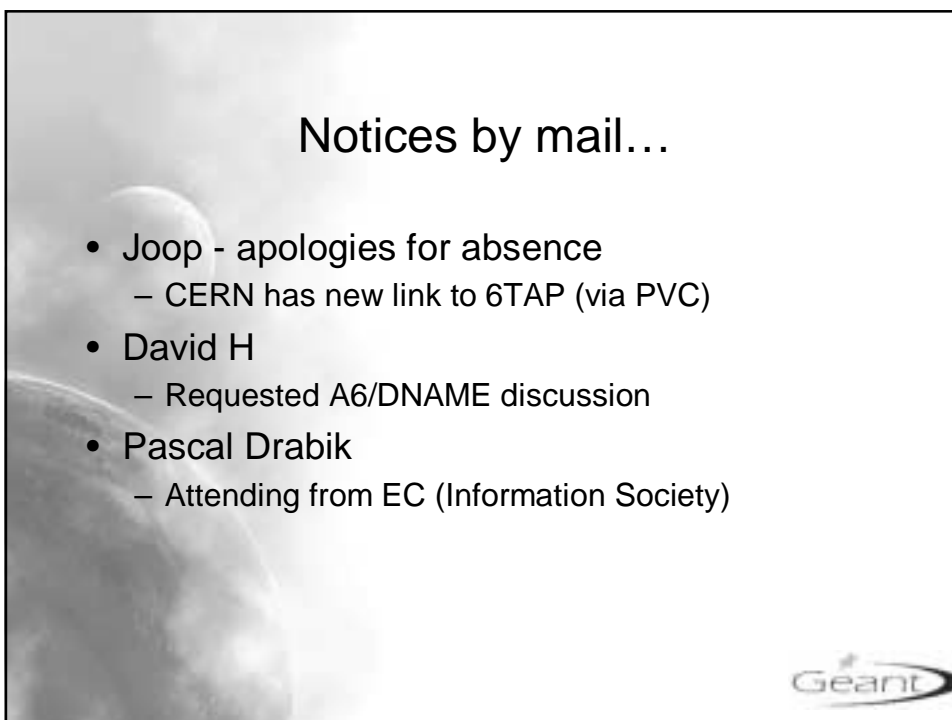



IPv6

Tim Chown  
University of Southampton & UKERNA  
tjc@ecs.soton.ac.uk



Notices by mail...

- Joop - apologies for absence
  - CERN has new link to 6TAP (via PVC)
- David H
  - Requested A6/DNAME discussion
- Pascal Drabik
  - Attending from EC (Information Society)



## IPv6 Session Agenda

- IPv6 Network Infrastructure
- Presentation by Christian (IPv6/JOIN)
- Presentation by Bernard (?)
- Work item discussions
- AOB



## GEANT Test Programme GTPv6

- Understand deployment issues
  - Routing, DNS, registries, address allocation, ...
- Operational experience of IPv4/IPv6 backbone
- Insight into IPv6 impact down to site level
- Deployment of "production quality" IPv6 network
- Encourage additional NREN and site participation
- Seek collaborations with other networks/projects
- Study primary and secondary work items



## GTPv6 deliverables

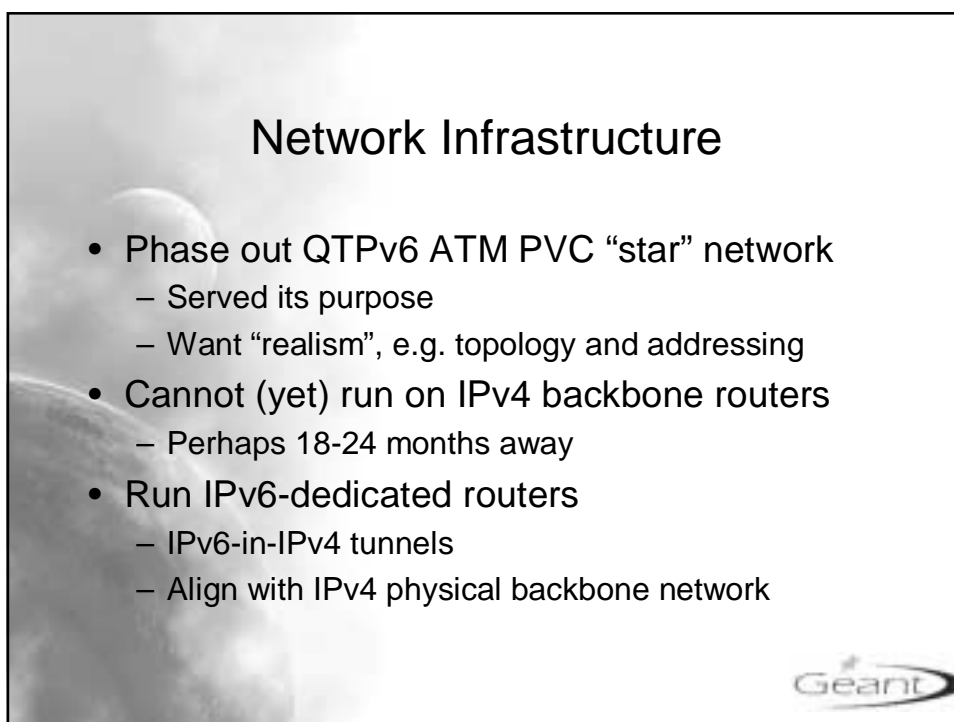
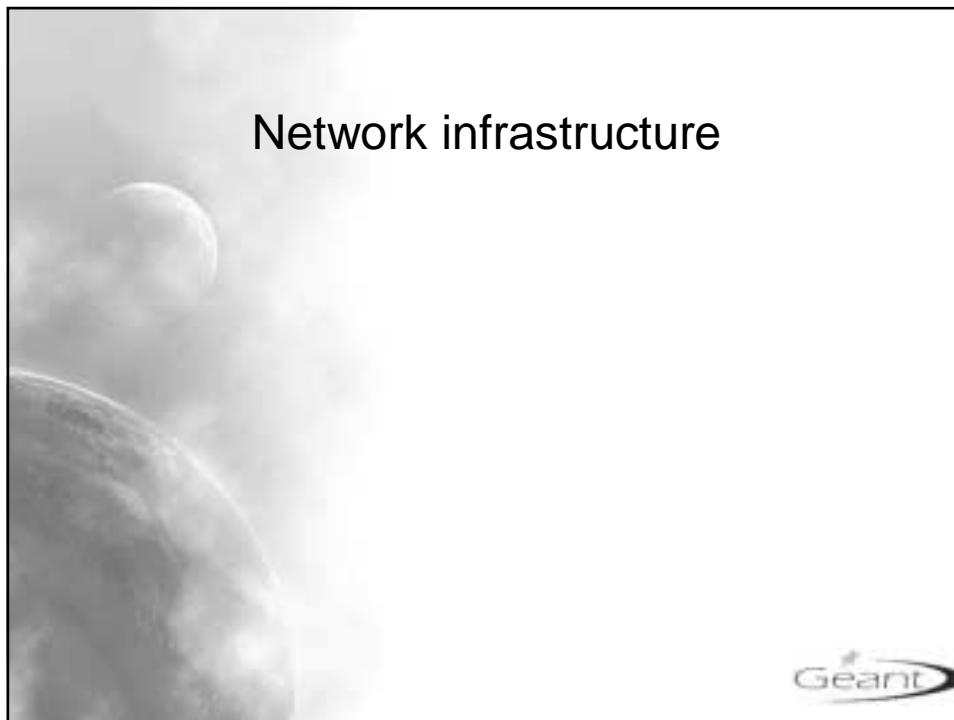
- Reports
  - 1<sup>st</sup> report July 2001 on primary work items
  - Additional GEANT end-of-year report Oct 2001
    - Includes secondary items
- Network
  - Successor to QTPv6 testbed network...



## GTPv6 Work Items

- Primary:
  - Platforms, routing and Interoperability (Christian)
  - Addressing and registries (Wilfried)
  - DNS (David Harmelin)
  - Transition tools (Stig)
  - Applications (Tim)
- Secondary
  - Network monitoring (Simon)
  - IPv6 multicast (Tim)
  - Firewalls (Mohacsi Janos, HU)
  - IPsec (Juergen, DFN)
  - Wireless access (Tim/6WINIT)





## Network infrastructure (2)

- A pilot with “production” qualities
  - in that we offer an IPv6 service to “academia”
  - and encourage NREN sites to join
- But run leading edge code
- And run commercially supported product
  - e.g. Cisco?
- Prefer use of production IPv6 address space
  - e.g, JANET 2001:0630::/35
  - Most NRENs have them



## Draft proposal

- Dedicated IPv6 routers
  - Links tunnelled, following IPv4 infrastructure
- Acquire hardware via loan/donation
  - Cisco? 7000 series? Higher?
  - Model requested now should run for 2+ years
  - May want to run IPv6 over <x> native later...
- Require 6-7 IPv6 routers
  - Much better spec than 2500 or TBC2000!

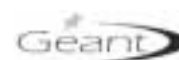
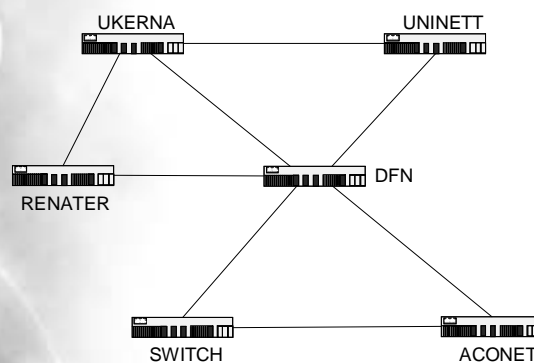


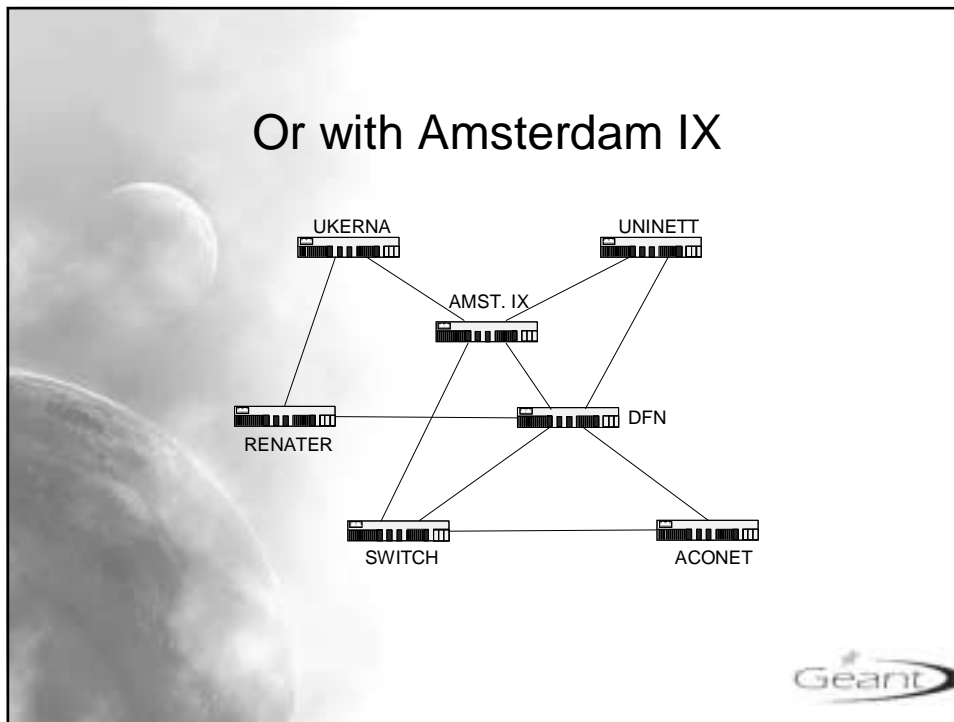
## Topology

- One router per principal participant
  - UKERNA, DFN/JOIN, RENATER,
  - UNINETT, SWITCH, ACONET
  - and perhaps AMX IX?
  - Others? (needs commitment)
- Other NRENs connect via tunnels
  - e.g. RENATER to REDIRIS
- Partial mesh
  - More than one hop between most routers



## Candidate topology





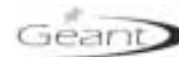
## Beyond tunnels...

- Run commercial code on dual-stack routers
  - e.g. Cisco IOS 12.3, 12.4? When?
  - Other vendors, e.g. Juniper or Hitachi?
- Parallel native infrastructure
  - Need fibres/links
  - To run what at link layer?
- Funding?
  - Possible EU 5th framework bid (April 2001)
  - GEANT?

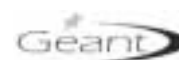
The background of the slide features a view of Earth from space. The Geant logo is located in the bottom right corner.

## Peering, transit

- Japan
  - 45Mbit link, UCL-Japan
- 6TAP
  - Currently has PVC to CERN
- AMS IX?
- Abilene (ran Cisco 7200's, /40 regionally)
- vBNS (Cisco/Juniper, /48 end sites)
- WIDE (/40 and /48 allocations)
- CA\*Net 3



## Work Items



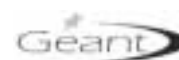
## Platforms, routing, interop

- Trials:
  - “Production” - Cisco, other?
  - “Experimental” - FreeBSD (e.g. for PIM-SM)
  - Reporting on BGP and informal interop
- Study
  - IPv6 routing protocol implementations, e.g. IS-IS
- Co: Christian



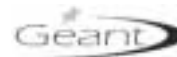
## DNS

- Trials:
  - BIND 9
  - Semi-operational DNS tree
  - Reverse DNS
- Study:
  - A6/DNAME issue: <http://cy.yo.to/djbdns/kill6.html>
  - Transition issues (A, AAAA, A6), dynamic DNS
- Co: David



## Registries/addressing

- Trials:
  - Registry interactions and requirements
  - Address assignment policies
  - Utilising RIPE production address space
- Study:
  - RIPE policies
  - Advice for end sites
- Co: Wilfried



## Transition tools

- Trials:
  - NAT-PT, 6to4 (?)
  - Tunnels and tunnel broker
- Study
  - Transition scenario comparison
  - What is required to deploy IPv6-only at site?
  - How should backbone ISP migrate (like GEANT!)
- Co: Stig



## Applications

- Trials:
  - Core: mail, web, ...
  - Other: vic, rat, openldap, ...
- Study
  - Porting issues, APIs
  - Java/IPv6 - SUN CAP: JDK 1.4  
(Contact: Menasse.Zaudou@eng.sun.com)
  - Middleware?
- Co: Tim



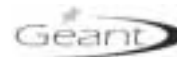
## Network monitoring

- Trials:
  - Reporting on network usage
  - Reporting on connectivity/routing info
- Study
  - IPv6 implications for monitoring task
  - IPv6 performance issues?
- Co: Simon (part of TF-NGN v4+v6 area)



## Multihoming

- Trials:
  - Unclear - no firm IETF proposals
  - Src/Dst address selection behaviour
- Study:
  - IETF proposals/drafts as they emerge
  - GSE/8+8 revival?
- Co: Wilfried (?)



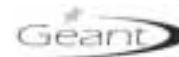
## IPsec

- Trials:
  - FreeBSD IPsec
  - FreeSWAN (Linux)
- Study:
  - Deployment issues, key management/etc
- Co: Juergen



## Firewalls

- Trials:
  - ip6fw (FreeBSD)
  - e-Border (commercial product with IPv6 support)
- Study:
  - IPv4 compatability
  - Built-in translators?
  - Address scope issues?
- Co: Mohacsi Janos <mohacsi@ik.bme.hu>



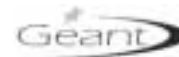
## Multicast

- Trials:
  - PIM-SM (FreeBSD)
  - With applications: vic, rat, icecast, other...
- Study:
  - Wider area deployment issues
  - Scoping
- Co: Tim (integrate with TF-NGN group)



## Wireless access

- Trials:
  - 802.11 equipment
  - Mobile IPv6
  - Bluetooth devices
- Study:
  - Interaction with 3G...?
  - Implications of large numbers of autoconf hosts
- Co: Tim (or 6WINIT representative)



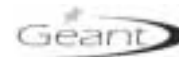
## Volunteers...

- Always needed... e.g. Yves @ RESTENA
- Please join [gtp-v6@dante.org.uk](mailto:gtp-v6@dante.org.uk)
- See <http://www.ipv6.ac.uk/gtpv6/>
  - Under update!



## Summary

- Network infrastructure:
  - Dedicated routers, initially tunnelled connections
  - Resourcing via? 5th framework, other?
- Work items
  - Identified, with leaders and trials/studies
- Project Interworking
  - To be done, e.g. LONG, WINE, ...
- Dissemination
  - Need to identify...



## 6INIT



- EU 5<sup>th</sup> Framework Project, ~ 4.5M euros, 16 months
- 12 partners including BT, Berkom, 6WIND, Ericsson, Telebit, Telscom, Telia, Netmedia, Intracom, er, UoS
- Focus on deployment of pan-European IPv6 testbed
  - Five interconnected national clusters
- Study and deploy transition tools
  - Using NAT-PT
- Develop and port multimedia applications
  - Includes VoIP, online stock trading, newspaper printing, videoconferencing, news-on-demand, streamed audio.



## 6INIT IPv6 network services

- DNS
- Quality of Service (QoS)
  - IPv6 diffserv edge device developed by 6WIND
- IPSec
  - FreeS/WAN for IPv6 developed by IABG
- IPv4-IPv6 interworking: NAT-PT
- Use of multiple sTLAs
- BGPv4+ peering
- IPv6 multicast



## 6INIT clusters

