



6net

Campus integration mechanisms

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Agenda

Dual stack IPv4-IPv6

Tunneling mechanisms

Translation mechanisms

Deployment strategies

Vocabulary is important

Transition, migration ...

Deployment, coexistence and integration !

Coexistence / Integration Mechanisms

Dual stack IPv4/IPv6

Dual stack

- IPv4 and IPv6 running together
- 2 scenarios:
 - Existing network
 - New network

Drawbacks

- Dual stack configured for IPv4 and IPv6
- Doesn't solve the lack of IPv4 addresses
- Routers need to be configured for both versions of IP
=> 2 sets of routing tables
- RFC 2893 (Obsoletes RFC 1933)

Coexistence / Integration Mechanisms

Tunneling

Tunneling facility

- Configured tunnels
 - widely deployed in the 6bone
 - used to connect two networks
 - require manual configuration

- Automatic tunneling
 - 6to4
 - ISATAP
 - Tunnel Broker
 - Other ideas...



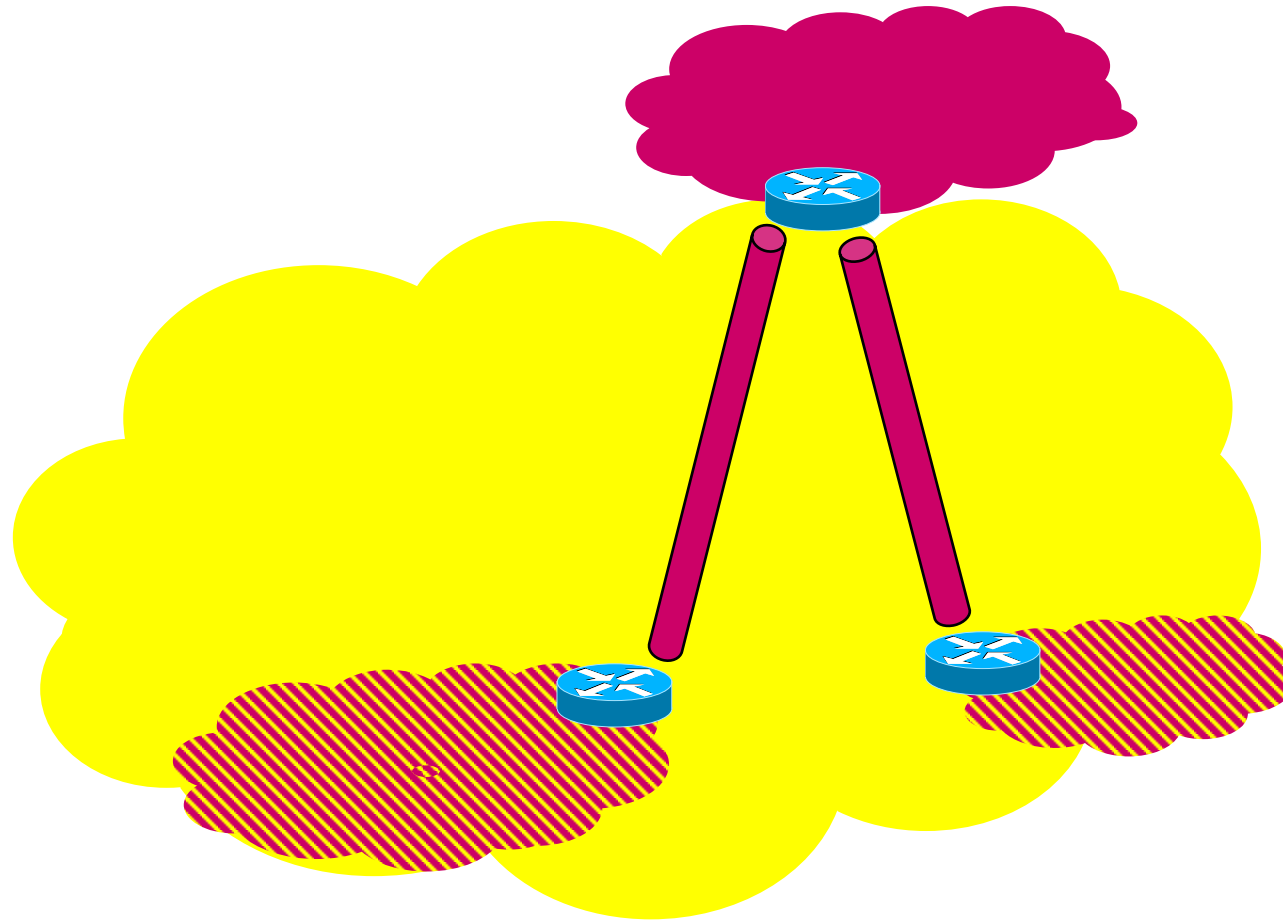
IPv6 in IPv4 configured tunnel

- Put IPv6 packet in IPv4 payload
- IPv4 protocol 41 means data = IPv6 packet
 - Possible IPv6 over GRE over IPv4
- Underlying infrastructure becomes transparent
- Makes it possible to connect to IPv6 network over an IPv4 infrastructure

- Need to specify tunnel end points (TEP)
- Can give addresses on IPv6 logical link



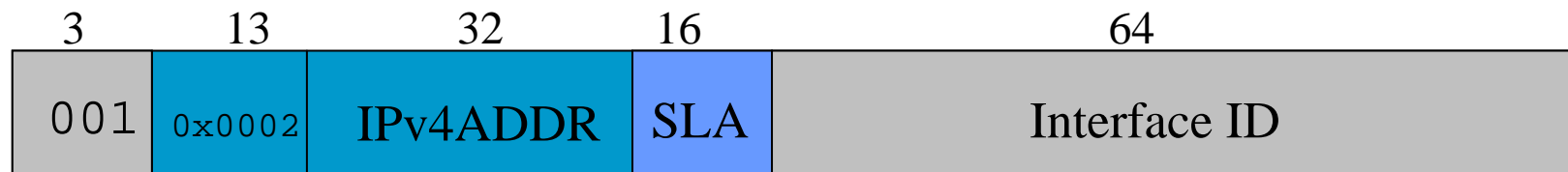
6bone



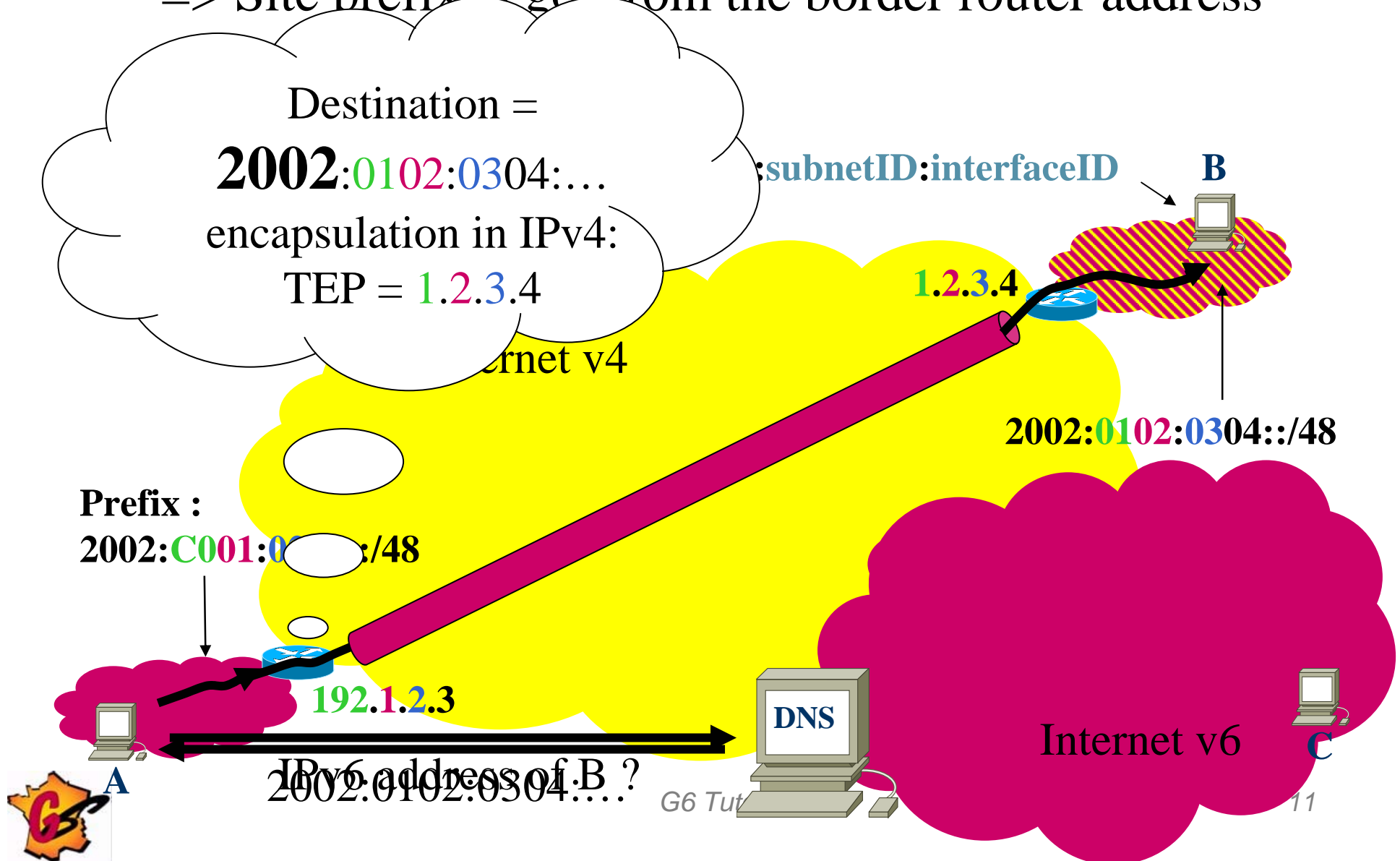
Create a virtual topology over the IPv4 network
with configured tunnels

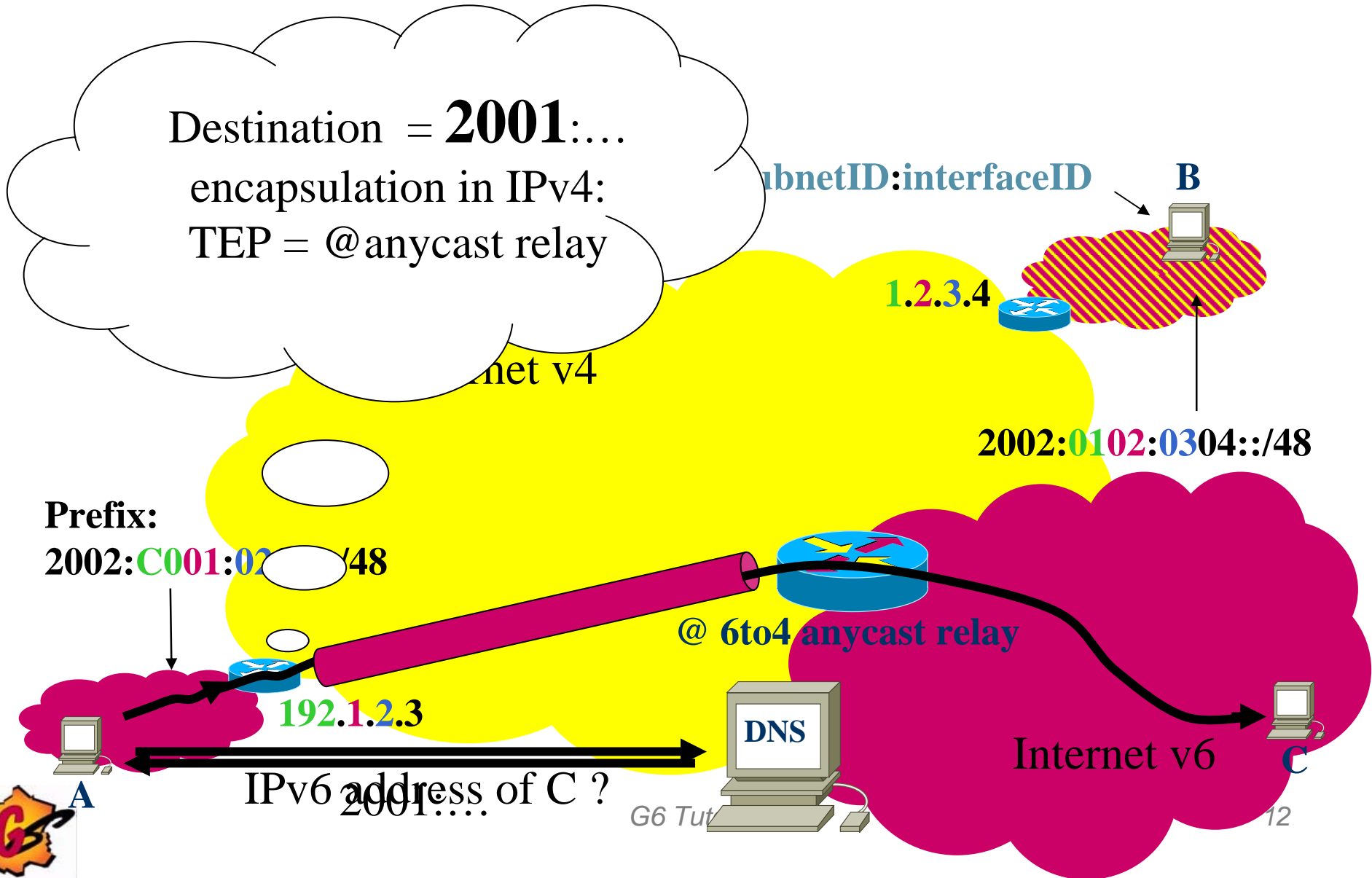
6to4 (RFC 3056 PS)

- Another way to build a tunneled infrastructure
- Simple configuration (no need to configure static tunnels)
- Use a special address plan
 - Prefix: 2002::/16

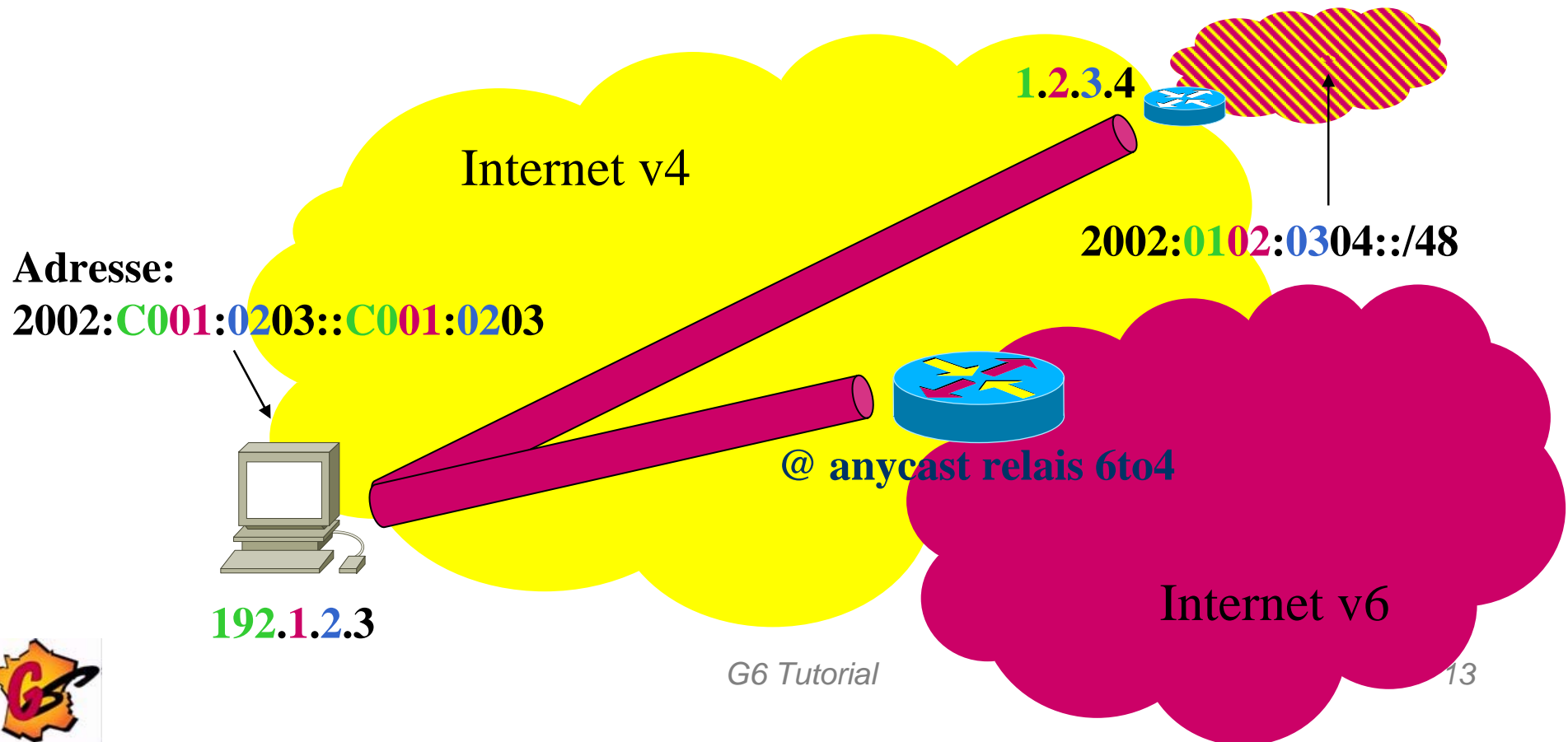


=> Site prefix is got from the border router address





- IPv6 address of a host derived from its IPv4 address

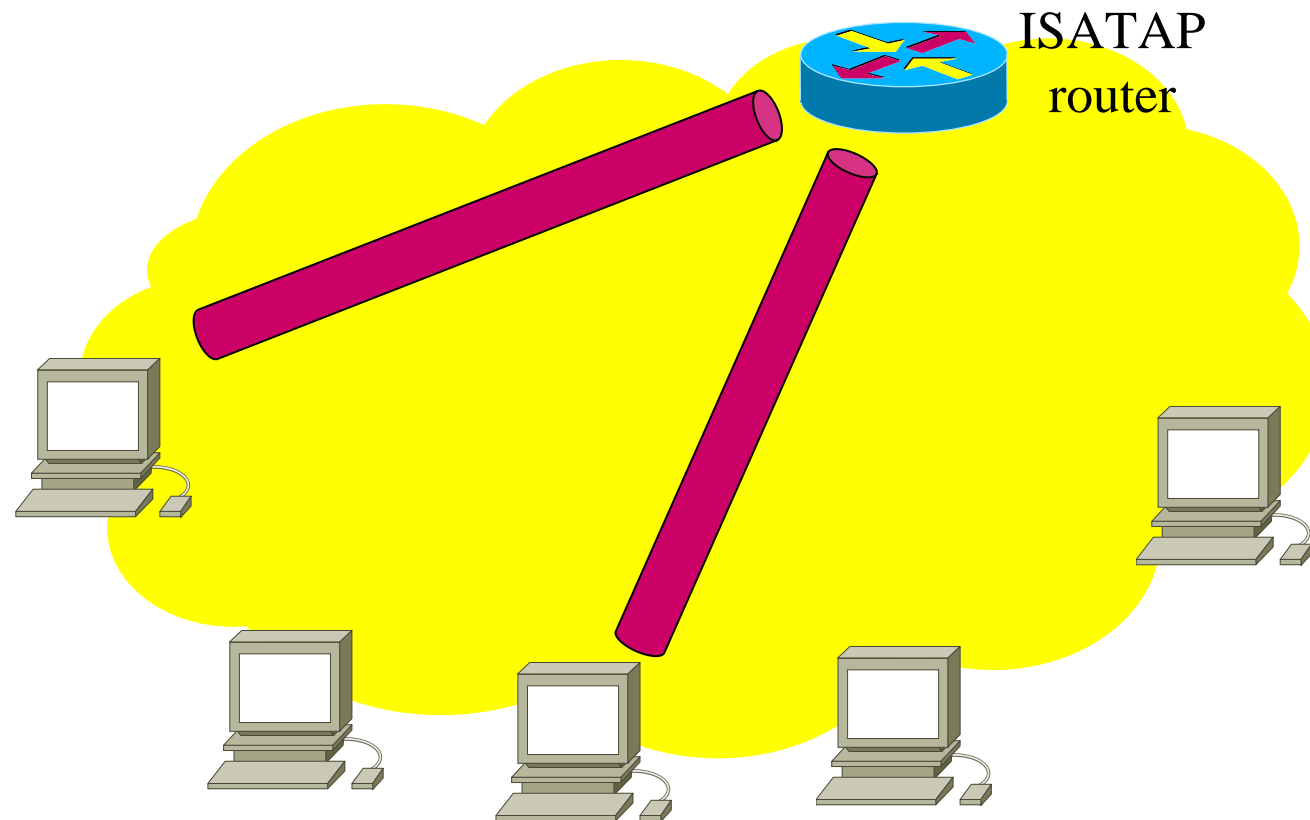


ISATAP

- Intra-Site Automatic Tunnel Addressing Protocol
- Used for giving connectivity to hosts
- One ISATAP router per site (well known)
- IPv4 address embedded in IID
 - 02-00-5E-**WW-XX-YY-ZZ**
- Hosts create their own link-local address
- Then receive the prefix via NDP from the ISATAP router

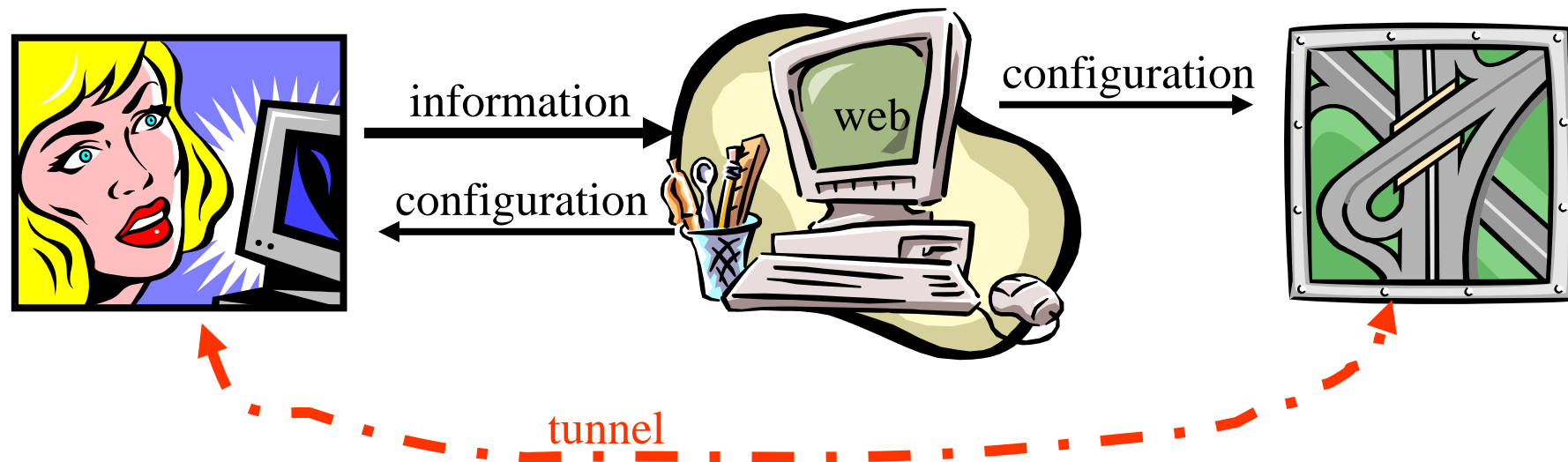


ISATAP



Tunnel Brokers

- Simplify/Allow the construction of IPv6/IPv4 tunnels.
- Use of a web page



Other ideas...

- Use already existing VPN infrastructure

- Change physical infrastructure
 - switch/router
 - VLANs !

- Better than any weird mechanism (ISATAP, TEREDO...)

Coexistence / Integration Mechanisms

Translation Mechanisms

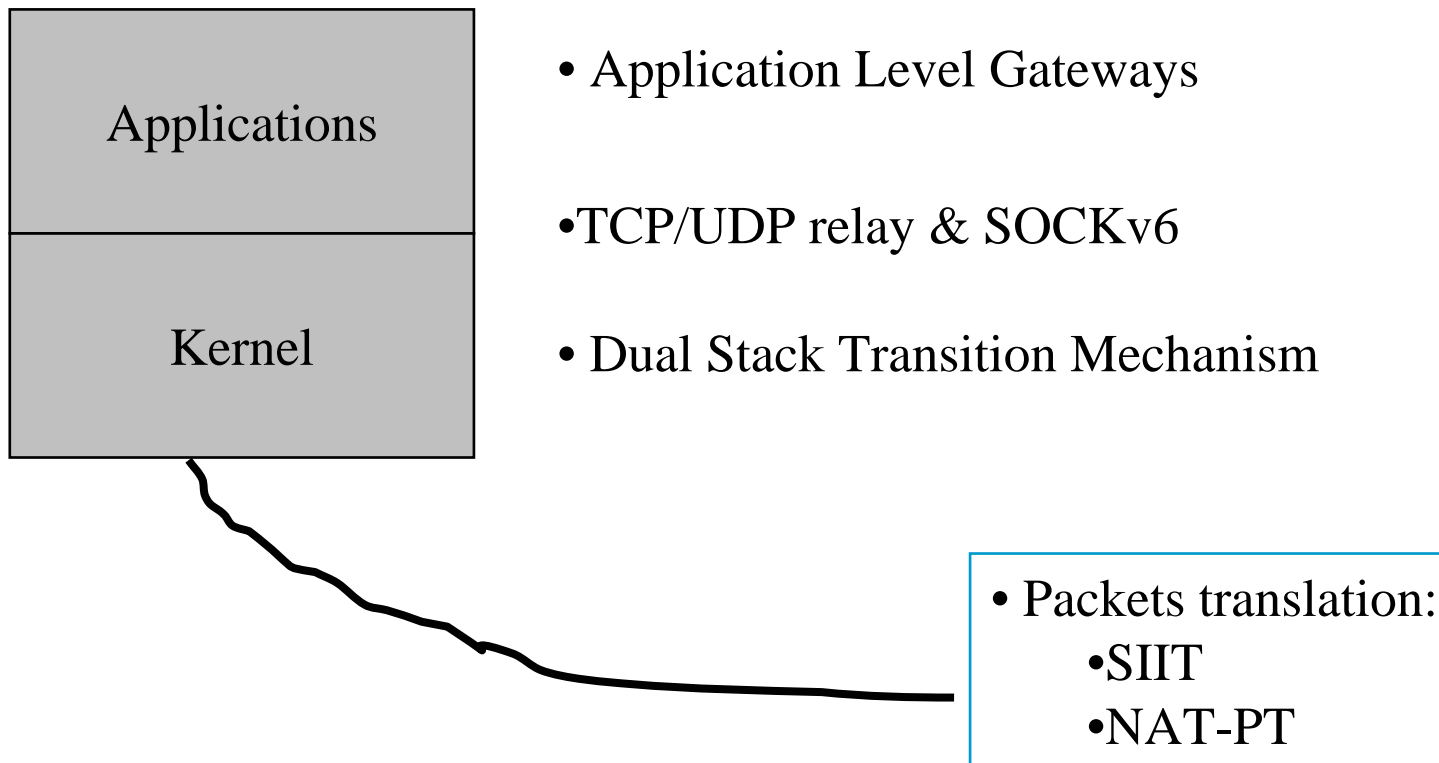
Interoperability tools: Translators

- IP level
 - SIIT (Stateless IP/ICMP Translation)
 - NAT-PT (Network Address Translation-Protocol Translation)
 - BIS (Bump In the Stack)
- TCP level
 - TCP-relays
 - SOCKS
- Application level
 - Bump in the API
 - Proxies



Mechanisms for coexistence

■ Different approaches



Application Level Gateways

- May be used for a large majority of common applications:
 - E-mail (POP3, IMAP, SMTP)
 - Web (proxies)
 - Printer (spoolers)
 - DNS : relay (may change the RR type)
- Reduce IPv4 traffic inside a domain

NAT-PT (RFC 2766 PS)

- Like NAT... but translates IPv4 in IPv6 and vice versa
- Translate addresses and headers
- Outgoing session translation is easy
- Incoming translation must intercept DNS queries
- Big performance problems !
- People don't want NAT again associated with IPv6... is being thrown away (sigh ?)



Deployment/migration strategies

Deployment strategies

- Technical factors
 - IPv6 availability (connectivity)
 - Native IPv6 applications/services availability
 - Avoid blocking situations (chicken and egg problem)
 - Make the most of upgrade plans. Put IPv6 as a requirement for any new hardware/software.
- Psychological factors
 - skills to configure IPv6
 - risk to modify something that works



IPv6

I'm lovin it !