

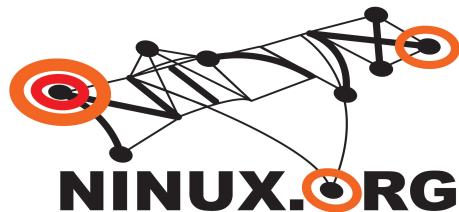
# Ninux.org

Saverio Proto (ZioPRoTo)



**Hackmeeting**  
**2010**  
**Roma**

<http://www.ninux.org>



# Roma: Ninux; TuscoloMesh

**Ninux Network Map - Mozilla Firefox**

File Modifica Visualizza Cronologia Segnalibri Strumenti ?

http://map.ninux.org/

Google Ninux

**Network Map**

Mappe Satellite Ibrida

Benvenuto\*!

Benvenuto\* alla mappa della rete Ninux.org!

- [Cos'è Ninux.org?](#)
- [Come si usa questa mappa?](#)

Trova Indirizzo

Indirizzo, via e città, stato o codice postale:

Imposta

- Visualizza
- Visualizza potenziali
- Visualizza
- Visualizza Internet

Nodi

Untit

Completato

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



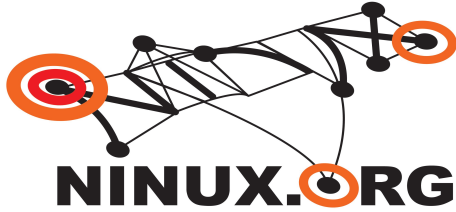


# Ninux: snapshot



**Approccio:  
Tutto o quasi  
“fatto in casa”  
(antenne, etc)**

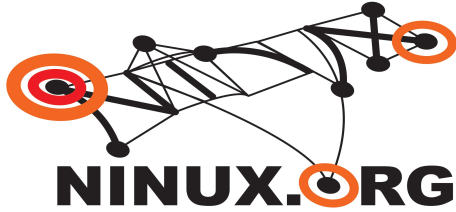




## Layer 8 - People

- 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

- 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

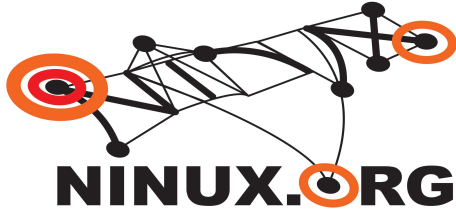
- Automatic (stateless) IP connectivity on same link
- fe80::/10
  - `ip addr show`
- Very good in combination with mDNS (Avahi, Bonjour)

### ■ Site Local

- Just like the old private IPv4
- fec0::/10

### ■ Global

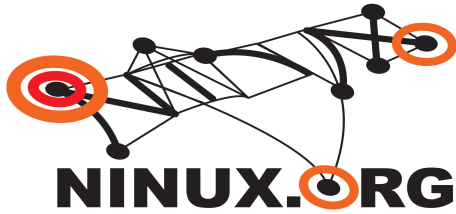
- You can request addresses (many) at a Tunnel Broker
- 2001::/10
- 2002:: ... mapped to IPv4 addresses (more later)



## Layer 3 – IPv6 Address Types

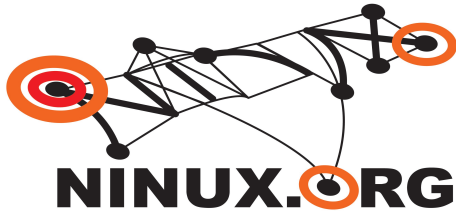
- **With Global IP addresses for every one**
  - Network Address Translation (NAT) is not necessary anymore
  - End user routers are faster because they do not maintain a state
    - NAT tables
  - Most application problems are NAT problems
- **We can finally use IPSec !**
  - Without tunneling over 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 is not provided with router advertisements, but anycast should do the job

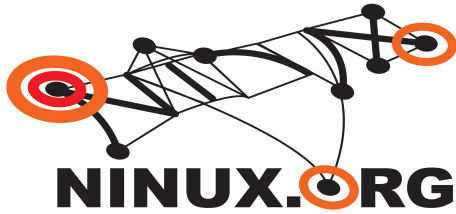


## Layer 3 – IPv6 Address Assignment

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

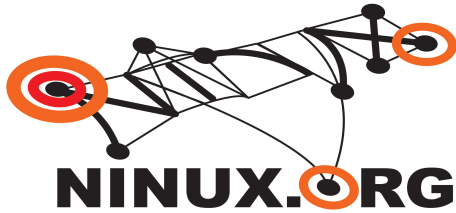
    prefix 2002:d985:b21a::2/64
    {
        AdvOnLink on;
        AdvAutonomous on;
        AdvRouterAddr off;
    };

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



## Layer 3 – IPv6 Address Assignment

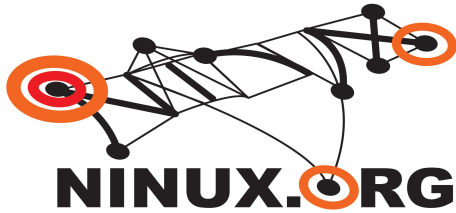
- Radvd is stateless but
  - No DNS is announced
- You can use:
  - IPv6 Anycast DNS
- DHCPv6
  - statefull



## 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 whenever 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 with original IPv4 address

### ■ 6in4

- It is simply a tunneling

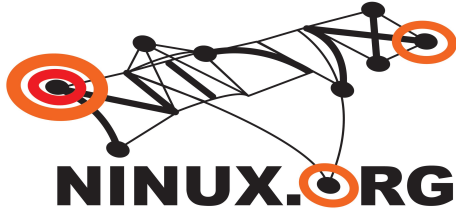
### ■ This is your sit0 interface on Linux

- Needs tun/tap drivers support in the Kernel

### ■ 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
```

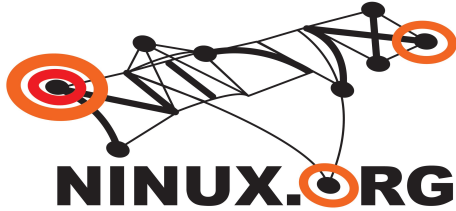
```
address 2002:c000:0203::1
```

```
netmask 16
```

```
gateway ::192.88.99.1
```

```
endpoint any
```

```
local 192.0.2.3 #fits address
```



## Layer 3 – IPv6 and IPv4

- 6to4
  - By hand

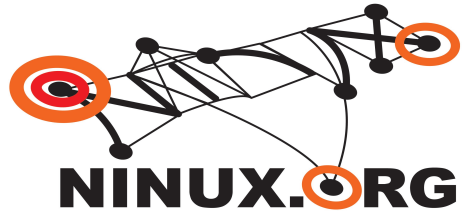
**Tnlifname = sit0**

**\$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
```



- **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 forwards packets in a NAT fashion



## Questions ?

- Thanks for coming
- Questions ?