



TF-NOC preparation meeting
May 3 (Monday), 2010
Copenhagen, Denmark

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Minutes

1. Introduction and roll call

The TF-NOC preparation meeting was held on the 3rd of May, 2010, in Copenhagen, Denmark, hosted by NORDUnet. The meeting was attended by the NOC representatives of 10 NRENs (see the complete list of participants) and 7 other organisations including DANTE, NORDUnet, CERN, USLHCNet, SARA, CESCA, and ESnet. The TERENA representative was Peter Szegedi. The initial aim of the meeting was to kick-off the discussions and prepare for a potential new TERENA task force on Network Operation Centres (NOC).

The meeting agenda and presentations are available here:

<http://www.terena.org/activities/tf-noc/prep/programme.html>

Stefan Liström (NORDUnet) welcomed the participants and asked for a roll call. He briefly introduced the initiative creating a forum for NOC people and stated the fact that NOC plays essential - business critical - role in both service and network operations of NRENs. However, there is extreme diversity in terms of NOC organisation, structure, and roles. Usually, NOCs cope with similar issues, but in very different ways (in terms of tools, procedures, workflow, etc.). The proposed Network Operator Centres task force is to bring together NREN people interested in NOCs, NOC tools, NOC procedures, NOC workflows, and NOC organisation with the aim of sharing information, experience, and expertise in an efficient way.

2. Taxonomy of NOC organisations

Five speakers had been invited from various types of organisations to illustrate the wide variety of NOC structures, roles, and procedures.

- **UNINETT – an NREN NOC**

Håvard Kusslid (UNINETT) presented UNINETT, the Norwegian research network, NOC. In 2002, their model was changed from outsourced help desk to 24/7 in-house NOC. The NOC provides full monitoring of network and services. It consists of 2 persons on daily duty from a pool of 20 engineers with mixed expertise on networks and system support/developments. There are no designated NOC operators (all network engineers participate as NOC operators, including NOC manager and the director of Network and Services) but the staff is rotating. During weekends, the duty engineer is on-call for priority issues.

Recently, the pool of NOC operators was extended with persons with system background (when the system and network departments were merged). One senior NOC operator is always on duty in the transition period.

Håvard spoke about the room layout and other practical things related to visualisation, powering, cabling, etc. An overview was given on the basic NOC tasks. Regarding problem management, NOC performs the usual steps when an outage or problem is occurring. Problems and events are logged in a daily watch log but currently not everything is ticketed. The solution for ticketing system/knowledge base is being researched. Problem management statistics are not currently produced, but are also "on the horizon". Regarding change management, NOC coordinates network installations and maintenance, and assists staff in this field. The customers also assisted with configuration changes (if requested). Emergency changes are handled on a case-by-case basis.

The NOC tools are the mixture of home-grown and open-sourced solutions. The system and network monitoring tools, the traffic engineering and simulation tool, and the calendaring and stuffing tool are developed internally while the ticketing system is open-sourced. There is some on-campus tools managed by the NOC, as well.

The main focuses of the current NOC development work at UNINETT are on:

- formalizing procedures for problem and change management, including handover of cases internally,
- implementing service agreements where applicable,
- integrating and developing monitoring systems, CMS, service catalogue, and ticket system/knowledge base so that these are connected in a logical manner.

The ambition is that the product of this work can be documented as a quality control system.

More about UNINETT's future NOC development plans can be read here:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Havard.pdf>

Q&A

- Toby (DANTE) asked about the consistency issues when the stuff is rotating. Håvard answered that there are some check-lists and procedures how to take over the duty on open issues.
- There was a question on the optical network operation. There are right-of-use on the fibres but the optical network ran by third party (not monitored by the NOC).
- Peter (TERENA) asked the group if practical issues such as room layout and visualisation practices are interesting to deal with. Everyone said yes, it is interesting to discuss.
- Ann (SWITCH) asked what the distinction between service and network operators is. Basically, the distinction is the operation and maintenance of servers or routers.

- **SARA - a research institute NOC**

Ronald van der Pol (SARA) introduced SARA, the Dutch national e-science support centre, providing services in the area of high-performance computing and networking, scientific visualisation, mass data storage and grid services. SARA is involved in many national and international projects and collaborations.

The main operational tasks include the operations and support for the Dutch National Supercomputer Huygens (capability computing) and for the Dutch National Cluster Computer Lisa (capacity computing), the Mass Storage facility (LHC TIER-1), the Grid and e-science services, the visualisation services (Render Cluster, Tiled Panels, ...), the network infrastructure (IPv4 + IPv6, Ethernet, CWDM), as well as the operations of SURFnet6 (Dutch NREN network) and NetherLight (Dutch optical exchange point).

SARA has around 60 employees in 6 groups divided in 3 areas: supercomputing, networking, and Grid & mass storage. For supercomputing and grid/storage, the NOC provides business day support, incident reports can be done via telephone and email. Each day 1 person is responsible for accepting and dispatching incidents, the rest of group is actively monitoring systems. For the network, SARA has 24/7 supported ITIL based NOC. Active monitoring (Nagios) is used outside business hours, an on-call duty engineer alerted by beeper via active monitoring software.

For more information about the home-grown and open-source tools can be found here:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Ronald.pdf>

Q&A

- Toby (DANTE) asked about the integration of the internal ticketing system and the user notifications. Ronald mentioned that the two systems/processes have no automatic interaction yet.
- It was noted that separated ticketing and customer information systems are better because usually the customers need different type of notifications than the NOC personnel (user doesn't want to know everything). However, it was also noted that the two functions should be integrated in one system to be consistent. A topic on various NOC tools and integration of these tools is interesting for the group.
- Peter (TERENA) asked about providing operation support for virtual networks (e.g., for projects). Ronald mentioned that SARA NOC is capable of doing that.

- **CESCA – a regional network operator**

Maria Isabel Gandía Carriedo (CESCA) gave a talk about the NOC of Anella Científica that is the regional research and education network (RREN) in Catalonia, Spain. The network architecture, applied technologies, access points, traffic statistics, and offered services were presented.

CESCA is the manager of the Regional Research and Education Network (RREN) in Catalonia and operates the Local Internet Registry (LIR). The NOC has 4 network engineers and 1 student. For the weekend monitoring there is a pool of 20 engineers. There is a complete structure of e-mail lists for contact and distribution during working hours. (The NOC is trying to be proactive in case of failures.) Out of working hours there is a 24/7 reactive service provided by an external enterprise. The external enterprise is able to check the state of the routers and switches and, if the problem is external, they can call CESCA's provider. The NOC is subscribed to the DANTE E2ECU (end to end coordination unit) mailing list for dedicated circuits.

Maria spoke about the communications database, the ad-hoc scripts and alarms, and the various statistics via SNMP and CACTI. In the communications database all the client information (institution, circuit, person, equipment, etc.) is stored and it is linked with the administrative database. It is beneficial because it is not necessary to maintain separated files for the assignment of VLAN, IP addresses, etc. All information is together and when there is a change on the technical/administrative contacts, it is changed "almost" automatically. The drawbacks are that each change requires programming and sometimes the initial programmer is not the same person that makes the changes. The ad-hoc scripts send e-mails and messages to mobile phone when a connection fails. It is the best way to be proactive.

In conclusion it was mentioned that the network and the service operations are quite different but the trend is to integrate them in common toolset. Currently there is no single tool for incident handling, database, monitoring and analysis. New models with dark fibre operation require new management models for the NOC.

The detailed description of the NOC tools and the benefits of their usage can be found in the presentation:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Maria.pdf>

Q&A

- Ann (SWITCH) asked about the information that is shared with the user. The users cannot see the tickets in the TTS. In the CACTI tool there is a view on the VLAN traffic of the user's physical interface but CPU usage and other parameters are not provided. The weather map is not shared with the users.
- It was asked how the user views are created. Maria explained that a view can be created by organisation. It is possible to have various user accounts but they all see the same view at that organisation.
- Toby (DANTE) asked about the interworking with the external enterprise and how proactive is that. Maria mentioned that it is not efficient when diagnosing internal

problems. There is a lack of knowledge on the network in general. Some progress in this area may happen.

- **SWITCH - GN3 view on multi-domain services**

Ann Harding (SWITCH) gave a talk about GN3 view on multi-domain services and its implications on NOCs. NOCs participating in the GN3 multi-domain environment have diversity of organization, structure, and roles. NOCs cope with similar issues in very different ways for local scope.

GN2/GN3 projects defined multi-domain services, manual or semi manual service delivery processes and provided multi-domain toolsets so far. Issues are being solved by us in the past many years but the tools don't necessarily work together. In this respect, TF-NOC is an opportunity to exchange expertise, best-practices, methodologies for optimising internal processes in NOCs, as well as to define standards' based NOC business processes and OSS functions for the seamless adoption of multi-domain services.

Ann elaborated a bit on the service definition. Eventually, the service is a piece of network infrastructure anyway. Someone's network could be part of another "service" in a multi-domain environment that is an operational challenge. The main question is how to deliver services on a network that is managed by someone else?

Network management evolves from pure networking towards much wider set of activities including management and software design. GN3 Joint Research Activity 2 (JRA2) analyzed network management related standards. As a conclusion, TMF appears to be the most relevant. ITU-T NGN architecture can be used as a model for a multi-domain Network Management Architecture by GN3. It is important to note that the main purpose of NOC management is business!

Ann concluded that the relation between TF-NOC proposal and GN3 activates should be considered as a synergy rather than an overlap. E.g., TF-NOC can get some feedback from GN3 JRA2 on standardised information/data models. Then, NOCs participating in the multi-domain chain can support a minimum common set of business processes worked out by GN3 JRA2. Ann proposed a TF-NOC work item in collaboration with GN3 JRA2.

The slides are available here:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Ann.pdf>

Q&A

- Mike (ESnet) commented on "what is a service anyway". It is important to have a common understanding on services managed by NOCs.

- **DANTE – a multiple domain NOC**

Toby Rodwell (DANTE, NOC Manager) introduced the new DANTE NOC. DANTE provides NOC for GÉANT and EUMEDCONNECT2 networks. The E2ECU (End to End Coordination Unit) is a single point of contact for users and operators (i.e., the multi-domain part). It supports 3 multi-NREN private networks: LHCOPN (and LHCT1T2), DEISA, and IGTMD. E2ECU notifies users/operators about planned and unplanned outages.

The motivations behind a new in-house DANTE NOC were the improved flexibility (easier, quicker and cheaper to add or change NOC services) and the reduced costs (new NOC approximately half the cost of previous NOC). The NOC has a service desk and a network control centre. The service desk is the first contact point (Magdalene, Tier 1 NOC) for the user. The network control centre (Tier 2 and 3 NOCs) is the in-house part and has 10 people. There is 1 engineer on-call overnight, and over the weekend. The staff is dealing with incident management, problem management, and change control.

Concerning the tools, Toby mentioned the Dashboard that is an in-house development for displaying correlated alarms (Cisco and Alcatel). The Service Desk Express (SDE) ticket system is provided by Magdalene (customized for DANTE). The Ops Database feeds data to SDE and E2EMON. E2EMON is an End to End Monitoring application developed by GN2.

The planned improvements will include the review and potential reorganization of the E2ECU to automate simple tasks and the creation of virtual teams for advanced support. The NOC is planning to operate advanced multi-domain services such as AutoBAHN and enhance NOC systems to support new networking technologies (40G, 100G).

The slides are available here:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Toby.pdf>

The attendees were exhausted, starving for lunch.

3. Presentations illustrating potential interest areas

In the afternoon session, three more talks illustrated the issues of choosing distributed or centralised operations, NOC front-end development questions, and various coordination and collaboration areas related to NREN NOCs.

- **CSC – distributed operations in the Nordics**

Vera Hansper (CSC) spoke about distributed operations in the EGI (European Grid Initiative) era. NDGF (Nordic DataGrid Facility) was set up as a distributed T1 centre for LHC resources in the Nordic countries. NDGF operations cover sites in 6 countries which are running the ARC middleware. The NE ROC, as part of EGEE, covers resources based on g-Lite middleware in the Nordic region.

NDGF team is on 5 week rotation roster (one person per shift) during working hours. There are numerous communication tools being used. Jabber is one of the most important

ones, more important than e-mails because it is spontaneous. Of course, e-mail, wiki, and phone are also used.

Since 2009, NDGF has been operating as a 24/7 NOC. NORDUnet NOC agreed to cover the out of working hours. It monitors Level 1 critical services, receives Nagios alerts via email after hours, and communicates directly with active responsible persons in case of emergency. The NORDUnet NOC has their independent roster. EGEE operations were moved from a centrally managed system (COD) to a regional managed model (ROD) in 2009. NE ROC has been in the regional model since the beginning of 2009 and NDGF has been instrumental in the creation process of the structure of the model.

Vera briefly introduced the monitoring tools, the ticketing system, and the customer communication/administration. It was concluded that the distributed operation under EGEE worked out well because of the good communication (co-operation between teams and co-operation in group as a whole). Moving to EGI should not be a problem! Common cultural/technical background to build up a community is the key. TF-NOC can facilitate this collaborative, supportive action.

More details about the distributed operation can be found here:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Vera.pdf>

Q&A

- Ann (SWITCH) made a comment on that Jabber/IRC/Skype chat tool, even among people in the same room, is really efficient and useful.
- Mike (ESnet) asked about the importance of video in communication. In case of ESnet there is an always-on, hardware-based VC system for spontaneous communication among staff. Vera answered that video could be interesting but not necessary. The hardware-based system might not be affordable.

- **HEAnet – front-end development**

Gareth Eason (HEAnet) brought up some questions regarding NOC front-end development and improvement. The most important questions are: how you think about your NOC and how your NOC thinks about its customers. The NOC actually looks like what the users can see from outside, nothing fancy just communication tools and contacts. The NOC basically a public face of our company. It is important to have a common understanding on NOC customers and their needs.

Many questions have to be asked, anyway: Who are your users and what do they want? How do your users interact with the NOC? What expectations do your customers have? What if faults occur (SLAs & Contracts)? What about reporting and statistics? What do you want from your NOC (and how to get it)?

It was time for questions, but we have to look at tools and processes to help later on. TF-NOC could be one of these useful "tools". We need to find answers but not to reinvent the wheel!

For number of relevant question, find the presentation here:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Gareth.pdf>

Q&A

- Lars (NORDUnet) noted that currently there are no books, documents or best practices available to find the answers to these questions. TF-NOC is the place where we can produce, collect, and share this kind of knowledge. Even big commercial providers have no common panic solutions...

- **NORDUnet – coordination and collaboration topics, issues, open questions**

Lars Fischer (NORDUnet) closed the session with a brief summary of interesting topics, issues being discussed during the meeting and might be discussed in the proposed new TERENA task force.

For more information:

<http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Lars.pdf>

4. Panel discussion

The TF-NOC preparation meeting was closed with a panel discussion. All the speakers had been invited to the panel. The panel discussion continued with the technical issues related to ticketing systems and SLA/SLS definitions.

Esther (RedIRIS) asked about the SLA definitions. Gareth (HEAnet) described their approach. HEAnet is moving away from best effort service towards an exactly defined SLA. They provide exact numbers to customers referring to the access point availability, one of the transit core nodes availability participating in the service, and the overall transit availability.

There was a lively discussion about the benefits and drawbacks of outsourcing NOCs or NOC functions to external enterprise. The panellists discussed about housing facilities and there was a question about managing optical services.

Stefan (NORDUnet) steered the discussions towards some practical issues related to the task force preparation. Lars (NORDUnet) mentioned that the additional value of this group should be emphasised. We must be clear that this group is not trying to operate any network or services and not trying to take over any operational task. It is important to position TF-NOC properly related to other groups such as the GN3 APM and JRA2.

Toby (DANTE) briefly introduced the APM (GÉANT Access Port Managers) group. This closed group consists of one national representative (and one deputy) of each GÉANT access point. There are three meetings per year where DANTE and the NRENs update each other about the latest developments/improvements regarding the access point management. Although, it is possible that APM people present their general NOC issues/improvement during the APM meeting, but the audience and a structure of the APM meetings are different from the proposed TF-NOC forum. APM is mainly for the network managers responsible for internetwork policies while TF-NOC's scope is much broader and it could be a forum for all kind of NOC people (e.g., network engineers, system engineers, operation managers, service integrators, software developers, etc.).

Ann (SWITCH) noted that the proposed relationship between TF-NOC group and the GN3 JRA2 activity should be more like a synergy. TF-NOC can get some feedback from GN3 JRA2 on standardised information/data models. Later on, NOCs participating in the multi-domain chain can support a minimum common set of models and business processes worked out by GN3 JRA2. It was also mentioned that TF-NOC can facilitate the inter-NOC discussions in case of multi-domain services. However, the term "multi-domain" should be avoided because one can easily associate this to GN3 activities (that is not correct). It is more accurate and appropriate to refer to "inter-NOC" collaboration in the context of the new task force.

5. Proposed work items and contributors

The panel and the meeting attendees started to discuss about the potential interest areas of the group that can be turned into specific work items for the proposed task force. Ann (SWITCH) mentioned two major areas: one is on the internal NOC tools and procedures and the other one is on the external face and contacts of the NOC. Gareth (HEAnet) and Stefan (NORDUnet) proposed a distinction between NOC management and organisational issues, and NOC tools and technical issues. Ivana (CARNet) mentioned three areas: day-to-day operations (including categorisation of managed networks and services), information/communication systems (i.e., how to integrate databases with CRM), and SLS/SLA definitions and federation aspects. Mike (ESnet) wanted to know what the essence of the work is. Collect how we do things and then discuss how to enhance and step forward. We need to learn from each other. Everyone agreed that the work must be started with a survey on various NOC attributes.

Peter Szegedi (TERENA) summarised the conclusion of the discussions in 5 specific work items. See: <http://www.terena.org/activities/tf-noc/prep/slides/20100503-TF-NOCprep-Peter.pdf>

The potential interest areas and proposed work items are as follows:

- a. **Taxonomy of NOC organisations, internal processes, workflows**
(including day-to-day operational models and NOC assessment)
- b. **NOC front-end development and improvement**
(including SLS/SLA issues and customer relationship)
- c. **NOC tools, interworking/interfaces issues, automation, (open-source development, if appropriate)**
(focusing on monitoring tools, ticketing systems, information databases, etc.)
- d. **Efficient communication/collaboration tools and practices**
(internal and external communications, inter-NOC communication)
- e. **Facilitate the collection/creation of best practice documents**

The aforementioned work item proposal has been accepted by the meeting attendees with no objections.

Peter (TERENA) mentioned two obvious work items, namely:

- f. **Creating a forum for NOC people**
(organise meetings, workshops, hands-on, as well as invite external speakers)
- g. **Liaise with other communities**

(e.g., GN3-APM, GN3-JRA2, EGI, etc.)

All the presented organisations expressed their interest in all the above work items. Further discussion may follow on the tf-noc mailing list: tf-noc@terena.org

To subscribe the mailing list, follow:

<http://www.terena.org/maillinglists.php?list=tf-noc@terena.org>

Stefan Liström (NORDUnet) volunteered to be the chair of the proposed TERENA task force TF-NOC. The meeting participant agreed with Stefan being the chair of the task force with no objections. Stefan also mentioned that he will be able to lead the work item a) if no one wants to do that. Gareth Eason (HEAnet) agreed to be the leader of work item b) dealing with front-end developments and improvements. The other work items are open for volunteers to lead.

6. Next steps and close

The group agreed to distribute and discuss the proposed work items further on the tf-noc mailing list. Stefan (NORDUnet) agreed to draft a Terms of Reference for the task force mainly based on the preparation meeting discussions (see this minutes) and the following e-mail discussions. **Deadline: June 15, 2010**

The TF-NOC task force proposal must be approved by the TERENA Technical Committee (on June 29, 2010) and the Executive Committee. In case of approval, the financial aspects of the task force must be clarified by the TERENA Secretariat before it comes into force.

However, the group agreed on the date of the next meeting:

September 2-3 (Thursday-Friday), 2010

Note that until official approval of the task force the working name of the next meeting is "NOC workshop", further support of TERENA Secretariat may not be guaranteed.

The meeting was closed at 6pm local time.

List of participants

NAME		AFFILIATION
Gyorgy	Balazs	CERN
Martin	Bech	UNI-C
Hans	Bjarkov	UNI-C
Gareth	Eason	HEAnet
Lars	Fischer	NORDUnet
Maria Isabel	Gandia Carriedo	CESCA - Centre de Supercomputació de Catalunya
Ivana	Golub	CARNet
Vera	Hansper	CSC/NDGF

Pieter	Hanssens	BELNET
Ann	Harding	SWITCH
Rachael	Holt	HEAnet *remotely
Gabor	Ivanszky	NIIF/Hungarnet
Håvard	Kuslid	UNINETT
Stefan	Listrom	NORDUnet
Yannis	Mitsos	GRNET
Mike	Norris	HEAnet *remotely
Michael	O'Connor	ESnet
Esther	Robles	RedIRIS/Red.es
Toby	Rodwell	DANTE
Sandor	Rozsa	USLHCNET
Peter	Szegedi	TERENA
Szymon	Trocha	PIONIER / perfSONAR
Ronald	van der Pol	SARA Computing and Networking Services
Paul	Wielinga	SARA