

TNC2013 Extended Abstract:

“INTEGRATED MANAGEMENT SYSTEMS”

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Extended Abstract

In June 2012, DANTE, the international research and education network provider, announced the selection of Juniper and Infinera as the providers of the next-generation research and education network. The new network will provide flexible multi-terabyte capacity to the NRENs. Such changes in the core infrastructure imply major changes in the less publicised area of the management systems.

For the Operations team to offer efficient and effective services requires not only a robust physical infrastructure but also the comprehensive configuration, monitoring and reporting features that are very much at the centre of a well-maintained and managed service.

One of the core challenges the DANTE teams are tackling with the integration of the new equipment is the rationalisation and integration of the different tools. The Operations team uses a variety of systems to monitor, manage and report on the network. The multiplication of tools brings challenges related to data consistency and communication between the tools.

The DANTE Operations team relies on seven key pieces of software:

- OpsDB is DANTE’s Configuration Management Database (CMDB). It is a PHP-based application that runs under an Apache Web Server. Information is entered into the system manually.
- Dashboard is a Network Monitoring System (NMS) that processes SNMP traps received from network equipment failures. It polls equipment in case SNMP traps were lost in transmission. Raw network alarms are correlated into higher-level alarms stored in a MySQL database. It is also integrated with Nagios for monitoring network services.
- Cacti is an “off the shelf” network monitoring tool. It is a PHP-based application that produces graphs of traffic utilisation.
- The Monthly Service Report (MSR) is a web-based application. The report shows availability, utilisation and trend analysis of network traffic to and from the GÉANT network.
- Bandwidth on Demand (BOD) is a service provisioning tool.
- Junos Space / Network Activate – Juniper’s proprietary network management tool.
- Digital Network Administrator – Infinera’s proprietary network management tool.

The approach DANTE took to ensure a successful integration of these tools was to decouple them as much as possible, reducing the data replication and using standard RESTful web

technologies and network protocols such as HTTP and XML as communication mechanisms between them.

The introduction of the new equipment brought two major changes to the management system design. First, the introduction of the “network is king” paradigm, where a management system feeds in real time off the live network, ensuring consistent, up-to-date information. Second, the introduction of versatile Application Programming Interfaces (APIs).

DANTE decided early in the migration process to follow the industry and to incorporate these new paradigms in its development strategy, moving away from a labour-intensive and error-prone management system to a more automated and intelligent one.

The first area to benefit from these new developments was the support of Bandwidth on Demand. The BoD integration allows the automatic configuration of the network and the automatic creation of a record in the asset database, as well as the creation of performance graphs.

In order to implement all these changes in a very flexible way and to be able to address the complexity of the task in a very short timeframe, the business needed to embrace change through agile methodologies. The Systems Development team adopted SCRUM as the main framework. This allowed the frequent release of usable code and allowed changes and modifications to be quickly incorporated into the releases.

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Biography

Xavier Martins-Rivas, IP Manager – received his Master’s degree in Computer Science in 2005 after two years at EFREI in Paris (France) and a final year at Concordia University in Montreal (Canada). After a little over a year in Paris as team leader in the GÉANT Network Operations Centre (NOC) he moved to Cambridge to join DANTE as a Network Engineer. After occupying different roles in the Operations team, Xavier is now the IP Manager, responsible for all the IP services offered in the GÉANT backbone.

Richard Sanigar, Principal Software Engineer – has over 30 years experience of software application development within both public and private sector organisations. He was managing director of Chaos Systems Ltd, a company specialising in bespoke software development and project management using agile methodologies before joining DANTE in 2010, as principal software engineer with responsibility for two of the company’s core business systems.