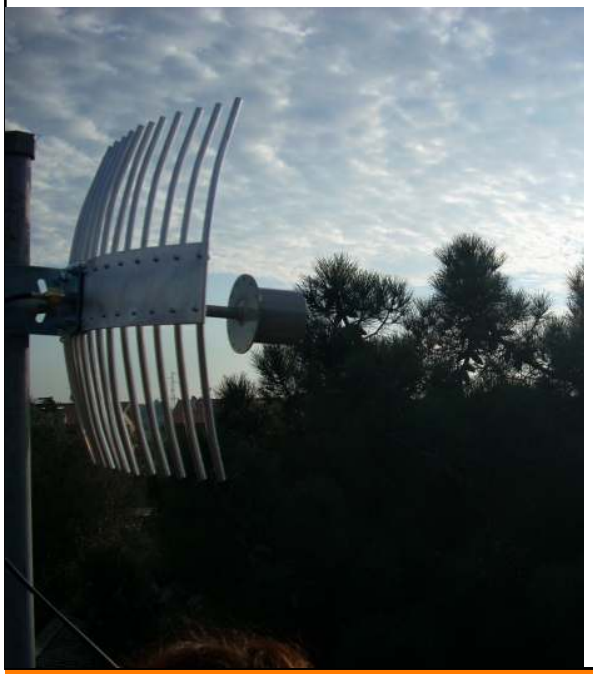
Ninux.org

Saverio Proto (ZioPRoTo)





Linux Day
2010
Firenze

Ninux: snapshot



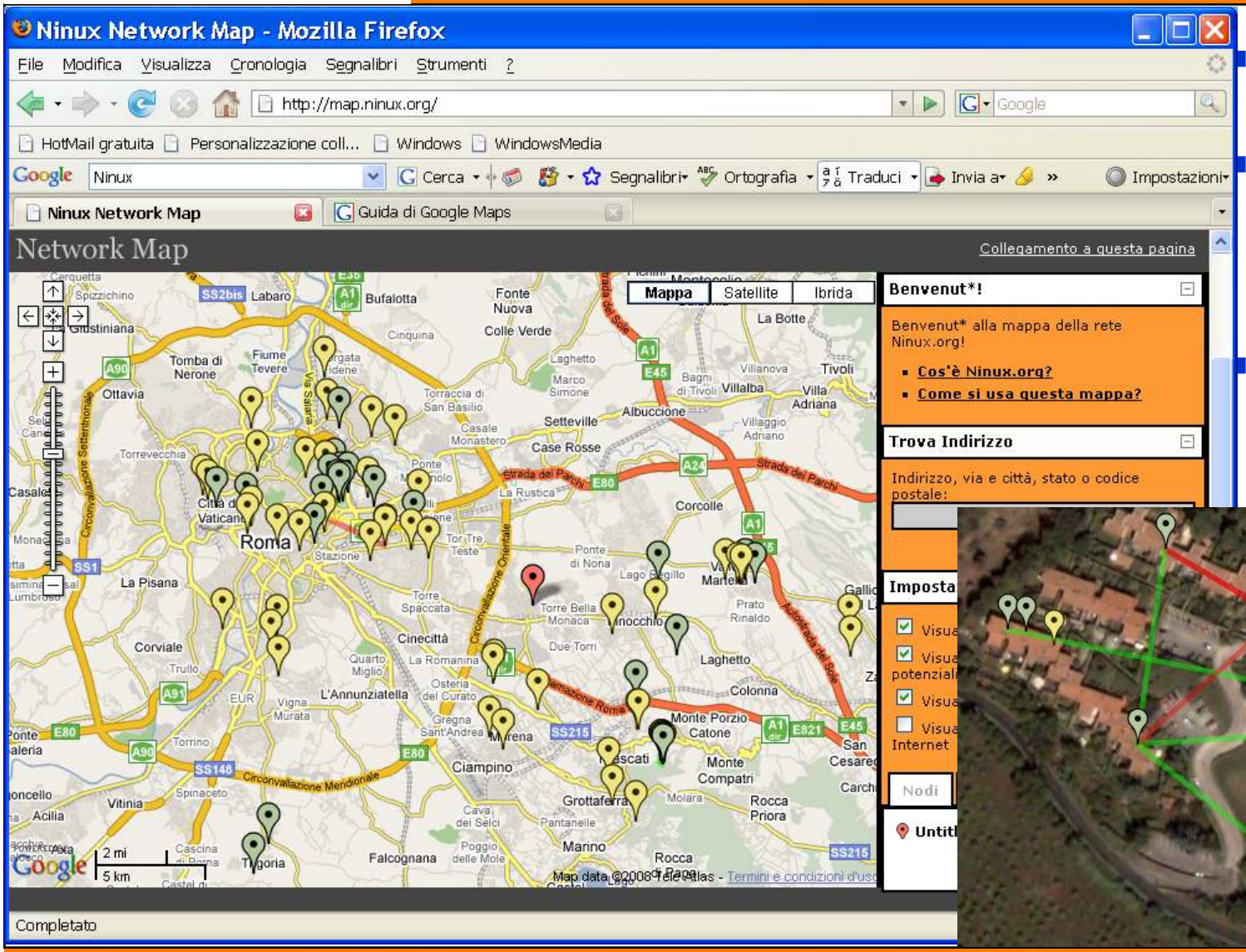


Siamo una wireless community network!





ROMA





- ~30 nodi ninux + ~10 nodi tuscolo
- Appassionati, studenti, forte collegamento con università
- sperimentazione tecnologie e soluzioni

PISA

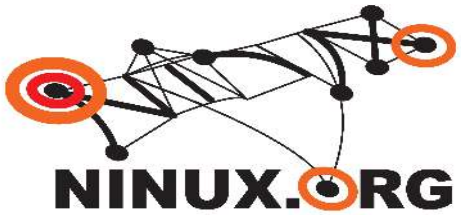




- ~20 nodi ninux
- Appassionati, collettivi di studenti (Eigenlab)
- Firmware autoconfigurante a livello IP sviluppato insieme a Freifunk e Ninux Roma
- Indirizzi IPv6 Pubblici

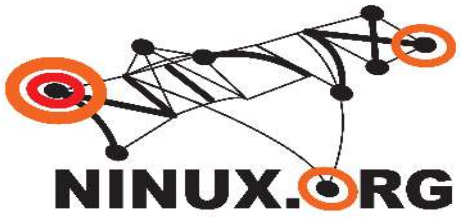
Layer 8 - People

- Is not easy to explain to people what is a Wireless Community
  - People are confused about Internet
  - People are confused about Free Software
  - What is Wiki RSS Jabber torrent ... ??
  - If you are not selling something there is something wrong with you!
- Most people are willing to pay but now willing to learn
  - At least at the beginning
  - Not everyone is like this!
  - Cultural problem, not technological



Layer 3 – IPv6

- RFC 2460 – RFC 3513 – RFC 4193
  - December 1998 !!
  - RFC 3363 and 3364 for DNS support (AAAA records)
- More Addresses
  - 128 bit IP addresses
- *Stateless* autoconfiguration
- No checksums
- No fragmentation
- Multicast / Anycast



Layer 3 – IPv6 in the Kernel

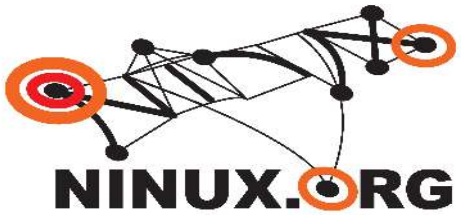
- Check **`/proc/net/if_inet6`**
- **`modprobe ipv6`**
- **`Networking - > Networking Options -> the IPv6 Protocol`**
- Forget **`ifconfig`** !
- Use **`ip`**
- Compile your applications for IPv6

Layer 3 – IPv6 Address Types

- Link Local
  - Automatic (stateless) IP connectivity on same link
  - fe80::/10
    - `ip addr show`
  - Very good in combination with mDNS (Avahi, Bonjour)
- Site Local
  - Just like the old private IPv4
  - fec0::/10
- Global
  - You can request addresses (many) at a Tunnel Broker
  - 2001::/10
  - 2002:: ... mapped to IPv4 addresses (more later)

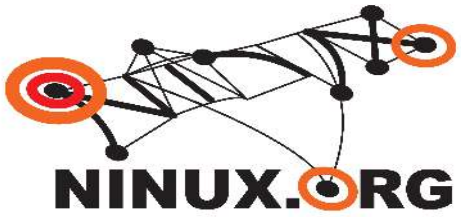
Layer 3 – IPv6 Address Types

- With Global IP addresses for every one
  - Network Address Traslation (NAT) is not necessary anymore
  - End user routers are faster because they do not mantain a state
    - NAT tables
  - Most application problems are NAT problems
- We can finally use IPSec !
  - Without tunneling over UDP
  - With better security and performances!



Layer 3 – IPv6 Address Assignment

- Manual Configuration
  - Usually on routers
- Statefull Autoconfiguration
  - Basically DHCPv6
- Stateless Autoconfiguration
  - Routers Advertise prefix of current attached subnet
  - Hosts are able to set up their IP addresses without communication exchange with other peers
  - There is not 1 node that holds the state of the all network
  - Note that DNS server IP address can be provided with router advertisements, but also anycast shuold do the job

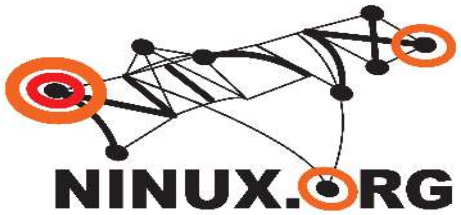


Layer 3 – IPv6 Address Assignment

```
interface br-lan
{
        AdvSendAdvert on;
        AdvManagedFlag off;
        AdvOtherConfigFlag off;

        prefix 2002:d985:b21a::2/64
        {
                AdvOnLink on;
                AdvAutonomous on;
                AdvRouterAddr off;
        };

        RDNSS fe80::500f:8fff:fece:be97
        {
        };
};
```



Layer 3 – IPv6 Packets are simpler

- No checksum
  - Avoid not necessary processing
  - Avoid checksum recalculation when changing options
- No fragmentation
  - VERY big benefit where a state is needed
  - Think of firewalls
    - Need to wait for all fragments before forwarding adding latency
  - Not all fragment are expected to flight on the same path

Layer 3 – IPv6 and IPv4

- 6to4
  - Let's you speak IPv6 wheneven you have a public IPv4
  - It is _NOT_ a way to make a IPv4 only host speak with a IPv6 only host
  - 2002:IPv4:IPv4:/48
  - Route towards IPv6 Backbone with anycast address 192.88.99.1
  - Route backwards to IPv4 host wth original IPv4 address
- 6in4
  - It is simply a tunneling
- This is your sit0 interface on Linux
  - Needs tun/tap drivers support in the Kernel

Layer 3 – IPv6 and IPv4

- 6to4
  - Gentoo
  - /etc/conf.d/net

```
link_sit0="eth0"
config_sit0=( "ip6to4" )
depend_sit0() {
        need net.eth0
        }
mtu_sit0="1280"
```

Layer 3 – IPv6 and IPv4

- 6to4
  - Debian

```
ipv6calc --quiet --action conv6to4 192.0.2.3
2002:c000:203::

auto tun6to4
iface tun6to4 inet6 v4tunnel
        address 2002:c000:0203::1
        netmask 16
        gateway ::192.88.99.1
        endpoint any
        local 192.0.2.3 #fits address
```

Layer 3 – IPv6 and IPv4

- 6to4
  - By hand

Tnlifname = sit0
$localip4 = 80.80.80.80

```
ip tunnel add $tnlifname mode sit remote any local $localip4 ttl 255
ifconfig $tnlifname up
ip addr add $localip6 dev $tnlifname
ip route add ::/0 via ::${remoteip4} dev $tnlifname
ip route add 2000::/3 via ::${remoteip4} dev $tnlifname
ip -6 addr add $prefix dev $LAN
```

Layer 3 – IPv6 and IPv4

- IPv6 only host to IPv4 world
  - Special DNS resolver
    - If the AAAA record does not exist provide a special A record with a site local prefix and the original IPv4
  - Special Gateway dual stack that keeps state of connections
    - Smart Gateway intercepts the site local prefix and threats packets in a NAT fashion

Layer 3 – IPv6 and IPv4

- A real story of IPv6 to IPv4 with proxy
  - Transmission bittorrent
    - IPv6 support for bittorrent protocol
    - The web interface supports IPv4 only
  - Apache2
    - Supports both IPv6 and IPv4
    - Using mod_proxy you can proxy to a IPv4 only web server

ProxyPass /foo http://foo.example.com/bar

Domande ?

- www.ninux.org
- Domande ?

