

**Report of the TERENA Technical Advisory Council
Rhodes, Greece
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Introduction

Claudio Allocchio welcomed TAC delegates to the meeting and explained that the purposes of this year's TAC is to undertake a formal review of the Special Interest Areas (SIAs) of the TERENA Technical Programme, the last formal review having been undertaken two years ago. To assist in the process, each of the TTC members will make a presentation on their area of responsibility and these would be followed by an open discussion from the floor.

Presentation: Voice & Video Collaboration Steve Williams, University of Swansea, UK

Steve Williams explained that there are many separate voice and video groups working in isolation leading to parallel developments of systems for desktops and studios. Service providers are seeing increasing numbers of conferences demanding the live streaming of video and facilities for archiving this material. A good example is the Access-Grid (<http://www.accessgrid.org/>). Access-Grid was designed with the view that bandwidth would become essentially unlimited and need not be a constraint on the provision of service. Although the Access-Grid uses multicast, it produced large data-streams that create a large load for the network infrastructure.

Steve Williams reported that H.323 conference rooms are being heavily used for a range of applications and are driving the need for high quality connections (which in this case should have less than 0.25% packet loss). Groups are integrating voice over IP (VOIP) with the PSTN networks with various developments going on around the world. Much of this work has been brought together and reported in the TERENA IP Telephony Cookbook (This publication is available on-line from <http://www.terena.nl/library/IPTELEPHONYCOOKBOOK/>). There has been a push to put in place a global dialling scheme, but this has not yet been fully integrated with the PSTN system. The global dialling scheme is rather like the DNS with a hierarchy of "gatekeepers" that enable anyone registered to dial IP telephones world-wide.

In the context of video distribution, CARNet has been doing a lot of work on architectures and implementation. The required architecture can broadly be categorised into the following components:

- Lower Layers – Traffic Delivery
- Middleware – Authorisation and Authentication
- Higher Level (Upperware) - Distribution, booking and directory services

Steve finished by saying that there is a growing need to move from the present development and pilot systems into a service environment. There is a need to get experienced institutions and individuals to contribute to a publicly available body of knowledge that can be shared in our community. It will be necessary to

coordinate the voice and video activities with those of TF-AACE, TF-NGN, and TF-Mobility.

Presentation: Security
Christoph Graf, SWITCH, Switzerland

Christoph began his presentation by giving a view of the security landscape from the NREN perspective. He explained that many NREN security teams gather in TF-CSIRT (which fits into the top layer of the model he presented), where they coordinate their activities and exchange information. He expects that the security work that will take place in the context of GN2 JRA2 will fit a little lower in the model. The question this raises is: in which sort of areas should the TERENA security groups should be active? The general agreement is that at the campus level the local teams handle security well and it would not be appropriate for TERENA to be directly involved. For international collaboration, the TERENA Task Force TF-CSIRT is regarded as a highly successful forum for collaboration; indeed there is a danger that it may become a victim of its own success. Christoph reminded the meeting that TF-CSIRT was initiated to coordinate the work of academic teams, but was opened to commercial and governmental teams and now has a very large membership. There is some thought being given to the possibility of separating the membership for academic, commercial and government. Christoph stressed that the important issue is to build on the successful achievements of the group and expects TF-CSIRT to continue as a forum in which to develop new ideas. In the context of new areas of work, Christoph explained that keeping a closer watch on legal issues, specifically, responsibility of the different actors involved in offering networked computing facilities is becoming increasingly important. He mentioned that this would include: system-owners; system-operators; system-users and system-vendors.

In conclusion, it was noted that security is not a formal Special Interest Area (SIA), but it is a strong candidate and would naturally integrate with other areas to provide security expertise. In the ensuing discussions it became clear that since many NREN services are becoming part of a critical infrastructure (CI), security is an essential element of the work across all technical areas. It was agreed that it would be appropriate to have at least one expert in each Task Force and project dedicated to security aspects.

Presentation: Grids
Roberto Barbera, Universita' di Catania, Italy

Roberto explained that the adoption of Grid technology and services is gaining momentum with many pan-European, national initiatives and projects underway. These cover many disciplines and areas of science, industry and government, many having links to the US and other continents.

The largest project in the context of the 5th Framework was European Data Grid (EDG). This project taught hundreds of new Grid users to use the middleware. EDG was also a massive programming achievement with more than 1 million lines of code, which is similar in size to the Linux kernel. The subsequent Enabling Grids for E-science in Europe (EGEE) project which started on 1 April 2004 includes 70 partners including TERENA and some NRENS with some 32 million euros of European Commission funding. TERENA will be the leader of the EGEE NA2 activity (dissemination and outreach). In addition, there are four Joint Research Activities (JRAs) of which JRA3 (security) and JRA4 (network service development). These will have strong interdependencies with the work already

being carried out in TERENA. It was noted that TERENA is already working with Euro-PMA in the context of TF-AACE and TACAR although as it was pointed out from the floor, the more general interface between the Grid AA work and TF-AACE needs to be better defined.

Roberto concluded by saying that it is vitally important that networking experts and Grid experts work together and that this applies to all areas, not just in the security area. TERENA's involvement in the EGEE will facilitate this to some extent, but it is also important for the individual NRENs to be involved with their own Grid users.

Presentation: Middleware
Ton Verschuren, SURFnet, the Netherlands

Ton explained that the TF-AACE (Authentication, Authorisation Coordination for Europe) succeeds the TERENA ad-hoc PKI-Coordination group. TF-ACCE has adopted a broader view of middleware than its predecessor. Goals of TF-ACCE include providing a forum for the discussion of middleware issues in particular defining interfaces for interoperability. It is particularly important to ensure that the middleware components developed in Europe and the United States can work together. Ton was able to report that Europe currently has three representatives participating in the Internet2 MACE (Middleware Architecture Committee for Education) initiative. The TACAR (TERENA Academic CA Repository) project is a practical pilot scheme, providing a repository of academic root certificates from the NREN and Grid communities.

Ton reported that TF-AACE mandate has recently expired and a new Task Force is proposed to continue the work in this area. The new group will be known as TF-EMC (European Middleware Coordination). It is expected that TF-EMC will form the top level coordination for the middleware activities in TERENA with specific technical activities being handled by sub-groups of the main task force. It is anticipated that GN2 has a significant requirements for middleware. It is expected that those working in GN2 will largely be those also working in TERENA Task Forces. It was agreed that it is important to coordinate and integrate the work in these two groups to avoid duplication and face the challenge for global middleware coordination.

The topic of mobility covers the middleware associated with providing access from remote networks with authentication being undertaken by the users' home institution. The TERENA Task Force on Mobility has been active in surveying equipment, software and defining a pan-European roaming architecture. TF-Mobility explored three potential candidate architectures which included the use of VPNs, a web-based approach and a solution based on 802.1x. The technology chosen to support the infrastructure is a hierarchy of radius servers with the root server being located and operated by SURFnet in the Netherlands. Currently there are around 16 countries participating in the pilot. Claudio expressed his desire to see this infrastructure expand as quickly as possible to cover the whole of the community, but explained that this will need the involvement of end-user campuses as well as the NRENs. Klaas Wierenga added that TF-Mobility is producing documentation on the requirements both on the WAN (NREN) and institution (campus) levels. It was noted that many of the TF-mobility members will also be participating in GN2 JRA5.

Presentation: TF-NGN and future activities
Victor Reijs, HEANET, Ireland

In the past year, TF-NGN has been working on IPv6 deployment, testing, IPv6 multi-cast and auditing (measuring the quality of service of the network on a pan-European scale). A major future initiative in this respect will be the Performance Emergency Response Team (PERT). Much of this work will be undertaken within GN2 which is expected to start in September 2004. Many of the NRENs taking part in TF-NGN have shown an interest in optical networking and have contributed to the GARDEN and GRANDE proposals to the European Commission; unfortunately both of these initiatives seem stalled. Much effort was devoted to the definition of Bandwidth allocation and Reservations (BAR) for the GN2 proposal. Victor stressed the importance of avoiding duplication of effort in the TERENA Task Forces and GN2, pointing out that there is a limited amount of technical resource in our community and this has to be utilized in the most effective manner possible.

Victor asked how best to coordinate the work of pan-European projects (such as GN2, EGEE, and MUPPET) with the lower layer works in the TERENA Task Forces. One idea is that the TF might be a think tank which can provide support in areas which cannot be included in the projects. He also pointed out that university researchers and commercial involvement in the TERENA Task Force has been falling and this needs to be addressed for the future. We will need expertise from these areas to assist in undertaking activities not being covered within the projects. Victor specifically mentioned that these might include:

- IPv6 multicast.
- Scalability of IP equipment for high speeds (issues such as: capability of going at 10 Gigabits per second or higher; should switching be undertaken at a lower layer).
- Pure optical switching on a pan-European scale.
- Packet and circuit switching in a manageable and secure way (like routing).
- First Mile Technologies including high speed mobile access.

In answer to a question from Egon Verharen, Victor confirmed that TF-NGN would be interested in working with other task forces such as TF-AACE and Mobility. This will be vital when looking at how to integrate AA into lower layer services.

Presentation: End-to-End and campus issues
Martin Sutter, SWITCH, Switzerland

Martin Sutter explained that the topic of his presentation covers two major areas, the first being the management of QoS and performance issues, the second being the introduction of new services.

In general, the end-user is interested only in the level of performance he sees at his workstation however, this service is often delivered from a remote source over a concatenation of networks spanning several management domains. It is uncommon for the providers of these networks to have an overall view of the end-to-end service received by the user. The source of problems can be in individual network configurations, the protocols being used and most complex of all, within the applications. NRENs have traditionally offered "best-efforts" transmission services, but today, this is not sufficient for some new real-time applications.

Martin explained the levels of networks that could be encountered along an end-to-end connection in terms of the Campus, the NREN and International NREN interconnect with the reverse being present at the remote end too.



Specialist monitoring tools are available for each of these networking segments, but currently there is no tool that provides a picture of the performance of the whole end-to-end path. A major obstacle to obtaining a detailed end-to-end performance picture is that the different elements fall into different management domains. Understandably, not all management domains are willing or able to share detailed performance data. It is apparent that the problems of achieving a good overall picture of the end-to-end performance is hence not only technical (interoperability and compatibility of tools), but also in the need for good inter-organisational communications. It is important to have an end-to-end view of responsibilities along the path.

One approach is the Performance Emergency Response Team (PERT) which is comparable to the purpose of CERT in the security area. The PERT will have a reactive role dealing the incidents and a proactive role undertaking information dissemination through workshops and training. Whilst the NRENs have experience of working together to solve problems in the context of the TERENA technical programme in general, the same is not true of campus network providers on a pan-European scale. In the US, the Internet2 community has put in place the end-to-end performance initiative <http://e2epi.internet2.edu/> which has as its objective to create a predictable and well-supported environment in which Internet2 campus network users routinely have successful experiences with their applications.

In terms of new applications, Martin suggested that end-to-end work could reasonably include support for e-learning, universal voice over IP and persistence of presence.

In the discussions that followed the presentation there was general agreement that there is a real need to explore the end-to-end issues and it is essential to have campus personnel involved. It is also clear that any work undertaken in TERENA must be undertaken collaboratively with Internet2 and GN2. In passing Andrew Cormack explained the scale of the difficulty mentioning that in a recent UK survey it was revealed that in some UK institutions as many as 100 organisations are involved in providing the campus network. TERENA could usefully develop a list of minimum requirements that campuses should aim to achieve. It was agreed by others including Mauro Campanella that there is an urgent need to disseminate information on providing satisfactory end-to-end services and that should also include a notion of who does what. It would be particularly important to express this in a clear and unambiguous common language that all would understand. Diego Lopez reported that the issue of middleware deployment on the campus is a work item for TF-AACE.

It was thought highly relevant to target the End-to-End work at the campuses as network bottlenecks are almost exclusively found on the local area, including within the "last-mile".

Open Discussion

Claudio started off the discussions by highlighting the problems associated with video conferencing and streaming as an example application that typifies the problems that need to be addressed. There are many technical issues that have to be solved and these require the involvement of the network provider's end-to-end. Not only is there the need for reliable packet delivery, but we need to address facilities coordination, for instance dialling schemes and resource discovery. A prime requirement is thus to bring the campus technicians and managers into the technical discussions.

In the security area, TERENA has been very successful in reaching out beyond the NRENs and has the interest of commercial and government in TF-CSIRT and the Trusted Introducer. There are additional security topics that TERENA should address as a matter of urgency, for instance: the legal issues of responsibility. Claudio suggested that since security is central to the reliable operation of all network services, we should have at least one person in each task force that would be dedicated to thinking about security aspects. He also noted that security is not currently classified as an SIA, but in view of its strategic importance should be explicitly included in the list.

Claudio explained that the Grid Community is exerting much pressure on campus networks and NRENs to deliver new functionality such as security, authorisation, authentication and other middleware services. Again he stressed the importance of bringing campus specialists into the discussions. Claudio went on to make similar cases in the areas of lower-layer technology, mobility and end-to-end service provision.

In reviewing the current structure of the TERENA technical programme, Claudio noted that current TERENA Task Forces are:

- TF-AACE
- TF-CSIRT
- TF-NETCAST
- TF-NGN
- TF-MOBILITY
- TF-PR

The Technical Programme SIA areas agreed in 2002 and reviewed in 2003 are:

- Lower Layers (IPv6, MPLS, and VPNs etc.)
- Quality of Service (including DiffServ)
- Videoconferencing and Streaming (Including IP Telephony)
- Content Delivery, Indexing and Searching
- Middleware (security, AAA)
- Mobility
(With Grid and Campus coordination across all the SIAs)

It was agreed that QoS no longer warranted being a separate SIA and could be more appropriately handled as part of the Lower Layers SIA. Similarly, content delivery could be handled as a sub-topic in the Videoconferencing and Streaming SIA.

From the presentations and discussions that ensued, it is clear that the issues of security, end-to-end service and grid technology are becoming increasingly important to our community. Whilst it was clear there is significant support for TERENA working in the areas of Grid, E2E and Security, it was also clear that

since these items cut across many other SIAs. Representing Grid, E2E and Security merely as additional items in a linear list of SIAs could lead to confusion. John Dyer and Claudio Allocchio agreed to explore a more appropriate way of presenting the Special Interest Areas. It should be noted that there is not necessarily a one-to-one relationship between the existence of an SIA and the creation of a Task Force. There could be either a single Task Force working across multiple SIA's or several Task Forces working within a single SIA.

A major issue that needs to be addressed by the TAC, TTC and GA is how to reach the right people in the community and how to bring them into the appropriate Task Forces and Projects. There was some debate about whether there should be a separate Grid Task Force, or whether there should be a Grid person in each Task Force. The similar discussions took place for both Security and End-to-end performance issues.

It was agreed that there is a huge amount of information about networking technology, service development and management. A major challenge for TERENA is how to gather and present this information in a way that is useful for its community.

A further challenge is for TERENA to coordinate information exchange between its Task Forces and the many large projects that will be running over the next few years (EGEE and GN2 where mentioned as vitally important). Within the last 12 months, TERENA has created Task Force PR. The expertise in this group will be useful in helping disseminate the information.

It was agreed that for the following two years, the SIAs that are of interest to TERENA are as follows:

- GRID, Campus and E2E coordination across all SIAs
- Lower Layers (to include: IPv6, Multicast, VPNs, MPLS, QoS, Performance Monitoring & Optical Technology)
- Voice & Video Collaboration (to include content delivery)
- Middleware (providing cross-SIA support)
- Security (providing cross-SIA support)
- Mobility

It was agreed that rather than curtail the discussions on the SIAs at the end of the meeting, they should continue on the TAC email distribution list. Claudio encouraged delegates to use this list throughout the year.

Attendees at the 2004 TAC Meeting

Name		Affiliation	
Allocchio	Claudio	GARR	VP Technical Programme
Baldi	Andrea	ESA	
Balint	Lajos	NIIF/Hungarnet	
		Univ. Catania	TTC Member
Barbera	Roberto	&INFN	
Bonac	Marko	ARNES	TEC Member
Byrne	Andrew	HEAnet	
Campanella	Mauro	GARR	
Cavalli	Valentino	TERENA	TERENA Staff
Chiotis	Tryfon	GRNRT	
Cormack	Andrew	UKERNA	
Durand	Jerome	RENATER	
Dyer	John	TERENA	TTC and TERENA Staff
Eppenberger	Urs	SWITCH	
Fischer	Lars	NORDUNET	
Florio	Licia	TERENA	TERENA Staff
Gilmore	Brian	Univ. Edinburgh	TTC Liaison
Graff	Christoph	SWITCH	TTC Member
Ivarsson	Lars-Owe	SUNET	
Jauk	Avgust	ARNES	
Jelacic	Zlatko	CARNET/SRCE	
Jónsson	Sæþór L	RHnet	
Kaskina	Baiba	TERENA	TERENA Staff
Kaufmann	Peter	DFN	
Kikuts	Janis	LATNET	
Kuusisto	Harri	CSC/FUNET	
López	Diego R.	RedIRIS	
Maray	Tamas	NIIF/Hungarnet	
Mazurek	Cezary	PSNC, Poland	
Meynell	Kevin	TERENA	TERENA Staff
Milinović	Miroslav	CARNET/SRCE	
Mønster	Dan	UNI-C	
Reijs	Victor	HEAnet	TTC member
Sadeniemi	Markus	CSC/FUNET	
Sankar	James	UKERNA	
Sataki	Katrina	LATNET	
Sevasti	Afrodite	GRNET	
Strømdal	Magnus	UNINETT	
Sutter	Martin	SWITCH	TTC member
Verharen	Egon	SURFnet	
Verschuren	Ton	SURFnet	TTC member
Vietsch	Karel	TERENA	TERENA Staff
Wierenga	Klaas	SURFnet	
Williams	Steve	Univ. of Swansea	TTC member

Apologies

Martin	David	IBM
Martin	Olivier	CERN
Woeber	Wilfried	ACONET