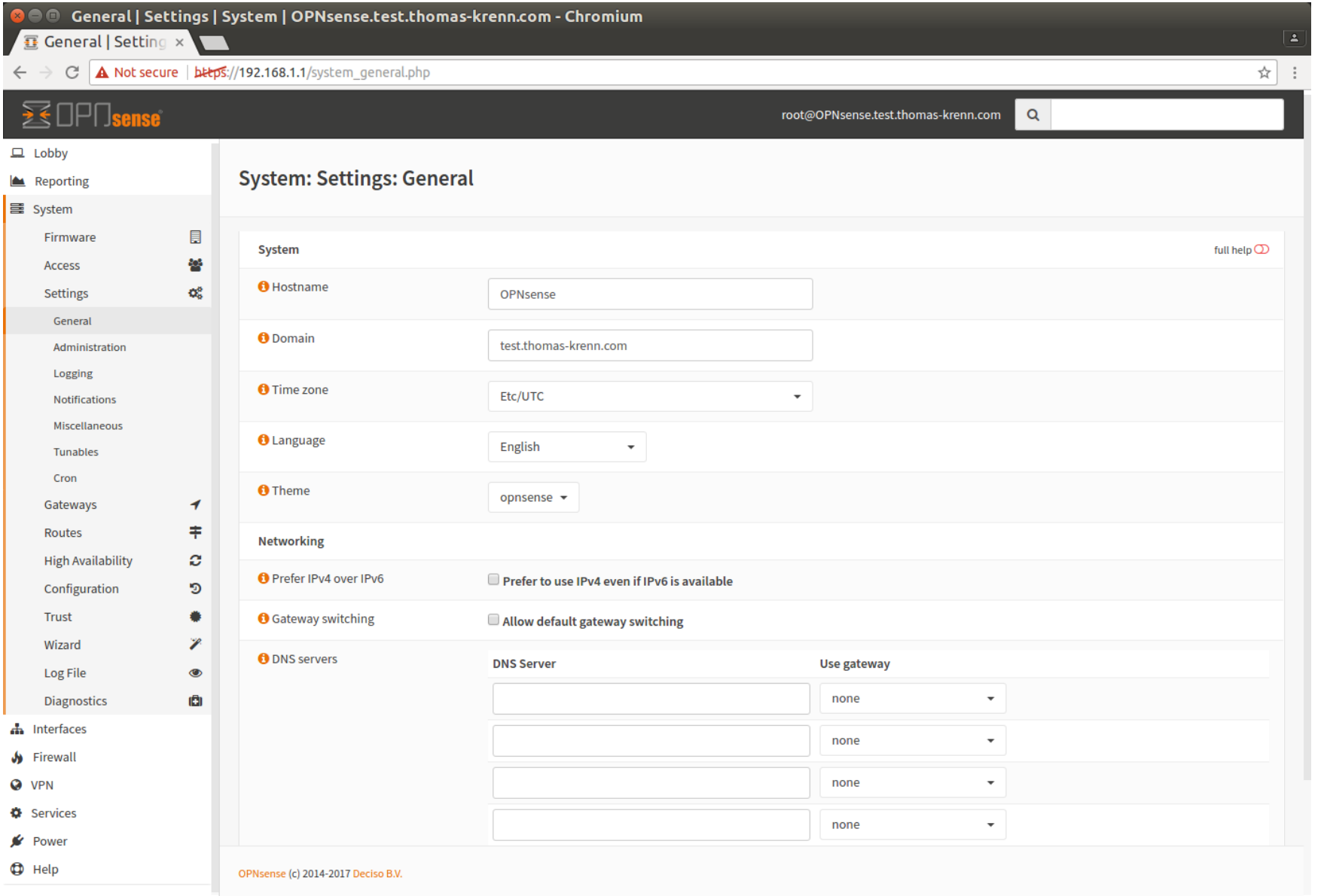
Inverse: Off | On

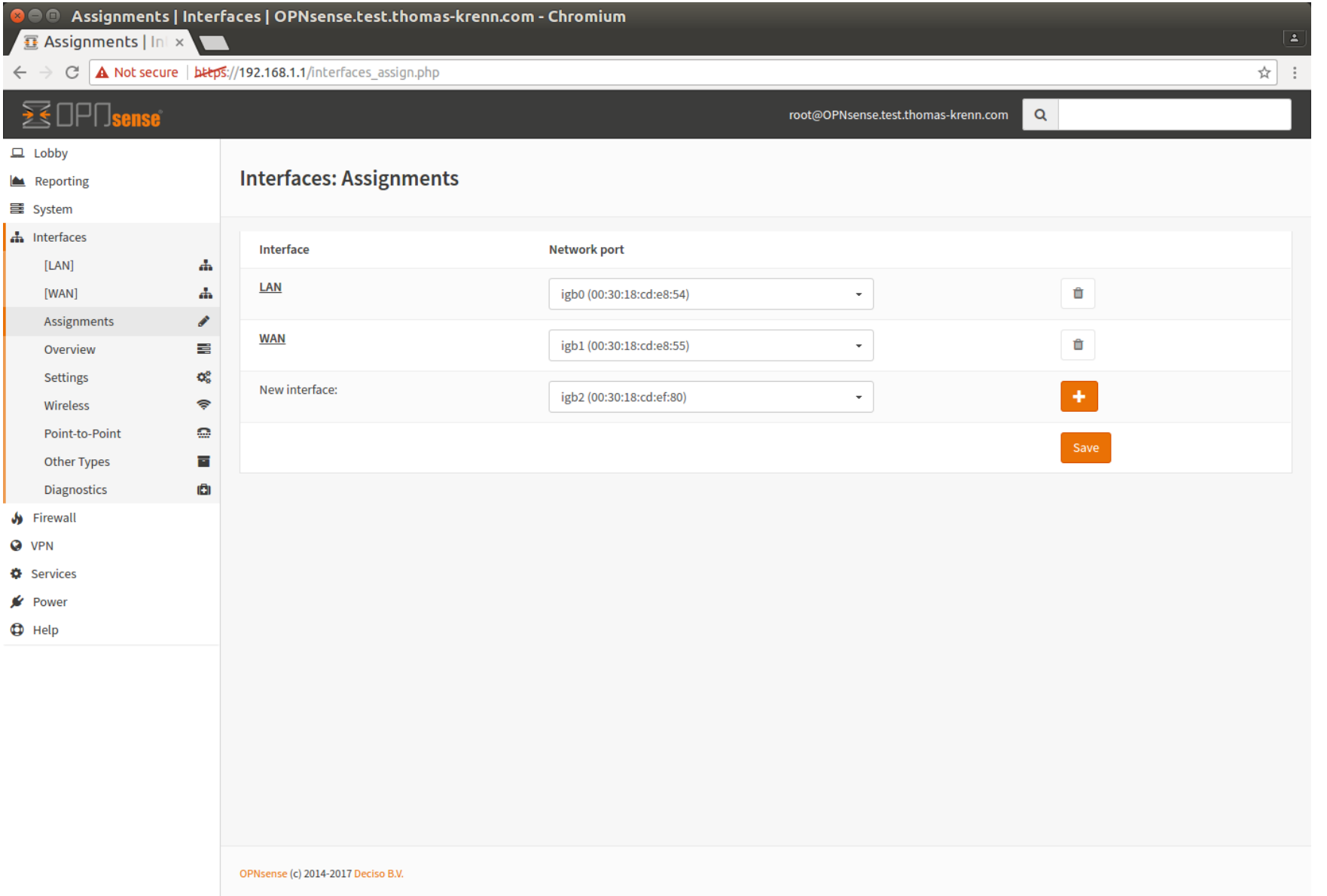
Resolution: Standard | Medium | High

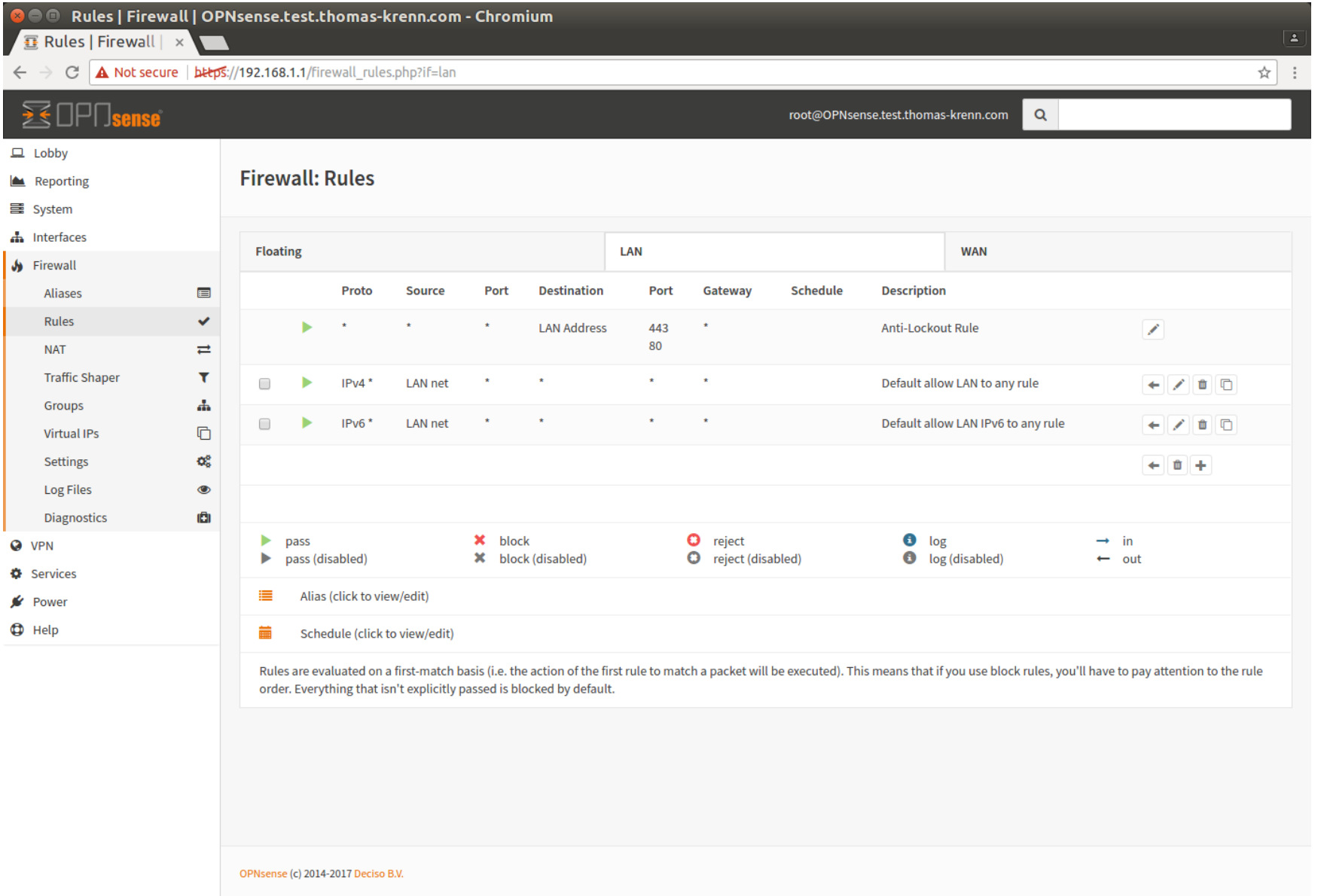
Show Tables: Off | On

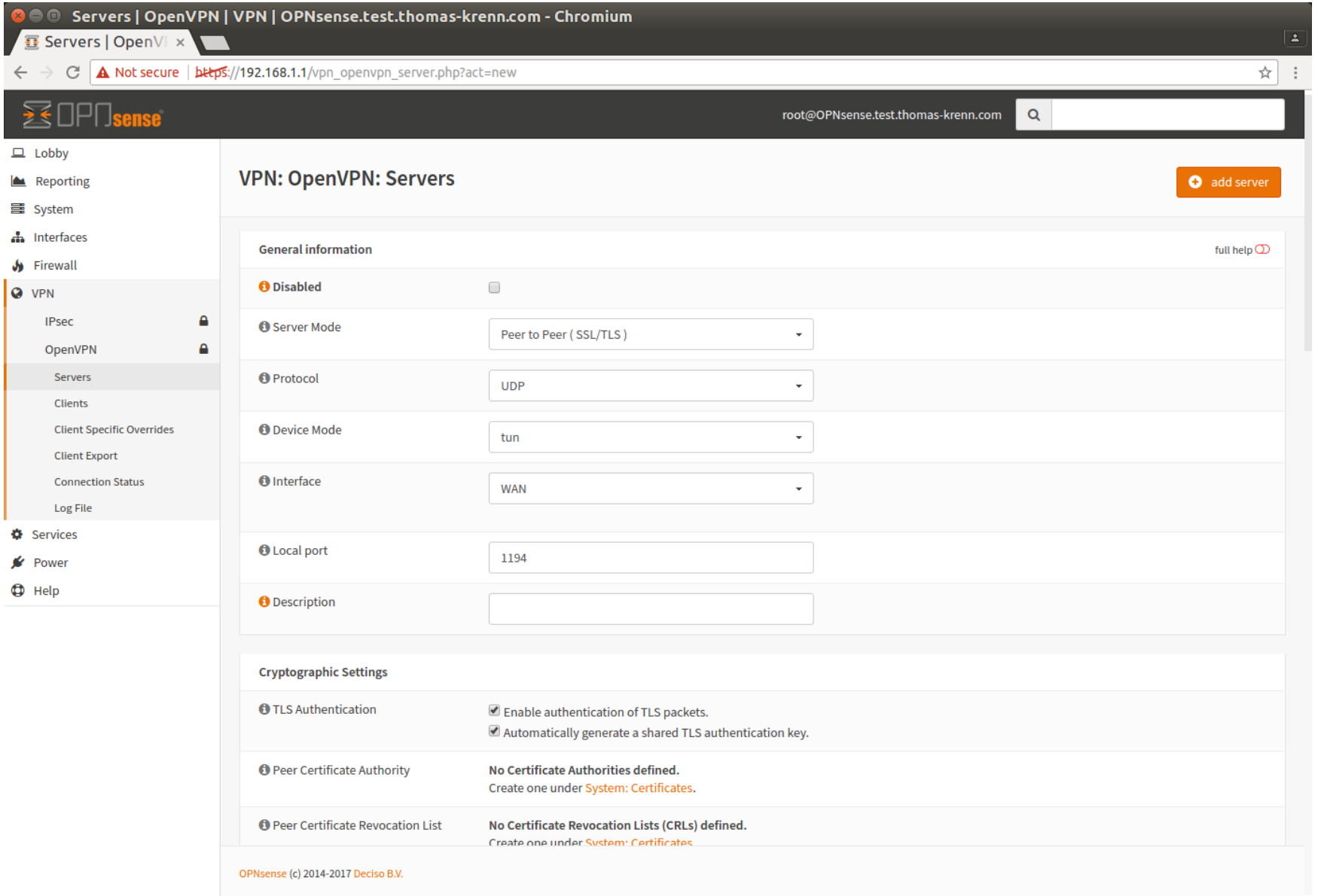
System Information - Traffic | Wan (Current detail is showing 0 seconds averages.)

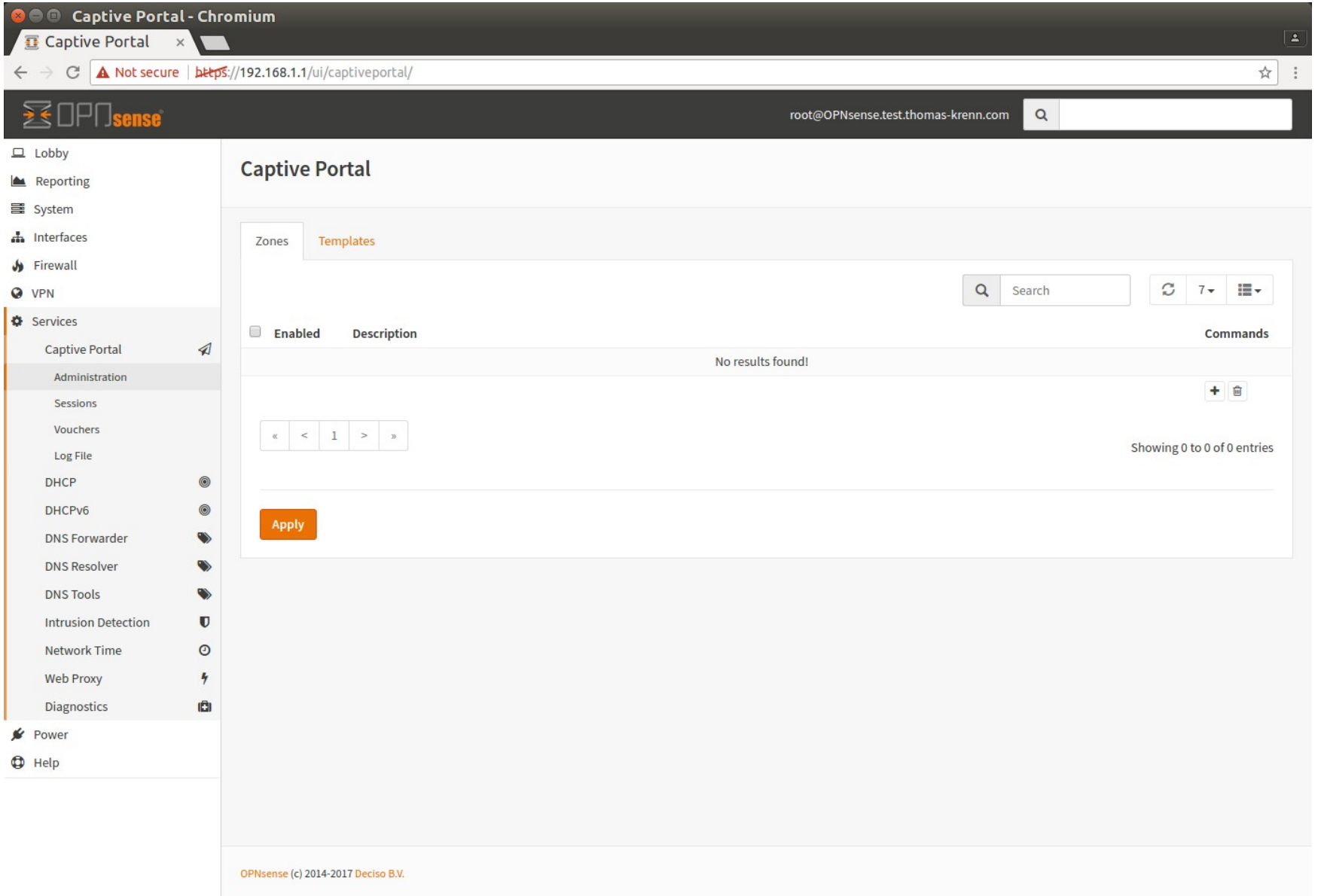


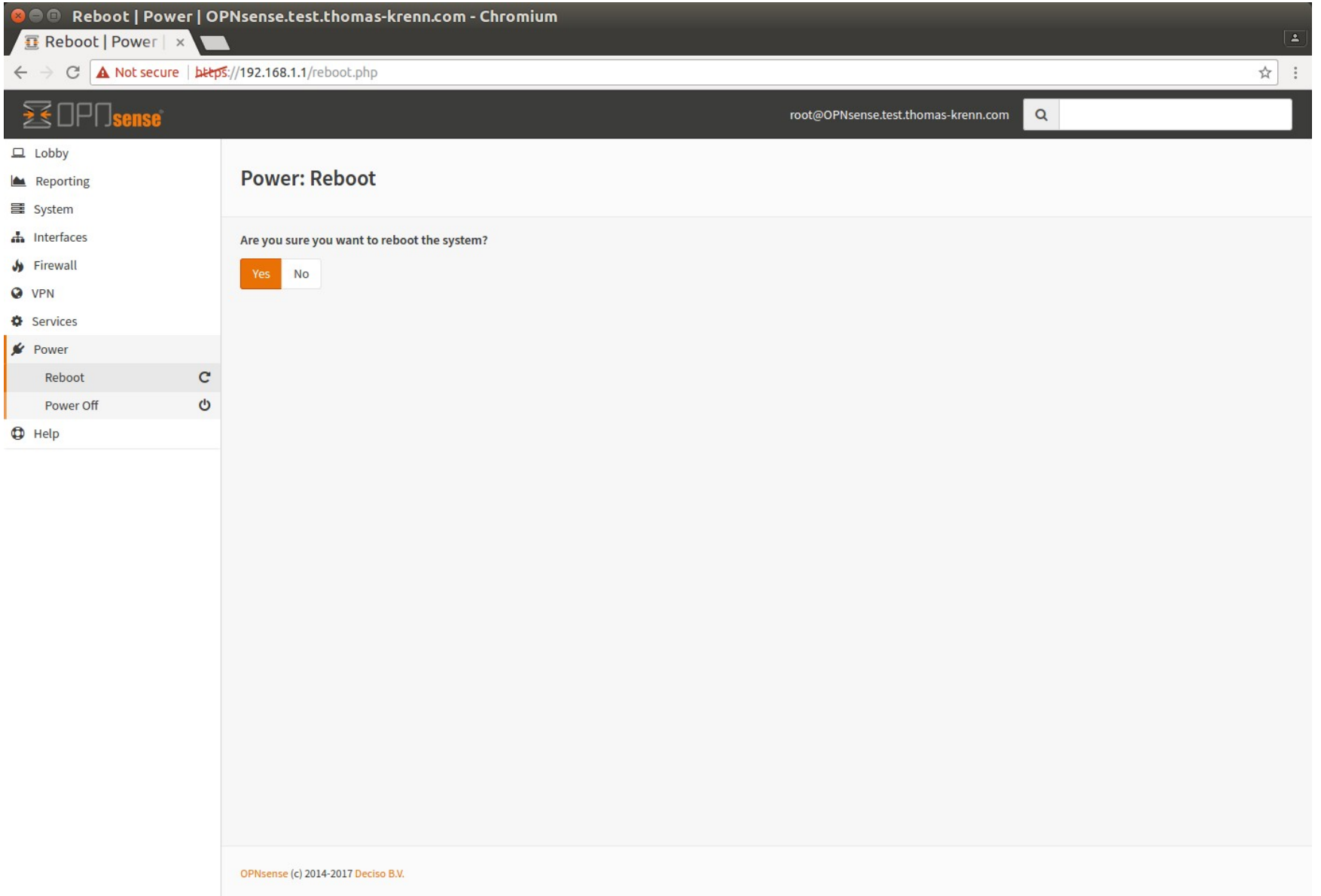

General | Settings | System | OPNsense.test.thomas-krenn.com - Chromium
General | Setting
Not secure
https://192.168.1.1/system_general.php
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Firmware
Access
Settings
General
Administration
Logging
Notifications
Miscellaneous
Tunables
Cron
Gateways
Routes
High Availability
Configuration
Trust
Wizard
Log File
Diagnostics
Interfaces
Firewall
VPN
Services
Power
Help
System: Settings: General
System
full help
Hostname
OPNsense
Domain
test.thomas-krenn.com
Time zone
Etc/UTC
Language
English
Theme
opnsense
Networking
Prefer IPv4 over IPv6
Prefer to use IPv4 even if IPv6 is available
Gateway switching
Allow default gateway switching
DNS servers
DNS Server
Use gateway
none
none
none
none
OPNsense (c) 2014-2017 Deciso B.V.


Assignments | Interfaces | OPNsense.test.thomas-krenn.com - Chromium
Assignments | In
Not secure
https://192.168.1.1/interfaces_assign.php
OPNsense
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Interfaces
[LAN]
[WAN]
Assignments
Overview
Settings
Wireless
Point-to-Point
Other Types
Diagnostics
Firewall
VPN
Services
Power
Help
Interfaces: Assignments
Interface
Network port
LAN
igb0 (00:30:18:cd:e8:54)
WAN
igb1 (00:30:18:cd:e8:55)
New interface:
igb2 (00:30:18:cd:ef:80)
Save
OPNsense (c) 2014-2017 Deciso B.V.


Rules | Firewall | OPNsense.test.thomas-krenn.com - Chromium
Rules | Firewall
Not secure
https://192.168.1.1/firewall_rules.php?if=lan
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Interfaces
Firewall
Aliases
Rules
NAT
Traffic Shaper
Groups
Virtual IPs
Settings
Log Files
Diagnostics
VPN
Services
Power
Help
Firewall: Rules
Floating
LAN
WAN
Proto
Source
Port
Destination
Port
Gateway
Schedule
Description
* * * LAN Address 443 80 * Anti-Lockout Rule
IPv4 * LAN net * * * * Default allow LAN to any rule
IPv6 * LAN net * * * * Default allow LAN IPv6 to any rule
pass
pass (disabled)
block
block (disabled)
reject
reject (disabled)
log
log (disabled)
in
out
Alias (click to view/edit)
Schedule (click to view/edit)
Rules are evaluated on a first-match basis (i.e. the action of the first rule to match a packet will be executed). This means that if you use block rules, you'll have to pay attention to the rule order. Everything that isn't explicitly passed is blocked by default.
OPNsense (c) 2014-2017 Deciso B.V.


Servers | OpenVPN | VPN | OPNsense.test.thomas-krenn.com - Chromium
Servers | OpenV
Not secure
https://192.168.1.1/vpn_openvpn_server.php?act=new
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Interfaces
Firewall
VPN
IPsec
OpenVPN
Servers
Clients
Client Specific Overrides
Client Export
Connection Status
Log File
Services
Power
Help
VPN: OpenVPN: Servers
add server
General information
full help
Disabled
Server Mode
Peer to Peer (SSL/TLS)
Protocol
UDP
Device Mode
tun
Interface
WAN
Local port
1194
Description
Cryptographic Settings
TLS Authentication
Enable authentication of TLS packets.
Automatically generate a shared TLS authentication key.
Peer Certificate Authority
No Certificate Authorities defined.
Create one under System: Certificates.
Peer Certificate Revocation List
No Certificate Revocation Lists (CRLs) defined.
Create one under System: Certificates
OPNsense (c) 2014-2017 Deciso B.V.


Captive Portal - Chromium
Captive Portal
Not secure
https://192.168.1.1/ui/captiveportal/
OPNsense
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Interfaces
Firewall
VPN
Services
Captive Portal
Administration
Sessions
Vouchers
Log File
DHCP
DHCPv6
DNS Forwarder
DNS Resolver
DNS Tools
Intrusion Detection
Network Time
Web Proxy
Diagnostics
Power
Help
Captive Portal
Zones
Templates
Search
7
Enabled
Description
Commands
No results found!
« < 1 > »
Showing 0 to 0 of 0 entries
Apply
OPNsense (c) 2014-2017 Deciso B.V.


Reboot | Power | OPNsense.test.thomas-krenn.com - Chromium
Reboot | Power
Not secure
https://192.168.1.1/reboot.php
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Interfaces
Firewall
VPN
Services
Power
Reboot
Power Off
Help
Power: Reboot
Are you sure you want to reboot the system?
Yes
No
OPNsense (c) 2014-2017 Deciso B.V.

Welcome to OPNsense's documentation!

OPNsense® is an open source, easy-to-use and easy-to-build FreeBSD based firewall and routing platform.

OPNsense includes most of the features available in expensive commercial firewalls, and more in many cases. It brings the rich feature set of commercial offerings with the benefits of open and verifiable sources.

Table of Contents

Versionen

Die folgende Tabelle zeigt im Überblick die bisherigen OPNsense Versionen:

Version	FreeBSD Basis	Releasemeldung	Wichtige Neuerungen (auszugsweise)	Weitere Informationen
OPNsense 17.1	FreeBSD 11.0	17.1	• PHP7 • SSH Installer • Lets Encrypt plugin • HardenedBSD's SEGVGUARD	Meldung zum 17.1 Release (heise.de)
OPNsense 16.7	FreeBSD 10.3	16.7	• Pluggable service infrastructure • Two factor authentication using RFC 6238 • HardenedBSD's ASLR implementation	Meldung zum 16.7 Release (heise.de)
OPNsense 16.1	FreeBSD 10.2	16.1	• Plugin support • Menu/navigation restructuring	
OPNsense 15.7	FreeBSD 10.1	15.7	• Support both OpenSSL and LibreSSL • Code refactoring	
OPNsense 15.1	FreeBSD 10.0	15.1	• Feature enhancements • Code cleanup	

Für Informationen zu künftigen Versionen ist eine detaillierte Roadmap abrufbar.[2]

pfSense

OPNsense®

	IPFire 2.19	pfSense® 2.3	OPNsense® 17.1
Basis	Linux® Kernel 3.14	FreeBSD® 10.3	FreeBSD® 11.0
Stateful Firewall	✔	✔	✔
Proxy Cache	✔	✔	✔
VPN	✔	✔	✔
IDS	✔	✔	✔
HA-Cluster		✔	✔
Multi-WAN		✔	✔
Layer 2 (transparent)		✔	✔
Zwei-Faktor-Auth			✔

getestet mit LES network mit 4G modem

auch für VPN Roadwarrior (z.B. Google Auth.)

LES network als Firewall

- Software: Open Source Firewall Lösungen im Überblick
- Hardware: LES network vorgestellt
- pfSense®, OPNsense® und IPFire am LES network
- Performance: Was bringt eine CPU mit AES New Instructions (AES-NI) für VPN?


HDD
ON/OFF


HDD
ON/OFF


DCIN
RESET
HDMI
COM
VGA


RoHS
AW24P64F8
SM863 2.5" 240GB SSD SATA6 Gb/s

- 10 NICs
- HSPA / UMTS / EDGE / LTE 4G Modem optional
- Low Energy Server

ubuntu CentOS redhat debian SUSE IPFire pfSense OPNsense

- 6 NICs
- HSPA / UMTS / EDGE / LTE 4G Modem optional
- Low Energy Server
- Intel AES-NI für hohe VPN-Loads (Skylake i5)

Ausblick: LES network+
(geplant: Mai 2017)

ubuntu CentOS redhat debian SUSE IPFire pfSense OPNsense





	LES v2	LES v3	LES network	LES network+	RI1102H+
CPU	Celeron N2930	Celeron N3160	Celeron J1900	Core i5-6300U	konfigurierbar
Takt	1,83 GHz	1,6 GHz	2,0 GHz	2,4 GHz	2,9-3,6 GHz
Cores/Thr.	4/4	4/4	4/4	2/4	2-4/2-4
AES-NI		✔		✔	✔
RAM	2-8 GB	2-8 GB	2-8 GB	4-32 GB	4-64 GB
NICs 1Gb	2	2	10	6	4
NICs optional					4x 1Gb oder 2x 10Gb



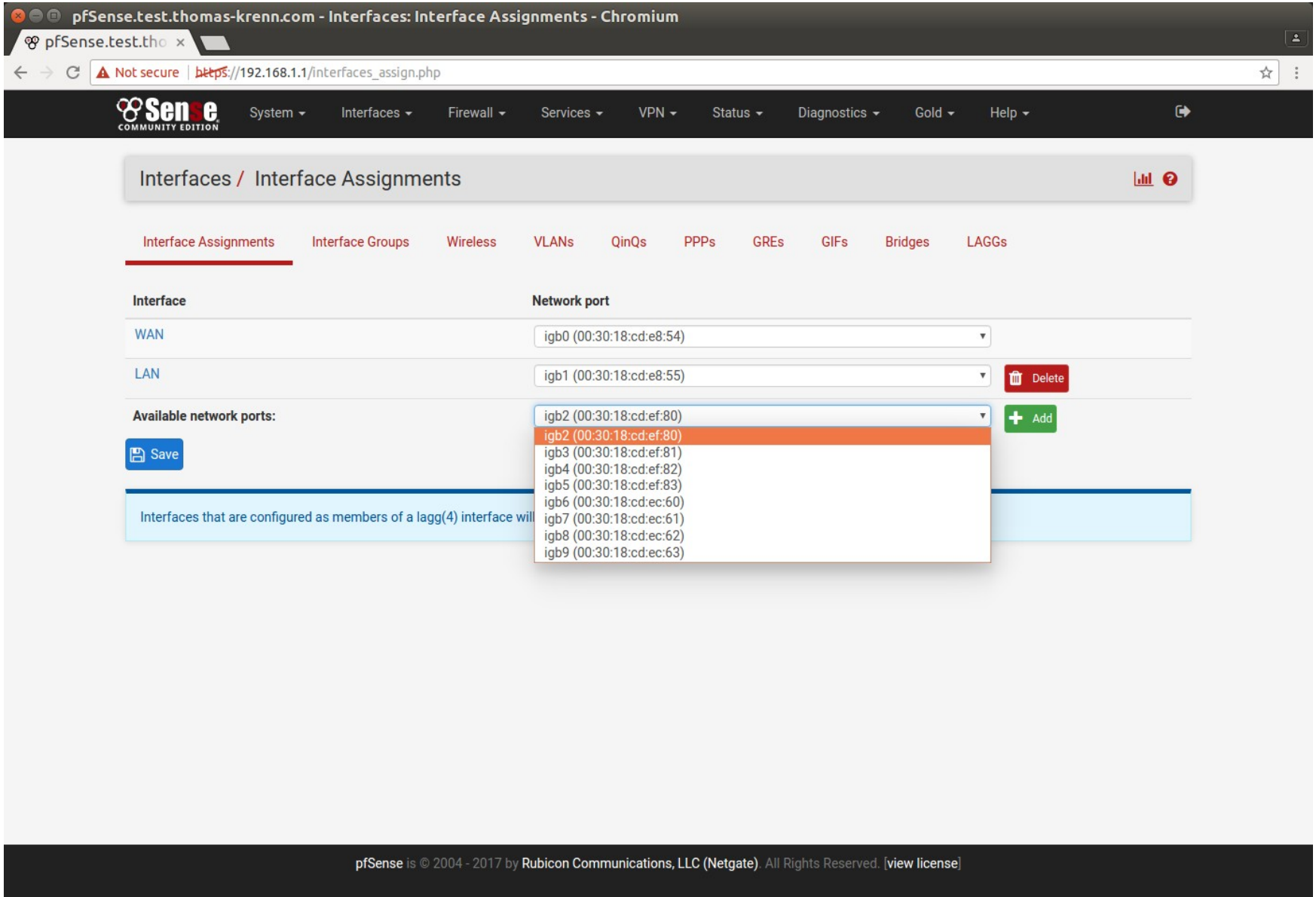


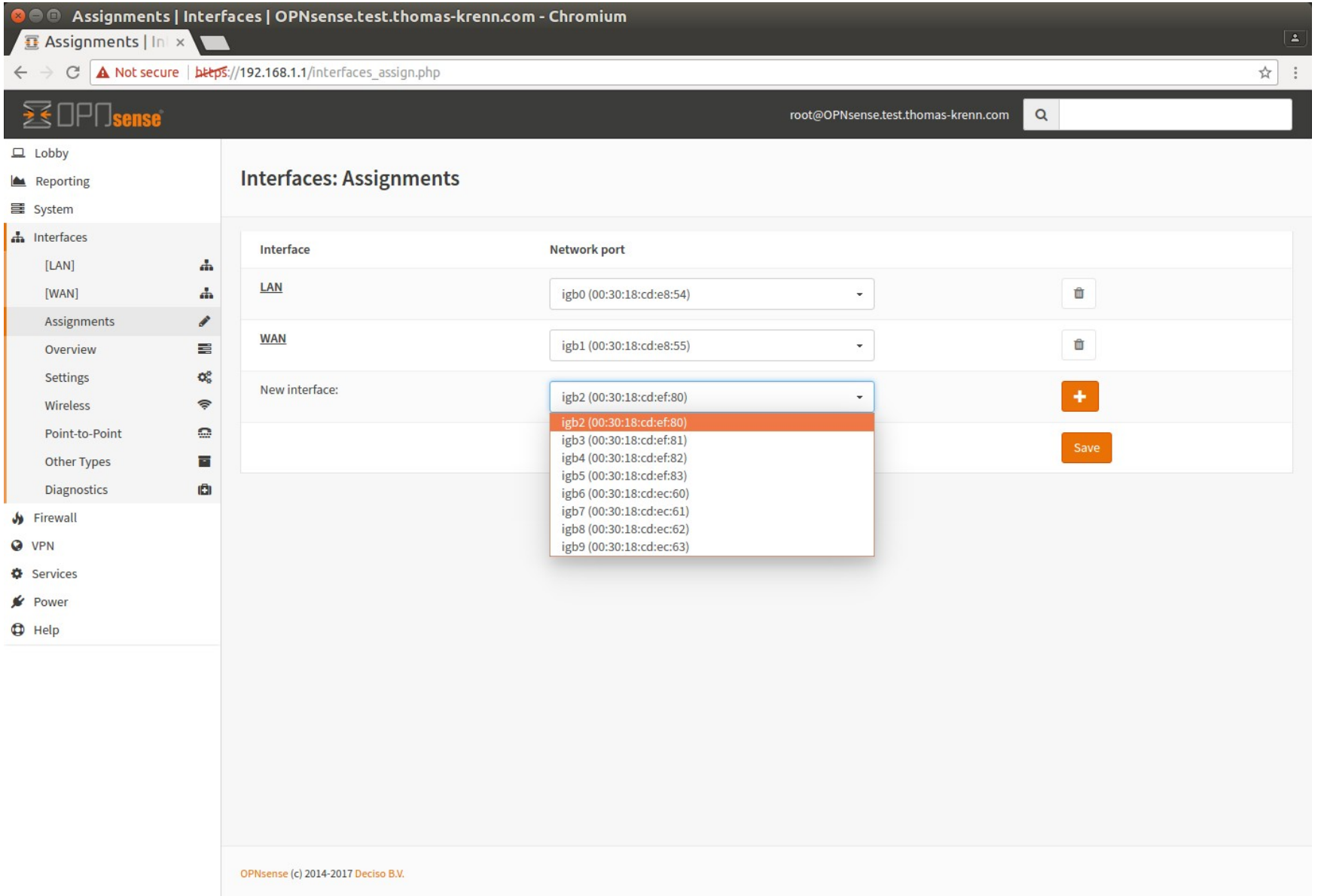
	LES v2	LES v3	LES network	LES network+	RI1102H+
CPU	Celeron N2930	Celeron N3160	Celeron J1900	Core i5-6300U	onfigurierbar
Takt					2,9-3,6 GHz
Cores/Thr					2-4/2-4
AES-NI					✔
RAM					4-64 GB
NICs 1Gb					4
NICs option					4x 1Gb oder 2x 10Gb

✔ Industrielles Design
✔ Staubgeschütztes Gehäuse
✔ Absolut geräuschlos

LES network als Firewall

- Software: Open Source Firewall Lösungen im Überblick
- Hardware: LES network vorgestellt
- pfSense®, OPNsense® und IPFire am LES network
- Performance: Was bringt eine CPU mit AES New Instructions (AES-NI) für VPN?


pfSense.test.thomas-krenn.com - Interfaces: Interface Assignments - Chromium
pfSense.test.tho
Not secure
https://192.168.1.1/interfaces_assign.php
Sense
COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Gold
Help
Interfaces / Interface Assignments
Interface Assignments
Interface Groups
Wireless
VLANs
QinQs
PPPs
GREs
GIFs
Bridges
LAGGs
Interface
Network port
WAN
igb0 (00:30:18:cd:e8:54)
LAN
igb1 (00:30:18:cd:e8:55)
Delete
Available network ports:
igb2 (00:30:18:cd:ef:80)
Add
Save
igb2 (00:30:18:cd:ef:80)
igb3 (00:30:18:cd:ef:81)
igb4 (00:30:18:cd:ef:82)
igb5 (00:30:18:cd:ef:83)
igb6 (00:30:18:cd:ec:60)
igb7 (00:30:18:cd:ec:61)
igb8 (00:30:18:cd:ec:62)
igb9 (00:30:18:cd:ec:63)
Interfaces that are configured as members of a lagg(4) interface will
pfSense is © 2004 - 2017 by Rubicon Communications, LLC (Netgate). All Rights Reserved. [view license]


Assignments | Interfaces | OPNsense.test.thomas-krenn.com - Chromium
Assignments | In
Not secure
https://192.168.1.1/interfaces_assign.php
root@OPNsense.test.thomas-krenn.com
Lobby
Reporting
System
Interfaces
[LAN]
[WAN]
Assignments
Overview
Settings
Wireless
Point-to-Point
Other Types
Diagnostics
Firewall
VPN
Services
Power
Help
Interfaces: Assignments
Interface
Network port
LAN
igb0 (00:30:18:cd:e8:54)
WAN
igb1 (00:30:18:cd:e8:55)
New interface:
igb2 (00:30:18:cd:ef:80)
igb2 (00:30:18:cd:ef:80)
igb3 (00:30:18:cd:ef:81)
igb4 (00:30:18:cd:ef:82)
igb5 (00:30:18:cd:ef:83)
igb6 (00:30:18:cd:ec:60)
igb7 (00:30:18:cd:ec:61)
igb8 (00:30:18:cd:ec:62)
igb9 (00:30:18:cd:ec:63)
Save
OPNsense (c) 2014-2017 Deciso B.V.

pfSense 2.5 and AES-NI

May 01, 2017 By Jim Thompson

HOME › BLOG

Related Categories

- Announcements
- Development
- Hardware
- Partners
- Releases
- Services

ABOUT NETGATE

As host of the pfSense open source firewall project, Netgate believes in enhancing network connectivity that maintains both security and privacy. We also believe everyone should be able to afford it.

RSS

We're starting the process toward pfSense software release 2.3.4. pfSense software release 2.4 is close as well, and will bring a number of improvements: UEFI, translations to at least five lanuguages, ZFS, FreeBSD 11 base, new login page, OpenVPN 2.4 and more. pfSense version 2.4 requires a 64-bit Intel or AMD CPU, and nanobsd images [illegible] version 2.4.

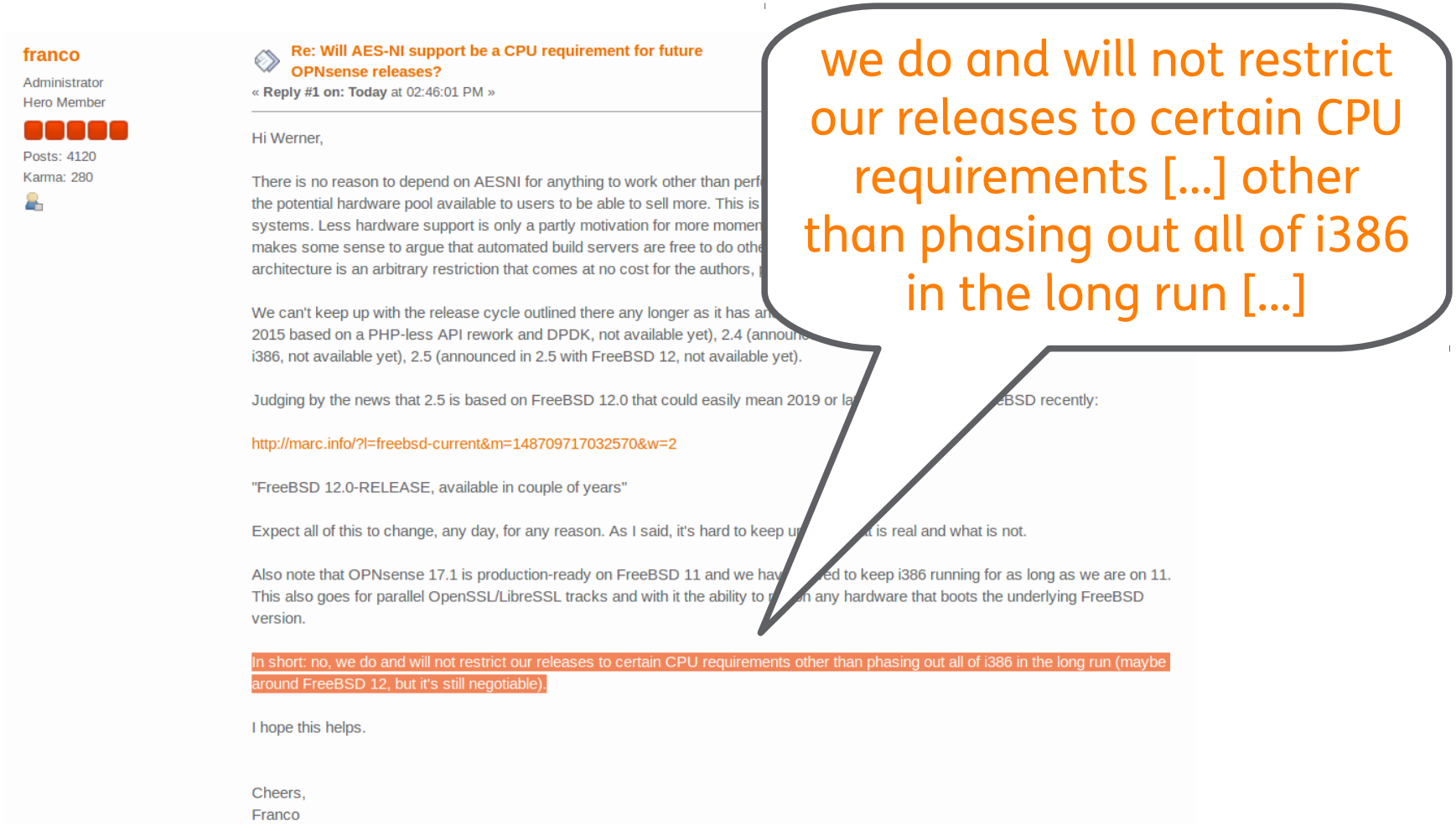
pfSense version 2.5 will be based on FreeBSD 12, wh[illegible] support for our integrated management platform, N[illegible] other features.

With the increasing ubiquity of computing devices p[illegible] home, the need for encryption has become more imp[illegible] phones, tablets, and many other devices all share this need to b[illegible] information. Without encryption, everything you send over a netw[illegible] store on a local storage device) is in the open, for anyone to read anytime he wan[illegible] or even change it.

While we're not revealing the extent of our plans, we do want to give early notice that, in order to support the increased cryptographic loads that we see as part of pfSense verison 2.5, pfSense Community Edition version 2.5 will include a requirement that the CPU supports AES-NI. On ARM-based systems, the additional load from AES operations will be offloaded to on-die cryptographic accelerators, such as the one found on our SG-1000. ARM v8 CPUs include instructions like AES-NI that can be used to increase performance of the AES algorithm on these platforms.

pfSense 2.5 [...] will include a requirement that the CPU supports AES-NI

Quelle: https://www.netgate.com/blog/pfsense-2-5-and-aes-ni.html



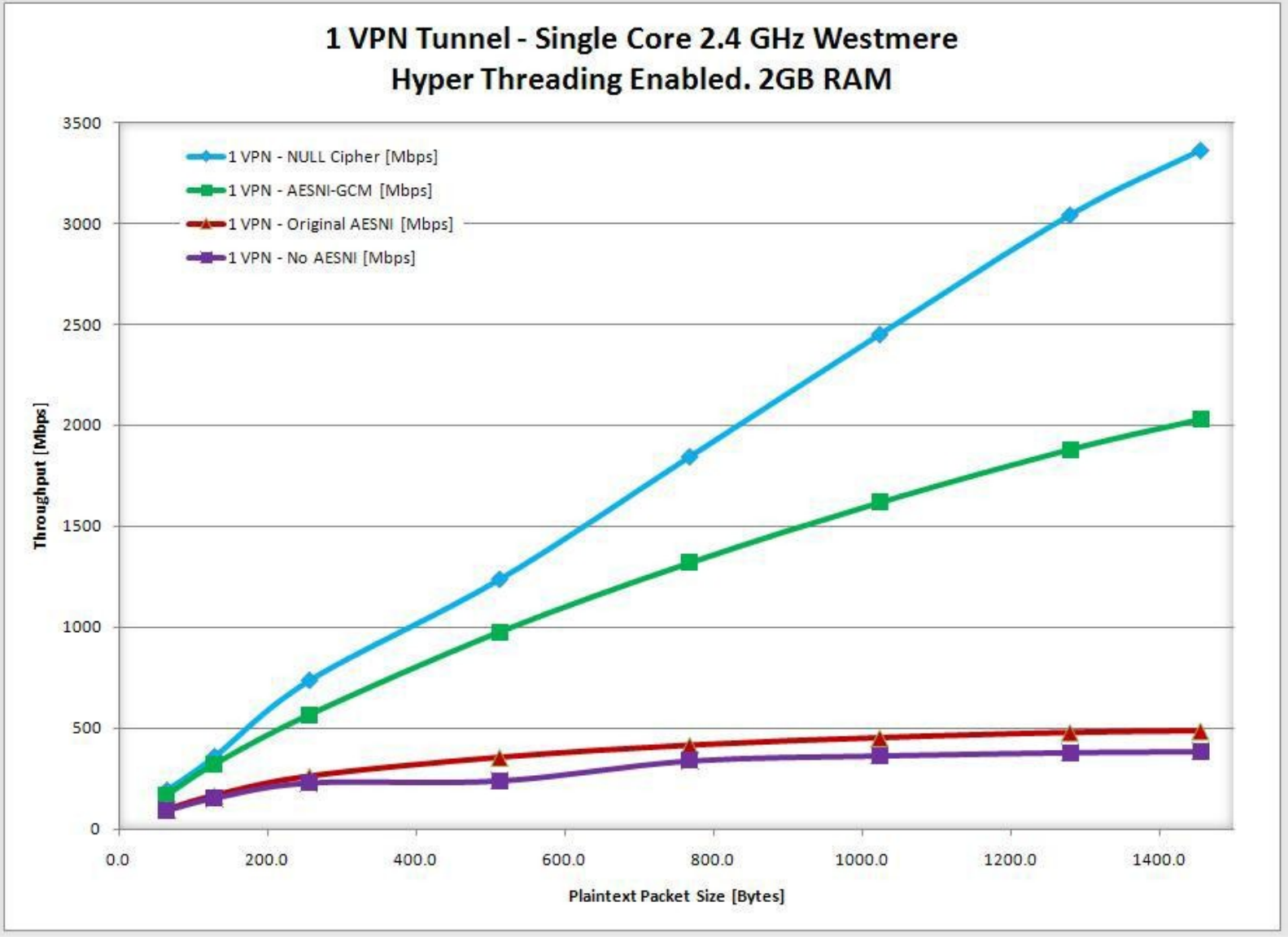
Quelle: https://forum.opnsense.org/index.php?topic=5097

LES network als Firewall

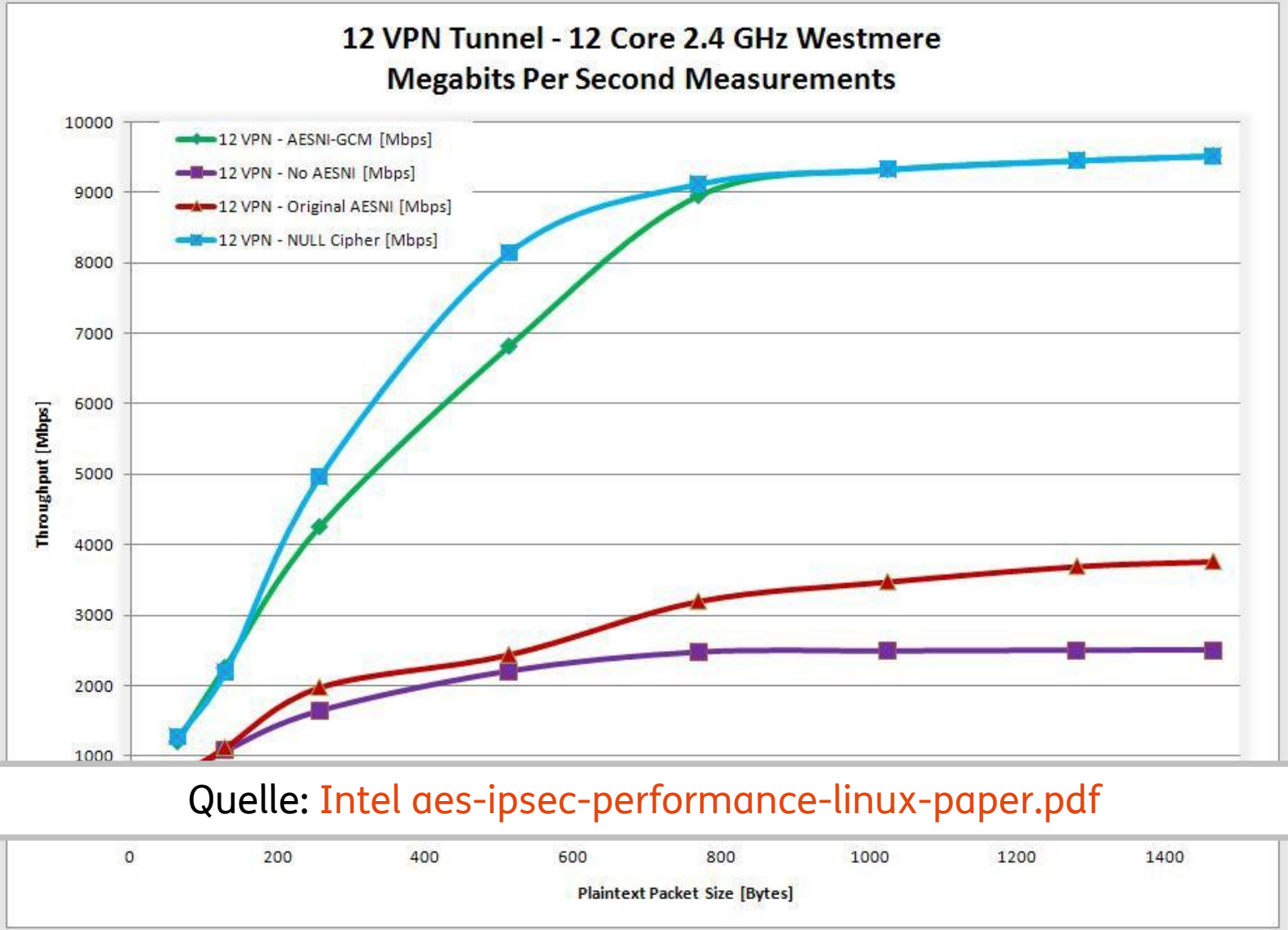
- Software: Open Source Firewall Lösungen im Überblick
- Hardware: LES network vorgestellt
- pfSense®, OPNsense® und IPFire am LES network
- Performance: Was bringt eine CPU mit AES New Instructions (AES-NI) für VPN?

/usr/local/bin/openssl speed -elapsed aes-256-cbc	26663.70k
/usr/local/bin/openssl speed -elapsed **-evp** aes-256-cbc	28743.04k
/usr/local/bin/openssl speed -elapsed aes-256-cbc	96986.32k
/usr/local/bin/openssl speed -elapsed **-evp** aes-256-cbc	**739713.49k**

Potential ist hoch, möglicher Nutzen hängt von Internet-Bandbreite ab (Bottleneck)


1 VPN Tunnel - Single Core 2.4 GHz Westmere
Hyper Threading Enabled. 2GB RAM
1 VPN - NULL Cipher [Mbps]
1 VPN - AESNI-GCM [Mbps]
1 VPN - Original AESNI [Mbps]
1 VPN - No AESNI [Mbps]
Throughput [Mbps]
3500
3000
2500
2000
1500
1000
500
0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
Plaintext Packet Size [Bytes]


12 VPN Tunnel - 12 Core 2.4 GHz Westmere
Megabits Per Second Measurements
12 VPN - AESNI-GCM [Mbps]
12 VPN - No AESNI [Mbps]
12 VPN - Original AESNI [Mbps]
12 VPN - NULL Cipher [Mbps]
Throughput [Mbps]
Plaintext Packet Size [Bytes]
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
0
200
400
600
800
1000
1200
1400



Quelle: Intel aes-ipsec-performance-linux-paper.pdf

LES network als Firewall

- Software: Open Source Firewall Lösungen im Überblick
- Hardware: LES network vorgestellt
- pfSense®, OPNsense® und IPFire am LES network
- Performance: Was bringt eine CPU mit AES New Instructions (AES-NI) für VPN?

Thomas-Krenn-Wiki - Chromium

Thomas-Krenn-W

Thomas-Krenn.AG [DE] | https://www.thomas-krenn.com/de/wiki/Hauptseite

THOMAS KRENN

Benutzerkonto erstellen | Anmelden

Lesen | Quelltext anzeigen | Versionsgeschichte

wiki

Unsere Experten teilen ihr Wissen mit Ihnen.

- Server-Hardware
- Server-Software
- Storage
- Netzwerk+Zubehör
- Projektvorstellungen
- Archiv

Werkzeuge

- Links auf diese Seite
- Änderungen an verlinkten Seiten
- Spezialseiten
- Druckversion
- Permanenter Link
- Seiteninformationen

In anderen Sprachen

- English
- Polski

Das Thomas-Krenn-Wiki - mehr als nur ein Lexikon

Hier im **Thomas-Krenn-Wiki** finden Sie das gesammelte Know-how der Mitarbeiter der Thomas-Krenn.AG. Die Artikel reichen von Installations- und Konfigurationsanleitungen über technischen Erklärungen bis hin zu konkreten Problemlösungen.

Wer wir sind: Die Thomas-Krenn.AG ist ein führender Hersteller individueller Server- und Storage-Systeme sowie Anbieter von Lösungen rund um das Rechenzentrum. Unser Onlineshop (thomas-krenn.com) bietet Kunden eine europaweit einzigartige Möglichkeit, in kürzester Zeit maßgeschneiderte Server mit geprüften Komponenten zu konfigurieren und bereits am nächsten Tag zu installieren.

Das Unternehmen produziert alle Server in Deutschland am Standort Freyung. Seit ihrer Gründung im Jahr 2002 weist die Thomas-Krenn.AG ein stetiges Wachstum aus eigener Kraft auf.

Weitere Informationen über Thomas-Krenn finden Sie in unserem Onlineshop (thomas-krenn.com). Weitere Informationen über unser Wiki finden Sie auf der Spezialseite über das Wiki der Thomas-Krenn.AG.

Neueste Artikel

- Firewall Software (02.05.2017)
- OPNsense Update (28.04.2017)
- PfSense Update (27.04.2017)
- PfSense Software RAID 1 (26.04.2017)

Beliebteste Artikel

- Windows für SSDs optimieren (521.733 Abfragen)
- Windows Server 2012 Editionsunterschiede (500.871 Abfragen)
- VLAN Grundlagen (486.127 Abfragen)

LES network

Innovative Technologie, flexibel einsetzbar

Kompakte Maße, zehn Ethernet-Ports, geringer Stromverbrauch, industrielles Design und absolute Geräuschlosigkeit – diese Eigenschaften zeichnen unseren LES network aus. Dank der flexiblen Ausstattungsmöglichkeiten ist das System für zahlreiche Anwendungen geeignet: Ob Firewall, SMS-Gateway oder Messtechnik in der Industrie – der Low Energy Server network passt sich jedem Einsatzgebiet an.

Weiteres Highlight: Dank stromsparender Konzeption ist der LES network wie alle unsere Low Energy Server extrem effizient. Informieren Sie sich jetzt über unseren flexiblen Allrounder!

In dieser Rubrik:

Rack-Server
Tower-Systeme
Workstations
IPC-Systeme
Storage-Systeme
Low Energy Systeme
LES
LES LI3Z
LES network
LES network
LES loadbalancer
PCs & Thin Clients
Appliances
Sonderlösungen
Software
Zubehör

Produkt | Produktdetails | Anwendungsgebiete

LES network

_ Industrielles Design - staubgeschütztes Gehäuse und absolut geräuschlos durch passive Kühlung
_ Qualitativ hochwertige Industriekomponenten
_ Geeignet für den 2...

mehr anzeigen

425,00 €

KONFIGURIEREN

THOMAS KRENN®

Allianz für Cyber-Sicherheit
Partner

Reach for the Stars:

→ Secure your Network with Open Source

→ Answer short questions

= valuable future content

THOMAS KRENN®