

The Tiscali logo is displayed in a blue, lowercase sans-serif font. To its right is a dark blue, 3D-rendered globe showing the continents in a lighter shade of blue. The globe is positioned on a dark blue horizontal bar that extends from the left edge of the slide. The background of the slide features a light gray world map with white lines connecting various geographical locations, suggesting a global network.

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# Access and Content Towards IPv6

Giorgio Lembo – Head of R&D Dept.

## Some words about me

My name's Giorgio Lembo and I'm in charge of the R&D division at Tiscali International Network (TINet). R&D is mainly focused on developing (adapting) mathematical models for optimal resource utilization and robust planning.

TINet is the carrier arm of the Tiscali Group: we count today about 500 carrier customers over a network that carries in excess of 1,5Tbps. Since 2001 TINet has been involved with IPv6.

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cat info > /dev/null

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## Network topology

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## TINet and IPv6

TINet strongly believe in IPv6: today more than the 15% of our customer base takes advantage from dual-stack access to our network:

- TINet has over 140 IPv6 peers and over 70 IPv6 customers
- IPv6 is being deployed/tested by Mobile Operators (e.g. Vodafone Italy, SFR), content providers (e.g. Google and Amazon) and Academic Networks (e.g. Belnet, Surfnets)
- HEAnet is our leading customer in the Irish market

We wish to share with you two real implementations, one on the access side and one on the content level.

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```
C:\ > ipv6 install
```

## A challenge from an Italian Municipality

Sic1 is a spinoff of an Italian Municipality (Comune di Chiaravalle) that asked us to provide *cheap and technically advanced* Internet access to its citizens.

*E-government* requirements forced Comune di Chiaravalle to seek for an ADSL product with a cost everybody would be able to access, alongside some specific technical requirements.

The project started 14 months ago, and it provides ADSL connections for 9 euro per month (and some ADSLs are given for free to selected citizens).

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# The challenge

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## The proposed solution

Sic1 asked to be able to exactly discriminate between citizens via IPv4 addresses. Tiscali proposed them to adopt IPv6 and provided all the design and implementation manuals (and confs) for free.

Two products were designed with the constraint to be ordered with specific mix percentages. A multi-user kit (four users over a single ADSL line) and a single-user kit. All connections would be granted against *application congestion* via Cisco-SCE and would be natively dual-stacked.

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## The project

## Technical choices

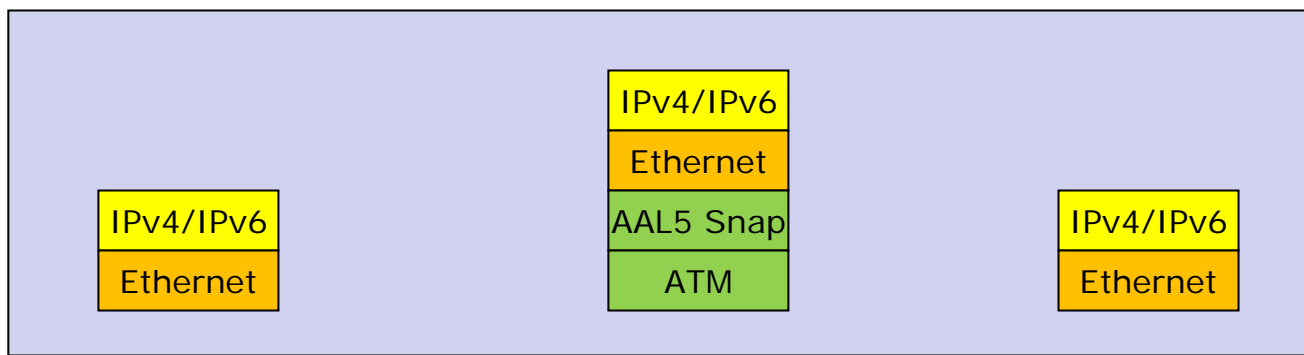
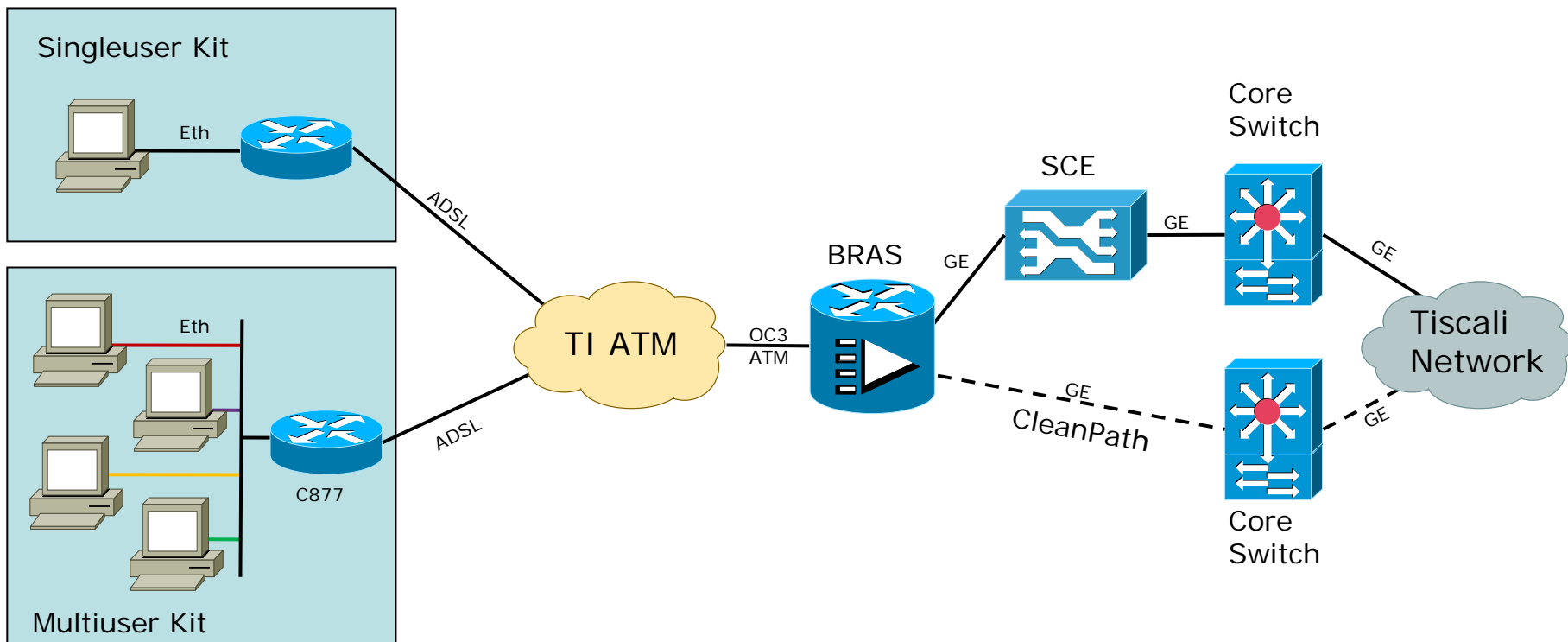
- Each customer has an ATM PVC. All connections bridged over ATM (former RFC1483). No authentication via username and password, but RADIUS accounting for DHCP addresses lease.
- L3 advantages: CPEs don't need to implement IPv6 (there are not a lot of CPEs IPv6 ready today). Because of bridging, in general, they are cheap as well.
- End-customers grouped up in IPv4 blocks using DHCP assignments, which eases management with the SCE. Customers may ask for different bandwidth profiles (CIRs).
- End-Customers are given an IPv6 /64 statically. A /64 allows IPv6 auto-configuration.

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# The network layout



# Sic1 – MultiUser Kit configuration (CPE)

The CPE configuration is trivial (showing a single user):

```
interface ATM0.1 point-to-point
  description Cliente 1 ADSL Condominiale n#
  no ip route-cache
  no snmp trap link-status
  !
  pvc 8/35
    encapsulation aal5snap
  !
  bridge-group 1
  !
interface FastEthernet0
  description Accesso Utente 1 su vlan 1
  duplex full
  speed 100
  !
interface Vlan1
  description Vlan Utente1
  no ip address
  bridge-group 1
  !
bridge 1 protocol ieee
```

← *Bridge the PVC SubIF*

← *Bring the customer access fastethernet into a separate VLAN*

← *Put the VLAN into a bridge-group*

Details: C877, IOS Version 12.4(11)XJ3

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## Sic1 – MU CPE Conf

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# Sic1 – MultiUser Kit configuration (BRAS)

The BRAS configuration is trivial as well (access interface):

```
Sic1-NpeG1#sh run int atm 2/0.5000
Building configuration...
```

```
Current configuration : 293 bytes
```

```
!
interface ATM2/0.5000 point-to-point
 ip unnumbered Loopback100
 ip access-group filter_in in
 ip access-group filter_out out
 no snmp trap link-status
 atm route-bridged ip
 atm route-bridged ipv6
 ipv6 address 2001:668:1F:2::1/64
 service-policy input XX_Out
 service-policy output XX_MCR
 pvc 71/165
 ubr XXXX
 encapsulation aal5snap
!
end
```

← *IPv4 is handled via the DHCP pool to whom Lo100 belongs*

← *Enable IPv6 route-bridging on the ATM side and provide a /64 to allow customer autoconfiguration*

Details: C7200 NPEG1, IOS Version 12.4(2)T6

## Sic1 – BRAS conf

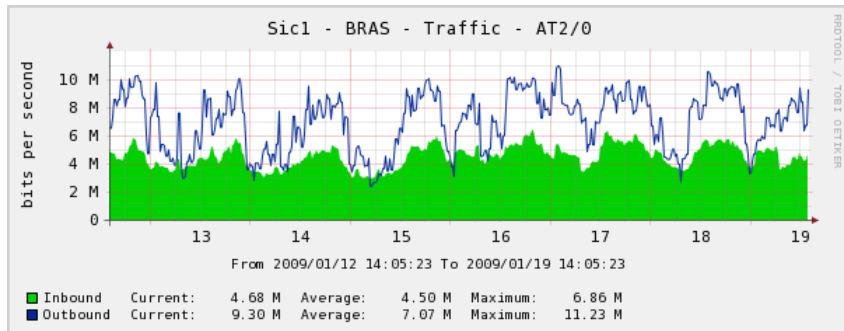
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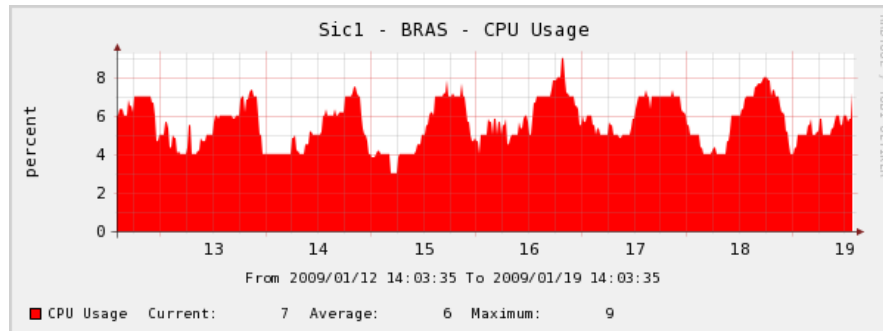


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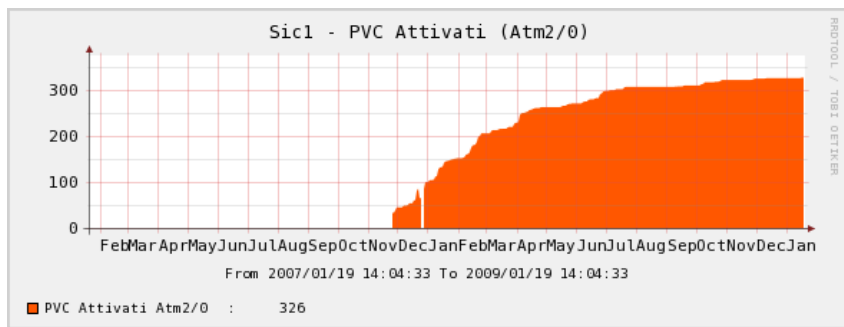
# Sic1 – BRAS load



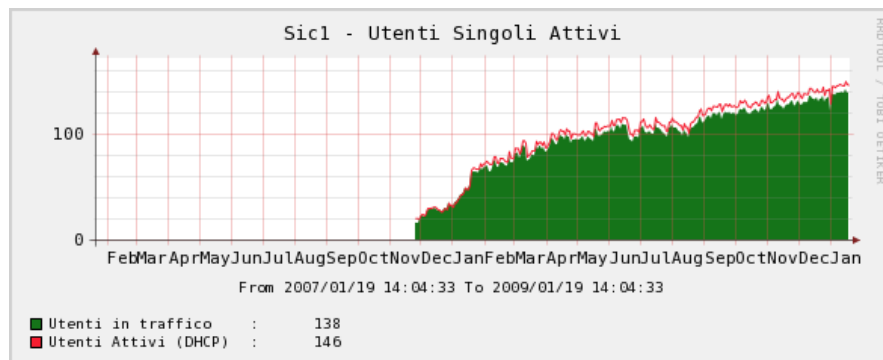
Total bandwidth is about 10M, and most of the traffic is v4.



Dualstack CPU consumption is negligible (SNMP link counts are read for nearly all PVCs!)



The municipality is over 300 activations (pls remember it's a municipality!)



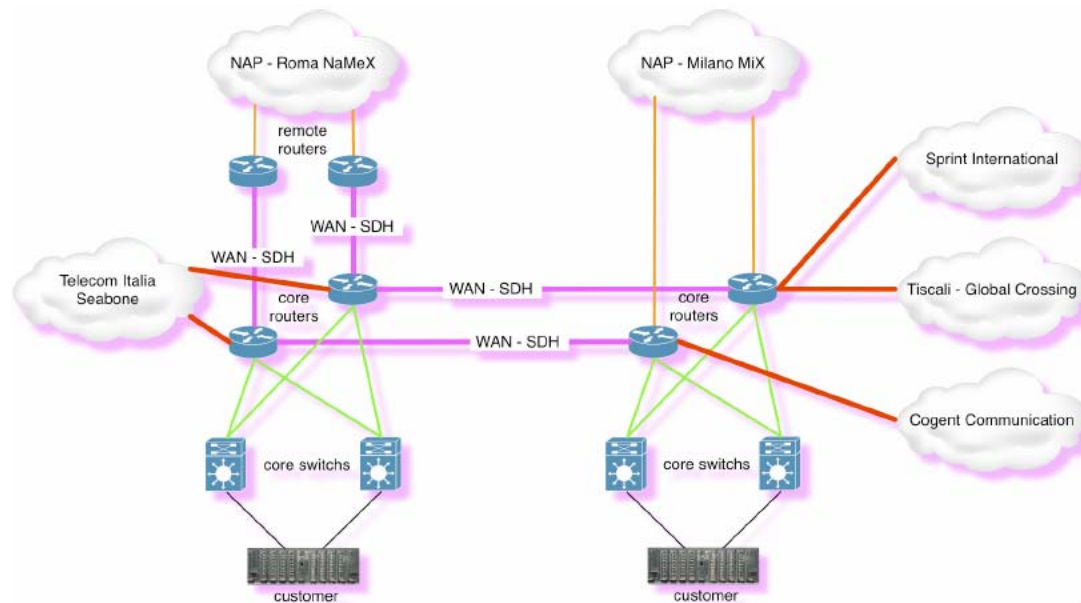
There are over 50% concurrently active users



# Migrating 62K webservers to IPv6

Seeweb is an Italian hosting and housing provider that runs two main datacenters in Milan and in Rome. Seeweb decided to provide to its customers, as a differentiating and useful feature, the implementation over its infrastructure of dual-stack IPv6 (\*).

Seeweb network structure is simple because carefully designed:



Source: courtesy of Mr Antonio Baldassarra, CEO Seeweb, public Internet Governance Forum presentation available at <http://www.seeweb.it/eventi/dw/20081023.pdf>

(\*) We are considering here the retail webhosting part.

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# Migrating webservers

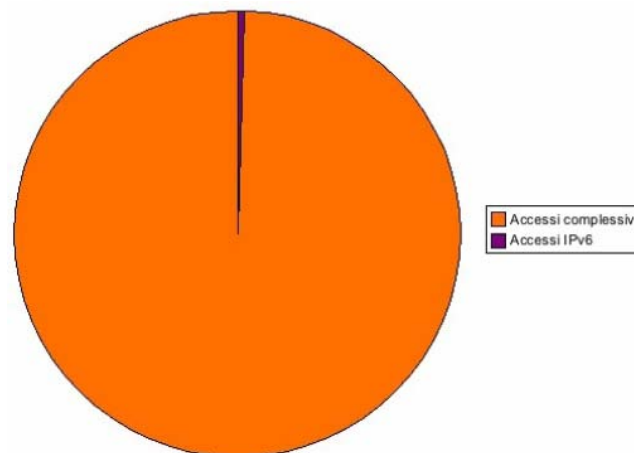
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## Seeweb: traffic results

After implementing dual-stack, Seeweb monitored the access on its infrastructure (1<sup>st</sup> week Oct 2008), and found interesting results:

Accessi	
Accessi Totali	157M
Accessi IPv6	178K

Origine	
IPv6:	178K
6to4 (2002::)	105K
GARR	7K
PROXAD (FR)	7K
ITGATE	1,5K



Source: data courtesy of Seeweb

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# Seeweb – traffic results

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## Commenting the results

This data were presented at the Internet Governance Forum we held in Sardinia October 23<sup>rd</sup> 2008, in preparation for the G8 summit.

I personally think that the Seeweb initiative is interesting. It demonstrates with numbers that if IPv6 is available and working on the content side, the customers will use IPv6.

This is furthermore true as most access was performed transparently by the TEREDO tunnelling from Vista users.

The percentage of users coming from Proxad is definitely relevant, these are French speakers requesting content in Italian!

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**Seeweb – some comments**

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## In conclusion:

Implementing IPv6 on the access side was useful and profitable for a Public Administration. End users were sensible to technical improvements when proposed to them.

Operating Systems now enable IPv6 by default, and if it is present, customers will use it *“transparently”*.

IPv6 requires most engineers to play with it to become comfortable, but quite frankly if IPv4 is known, IPv6 is just a fresh breeze!

## Conclusions

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**Thanks**

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**Backup slides**

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**Backup slides**

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# Sic1 – multiuser kit configuration (BRAS)

The policies part (just a profile, the others are identical):

```
class-map match-all XX_MCR
  description Clienti Residenziali XX MCR
  match any
class-map match-all XX_Out
  description Clienti Residenziali XX MCR Upload
  match any
!
!
policy-map NO_MCR
  class NO_MCR
    police cir XXXX pir XXXX
      conform-action transmit
      exceed-action set-clp-transmit
      violate-action drop
policy-map Out
  class Out
    police cir XXXX pir XXXX
      conform-action transmit
      exceed-action transmit
      violate-action drop
```

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