Dual-stack Firewalling with husk

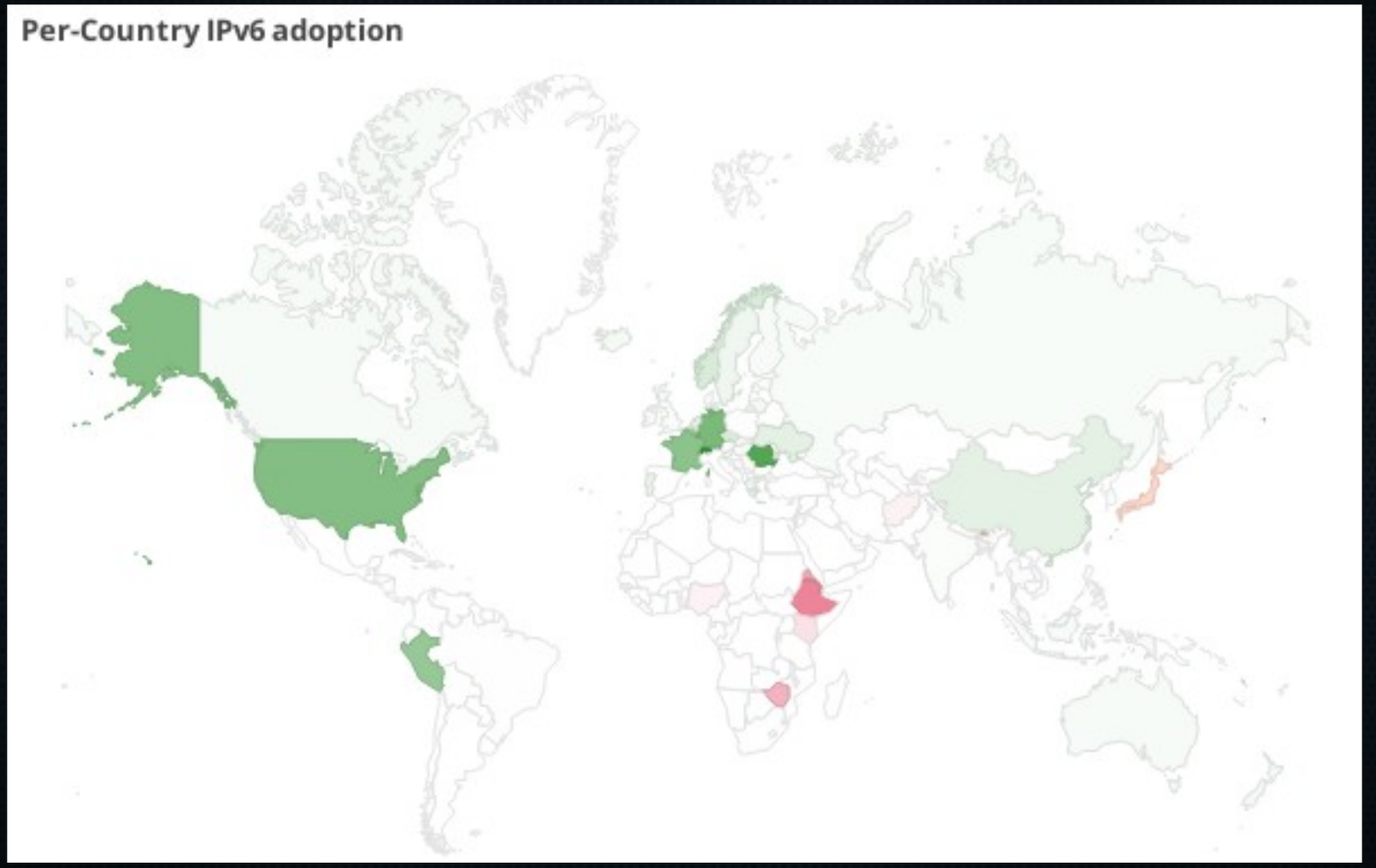
Phil Smith

linux.conf.au – Perth 2014

Phil Smith

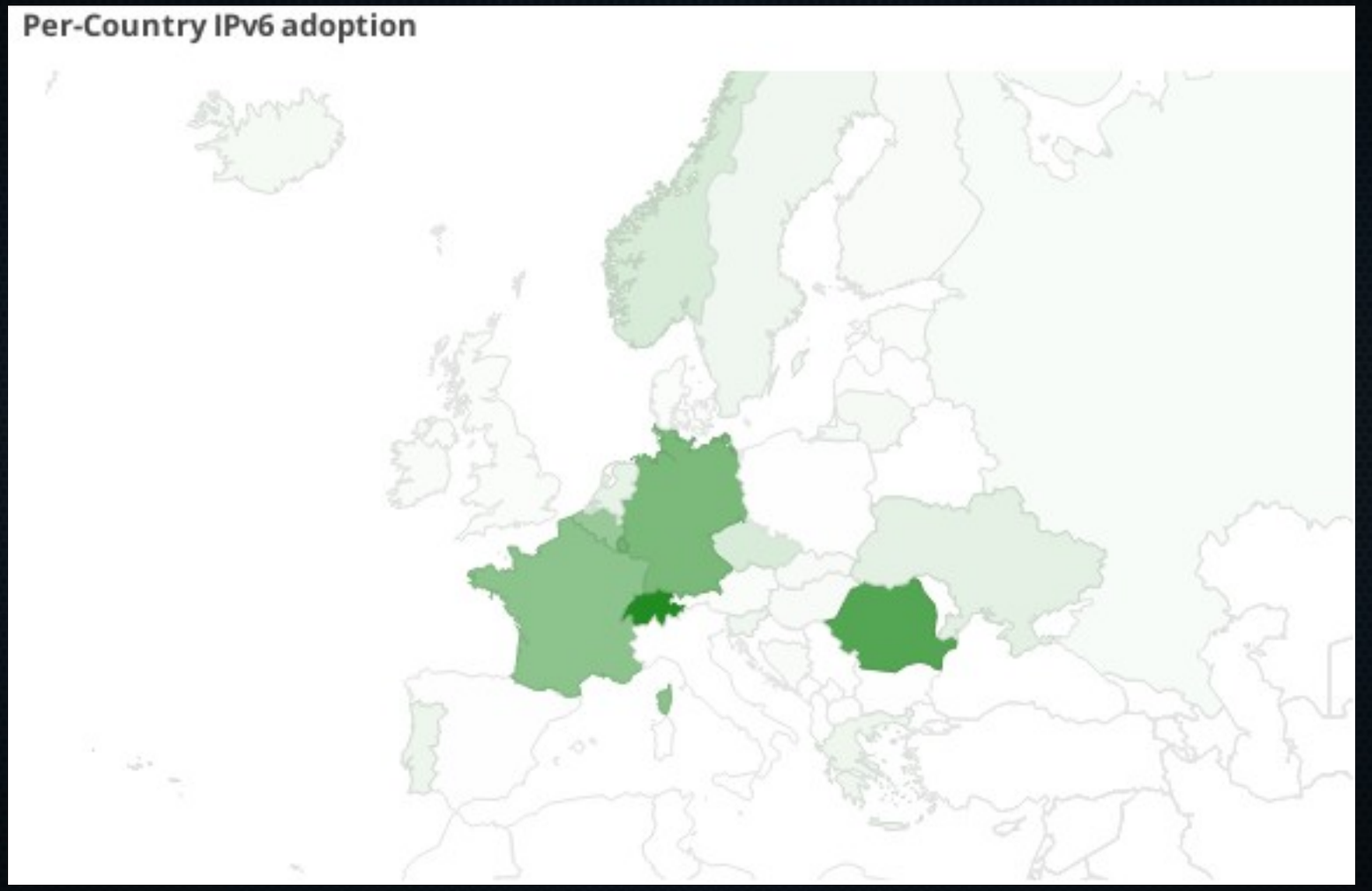
- SysAdmin from Melbourne
- Personal Care Manufacturer
  - Implemented complete Dual-stack
- Previous role in managed security
- 4WD'ing & Fire-fighting

Google IPv6 Statistics



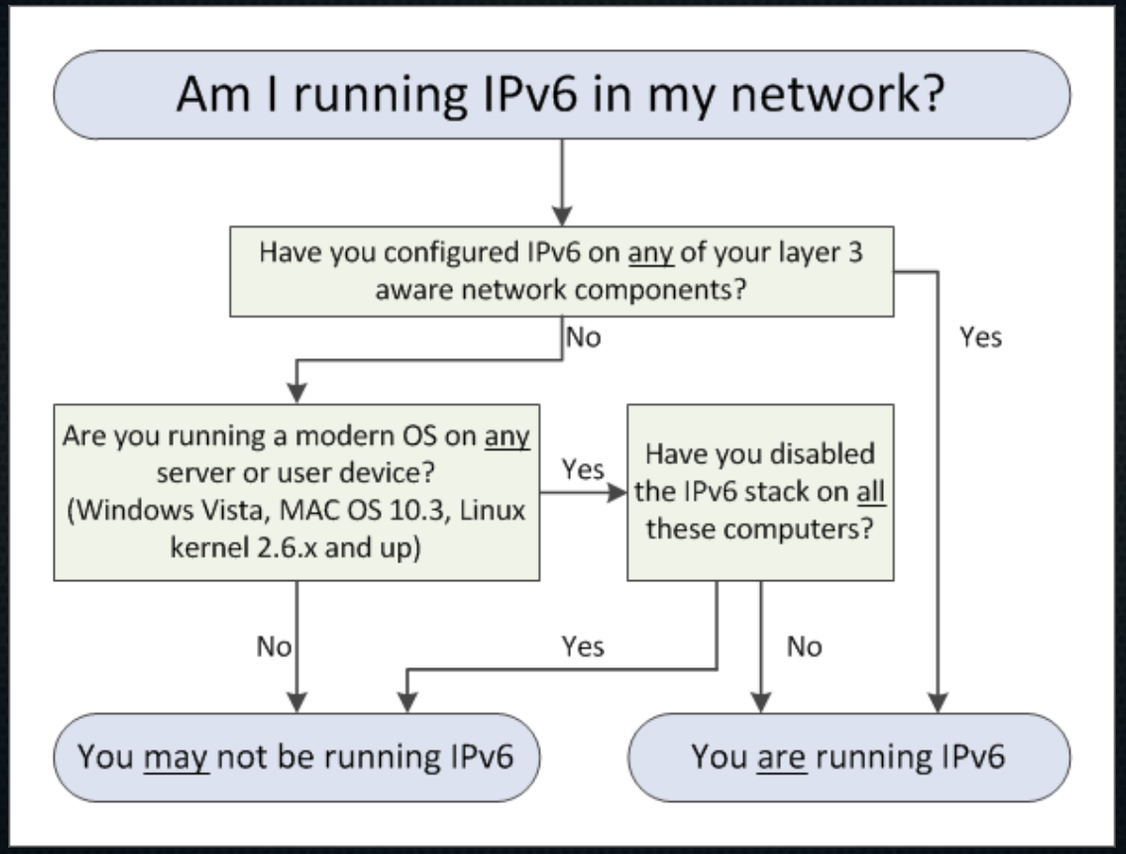
Source:http://www.google.com/ipv6/statistics.html on 18 Dec 2013

Google IPv6 Statistics



Source:http://www.google.com/ipv6/statistics.html on 18 Dec 2013

Are you running IPv6?



IPv6 Challenge for Firewalls

Who has the attention span for this everytime?

```
# vi /etc/sysconfig/iptables
  *tap tap tap tap*
# vi /etc/sysconfig/ip6tables
  *tap tap tap tap*
# iptables-restore < /etc/sysconfig/iptables
# ip6tables-restore < /etc/sysconfig/ip6tables
# kill $(pidof me)
```

IPv6 Challenge for Firewalls

- That's hard.
- If it's hard, it won't get done.

- That's repetitive.
- If it's repetitive, script it!!

Husk

Sweet shell around the juicy core; like a coconut!

- Wrapper around netfilter *(iptables / ip6tables)*
- IPv6 Support
- Perl (mostly)
- Only 2 Dependencies
- Custom DSL
- Fails Safe (*LOG and DROP by default)*
- Hooks (*eg, fail2ban*)
- Helpers

Husk is not...

- Complete abstraction
- Automatic
- Incremental

Fun Fact

Production Dual-stack Firewall

- 2,540 rules managed in 796 lines of configuration ☺

```
fw1 ~ # (iptables-save && ip6tables-save) | grep -c -- -A
2540
fw1 ~ # egrep -cv "^#|^$" /etc/husk/rules.conf
796
```

Custom DSL

- Flexible, human-readable and case-insensitive

  <action> <match criteria>

- Examples:

```
accept in NET protocol tcp port http
```

vs

```
-A INPUT -i eth0 -p tcp –dport 80 -j ACCEPT
```

```
drop in NET source address microsoft.com
```

vs

```
-A INPUT -i eth0 -s microsoft.com -j DROP
```

Custom DSL

- Multiport Example:

```
accept in NET protocol tcp ports http,https
```

vs

```
-A INPUT -i eth0 -p tcp -m multiport --dports 80,443 -j ACCEPT
```

- NAT* Example:

```
map in NET protocol tcp port http to 192.0.2.100
```

vs

```
-t nat -A PREROUTING -i eth0 -p tcp –dport 80 -j DNAT –to 192.0.2.100
```

** Please don't do NAT. It kills unicorns.*

Custom DSL

- Also raw iptables rules

```
iptables -t nat -A POSTROUTING -s 150.101.140.197 -j SNAT –
to 1.2.3.4

ip6tables -A INPUT -m physdev --physdev-in eth0 -j ACCEPT
```

** Please don't do NAT. It kills unicorns.*

Zones

- Give interfaces nice names

- Example:

ppp0 → NET
eth1 → LAN
eth2 → DMZ
lo → ME

Helpers - Builtin

- NAT
  - Apply NAT to outbound traffic in zone.
  - Only applied to RFC1918 source addresses
- BOGON
  - Drop common IPv4 + IPv6 Bogon Traffic (RFC1918, CGN, LL etc)
- PORTSCAN
  - Common port scanning patterns
- XMAS
  - Christmas Tree Packets

Helpers - Custom

- Various helpers distributed with Husk
  - Active Directory
  - GoToMeeting
  - DNS
  - Email
  - ICMP rate-limiting
  - More...

Simple Example – Standalone Host

```
define rules SSH_OK
accept source address example.com
end define

define rules INPUT
SSH_OK protocol tcp port ssh
accept protocol tcp ports http,https
end define

define rules OUTPUT
accept all
end define
```

Simple Example – Router

```
define rules LAN to NET
reject protocol tcp port smtp
accept protocol tcp ports http,https
end define

define rules NET to DMZ
accept protocol tcp ports smtp,pop3 destination address mail.example.com
DNS destination address ns1.example.com
end define

define rules LAN to DMZ
accept all
end define
```

Simple Example – Adding IPv6

```
define rules SSH_OK
accept ip both source address example.com
accept ip 4 source address 192.0.2.123
accept ip 6 source address 2001:db8::beef
end define

define rules INPUT
SSH_OK ip both protocol tcp port ssh
accept ip both protocol tcp ports http,https
end define

define rules OUTPUT
accept ip both all
end define
```

Simple Example – Adding IPv6

```
define rules LAN to NET
reject ip both protocol tcp port smtp
accept ip both protocol tcp ports http,https
end define

define rules NET to DMZ
accept ip 4 protocol tcp ports smtp,pop3 dest address mail.example.com
DNS ip both destination address ns1.example.com
end define

define rules LAN to DMZ
accept ip both all
end define
```

Applying Changes

- Atomic Loads using `iptables-restore` and `ip6tables-restore`
- Logged to syslog

```
~ # fire
Compiling rulesets...
   => IPv4
   => IPv6
Saving current rulesets...
   => IPv4
   => IPv6
Running pre-hooks...
Applying new rulesets...
   => IPv4
   => IPv6
Running post-hooks...
Can you establish NEW connections to the machine? (y/N) y
Thank-you, come again!
IPv4: Loaded 470 rules in 47 chains.
IPv6: Loaded 419 rules in 46 chains.
~ #
```

Husk Firewall

Questions?

http://huskfw.info

github.com/fukawi2/husk

@fukawi2