IPv6 at CERN

Update on Network status

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http://cern.ch/ipv6

IPv4 exhaustion consequences

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In general:

- Problematic for new players to join the IPv4 Internet
  - **Part of the Internet will be IPv6 only**

- Difficult to deploy new large services based on IPv4 (virtualization, clouds, mobile devices...)
  - **Users hidden behind layers of NAT (CGN)**

For CERN, IPv6 is necessary to:

- **Keep reaching all remote users**
- **Deploy new large scale services**

Transition strategies

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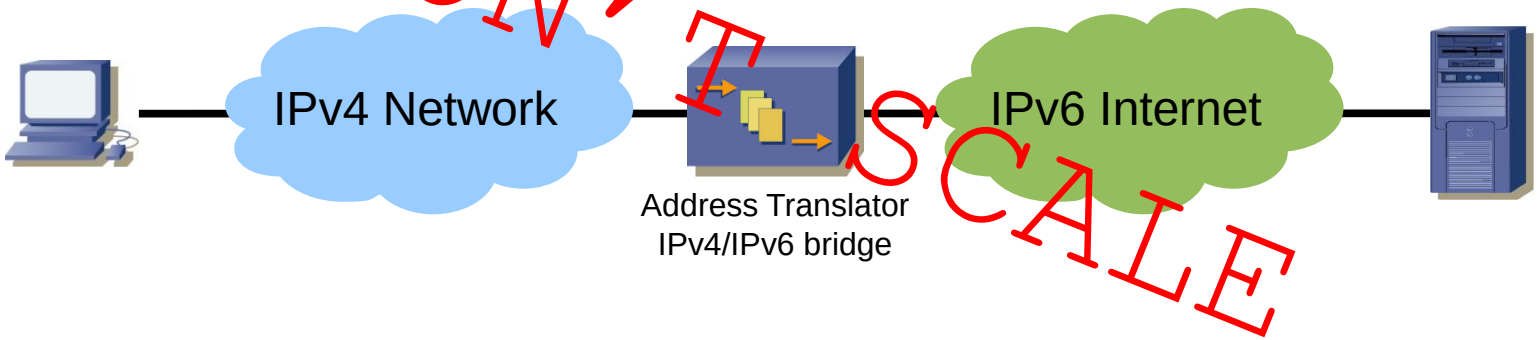
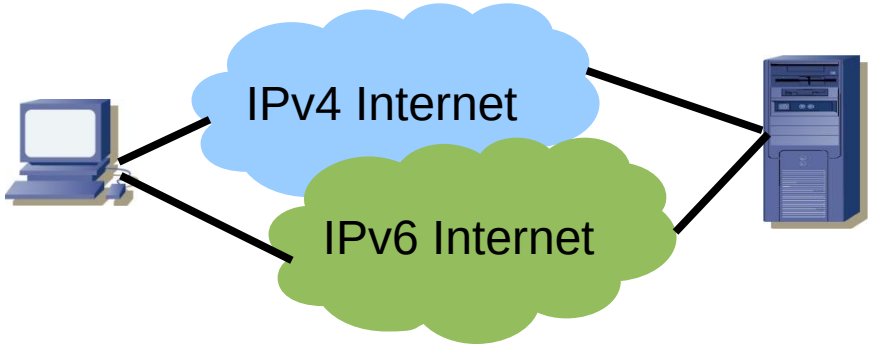
Many NAT/Tunneling “solutions”:



DUAL-STACK:

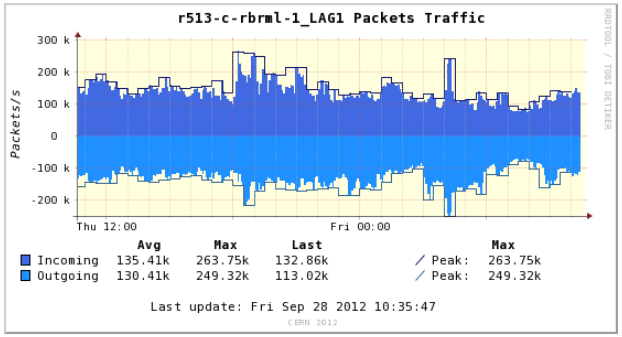


Dual Stack: only viable solution

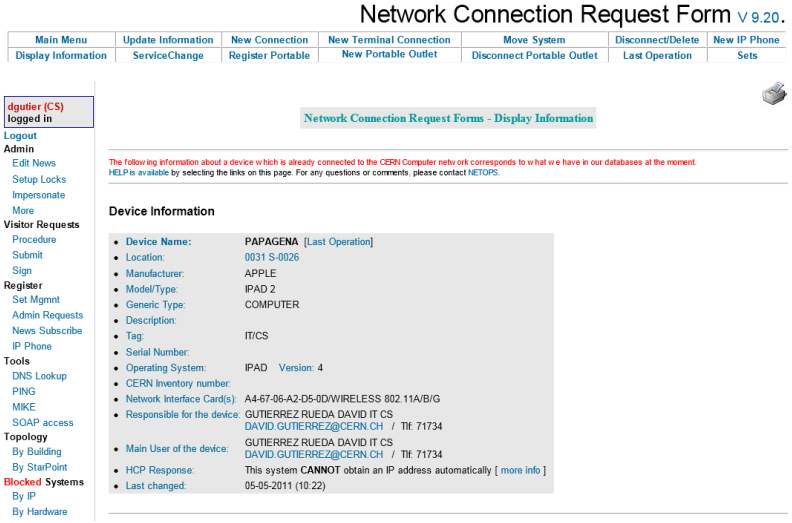
CERN IPv6 service

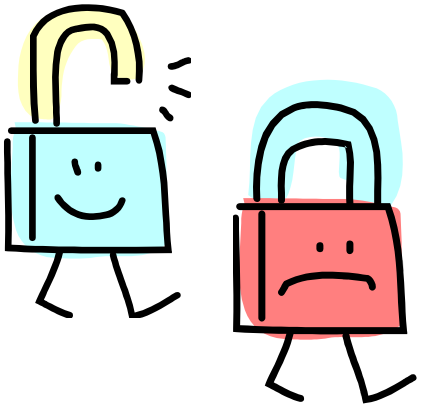
137.138.34.20
2001:1458:201:b572::100:2

IPv6 ≥ IPv4



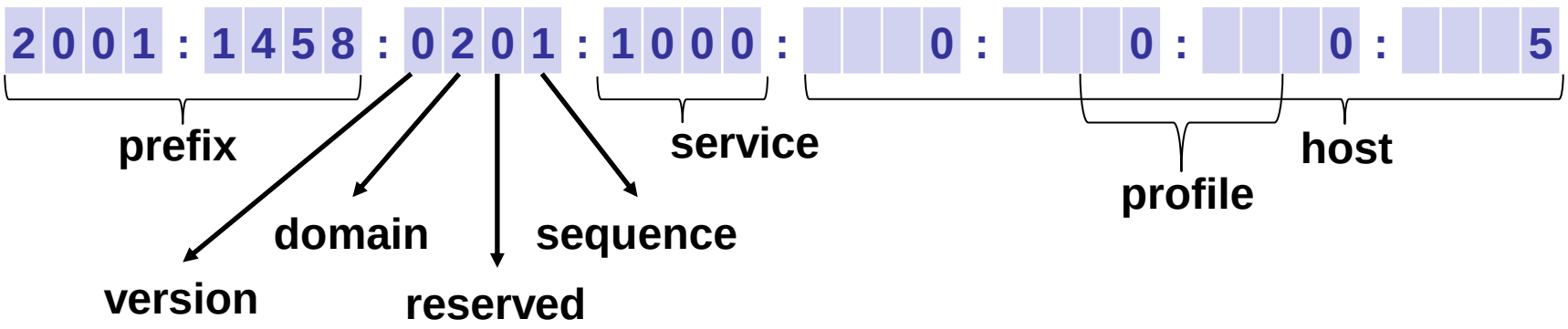
The CERN IPv6 service must be at the same level of the IPv4 service.
Plus the advantages peculiar to IPv6.





IPv6 Deployment

IPv6 Addressing plan



GVA prefixes
2001:1458::/32
fd01:1458::/32

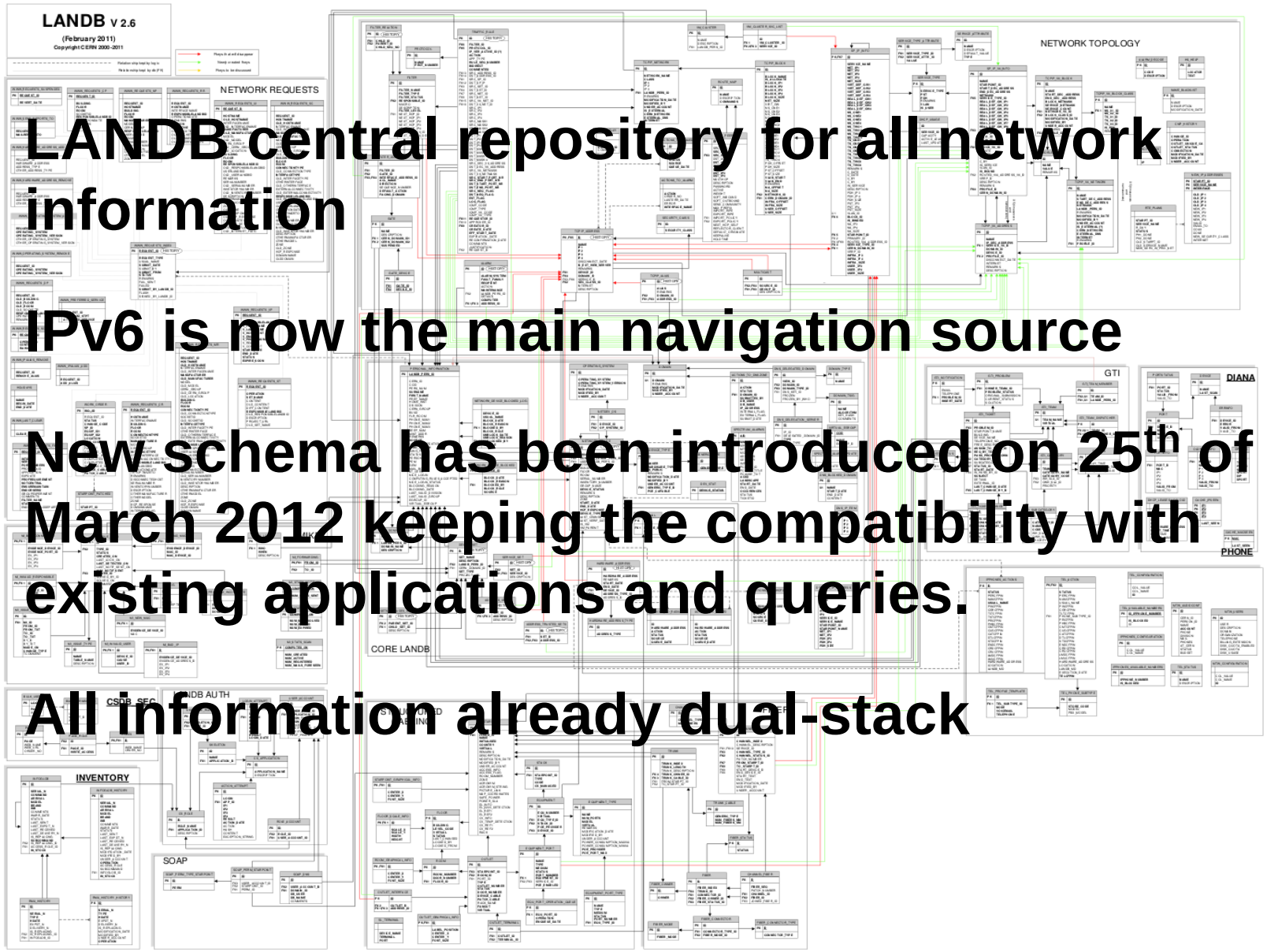
WIGNER prefixes
2001:1459::/32
fd01:1459::/32

Network Domains	
0	EXTNET and Firewall
1	CORE
2	General Purpose Net
3	LHC Computing Grid
5	ALICE

Network Profiles	
fffe	EUI64
0000	Net Equipment
0001	User device

Well known hosts	
x::1	Gateway
x::2	VRRP backup

IPv6 LANDB



- LANDB central repository for all network information
- IPv6 is now the main navigation source
- New schema has been introduced on 25th of March 2012 keeping the compatibility with existing applications and queries.
- All information already dual-stack

Network configuration

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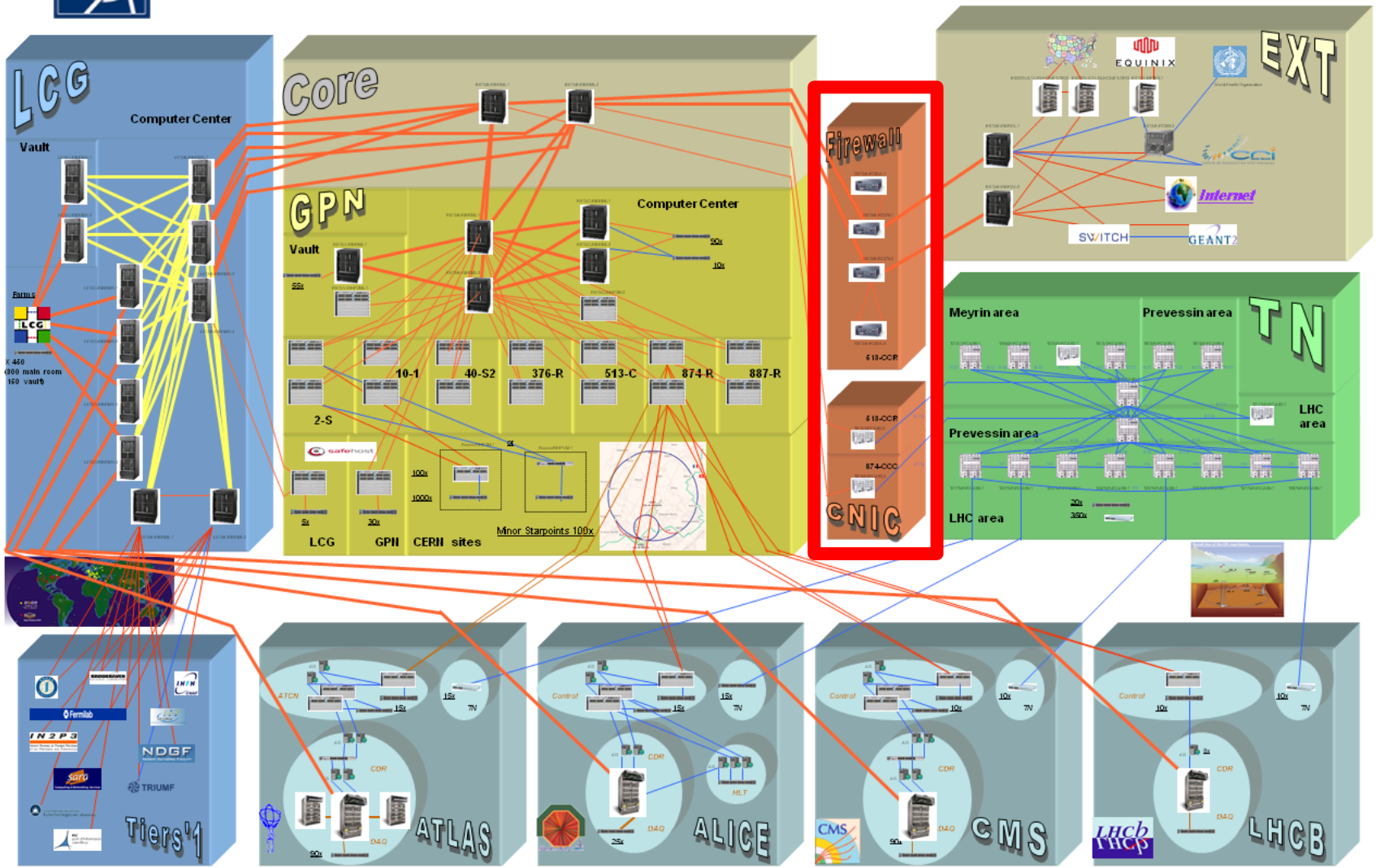
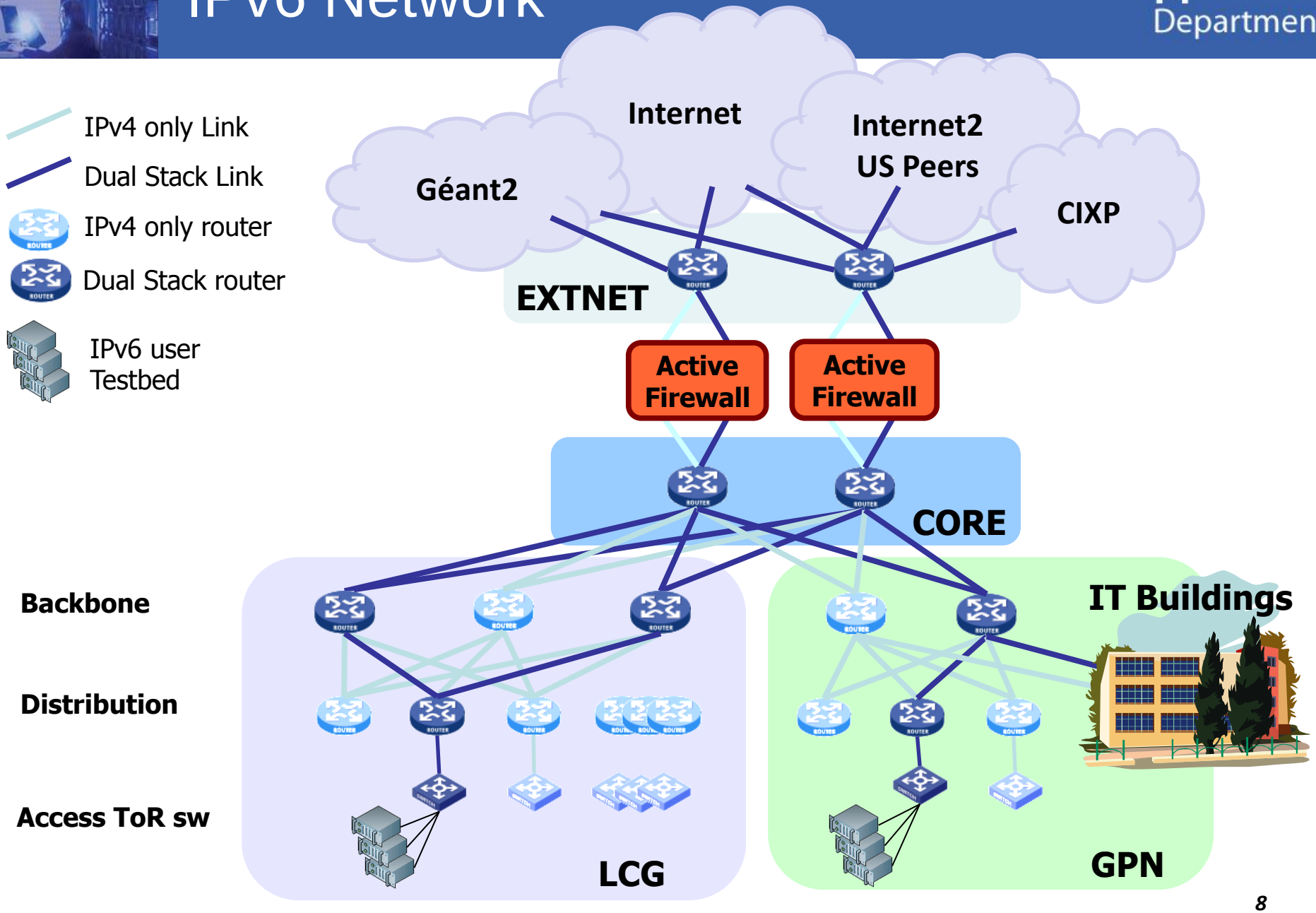
Campus Network Backbone Topology



IPv6 Network



LCG: LHC Computing Grid GPN: General Purpose Network CIXP: CERN Internet eXchange Point

IPv6 Deployment timeline

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2011Q2	Testing of network devices: **completed**
2011Q3	IPv6 Testbed for CERN users: **available**
2012Q1	New LANDB schema: **in production**
2012Q1	Addressing plan in LANDB: **in production**
	Provisioning tools : **on going**
	Network configuration: **on going**
Today	User interface (network.cern.ch): **on going**
	Network services (DNS, DHCPv6, Radius, NTP): **ongoing**
	User training
2013Q2	IPv6 Service ready for production

IPv6 Ready?

- Host **papageno** still testing IPv6
- **papageno** has NO IPv6 firewall openings
- papageno.cern.ch AAAA? ► NO RECORD
- papageno.ipv6.cern.ch AAAA? ► 2001:1458:201::100:34

- Host **papagena** is IPv6 ready
- <u>All</u> **papagena** applications listen both IPv4 and IPv6
- **papagena** has equivalent IPv4 and IPv6 openings in the firewall
- papagena.cern.ch AAAA? ► 2001:1458:201::100:35

papageno and **papagena**:

- Can obtain an IPv6 DHCP lease (if HCP enabled)
- Will receive the default IPv6 gateway via RA
- Will be able to use Network Services via IPv6

Unregistered Devices

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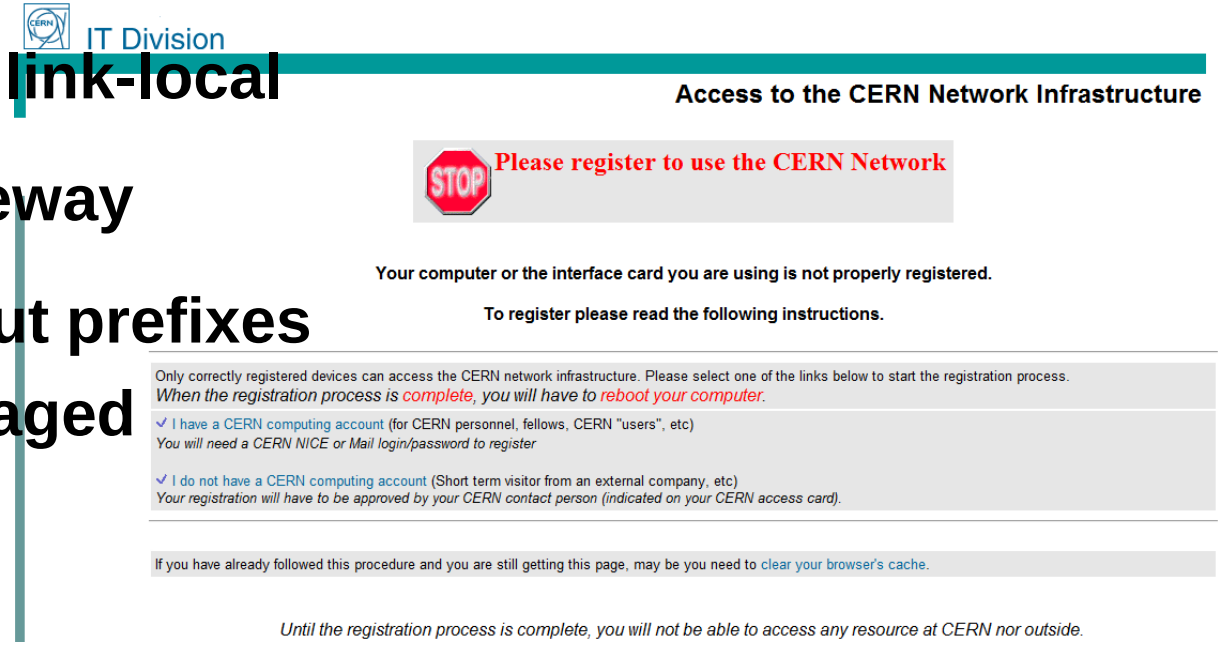
- **Devices have to be registered to make use of the network infrastructure**
- **IPv4 DHCP provides special pool for unregistered**
- **IPv6 DHCP6. Gateway?**
  - **SLAAC only link-local**
  - **Provide Gateway**
    - **RA without prefixes**
    - **RA +Managed**



Thank you for your attention

Questions?