

Networking : Directions

1. Global end- to- end connectivity is a key issue. Universally deploy interoperable protocols, formalize a human network to exchange views and ideas, keep leading position and cooperate with interested regions
2. Pan- European networking infrastructure should aggressively cover all European member states with world class connections (ease the 'digital divide')
3. **Building dedicated network** of links between major **computing centres** would be a good investment
4. Solving the many (often legal) issues on a European level concerning the last mile is crucial for the development of e- Infrastructure in the long run
5. **Investigate the opportunities for mobile networking**
6. Exploit new business model: the use of dark fibre acquired from the 'new market' implements a new model for ownership of the networking resource; it decouples the provision of the network from bandwidth provision by traditional carriers

Networking in infrastructure

Next turn: (short term actions)

1. define and develop standard protocols and interfaces for network control and management planes coping with a multi- administrative, multi- technology and multi- equipment domain environment
2. work on interoperability of the grid middleware with the above network control and management planes
3. solving the many (often legal) issues on a European level concerning the last mile is crucial
4. development of network technology and infrastructure in continuous and close cooperation with advanced and demanding user groups, specifically those using grid technology

One end- destination:

- A reliable high speed hybrid network covering all of Europe and providing global **real- time** end- to- end connectivity

Relevant policies, organizations, activities:

- DANTE, NRENs, NRENPC, TERENA, IETF, ITU, IEEE, DG Information Society and Media, GLIF, GLORIAD (?), **ENPG, DG Research**

Networking: Recommendations

1. Balance the needs of everyday and high-end (grid) users when defining RN policies as well as development and provision plans. The balancing method, governance and duties of RN users and providers should be based on shared responsibilities, permanent service provision, and realistic user demands. The proven governance model of the pan-European RN development and operation is available also for network-based applications, especially for European scale high-end e-Infrastructure solutions.

(Recommendation A1/ A2 of Austria White Paper)

Consider as next turn in roadmap? **For Michiel to decide.**

Networking: Recommendations

2. Base the RN development policy on emerging solutions that enable maintaining leading edge position on global scale, user input (e.g., EARNEST activities) and other e-IRG goals (AAI, business/economy, etc). In order to enable this, develop, in collaboration with the EC, a flexible continuous, sustainable funding structure that is not dependent on the periodicity of the EU framework programmes, and provides financial resources for both introducing the most advanced technologies and easing the digital divide in the pan-European RN.

(Recommendations B1/ B2 of Austria White Paper)

Consider as next turn in roadmap? ...

Networking: Recommendations

3. Put emphasis on informing, training, and educating the e-Infrastructure users about the opportunities provided by the RN and the Grid infrastructure. Carefully harmonize academic and research networking with school developments, include e-Infrastructure topics in the curricula in both domains in order to ensure smooth and efficient transition into the digital age for the users.

(Recommendation C2 of Austria White Paper)

Consider as next turn in roadmap? **No. It is an important issue, but it does not belong in the roadmap for networking.**

Networking: survey results

Quick glance through results of survey for Roadmap update:

18 answers of which 3 answers that address networking:

Dany Vandromme (RENATER)

Lajos Balint (Hungarnet/ NIIF)

Simon Watts (DANTE)

Networking: survey results

Dany Vandromme (RENATER)

NRENS working together has proven to be a working concept

Most important technical development during next decade is E2E on a global scale, both from infrastructure and service point of view.

Research networks are a key building block for any pan- European e- infrastructure

Networking: survey results

Lajos Balint (Hungarnet/ NIIF)

Challenges:

- full pan- European geographic coverage characterised by minimised digital divide and by leading position
- multi- country co- operation supposes minimised digital divide

Potential benefit:

unlimited access and collaboration – increased efficiency in innovation

NRENS have a proven well working organizational model. Future e-Infrastructure should use this model (with sustainable funding of basic resources)

Most important technical development in the next decade is the revolution of radiated wave technology; high speed transmission and high volume storage will be integrated for new HPC machines

Mention ENPG and DG research as parties that must be involved

Networking: survey results

Simon Watts (DANTE)

page 10: “Additionally, when linking to resources that are out of the scientific domain (such as public utility, commercial or military resources) other networks may be added.” Not sure about this. It does not apply now, but who knows in the future, perhaps GEANT will be opened to these areas.

Page 11 (?), add to 3rd paragraph:

GEANT2 is already deploying end-to-end connectivity, including trans-Atlantic routes. These services should be developed and enhanced in the future.

Page 11 (20?), bottom:

There are significant opportunities for mobile networking currently being investigated by DANTE. Steps have been taken to found a European organisation that further investigates these opportunities and seeks to deploy a pan-European mobile networking environment.

Networking: other issues

Jacko Koster (UNINETT Sigma)

- Directions 3rd paragraph: Building dedicated network of links between major computing centres would be a good investment.

... seems to be a reference to a European supercomputer infrastructure (p.38). No reference to e.g., European grid storage facility (“that is secure, distributed and extremely fast” – p.39) or **resources** in general

- End-destination: A reliable high speed hybrid network covering all of Europe and providing global end-to-end connectivity.

... grid applications, collaborative environments need low latencies **real-time**

- Perhaps include some wording on the need for excellence and need for Europe to maintain a leading position

Networking

Klaus Ullmann (DFN), summary talk 04.10.2006

1. Bandwidth, which has been the major problem for any research networking in Europe over the past decade will be no longer a major problem.
2. Developments for future network technology have to be done in close cooperation with advanced user groups, specifically those using Grid technology
3. Due to the user demands one of the main future challenges for the developments of research networking is to further work out solutions for multi-domain environments for operational purposes. Work started in GN2 („e2e“) but solutions have to be driven further according to developing demands for example from Grid communities
4. Intelligent networks (ie. „intelligent“ VPNs / OPNs adaptable more flexibly to user needs) have to be further developed in the future, ie. VPNs „on demand“ or dynamic VPNs
5. Presently there is no need to change the governing structure (NREN PC) as it is working and flexible enough for