

# TERENA TASK FORCE ON NEXT GENERATION NETWORKING

## Summary Report on the 16th TF-NGN meeting 13-14 January 2005 Vrije Universiteit Brussel, Brussels, Belgium

Issue 1, Valentino Cavalli

### 1. Introduction

#### 1.1. Attendees

<u>Name</u>	<u>Organisation</u>	<u>Country</u>
Antal Bulanza	STC-ULB	Belgium
Emilie Camisard	RENATER	France
Mauro Campanella	GARR	Italy
Valentino Cavalli (Secr.)	TERENA	-
Tim Chown	University of Southampton	United Kingdom
Wim Derijnck	BELNET	Belgium
Larry Dunn	Cisco Systems	-
Jerome Durand	RENATER	France
Anders Elgemyr	Wavium AB	-
Michael Enrico (Chair)	DANTE	-
Marcin Garstka	PSNC	Poland
Jon Kåre Hellan	UNINETT	Norway
Sten Hubendick	Wavium AB	-
András Jákó	NIIF/HUNGARNET	Hungary
Avgust Jauk	ARNES	Slovenia
Olivier Jerphagnon	Calient Networks	-
Dimitrios Kalogeras	GRNET	Greece
Radek Krzywania	PSNC	Poland
Loukik Kudarimoti	DANTE	-
Felix Kugler	SWITCH	Switzerland
Olav Kvittum	UNINETT	Norway
Yolanda Lamilla	Cisco Systems	-
Roland Leners	Optovia	-
Athanassios Liakopoulos	GRNET	Greece
Edoardo Martelli	CERN	-
Ines Martinez	STC-ULB	Belgium
David Martinez Moreno	RedIRIS	Spain
Maurizio Molina	DANTE	-
Victor Olifer	UKERNA	United Kingdom
Jordi Palet Martinez	Consulintel	Spain
Cristel Pelsser	Université Catholique de Louvain	Belgium
Bruno Quoitin	Université Catholique de Louvain	Belgium
Jürgen Rauschenbach	DFN-Verein	Germany
Victor Reijs	HEAnet	Ireland
Ana Romero	DANTE	-
Robert Stoy	DFN	Germany
Bernard TUY	RENATER	France
Sebastien Tandel	Université Catholique de Louvain	Belgium
Szymon Trocha	PSNC	Poland
Jean-Marc Uzé	Juniper Networks	-

Jeroen Valcke	BELNET	Belgium
Stig Venaas	University of Southampton	United Kingdom
Chris Welti	SWITCH	Switzerland
Fuhua Yin	STC-ULB	Belgium

## 1.2. Apologies

<u>Name</u>	<u>Organisation</u>	<u>Country</u>
Carlos Friaças	FCCN	Portugal
János Mohácsi	NIIF/HUNGARNET	Hungary
Wilfried Wöber	UniVie-ACOnet	Austria

## 1.3. Online presentations

All presentations from the meeting are available online at the following URL:  
<http://www.terena.nl/tech/task-forces/tf-ngn/presentations16.html>.

Readers of this report should refer to the presentations for detailed information. The additional information contained in this document is provided as a record of the main discussion items and actions arising during the meeting.

## 2. GÉANT and GÉANT2

### 2.1 Update on GÉANT and GÉANT2 networks, Michael Enrico

The most significant change on the GÉANT network since the previous TF-NGN meeting concerned the JUNOS OS upgrade. Details about this were provided by Ana in her presentation during the IPv6 session (see section 7.1 below).

The GÉANT2 procurement was still ongoing at the time of the meeting. Decisions were expected to be made in March or April 2005. The suppliers had been short-listed, but a new cost-sharing model still needed to be agreed by NRENS.

Work on establishing a minimum set of services for the GÉANT2 service portfolio was ongoing. Currently, a number of point-to-point light-path service scenarios and GE light-path services were under consideration. These issues were discussed in December 2004 at a meeting of NRENS in Amsterdam. Cross-border fibre options were also discussed at that meeting.

### 2.2 GN2 Research and Service Activity Update, Michael Enrico, Loukik Kudarimoti and Jürgen Rauschenbach

A number of presentations were given about the status of GN2 Joint Research Activities and Service Activity 3. The JRA1 activity, which participants had met immediately before TF-NGN, was presented by Loukik on behalf of Nicolas Simar. Michael presented JRA2, JRA3, JRA4 and SA3. Jürgen presented JRA5.

For each activity, the audience was informed about the development status, the deliverables planned and completed and related collaboration activities. Details are provided in the relevant slides at the link mentioned in section 1.3 above.

## 3 Optical Networking session

### 3.1 Optical Networking Work Area in TF-NGN, Victor Reijs

Victor provided an overview of the optical networking activities in TF-NGN, the work item 9.7 of the new Terms of Reference (see [http://www.terena.nl/tech/task-forces/tf-ngn/tf-ngn\\_tor.pdf](http://www.terena.nl/tech/task-forces/tf-ngn/tf-ngn_tor.pdf)).

This work item should avoid duplicating work already planned in JRA3 and SA2 of the GN2 project and in the MUPBED (formerly known as MUPPET) project.

In principle, the activity should look mainly into OOO and focus on technologies that operate in an E2E environment, crossing multiple NREN domains.

Victor listed medium-term, operational-oriented, and Long-term subjects of interest. The latter would include, among others:

- pure optical (burst) switching/routing; Victor's idea is to invite people working in these areas to talk at TF-NGN meetings;
- open WDM standards; Roland remarked that it is difficult to predict how this trend will develop;
- Quantum cryptography.

Victor remarked that in many cases such technologies are already deployed. The relevance to TF-NGN is to see if, and how, they will be applied in the NREN environment.

Additional work in TF-NGN would be required on term definition, understanding new concepts, discussing with providers and manufacturers, exchanging information and testing optical equipment.

ACTION 050113-01. Victor to provide a draft of the term definition document before the next TF-NGN meeting.

Further details were needed about who will participate in the activity and on which networks/test-beds these tests may be carried out. These issues were not discussed at the meeting; Victor agreed to send a call for participation on the TF-NGN mailing list.

ACTION 050113-02. Victor to send a call for participation in optical activities on the TF-NGN mailing list.

### **3.2 Sten Hubendick – Light-path provisioning**

Sten's presentation focused on the concept of light-path, the rationale and the ways to provide light-path services and how they are supported in Wavium equipment.

GMPLS was presented as the solution for provisioning network services across multiple layers and multiple technologies. Sten highlighted the advantages of GMPLS and reported that at the end of 2004 Wavium carried out tests using RSVP –TE UNI. GMPLS seems to be the solution to light-path provisioning; however there are still bits missing, like UNI/NNI etc.

The Wavium gear supports fully transparent switching plus 10 GE and 10G SDH. In most cases GFP is used for multiplexing.

The presentation was followed by a discussion about the signalling model of reference and, in particular, about the pros and cons of the overlay and peer models. Which one is the best depends on which part of the network is being managed. For packet-based networks the peering model is the best, for inter-working between different layers the overlay model is more convenient. Inside layers, the peer model is again the most suitable one.

## **4. Hands-on evaluation Work Area in TF-NGN, Marcin Garstka**

Marcin provided an overview of work item 9.7 "Hands-on evaluation of new routers and switches". He presented the scope of the activity and discussed possible collaboration.

Michael addressed a question to the vendors' representatives at the meeting about the confidentiality involved in the kind of tests expected in this work item.

A brief discussion followed, regarding the real options for NRENs to get access to information and the capability to share the results of such tests. The issue was that test results may not be disclosed before a vendor decides to publish information about a product. Vendors and NRENs representatives agreed that it would be feasible for NRENs to work under NDA for a certain time before test results are published and to disclose them only when the vendor goes public with the product.

Michael suggested Marcin to draft a common test plan, starting with a list of features of interest and the methodology to test them. Marcin remarked that this involves test tools and the choice of tools depends on which environment the tests are carried out.

ACTION 050113-03. Marcin to provide a list of features to be tested and the test methodology in work item 9.7.

## **5. Transport Protocols Work Area in TF-NGN, Radoslaw Krzywania**

Radoslaw presented his views about the scope of work item 9.6. This would span over TCP oriented technologies, UDP oriented technologies and other technologies, including fibre channels.

Radoslaw highlighted some ideas for possible work in the area. Larry pointed out that the work done in Web100 would be a useful model to be taken into account.

Radoslaw provided some details of the Internet2 work on bulk transfer protocol and expressed an interest in carrying out collaboration with Stanislav Shalunov in this area.

The activity plan of this work item would start with a document on the state-of-the-art, which should be developed by the end of February, and collaboration with Internet2; plans for testing at Europe-wide scale should be done in March and actual tests start in April.

The meeting participants were asked about who would be interested in participating in the activity. Expressions of interest were made by HEANet, UNINETT and RedIRIS.

ACTION 050113-04. Radoslaw to prepare a state-of-the-art document on transport protocols before the next TF-NGN meeting.

## **6. IP routing session**

### **6.1 IP Routing Work Area in TF-NGN, Mauro Campanella**

Mauro presented the rationale and the current views about the work item on IP routing (activity 9.3). His talk was also an introduction to the mini-workshop on routing that he had organised and that took place on Friday afternoon, immediately after the TF-NGN meeting.

Mauro presented a draft plan for the activity, research topics for discussion by the task-force participants and a list of other activities and projects, which are suitable for collaboration.

## **6.2 Impact of IS-IS changes on BGP: Case study on GÉANT, Bruno Quoitin**

Bruno presented the background and the features of a few tools released as part of the TOTEM traffic engineering toolbox <http://totem.info.ucl.ac.be/tools.html>. These tools include C-BGP, a BGP decision-process simulator and LISIS, a set of scripts to monitor the behaviour of IS-IS in ISP networks. These tools have been studied in relation to specific scenarios on GÉANT.

Michael asked if the results of Bruno's work could be used to provide recommendations to designing the IP service of GÉANT2. In addition, Jean-Marc asked if they could be used to tune routing protocols. Bruno confirmed that the tools he presented could be used for the GÉANT2 IP service definition as well as for evaluating many different network scenarios.

## **7. IPv6 session**

### **7.1 Multicast Ipv6 in GÉANT, Ana Romero**

Work had started in the previous year with the goal of having a native IPv6 multicast pilot service available on GÉANT by the end of 2004.

Ana described the service topology, then said NRENs would be expected to natively connect to the GÉANT access route; however, if needed tunnels would be provided too.

The roll-out of the service was about 3 weeks behind schedule, due to issues with upgrade of JUNOS to release 6.4. The image contained a bug related to PIM, but not to IPv6 multicast. However this was very critical and stopped the upgrade process. A fix was provided by Juniper in December, and the process of connecting NRENs could start again. See Ana's slides for the current schedule.

Regarding inter-domain IPv6 multicast, Ana reported that Juniper supports embedded RP in new version of JUNOS 7.0R2. GÉANT plans to upgrade to R3 when available, and this will need to be deployed in all domains.

### **7.2 Cisco IPv6 status, Larry Dunn**

Larry provided an update on the status of IPv6 support in the Cisco IOS. Two phases out of the three envisaged in the IPv6 development plan by Patrick Grossetete were completed. Larry pointed out that the most interesting features will become available in release 12.3M/T.

Larry provided an overview of the status/projection of IPv6 availability on the 6700 and 6500 series. Many details are available in the slides.

There were questions about the schedule for the implementation of multicast RPF. Yolanda said this was expected in April 2005.

ACTION 050113-05. Jean-Marc to send Valentino slides on JUNOS IPv6 support to be made available on the TF-NGN website.

ACTION 050113-06. Yolanda to find out schedules of MIB implementations for IPv6.

### **7.3 m6bone status and results, Jerome Durand**

Jerome updated the audience about the current status of the m6bone network.

With the 6NET network being decommissioned and the IPv6 multicast service not yet available on GÉANT, some European NRENs have been temporarily tunneling to RENATER.

Jerome discussed two possible options for interconnecting the m6bone to GÉANT, a central and a distributed one. The first option was chosen, with RENATER providing the single point of interconnection.

#### **7.4 IPv6 inter-domain multicast, Stig Venaas**

Stig reported on SSM developments. SSM needs now to be assessed; specifically, one needs to test applications, like FLUTE, that support SSM.

More work should be done regarding the ASM service. IPv6 ASM is more difficult than IPv4 ASM, basically because of no MSDP support as well as of scalability problems. Embedded RP is a possible solution for IPv6, as it makes possible to do ASM into the domain; however a very different model from IPv4 is needed.

Stig suggested starting a discussion about practical tests with NRENs interested in using the GÉANT multicast IPv6 service, when available. Stig expressed an interest in testing basic connectivity, but also many other things, including embedded RP at large scale, applications issues etc. Tim suggested making a test plan to be ready by end of March.

ACTION 050113-07. Tim/Stig to solicit ideas and lead discussion about a test plan concerning the GÉANT multicast IPv6 service, to be ready by end of March.

#### **7.5 Results from Euro6IX and 6POWER, Jordi Palet**

Jordi provided brief updates on the status of the Euro6IX and 6POWER projects.

The Euro6IX project duration was extended until end of June 2005. The main outstanding issues were related to Internet exchanges: the work was not complete. In this respect, the project was proposing a new, very innovative model, which might also require some time to get accepted on the market. The network architecture is based on Policy-Based Systems. Jordi said demonstration events were planned. He said more and more telecom operators were starting to announce provision of commercial IPv6 services.

Jordi said 6POWER is the only power-line project supporting IPv6 today. Lots of trials were done in the project, which will release 200Mbit/s technology, supporting QoS, VoIP, and much more. Results would be announced on the IPv6 cluster web site <http://www.ist-ipv6.org/>

#### **8. Ethernet transport service in Wide Area Network, Bertrand Duvivier**

Bertrand's presentation was a preliminary talk to the routing workshop, which was held immediately after the end of the TF-NGN meeting. Presentations from the workshop are available at <http://www.terena.nl/tech/task-forces/tf-ngn/routing-ws.html>

Bertrand's slides may be found at [http://www.terena.nl/tech/task-forces/tf-ngn/presentations/tf-ngn16/050113\\_bd\\_ethernet.pdf](http://www.terena.nl/tech/task-forces/tf-ngn/presentations/tf-ngn16/050113_bd_ethernet.pdf)

Besides providing lot of useful information about the rationale and the current development of Ethernet transport service in WAN, Bertrand's presentation includes a section on the idea and the

building blocks of VPLS, which basically allows to emulate a LAN (provide a transparent LAN service) over the WAN.

ACTION 050113-08. Michael to discuss with Janos about the possibly to extend the scope of the VPLS work item.

## 9. Next meetings

The following TF-NGN meetings in 2005 would be held at the following dates and locations:

- 14-15 April in Zürich, Switzerland
- 28-29 July in Paris, France
- Week of 17 October in Athens, Greece

## 10. Summary of ACTIONS

ACTION 040929-01	Michael Enrico to draft a text in the new Terms of Reference about producing How-To documentation.	Superseded
ACTION 040929-02	Valentino Cavalli to make sure that new TF-NGN work items are finalised via the task force email list.	DONE
ACTION 040929-03	Jean-Marc Uzé, Michael Enrico to organise a discussion on dynamic configuration, customer-empowerment at next TF-NGN meeting.	Outstanding
ACTION 040929-04	Tim to share long-list of possible new work items via the tf-ngn mailing list and encourage the group to nail down to some feasible IPv6 activity.	DONE
ACTION 050113-01	Victor to provide a draft of the term definition document before the next TF-NGN meeting.	NEW
ACTION 050113-02	Victor to send a call for participation in optical activities on the TF-NGN mailing list.	NEW
ACTION 050113-03	Marcin to provide a list of features to be tested and the test methodology in work item 9.7.	NEW
ACTION 050113-04	Radoslaw to prepare a state-of-the-art document on transport protocols before the next TF-NGN meeting.	NEW
ACTION 050113-05	Jean-Marc to send Valentino slides on JUNOS IPv6 support to be made available on the TF-NGN website.	NEW
ACTION 050113-06	Yolanda to find out schedules of MIB implementations for IPv6.	NEW
ACTION 050113-07	Tim/Stig to solicit ideas and lead discussion about a test plan concerning the GÉANT multicast IPv6 service, to be ready by end of March.	NEW
ACTION 050113-08	Michael to discuss with Janos about the possibly to extend the scope of the VPLS work item.	NEW