



# Minutes of 3rd TF-TANT Meeting



TERENA/DANTE TASK FORCE FOR TESTING ADVANCED NETWORKING TECHNOLOGIES

Minutes of the 3rd TF-TANT meeting held on the 29th and 30th of March 1999 at the National Technical University of Athens, Greece.

Kevin Meynell - Issue 2

## PRESENT

Name	Organisation	Country
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Pantelis Balaouras	GRNET/U.Athens	Greece
Michael Behringer	Cisco	United Kingdom
Marc van den Bergh	KPN Research	The Netherlands
Zlatica Cekro	VUB/ULB	Belgium
Howard Davies	DANTE	-
Larry Dunn	Cisco	United States
Tiziana Ferrari	INFN Bologna	Italy
Leon Gommans	U.Utrecht/Cabletron	The Netherlands
Christoph Graf (Chair)	DANTE	-
Ivano Guardini	CSELT	Italy
Jean-Marc Haye	Torrent	France
Joop Joosten	CERN	Switzerland
Dimitrios Kalogeras	GRNET	Greece
Tom Kosnar	CESNET	Czech Republic
Cees de Laat	U.Utrecht	The Netherlands
Simon Leinen	SWITCH	Switzerland
Ladislav Lhotka	CESNET/USB	Czech Republic
Edward Meewis	Univ. Twente	The Netherlands
Vassilis Merikoulias	GRNET	Greece
Kevin Meynell (Sec)	TERENA	-
Jan Novak	DANTE	-
Simon Nybroe	Telebit	Denmark
Damir Pobric	IAT-CNR Pisa	Italy

Themos Rapsomanikis	NTUA	Greece
Juergen Rauschenbach	DFN	Germany
Victor Reijs	SURFnet	The Netherlands
Esther Robles	RedIRIS	Spain
Roberto Sabatino	DANTE	-
Guenther Schmittner	JKU/ACOnet	Austria
Yannis Siahos	Upatras-Net	Greece
Robert Stoy	RUS/DFN	Germany
Jean-Marc Uze	RENATER	France
Marcel Wiget	Nortel Networks	France
Bert Wijnen	IBM	The Netherlands
Wilfried Woeber	ACOnet	Austria
Alexios Zarras	GRNET	Greece

Apologies were received from:

Mauro Campanella	INFN Milano	Italy
Brian Carpenter	IBM UK	United Kingdom
Olav Kvittem	Uninett	Norway
Bernard Tuy	CNRS	France

## 1. APPROVAL OF MINUTES

The minutes of the TF-TANT meeting held on the 25th and 26th of January 1999 were approved.

## 2. STATUS OF QUANTUM & TEN-155

Roberto reported the lines between Germany and Austria, Germany and Italy, and Germany and Poland had been installed since the last meeting. The connections between France and Spain, Austria and Slovenia, and from Portugal to either the UK or the Netherlands, were still being negotiated. Other connections being planned included a 34 Mbps line between Tel Aviv and London, an additional 155 Mbps line from either London or Amsterdam to the US, and a 10 Mbps connection between Ireland and the UK.

Some interim peering arrangements had been made to resolve the interconnection problems with commercial networks during the roll-out of TEN-155. These however, were only valid for six months and a tender was being issued to obtain more permanent interconnections.

The problems experienced with the Ascend ATM switches under high traffic loadings had been resolved by installing additional interface cards. The Cisco 12000 router in the US had also suffered performance problems and had been replaced by two Cisco 7515s.

Obviously this was a concern because the Cisco 7507 routers currently used on the TEN-155 network, would eventually not be adequate. Alternative solutions from Juniper, Nortel and Ascend were therefore being investigated.

The TEN-155 Managed Bandwidth Service (MBS) was successfully used for a demonstration during the launch of the EU Fifth Framework Programme in Essen, Germany. It would now move into a Beta-testing phase with the TF-TANT, DYNACORE and EDISON projects.

Wilfried asked whether it was possible to obtain native ATM from the MBS. Roberto replied this was possible, but NRNs would also need to support native ATM over their local infrastructure.

Cees asked how the bandwidth for the TEN-155 demonstration in Germany had been arranged. He understood that users had to contact their NRNs rather than DANTE. Roberto replied this was the general policy, but if a local NRN did not support the MBS, it might be possible for users to obtain their own connection to a TEN-155 PoP. Nevertheless, each NRN could determine their own policy on this.

Christoph mentioned the EU had requested that funding notices/disclaimers be appended to everything published by TF-TANT. He would circulate the relevant text on the list.

#### ACTION 3.1 - Christoph Graf

Kevin however, thought this was only reasonable for formal QTP deliverables as TF-TANT was a volunteer effort with only the Chairman and Secretary being partially funded by the EU. The group agreed with this view.

### 3. TF-TANT OVERLAY NETWORK

Roberto said the previous meeting had discussed whether a permanent overlay network should be established over TEN-155 for the TF-TANT experiments. He presented plans for such an overlay using 2 Mbps VPs, which would allow circuits to be established as required. It had been designed to evenly share traffic between PoPs, although some PoPs obviously had to support more connections than others. The meeting was asked whether such an overlay should be set-up, or whether the group would prefer connections to be set-up on a per-experiment basis.

Simon L said the reasons for establishing a complex permanent overlay network no longer applied. It had only been necessary to establish such an overlay for TF-TEN because obtaining VPs from the JAMES project was complicated. This said, the network was then

always available when required.

Wilfried was concerned that adding and removing connections on a regular basis might affect the production network. Guenther agreed, and added that ad-hoc connections made coordination difficult at both the international and local level.

Victor asked whether single VCs could be switched between VPs to create specific sub-overlays. Roberto replied that KPN did not offer this as a standard service.

Lladislav thought a decision should not be made until the requirements of each experiment were known. Christoph agreed, and said he would circulate a questionnaire about requirements on the mailing list. The initial experiments would therefore have to make use of ad-hoc overlays.

ACTION 3.2 - Christoph Graf

Lladislav asked whether it would be possible to install test switches in the TEN-155 PoPs. Roberto replied the purchase of these would have to be approved by the QUANTUM Policy Committee.

#### 4. REVIEW OF EXPERIMENT DESCRIPTIONS

##### 4.1 Differentiated Services

Tiziana had presented her proposal for testing Differentiated Services (<http://www.cnaf.infn.it/~ferrari/tfng/diffserv.html>) at the last meeting, but she thought it should be extended to include investigation of bandwidth brokers as the IETF was doing a lot of work on these. The experiment was scheduled to start in April or May, but this was dependent on when IBM could loan some equipment. In addition, it would be better to conduct tests over 4-8 Mbps tunnels as TCP back-off could cause inefficient bandwidth utilisation over smaller tunnels.

Cees thought that 2 Mbps tunnels could be used if the number of assigned priorities were reduced to two. Tiziana agreed this could be done if it was not possible to obtain more than 2 Mbps.

Roberto pointed out the proposal assumed the existence of a generic overlay network which might not exist. In addition, it involved Spain which was not yet connected to TEN-155. It would therefore be necessary to set-up tunnels on an ad-hoc basis. Tiziana replied she would revise the proposed topology.

Christoph agreed that bandwidth brokers should be incorporated into the experiment. These could be tested in a second phase when they became available.

#### ACTION 3.3 - Tiziana Ferrari

##### 4.2 RSVP to ATM Mapping

Tiziana reported this experiment was scheduled to start in July when SVCs were supported by TEN-155. In addition, she was hoping to test equipment loaned by Nortel Networks and Telebit.

Michael suggested the Cisco equipment loaned for the MPLS experiment could also be used for this experiment.

##### 4.3 QoS Monitoring

Tiziana expanded on her proposal that was presented at the last meeting (<http://www.cnaf.infn.it/~ferrari/tnfg/qosmon.html>). The experiment was scheduled to start in April or May, but effort-wise, this was dependent on when the MPLS experiment finished. It was hoped that RIPE and/or Surveyor traffic measurement equipment could be utilised to monitor one-way delays. At a later stage, testing over the QBone could also be carried out.

##### 4.4 IP over ATM

Roberto presented his proposal for testing the performance of IP over ATM (<http://www.dante.net/staff/roberto/docs/1999/qtp/RS-99-04.html>). The aims were to identify the best configuration for combining best-effort IP and other types of traffic, and to verify that SCR was guaranteed in the event of congestion.

Some tests had already been conducted at the KPN laboratories in Hilversum. Three workstations sent varying amounts of traffic to an Ascend CBX-500 configured to support different SCRs for each. Unfortunately, the results showed the switch did not load balance correctly when the lines were operating at full-rate. Further investigations were therefore necessary.

Christoph said the experiment proposal did not describe the tests in Hilversum. Roberto agreed to incorporate these.

#### ACTION 3.4 - Roberto Sabatino

##### 4.5 Flow-based Monitoring

Simon L reported he had received a lot of feedback about this project. A lot of NRNs appeared to be working in this area, or were

at least conducting investigations.

He was currently collecting pointers to relevant software and other similar projects (<http://www.switch.ch/tf-tant/floma/>). The next stage would be to install a few packages and start to analyse traffic streams; mainly to obtain information about usage patterns. Whilst a testing environment needed to be defined, this did not directly require hardware and software resources from TEN-155.

#### 4.6 RSVP

Simon L said there did not appear to be much interest in this experiment and proposed to amalgamate it with the RSVP to ATM SVC mapping experiment or scrap it completely. He did not consider it worthwhile to conduct more tests under local area conditions.

Christoph asked whether anyone was planning to use RSVP, and there was no response. Victor however, suggested the interaction between DiffServ in a core network with RSVP at the edges should be tested. He would send the URL of a document about this to the mailing list.

#### ACTION 3.5 - Victor Reijs

It was agreed any further work in this area should be conducted in the context of the RSVP to ATM mapping experiment.

#### 4.7 Multicasting (IP and ATM)

Robert presented his plan for testing native multicasting over TEN-155. A number of independent multicast domains would be established to allow PIM Sparse Mode, MBGP and BGMP to be tested. Cisco equipment running IOS 12.x would therefore be required in Austria, Germany, the Czech Republic, the Netherlands, Italy and Spain. It was hoped this could be established before the IETF in Oslo.

EURESCOM were also interested in collaborating with TF-TANT. This consisted of twenty-one European PNOs who wished to investigate multicasting amongst other things. They were not certain they could obtain a suitable test infrastructure and were interested in using TEN-155.

Christoph had some reservations about this type of collaboration. He did not think it was acceptable for commercial companies to use TEN-155 for their own research, especially if NDAs were involved. Nevertheless, if they managed to obtain their own multicast network, it should not be a problem to connect it to TEN-155. Wilfried added that commercial companies should be welcomed, but on the understanding that everything was in the public domain.

Wilfried (?) also expressed concerns about the impact of native multicasting on the production network. Simon L however, said these arguments had prevented the introduction of new technologies on TEN-34. New technologies would have to be introduced eventually, and TEN-155 presented an ideal opportunity to do this.

Christoph suggested approval for setting-up the multicast network should now be sought from the QUANTUM Policy Committee. Roberto agreed to make the necessary representations.

ACTION 3.6 - Roberto Sabatino

#### 4.8 IP Version 6

Simon N reported that AConet, CESNET, INRIA/G6, DFN, GRNET, INFN, SURFnet, Uninett, RedIRIS, SWITCH, DANTE and Telebit had expressed interest in this activity. The intention was to build a pre-production native IPv6 network that could be used for realistic end-to-end experiments, gaining operational experience, and identifying areas that required further development. Hopefully, it would also generate interest in production IPv6 networks.

The plan was to run native IPv6 on SVCs over TEN-155. The participating NRNs would provide transit to end-users and would connect using either IPv4 or IPv6. This would allow tunnelling to be tested. A connection to the 6Bone would also be provided.

Simon L said there was a lot of interest in this activity and he proposed something should be established before the Oslo IETF in July. This was agreed.

Christoph noted the use of SVCs was proposed, but they would not be available until June at the earliest. Simon N replied they were not a prerequisite and PVCs could be used if necessary.

Wilfried asked where the Telebit equipment would be located, and who would be managing it. Christoph replied it would probably be located in a KPN PoP in either Amsterdam or Frankfurt. DANTE would undertake the management with assistance from Telebit.

Tiziana asked whether a connection to the 6REN was still planned. Simon N replied this was not an immediate priority, and in any case, TEN-155 was not yet connected to the STARTAP.

#### 4.9 ATM Signalling

Jan reported on the introduction of ATM signalling on TEN-155. The

service had to be specified before the 30th of April, and contributions to the process were currently being sought. KPN planned to start using ATM from the 1st of June, and would be conducting acceptance tests for approximately one month. Once these were concluded, DANTE would conduct its own acceptance tests until the end of September. If these were successful, SVCs would be made available to MBS projects.

The introduction of SVCs should not affect the production network as additional interfaces were being installed on the Ascend switches. Both UNI 3.1 and 4.0 would be supported, using E.164 AESA addressing.

In order to conduct the acceptance tests, DANTE were looking for participants with Cisco LS-1010 or Fore ATM switches. Dimitrios, Jean-Marc U, Simon L and Guenther/Wilfried volunteered for this.

Juergen commented that most NRNs used, or planned to use, DCC-based rather than E.164-based addresses. Nevertheless, these could be mapped relatively easily if necessary.

Guenther asked whether PNNI would be supported. Marc replied that Ascend did not recommend its use, but it could be offered in principle. It was therefore agreed that KPN would be asked whether they would provide PNNI.

ACTION 3.7 - Guenther Schmittner

#### 4.10 Policy Control

Leon reported this activity was currently in the research phase which was scheduled until June. This aimed to identify the scope of the work, acquire information on standards and products, and to define testing procedures. The next phase would be to conduct testing of different protocols (e.g. COPS, DIAMETER, PFDL), service access models (host, user or application), user authentication (e.g. Chipcards), and finally accounting mechanisms.

Marc asked whether any policy control products were currently available. Leon replied he knew of a couple of access control applications and a bandwidth broker implementation. He asked people to forward details of any other known applications.

#### 4.11 Route Monitoring

Simon L was currently investigating route monitoring software. The next stage would be to install a few packages on a workstation on TEN-155 to investigate their usefulness. Depending on the security policy of TEN-155, the routing data could then be made available to

interested parties.

#### 4.12 VPNs

Victor said RENATER was planning to implement VPNs, and this activity should be postponed until they became available. Nevertheless, some work could be conducted in the context of the Policy Control experiment.

Dimitrios asked whether VLANs and Emulated LANs would be investigated as part of this activity. Victor replied this was planned, but they were not the highest priority initially.

#### 4.13 SDH Issues

Victor said this activity had not progressed since the last meeting due to lack of information. He would however, draft a document expressing the concerns of the research community about STM-4c.

ACTION 3.8 - Victor Reijs

#### 4.14 WDM

Victor said investigations were still ongoing. A number of WDM networks were being planned, but the technical details were not yet available.

Juergen gave a presentation on the two Gigabit testbeds in Germany. One was located in the Nord-Rhein-Westfalia region with a capacity of 2.5 Gbps. This used ForeRunner ASX-4000 switches, but did not use WDM.

The other testbed ran between Munich and Erlangen, and had recently been extended to Berlin. This was based on WDM and currently used three wavelengths (as only three transponders were provided per MUX), although it could potentially support eight. One channel was used to connect three ASX-4000 switches, one channel was used to connect three Ascend GX-550 switches, with the remaining channel being used for further tests such as IP over WDM. The ATM switches had STM-16 (OC-48) interfaces, with applications using STM-1/4 accesses.

Further developments would lead to the use of increasing numbers of wavelengths (up to 48 at present) with higher data rates (10 Gbps). New features like protection switching on the optical layer would also be available soon.

#### 4.15 MPLS

Jean-Marc U reported that AConet, CERN, CESNET, DANTE, DFN, GARR, GRNET, KPN, RedIRIS, RENATER, SURFnet and the University of Namur had expressed interest in participating in this experiment. Cisco had agreed to loan some LS-1010 switches and 7200/7500 series routers, whilst Netcom would loan some measuring equipment for this.

The experiment would be divided into four phases: Phase One was scheduled for 15/4 to 10/5 and would consist of basic functionality tests. Phase Two between 11/5 and 17/5 would investigate VPNs. Phase Three between 18/5-24/5 would examine RRR. Finally, Phase Four between 25/5 and 31/5 would test QoS, DiffServ, OSPF and BGP routing, VC merging and intelligent discard, and performance of UDP and TCP traffic.

Each experiment participant was asked to confirm their participation, arrange ATM connectivity to TEN-155, complete the MBS questionnaire, put a diagram of their local Tag architecture on the Web, specify a delivery address for the loan equipment, and sign the Non-Disclosure Agreement. Jean-Marc U would propose the backbone infrastructure and VPN set-up, circulate the configuration document, and organise a Smartbit tutorial in Paris. In the meantime, Cisco were asked to check the hardware configurations, determine software availability, and provide feedback on the test plan.

ACTION 3.9 - All MPLS experiment participants

ACTION 3.10 - Jean-Marc Uze

ACTION 3.11 - Cisco

CERN, CESNET, GARR, GRNET, KPN and SURFnet confirmed their participation in the experiment. AConet and DFN did not currently have local access to the MBS, whilst DANTE did not have the manpower. DANTE were willing to install equipment in the TEN-155 PoPs, but someone else would have to manage it.

Marc asked whether it was possible to participate using a Cisco 4500 series router. Jean-Marc U was uncertain whether this supported MPLS.

Guenther asked how the bandwidth for this experiment should be specified. Jean-Marc U replied it should be in megabits per second, although configuration would actually be done in cells per second.

Bert thought the number of participants in this experiment would cause logistical difficulties. Christoph replied that many NRNs were considering using MPLS, and they needed to gain experience.

## 5.1 Torrent

Jean-Marc H gave a presentation on the Torrent IP9000 Gigabit router. This was currently being beta-tested, with production planned for the fourth quarter of 1999.

Two models were available: an 8-slot with a 10 Gbps backplane, and a 15-slot with a 20 Gbps backplane. These could accept a combination of DS-3, OC-3/12, Fast Ethernet and Gigabit Ethernet interfaces. As each physical port maintained a copy of the routing table, this allowed fast routing decisions to be made.

The IPAction operating system was based on BSD Unix and currently supported RIP1/2, OSPF2, ISIS, BGP4, IGMP, DVMRP, PIM, RSVP, NTP, AAA and TACAC. DiffServ support was due in the summer, with MPLS support later in the year.

Christoph asked whether Torrent wished to collaborate with TF-TANT. Jean-Marc H thought this would be of interest to them from the summer onwards.

Juergen asked about IPv6 support. Jean-Marc H replied this was not a high priority at the moment.

## 5.2 Telebit

Simon N confirmed that Telebit would participate in the IPv6 activity. He had presented a proposal earlier in the meeting.

## 5.3 Nortel Networks

Marcel said that Nortel Networks were interested in the MPLS and DiffServ experiments. They would be willing to loan equipment and provide support if necessary.

## 5.4 IBM

Bert said IBM proposed to loan five 2212 and two 2216 routers for the DiffServ experiment. They aimed to get some feedback on the product line, so they would also be providing extensive support from the UK. The loan still had to be approved by their research grant department, but this was expected shortly.

IBM equipment did not currently support MPLS or RTFM, but it did support IPv6. The AIX operating system also supported IPv6, so there might be some scope to participate in the IPv6 testbed. In addition, they were interested in the Policy Control activity.

## 5.5 Cisco

Michael said Cisco would be providing general support for TF-TANT, with additional support for certain experiments. A dedicated contact person had been appointed, engineering staff would be available, and the group would have access to technical information and beta software releases. The Cisco Laboratories in London and Paris could also be used for testing, but they were quite heavily booked. Finally, equipment was being loaned for the MPLS and DiffServ tests.

Larry then gave an appraisal of the TF-TANT Experiment Programme:

Differentiated Services - Very important, but timescales were optimistic. Shaping at AS boundaries should also be investigated.

RSVP to ATM mapping - Not much demand for this. Requires Cisco IOS 12.0(3)T.

QoS Monitoring - Very important. Refer to work by IPPM, RTFM, CAIDA, CSELT and UCLA.

IP over ATM - Medium importance. ABR was promising for best-effort traffic.

Flow-based Monitoring - Important.

Multicasting (IP and ATM) - Important, but UCL should also be involved. Please update obsolete Web pages!

IPv6 - Cisco might be interested in loaning equipment.

ATM Signalling - Relevant to TEN-155.

Policy Control - Very important, but Sweden should also be involved.

Route Monitoring - Did not appear to be much support, especially from DANTE who originally proposed this activity.

VPNs - Could be merged with MPLS activity.

WDM - Cisco was very interested in this, but conducting tests will be difficult and expensive.

SDH Issues - The problem will probably be solved in six months time.

MPLS - Extremely important for Cisco. Already loaning equipment.

## 6. DATE OF NEXT MEETING

The next meeting was provisionally arranged for the 17th and 18th of June 1999 at INFN Bologna, Italy. This was dependent on the EU Telematics for Research Concertation meeting being held on the 14th of June, rather than the 18th as originally proposed.

## 7. ACTIONS FROM LAST MEETING

- 2.1 Simon Leinen to contact Tiziana Ferrari to determine what activities could be included in the RSVP to ATM SVC Mapping Experiment.  
- Ongoing.
- 2.2 Robert Stoy and Jan Novak to specify the TEN-155 multicast facilities.  
- Ongoing.
- 2.3 Tiziana Ferrari to integrate DYNACORE project into the Differentiated Services proposal.  
- Done.
- 2.4 Simon Nybroe to mention IPv6 proposals at RIPE32 to determine levels of support.  
- Done.
- 2.5 Roberto Sabatino to draft a detailed proposal for the IP over ATM experiment.  
- Done.
- 2.6 Leon Gommans to send details of the policy control mechanisms under investigation to the mailing list.  
- Done.
- 2.7 Roberto Sabatino to make routing analysis scripts available on the WWW.  
- Done.
- 2.8 Simon Leinen to revise the flow-based monitoring proposal.  
- Done.
- 2.9 MPLS experiment participants to specify their equipment requirements.  
- Done.
- 2.10 Jean-Marc Uze to put references to IETF MPLS drafts on the WWW.  
- Done.

- 2.11 Juergen Rauschenbach to send some information about WDM experiences to the mailing list.
  - Gave a presentation during the meeting instead. Done.
- 2.12 Experiment Leaders to specify equipment requirements in their proposals by mid-February.
  - Ongoing.
- 2.13 All to produce a list of the equipment they already have.
  - Done.

#### OPEN ACTIONS

- 3.1 Christoph Graf to circulate EU funding notice/disclaimer on the mailing list.
- 3.2 Christoph Graf to circulate a questionnaire about MBS requirements on the mailing list.
- 3.3 Tiziana Ferrari to incorporate bandwidth brokers into the Differentiated Services experiment proposal.
- 3.4 Roberto Sabatino to describe laboratory tests in the IP over ATM experiment proposal.
- 3.5 Victor Reijs to send URL of document discussing the use DiffServ in conjunction with RSVP to the mailing list.
- 3.6 Roberto Sabatino to obtain approval for the TEN-155 multicast network from the QUANTUM Policy Committee.
- 3.7 Guenther Schmittner to ask KPN whether they will support PNNI.
- 3.8 Victor Reijs to draft document expressing the concerns of the research community about STM-4c.
- 3.9 All MPLS experiment participants to arrange ATM connectivity to TEN-155, complete MBS questionnaire, put diagram of local Tag architecture on the Web, specify delivery address for loan equipment, and sign Non-Disclosure Agreement.
- 3.10 Jean-Marc Uze to propose backbone infrastructure and VPN set-up, circulate the configuration document, and organise Smartbit tutorial.
- 3.11 Cisco to check the hardware configurations, determine software availability, and provide feedback on test plan.

- 2.1 Simon Leinen to contact Tiziana Ferrari to determine what activities could be included in the RSVP to ATM SVC Mapping Experiment.
- 2.2 Robert Stoy and Jan Novak to specify the TEN-155 multicast facilities.
- 2.12 Experiment Leaders to specify equipment requirements in their proposals as soon as possible.

Contact: [nep@dante.org.uk](mailto:nep@dante.org.uk)

*DANTE / TERENA*

*[July 1999]*