The DANTE NOC
Network Monitoring System

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TNC 2010, Vilnius, 2nd June 2010
The brief for the DANTE Network Operations Centre Network Monitoring System

● **The requirement**
Network Monitoring Tools to support the Network Operations Centre business model

● **The solution**
An integrated monitoring system correlating and interpreting alarms from multi-layer, multi-vendor network systems
Tasked with developing a suite of monitoring tools -

- Tailored to the Network Operations requirement for the DANTE NOC
- Create a central dashboard of network problems accessible by multiple teams, to help organise workflow
- Correlating multiple alarms to provide more straightforward problem descriptions
- Provide network information as the basis for the creation of further tools and reports
Tailored Monitoring Tools at the Centre of the NOC

- **Tier 1**
  Basic Skill, 24x7

- **Tier 2**
  Higher skill, 5am–9pm, Mon-Fri

- **Tier 3**
  Specialists 9am-5pm, Mon-Fri
Enabling Multi-skilled Operations

IP and Optical Support in the same NOC team, which requires integrated monitoring solutions.
The Solution

- A trap handling mechanism
- A database
- A correlation engine

Network Monitoring Solution
Creating the global research village

**An Example of the Correlation Requirement**

- **Fibre Cut**
  - Regular non-preventable problem
  - Priority to respond quickly
  - Important to simplify alarms generated at multiple layers

- **The Challenge:**
  - Multiple vendors / hardware
  - Different layers see the problem differently
  - A lot of alarms are generated, confusing operators
Correlation

- Responding to the challenge
  - Logical analysis by product specialists within DANTE
  - ‘Trigger Points’ identified
  - Related/unrelated alarms separable using logic and ‘time buckets’
  - Correlation output translated to coded logic
Correlation

- End product –
  - “Possible Fibre Cut” alarm
  - One alarm with clear time and location
  - Containing detail of underlying alarms, and related higher layer alarms
  - Definitive call-out trigger for out of hours response

2009-01-29 11:23:14
12h 49m 27s
1 ams - bru ila01.ams-bru.nl GEANT Possible Fibre Cut
The GUI

‘The Dashboard’

- Needed to be an interactive database by all three support
- Containing all required information for response and resolution
- Configurable to a basic level by operators
The Dashboard

NETWORK MONITORING SOLUTION

Blacklist and Filter

Alarm:

Occurrences

Description

Creating the global research village
### Network Monitoring Solution

#### Dashboard – Alarm detail

<table>
<thead>
<tr>
<th>Date</th>
<th>#</th>
<th>Location</th>
<th>Equipment</th>
<th>Project</th>
<th>Alarm type</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-05-2010 07:15:33 (UTC)</td>
<td>2</td>
<td>ion</td>
<td>r1.ion.uk</td>
<td>GEANT</td>
<td>Ion SURFnet-AP2 a PC (interface so-3/10) is down</td>
</tr>
<tr>
<td>24-05-2010 07:27:15 (UTC)</td>
<td>8</td>
<td>ion</td>
<td>r1.ion.uk</td>
<td>GEANT</td>
<td>BGP peering junet-gwrt1 Ion UK geant2 net (E2.40.125.188) is down</td>
</tr>
<tr>
<td>23-05-2010 10:48:22 (UTC)</td>
<td>1</td>
<td>madrid</td>
<td>r1.madrid</td>
<td>GEANT</td>
<td>ES-IT (Interface so-1/10) is down</td>
</tr>
<tr>
<td>23-05-2010 07:43:10 (UTC)</td>
<td>6</td>
<td>madrid</td>
<td>r1.madrid</td>
<td>GEANT</td>
<td>ES-IT (Interface so-1/10) is down</td>
</tr>
<tr>
<td>23-05-2010 06:23:12 (UTC)</td>
<td>1</td>
<td>mill</td>
<td>r1.mill</td>
<td>GEANT</td>
<td>ES-IT (Interface so-1/10) is down</td>
</tr>
<tr>
<td>23-05-2010 07:51:20 (UTC)</td>
<td>2</td>
<td>bus</td>
<td>r1.bus</td>
<td>GEANT</td>
<td>BGP peering ulabrum lwow r1.ueo to geant2 net (2001:07:88:0026:1032:0:0:0:6) is down</td>
</tr>
</tbody>
</table>

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Creating the global research village
## Integrating existing tools

### DANTE Operations Circuit Database

<table>
<thead>
<tr>
<th>Segments</th>
<th>Name</th>
<th>Circuit-Td</th>
<th>A-End</th>
<th>B-End</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shell Card</td>
<td>Part LU</td>
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</tr>
<tr>
<td>London</td>
<td></td>
<td></td>
<td>POS-30</td>
<td>0</td>
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<tr>
<td>London</td>
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<td>POS-30</td>
<td>0</td>
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<tr>
<td>London</td>
<td></td>
<td></td>
<td>POS-30</td>
<td>0</td>
</tr>
</tbody>
</table>

### Asset Database

- DANTE Operations Circuit Database

### Configuration items

- DANTE Operations Circuit Database

### Contact information

- DANTE Operations Circuit Database
### IP Services - Detailed IP Access Availability (1 of 3)

<table>
<thead>
<tr>
<th>IP Access</th>
<th>Total Number of Failures</th>
<th>Total Outage Time</th>
<th>Total Outage Time During Maintenances</th>
<th>Total Availability</th>
<th>Mean Time Between Failures</th>
<th>Mean Time To Repair</th>
</tr>
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<tbody>
<tr>
<td>ACOnet AP</td>
<td>1</td>
<td>0:07:27</td>
<td>0:07:27</td>
<td>99.983%</td>
<td>719:52:32</td>
<td>0:07:27</td>
</tr>
<tr>
<td>ACOnet AP2</td>
<td>6</td>
<td>0:54:51</td>
<td>1:07:11</td>
<td>99.040%</td>
<td>118:50:51</td>
<td>1:09:09</td>
</tr>
<tr>
<td>ARNES AP</td>
<td>1</td>
<td>0:55:25</td>
<td>0:00:00</td>
<td>99.872%</td>
<td>719:04:34</td>
<td>0:56:25</td>
</tr>
<tr>
<td>ARNES AP2</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>BELNET AP</td>
<td>4</td>
<td>1:46:17</td>
<td>0:16:30</td>
<td>99.754%</td>
<td>179:33:25</td>
<td>0:26:34</td>
</tr>
<tr>
<td>BELNET AP2</td>
<td>3</td>
<td>0:00:40</td>
<td>0:00:00</td>
<td>99.990%</td>
<td>239:53:46</td>
<td>0:00:13</td>
</tr>
<tr>
<td>CARNet AP</td>
<td>1</td>
<td>0:55:26</td>
<td>0:00:00</td>
<td>99.872%</td>
<td>719:04:33</td>
<td>0:55:26</td>
</tr>
<tr>
<td>CARNet AP2</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>CESNET AP</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>CESNET AP2</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
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<tr>
<td>CyNet AP LB1</td>
<td>1</td>
<td>0:00:05</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>719:53:54</td>
<td>0:00:05</td>
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<tr>
<td>CyNet AP LB2</td>
<td>17</td>
<td>3:18:53</td>
<td>0:00:19</td>
<td>99.540%</td>
<td>42:09:29</td>
<td>0:11:42</td>
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<tr>
<td>DFN AP</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>EENet AP</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>EENet AP2</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>FCCN AP</td>
<td>13</td>
<td>10:35:66</td>
<td>2:16:24</td>
<td>98.638%</td>
<td>54:34:09</td>
<td>0:48:66</td>
</tr>
<tr>
<td>FCCN AP2</td>
<td>2</td>
<td>0:00:16</td>
<td>0:00:00</td>
<td>99.990%</td>
<td>359:53:61</td>
<td>0:00:08</td>
</tr>
<tr>
<td>GARR AP</td>
<td>0</td>
<td>0:00:00</td>
<td>0:00:00</td>
<td>100.000%</td>
<td>0:00:00</td>
<td>0:00:00</td>
</tr>
<tr>
<td>GRNET AP</td>
<td>2</td>
<td>0:31:24</td>
<td>0:00:00</td>
<td>99.997%</td>
<td>359:59:17</td>
<td>0:00:42</td>
</tr>
<tr>
<td>GRNET AP2</td>
<td>6</td>
<td>8:16:34</td>
<td>1:34:49</td>
<td>98.651%</td>
<td>118:37:14</td>
<td>1:22:46</td>
</tr>
</tbody>
</table>

**Legend**
- AP Primary Access Point
- AP2 Backup Access Point
- LB1 Load Balance Access
Evaluation of the Process

A lot of work was invested in delivering this solution

- Initially –
  - 1 developer coding for 6 Weeks
  - The time of many experts within the company (Engineering and Planning, Systems, NOC, Operations)

- Now
  - 0.5 FTE of a developer; on-going support
Evaluation of the Process

... A unique result delivering great results for the network

- A tool that fits our need
- With a very high level of flexibility and integration
- A natural way to control the work flow

An important basis for the development of further tools to add to the network management portfolio
Conclusion

- The Dashboard is available for Download

http://downloads.geant.net