Factors Influencing IPv6 Deployment

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Availability of Standard Software

- Host software is now available for many platforms
  - e.g. Sun, Microsoft, Linux, FreeBSD
- For many the IPv6 Stack is not in the Standard release:
  - though this is changing fast
- Most of the stacks are still not complete
  - e.g. missing mobile IP, IPSEC or flow labelling
- There is enough, however, to allow complete systems to be run.

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Lack of Router Facilities

- In the same way as with hosts, some routers still have not complete IPv6 in Standard Release
  - e.g. the Cisco one is not yet the Standard Release
  - IPSEC for Cisco has not been released
  - The VPN module does not yet exist
  - There are less routing options than for IPv4
- Again this is changing fast
  - But market demand still limited outside Japan
  - Hardware implementations a year away

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Incomplete Applications

- Many IPv4 applications have been ported to IPv6, but there are still major deficiencies
  - Interfaces to different platforms still variable
  - Probably some vital ones are still missing
- Applications cannot yet rely on facilities in the underlying stack - and so do not use them
  - and vice versa
- Application often still use the underlying stacks statically
- There is no experience on IPv6 impacts
- Again it is changing slowly, but needs large-scale deployment for remedy

Availability of Middleware

- Languages are still deficient
  - e.g. JAVA not yet quite there - though Beta from Sun is imminent
- New protocols are implemented only in IPv4
  - When applications and stacks are better, much more will be needed in the middleware
- Complex new initiatives from the applications fields still mainly for IPv4
  - Grid people do not care about IPv6 yet
  - Media services designed only for IPv4
  - VR groups have not considered it yet
- This can be changed with the right incentives

Commitment by Operators

- Research Networks have often led the way
  - Most still only paying lip service to IPv6
- Incremental improvements to existing services given much higher priority
  - Much more emphasis on speed
  - Lack of personnel forces choice of priorities
- Considerable effort goes into providing facilities that would exist if IPv6 was deployed in a more uniform way
- 6BONE is very important
  - but IPv4 facilities used where needed
- Need further incentives to operators

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Lack of Agreement and Understanding of use of Facilities

- Methods of allocating addresses
  - 64 bits of global address agreed
  - different communities eye the other 64 bits for their purposes
    - e.g. Home Networks may use them one way
    - UMTS could try to ease transition
    - Mobile nets could help auto-configuration
- Experience on how to use multicast
  - and availability of multicast in networks
- Mechanisms for privacy and authentication
  - Contradiction on IPSEC and Header Compression
  - Standards on key exchange for IPSEC
- Control QoS from applications or elsewhere
- Suitability of Mobile IP

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Actions Needed

- **Incentives to Deploy IPv6 - rather than not to**
  - **The IPv6 deployment should be limited by facilities, not need to argue when it must happen**
  - **Must develop good transition strategies**
- **More advanced facilities should have it**
  - **Japan link, Japanese pilots lead the way here**
  - **GÉANT, UKERNA planning the opposite**
  - **Advanced testbeds should be widely available**
- **Initiatives outside networking should encourage it**
  - **E.g. our Active networks projects need to justify**
  - **No Grid initiative is considering it, though it would be much easier with its facilities**
  - **Complete services like conferencing should be targeted to such a community**

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Financial Incentives

- Move to IPv6 potentially expensive
  - fiscal measures related to potential obsolescence write-offs could considerably help
- Mobile use is clearly both a natural and vital
  - Cost of licences and introduction of services forcing a scale-back of investment and guarantees of getting returns fast
  - Could give major financial incentives to return some of the licence fees if IPv6 deployed early
- Large-scale purchasing commitment vital
  - Suppliers will react fast if purchasers are seen to require the services

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IPv6 ICT Projects

- Many such projects exist –
  - 6INIT, 6WINIT, Moby Dick, NGN-I, DRIVE …..
- Most work on middleware and applications
  - For cost reasons the proposals have minimal provisions for infrastructure or equipment
- Some new IPv6 testbeds are proposed
  - Some existing nets like GEANT are considering embracing IPv6
- There should be a deliberate policy of encouraging significant equipment and infrastructure in such projects
- Specific equipment and network provisions
  - To encourage industry to provide suitable products

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