



Connect. Communicate. Collaborate

# Using PerfSONAR tools in a production environment

Marian Garcia, Operations Manager, DANTE  
Joint Tech Workshop, 16<sup>th</sup> July 07

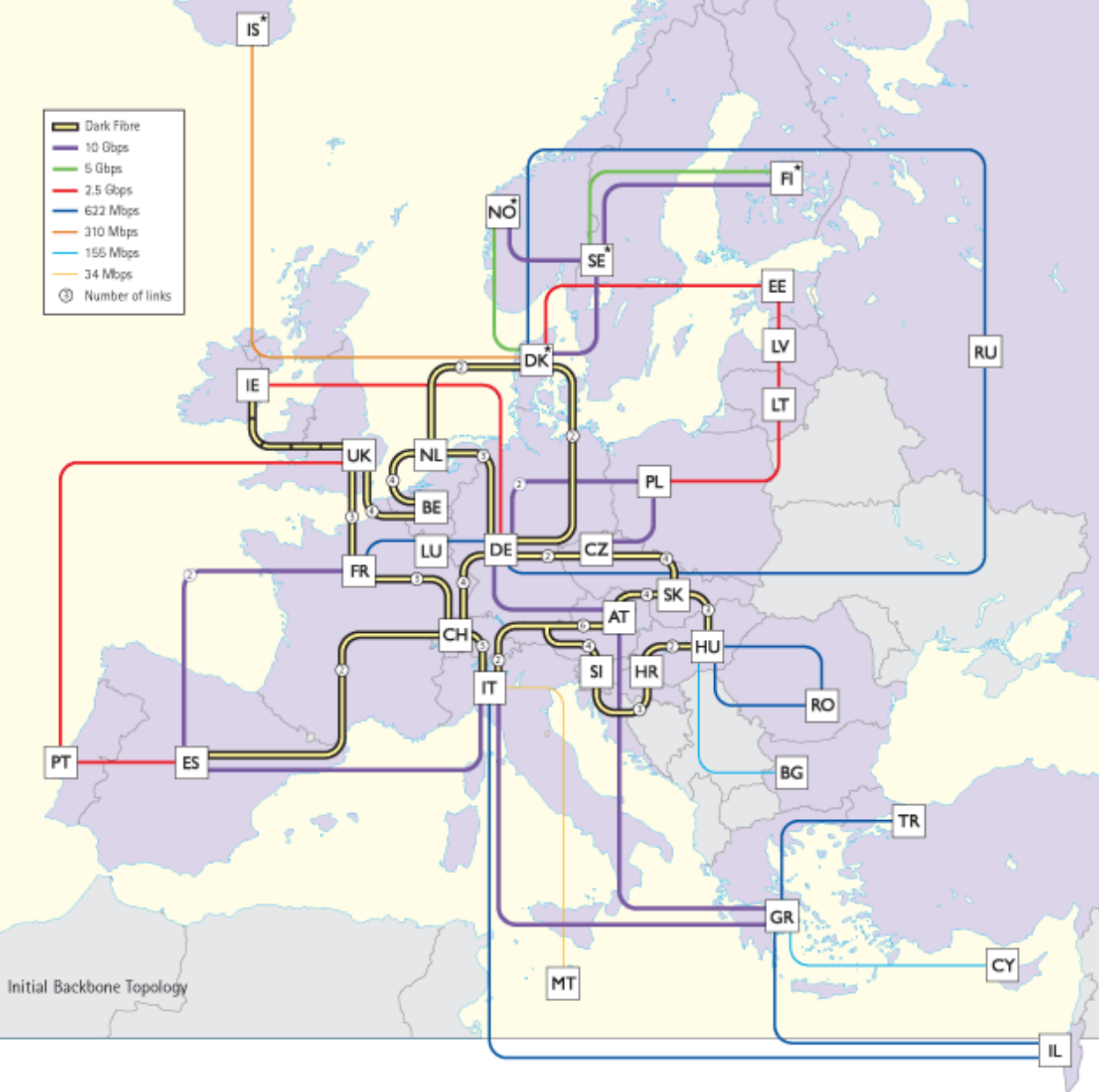


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- GÉANT2 Project
- GÉANT2 and the Research community
- perfSONAR and L1/L2 Monitoring
  - Multi domain monitoring
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- Conclusions

# GÉANT2: The European Project For Research Networks

- Funded 50% by the European Commission and 50% by the National Research Networks in Europe
- Funds are dedicated to:
  - Build a Pan-European Network
    - GÉANT2 network : Internet2's counterpart in Europe
  - Research Activities
    - Monitoring, Security, Bandwidth on Demand, AAI ....



## GEANT2:

- 12,000 Km. of Dark Fibre
- 200 sites
- 18 Dark Fibre routes
- 26 Leased SDH circuits

## Researchers and Networking

Researches around the globe require:

- Distributed infrastructure
- More connections and higher BW
- Ensured quality and reliability in their connectivity



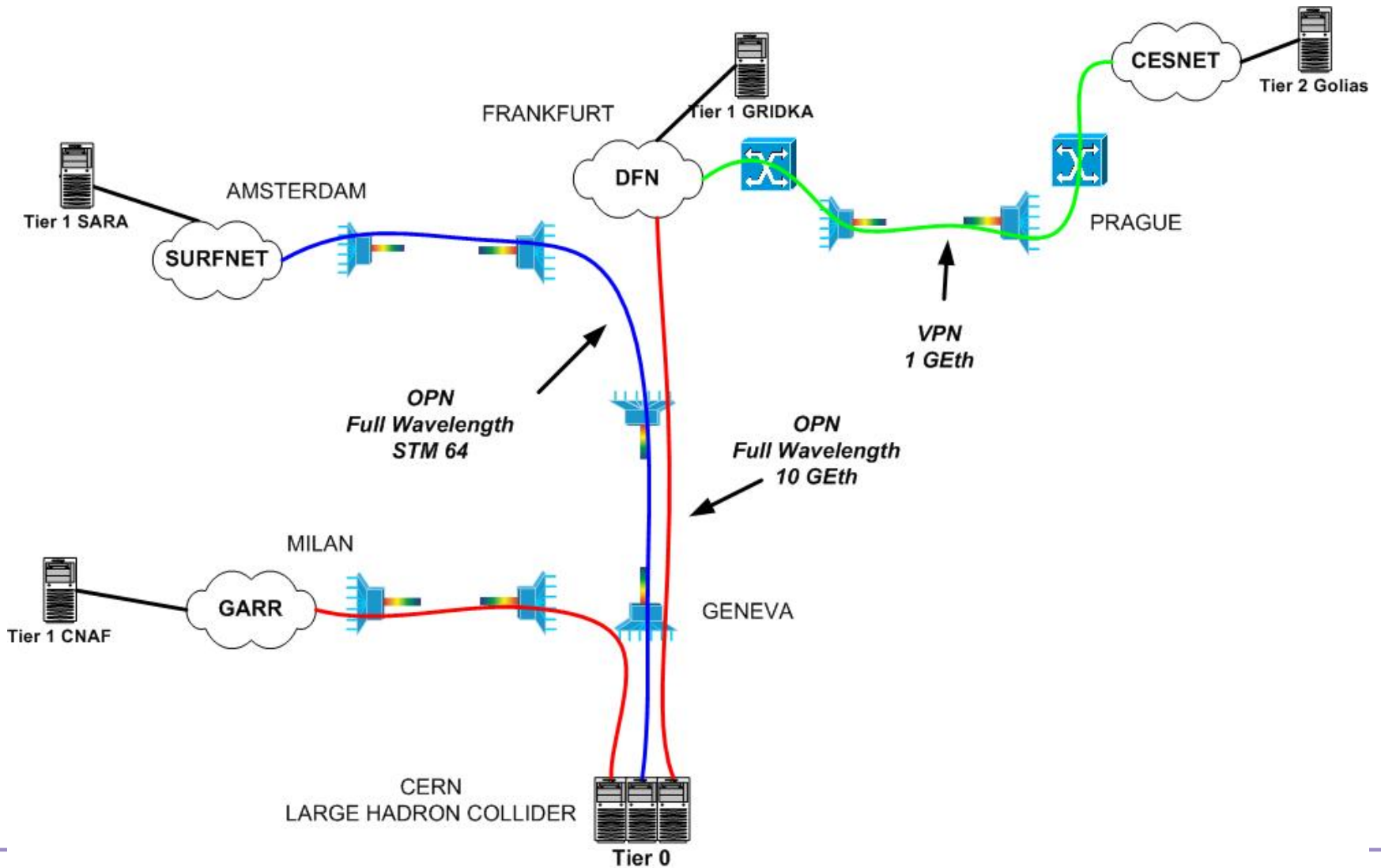
# perfSONAR

- In conjunction with Internet2
- Multi Domain Monitoring
- Products:
  - SSH/Telnet MP (looking glass)
  - BWCTL MP probes
  - OWD (Hades) probes
  - RRD MA or **SQL MA** to provide link utilisation, capacity and status

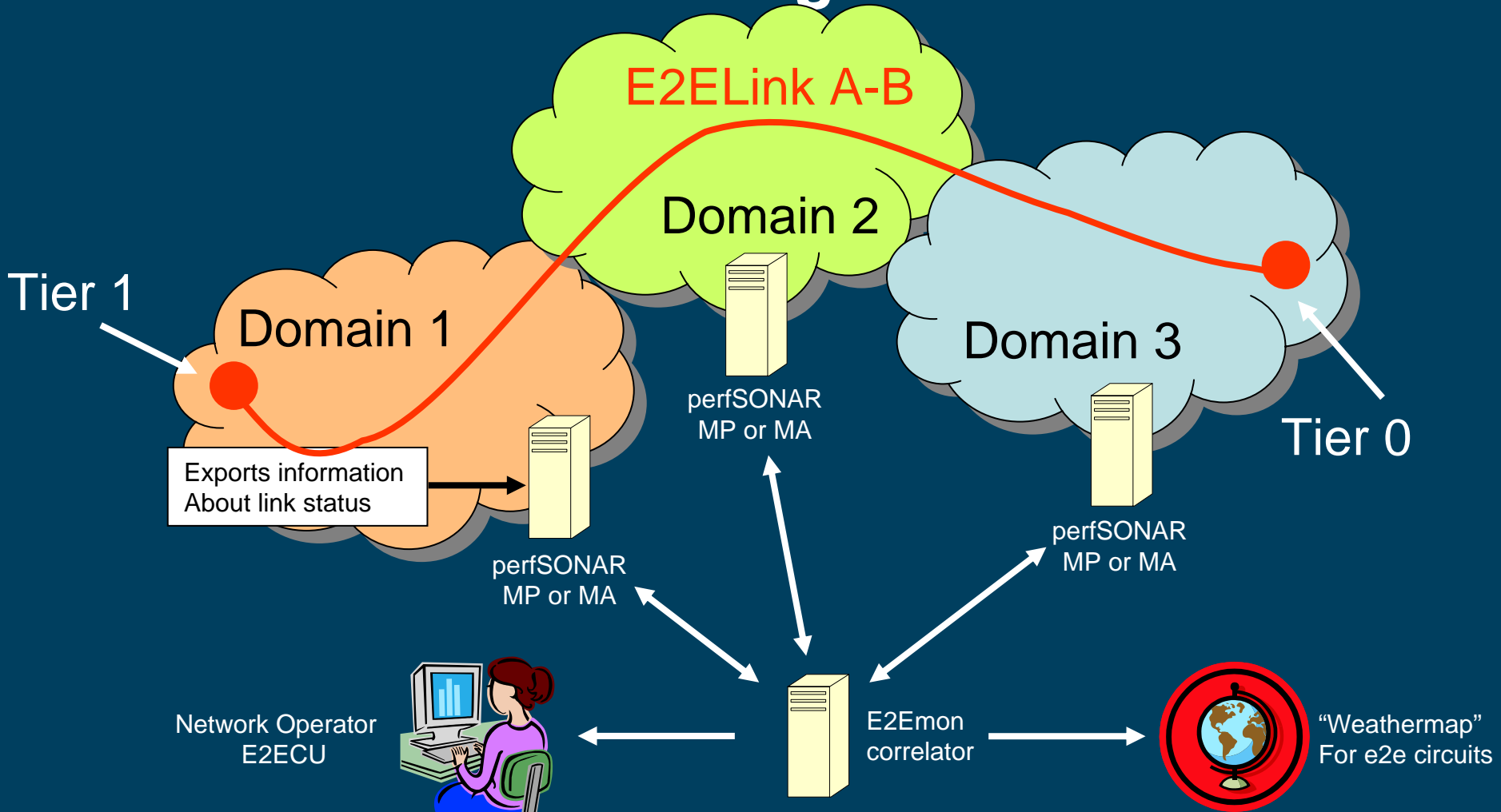


*Includes the possibility of storing L1-L2 status*

# LHC Optical Private Network



# Multi domain Monitoring



## Monitored Links for Domain GEANT2

E2E Link ID	Topology Point A	Role	Topology Point B	Role	(Domain) Local Name	Link Type	Oper. Status	Admin. Status	Time Stamp
<a href="#">CERN-SARA-LHCOPN-001</a>	GEANT2-AMS	D	SURFNET-SARA	E	SURFNET-LHC_ter1.15.ams-fra.ams	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-001</a>	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06002	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-001</a>	CERN-T0	E	GEANT2-GEN	D	CERN-LHC_ext1.18.fra-gen.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-GRIDKA-LHCOPN-001</a>	DFN-FRA82	D	GEANT2-FRA	D	DFN-LHC_ter1.15.fra-gen.fra	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-GRIDKA-LHCOPN-001</a>	GEANT2-FRA	D	GEANT2-GEN	D	fra-gen_LHC_CERN-DFN_06006	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-GRIDKA-LHCOPN-001</a>	CERN-T0	E	GEANT2-GEN	D	CERN-LHC_ter1.15.fra-gen.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-CNAF-LHCOPN-001</a>	GARR-MIL	D	GEANT2-MIL	D	GARR-LHC_ter1.16.gen-mil.mil	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-CNAF-LHCOPN-001</a>	GEANT2-MIL	D	GEANT2-GEN	D	gen-mil_LHC_CERN-GARR_06007	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-CNAF-LHCOPN-001</a>	CERN-T0	E	GEANT2-GEN	D	CERN/SWITCH-LHC_ter1.16.gen-mil.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-004</a>	GEANT2-AMS	D	SURFNET-SARA	E	SURFNET-LHC_ext1.6.ams-fra.ams	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-004</a>	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06015	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-004</a>	CERN-T0	E	GEANT2-GEN	D	CERN-LHC_ext1.6.fra-gen.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-002</a>	GEANT2-AMS	D	SURFNET-SARA	E	SURFNET-LHC_ext1.16.ams-fra.ams	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-002</a>	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06001	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-002</a>	CERN-T0	E	GEANT2-GEN	D	CERN-LHC_ext1.15.fra-gen.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-RAL-LHCOPN-001</a>	GEANT2-LON	D	UKERNA-LON	E	JANET-LHC_ter1.15.lon-par.lon	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-RAL-LHCOPN-001</a>	GEANT2-LON	D	GEANT2-GEN	D	gen-lon_LHC_CERN-JANET_06008	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-RAL-LHCOPN-001</a>	CERN-T0	E	GEANT2-GEN	D	CERN/SWITCH-LHC_ter1.15.gen-par.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-003</a>	GEANT2-AMS	D	SURFNET-SARA	E	SURFNET-LHC_ext1.17.ams-fra.ams	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-003</a>	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06003	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-SARA-LHCOPN-003</a>	CERN-T0	E	GEANT2-GEN	D	CERN-LHC_ext1.16.fra-gen.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-NDGF-LHCOPN-001</a>	GEANT2-COP	D	NORDUNET-COP	E	NORDUNET-LHC_ter1.16.cop-fra.cop	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-NDGF-LHCOPN-001</a>	GEANT2-COP	D	GEANT2-GEN	D	cop-gen_LHC_CERN-NORDU	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
<a href="#">CERN-NDGF-LHCOPN-001</a>	CERN-T0	E	GEANT2-GEN	D	CERN-LHC_ext1.17.fra-gen.gen	ID Part. Info	Up	Normal Oper.	2007-04-18T14:49:11.0+0100

[Start page](#)**E2ECU view**[All E2E Links](#)  
[Problem Links](#)**Domain view**[CERN](#)  
[DFN](#)  
[ESNET \(?\)](#)  
[FERMI](#)  
[GARR](#)  
[GEANT2](#)  
[IN2P3](#)  
[RENATER](#)  
[SURFNET](#)  
[SWITCH](#)  
[USLHCNET](#)**Project view**[IGTMD](#)  
[LHCOPN](#)**Availability Statistics**[Current Month](#)  
[Last Month](#)**All E2E Links**

E2E Link ID	State Oper	State Admin	Additional Info
<a href="#">CERN-FERMI-LHCOPN-001</a>	Up	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four <b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">FERMI-IN2P3-IGTMD-002</a>	Up	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four <b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">GRIDKA-SARA-LHCOPN-001</a>	Up	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four <b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">FERMI-IN2P3-IGTMD-001</a>	Up	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four <b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-BNL-LHCOPN-001</a>	Up	Normal Oper.	
<a href="#">GRIDKA-IN2P3-LHCOPN-001</a>	Down	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four <b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-SARA-LHCOPN-001</a>	Up	Normal Oper.	
<a href="#">CERN-FERMI-LHCOPN-002</a>	Up	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four <b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-GRIDKA-LHCOPN-001</a>	Up	Normal Oper.	
<a href="#">CERN-CNAF-LHCOPN-001</a>	Up	Normal Oper.	
<a href="#">CERN-SARA-LHCOPN-004</a>	Up	Normal Oper.	<b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-SARA-LHCOPN-002</a>	Up	Normal Oper.	<b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-RAL-LHCOPN-001</a>	Up	Normal Oper.	<b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-BNL-LHCOPN-002</a>	Up	Normal Oper.	<b>Error:</b> E2E Link is <b>not</b> contiguous (End Point missing or gap four
<a href="#">CERN-SARA-LHCOPN-003</a>	Up	Normal Oper.	<b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-NDGF-LHCOPN-001</a>	Up	Normal Oper.	<b>Warning:</b> Operational state is known not for all involved links <b>Warning:</b> Administrative state is known not for all involved links
<a href="#">CERN-IN2P3-LHCOPN-001</a>	Up	Normal Oper.	
<a href="#">CNAF-GRIDKA-LHCOPN-001</a>	Up	Normal Oper.	

# End to End Monitoring in Operation

- Circuits from A end to B end crossing different domains are actively monitored
- Faults in any segment of the link are reported to a multi domain NOC (end-to-end coordination unit)
- Operational processes (alarms acknowledge, TTs, coordination in debugging....) are followed up by the end-to-end circuit

# GÉANT2 and Researchers

- GÉANT2 community committed to support the research projects
- Research projects involve multiple domains
- GÉANT2 Activities are providing some products ( perfSONAR monitoring, BoD, AAI....) for better provisioning multi domain services
- These products have now started to be used by the network operations teams

# Thanks!!

[marian.garcia@dante.org.uk](mailto:marian.garcia@dante.org.uk)

[www.geant2.net](http://www.geant2.net)



Network Event Broker (dashboard in Paris)

Nagios

E2E Monitoring Instance (Vienna) – polls each MP for data

GEANT2 MP

SWITCH MP

Renater MP

Surfnet MP

ESNET MP

Fermi MP

IN2P3 MP

GARR MP

DFN MP

CERN MP

USLHCNET MP

GEANT2 Alcatel NMS (sends SNMP traps)

GARR kit / NMS (is polled)

DFN NIS (sends SNMP traps)

CERN NSMS (sends SNMP traps)

Fermi kit / NMS (is polled)



# Fault Report and Restoration:

