Multi Domain Coordination in GÉANT2

Hans Döbbeling, DANTE

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GE★ANT2

DANTE

GÉANT2

31 management domains + carriers + regional networks + campus networks

End-to-end circuit services, CBF services

pilot projects → transition to service → regular multi-domain operations
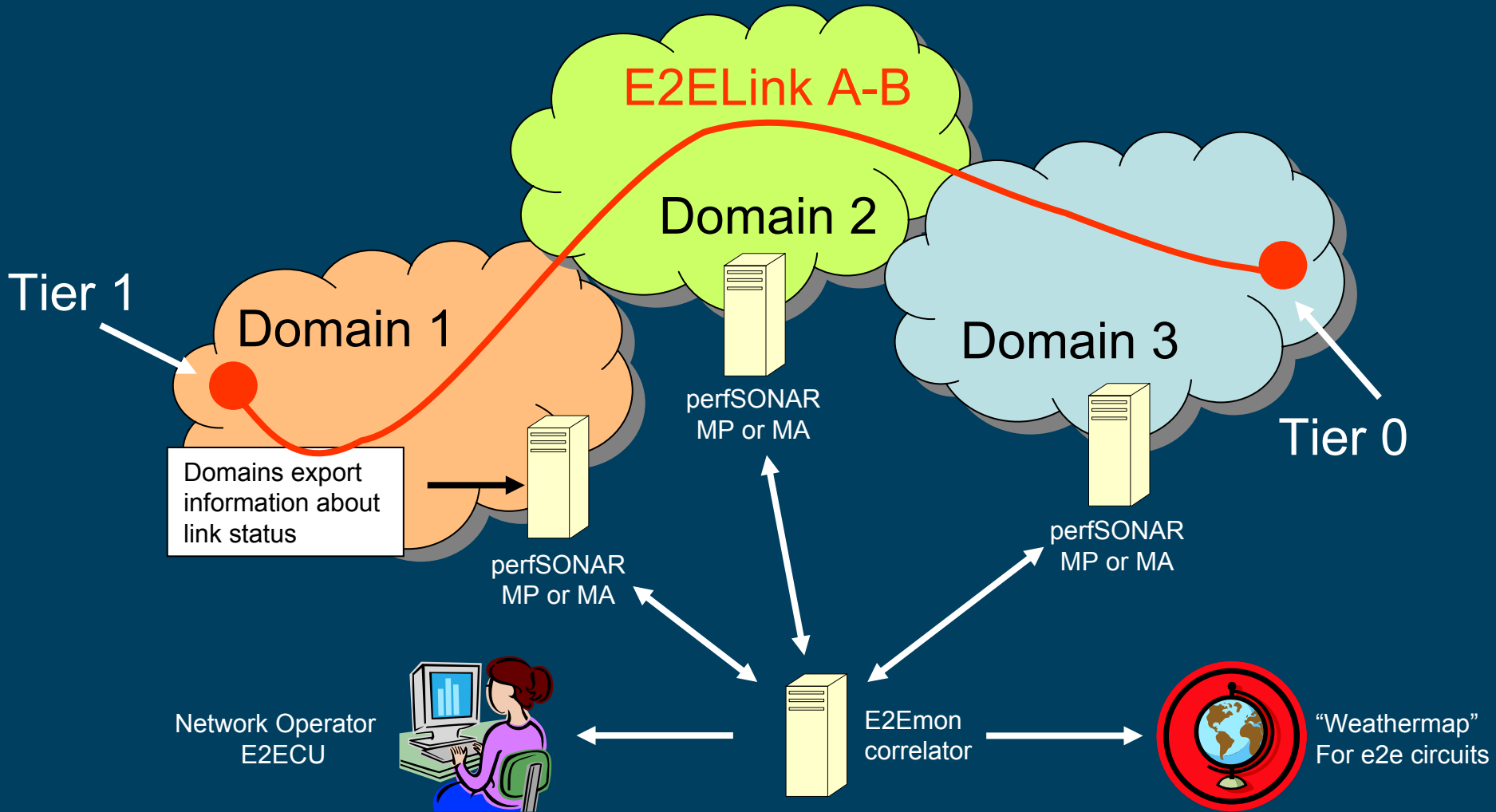
hundreds of services

Monitoring: perfSONAR

- In cooperation with Internet2 and ESnet
- 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

Current 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
CERN-SARA-LHCOPN-001	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
CERN-SARA-LHCOPN-001	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06002	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-SARA-LHCOPN-001	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
CERN-GRIDKA-LHCOPN-001	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
CERN-GRIDKA-LHCOPN-001	GEANT2-FRA	D	GEANT2-GEN	D	fra-gen_LHC_CERN-DFN_06006	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-GRIDKA-LHCOPN-001	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
CERN-CNAF-LHCOPN-001	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
CERN-CNAF-LHCOPN-001	GEANT2-MIL	D	GEANT2-GEN	D	gen-mil_LHC_CERN-GARR_06007	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-CNAF-LHCOPN-001	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
CERN-SARA-LHCOPN-004	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
CERN-SARA-LHCOPN-004	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06015	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-SARA-LHCOPN-004	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
CERN-SARA-LHCOPN-002	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
CERN-SARA-LHCOPN-002	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06001	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-SARA-LHCOPN-002	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
CERN-RAL-LHCOPN-001	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
CERN-RAL-LHCOPN-001	GEANT2-LON	D	GEANT2-GEN	D	gen-lon_LHC_CERN-JANET_06008	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-RAL-LHCOPN-001	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
CERN-SARA-LHCOPN-003	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
CERN-SARA-LHCOPN-003	GEANT2-AMS	D	GEANT2-GEN	D	ams-gen_LHC_CERN-SURFNET_06003	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-SARA-LHCOPN-003	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
CERN-NDGF-LHCOPN-001	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
CERN-NDGF-LHCOPN-001	GEANT2-COP	D	GEANT2-GEN	D	cop-gen_LHC_CERN-NORDU	Domain Link	Up	Normal Oper.	2007-04-18T14:49:11.0+0100
CERN-NDGF-LHCOPN-001	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

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E2ECU view

Domain view

Project view

Availability Statistics

All E2E Links

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

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Multi Domain Operations

Correlation of services
  across domain boundaries
  across service layers
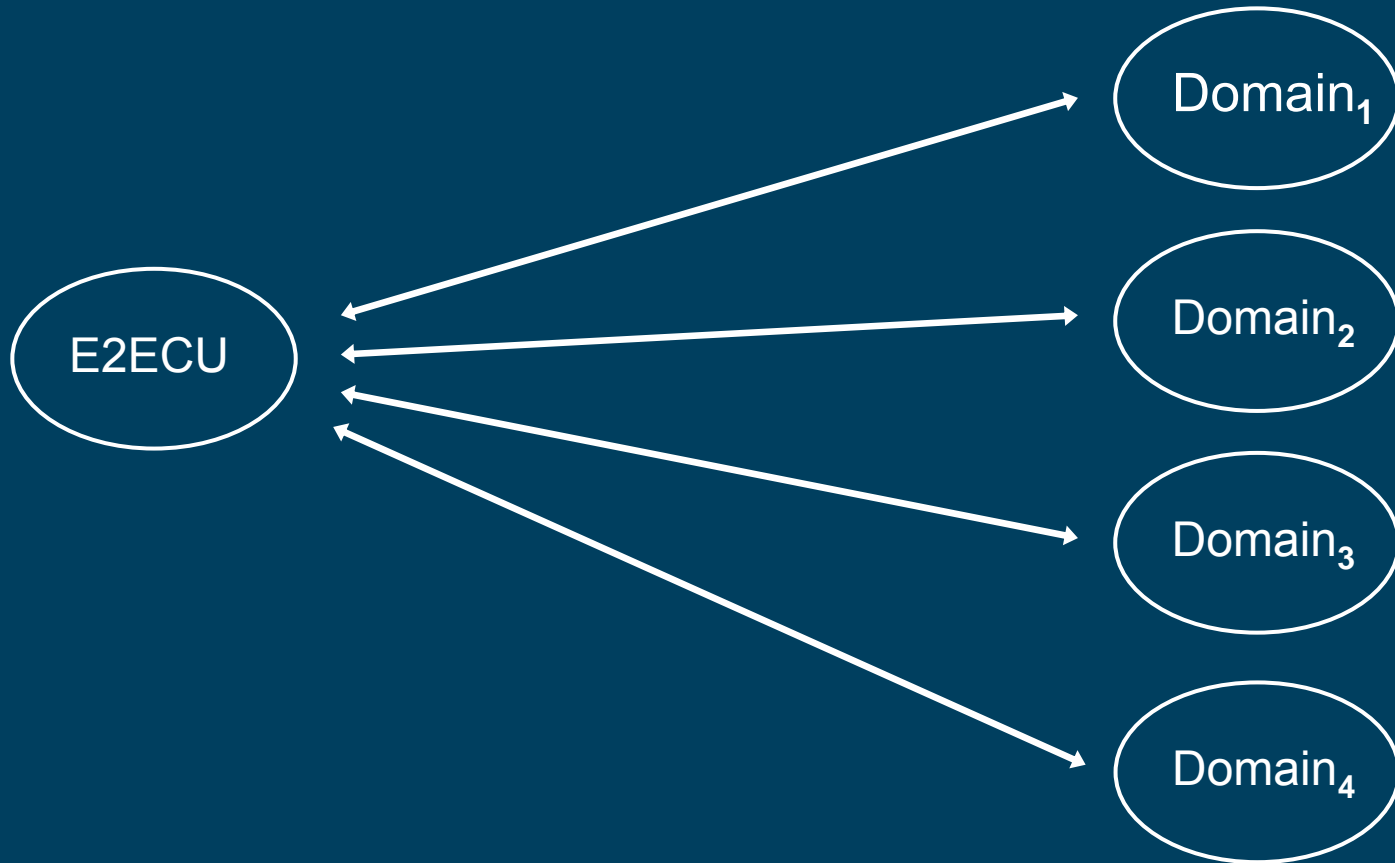
E2E Coordination Unit Role

Monitor and report on circuit services

Own and coordinate problem resolution

Set-up and removal of services

Naming of services

E2ECU coordinating NOCs

MD Operations Use Cases

Establish an E2E circuit service, name the service

Signal scheduled maintenance

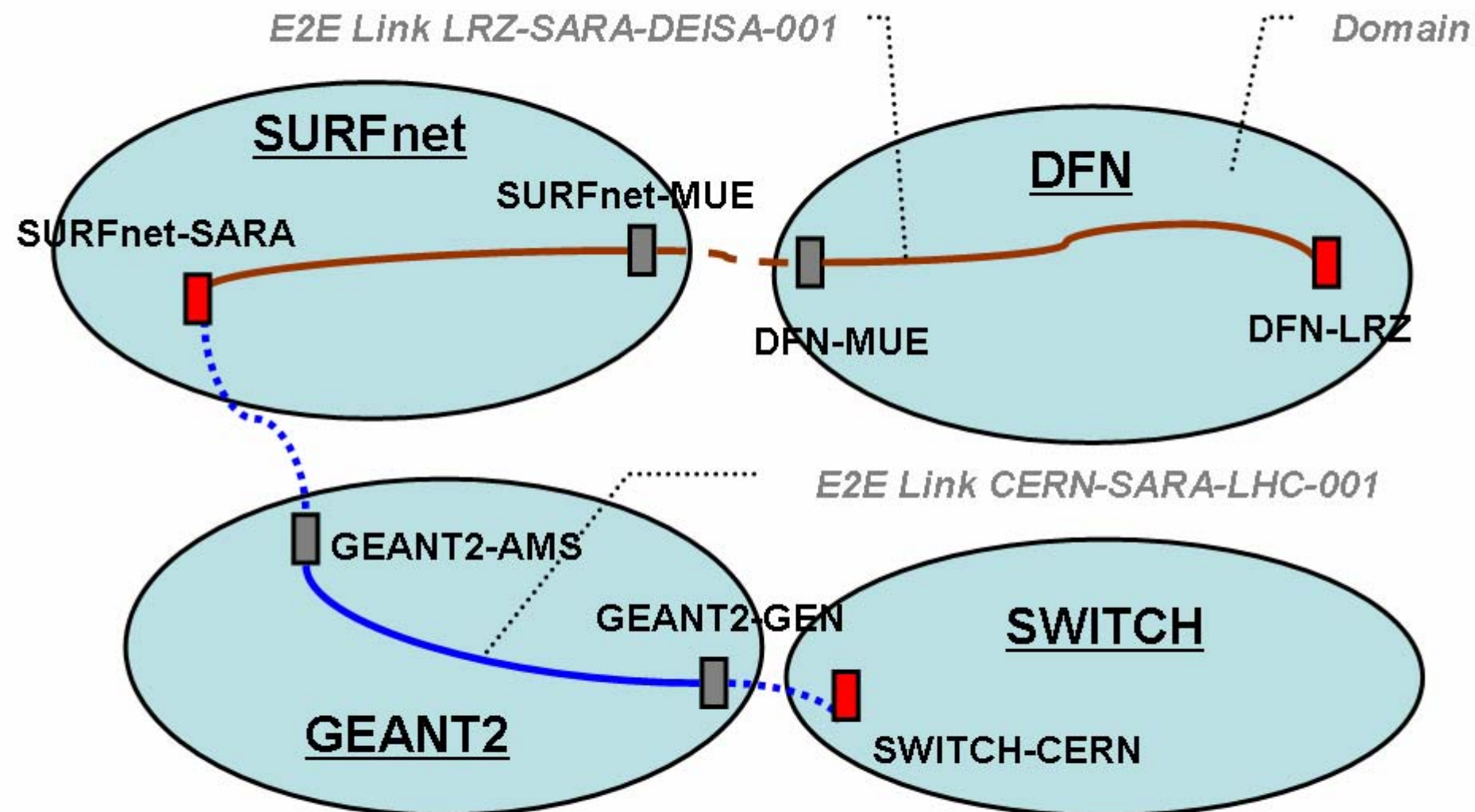Report a fault and its effects to all stakeholders

Correlate alarms

PERT needs to find components of a service ….

Application requires topology information

Application sets up circuit and needs to register it for monitoring

Demo Scenario

Demo Scenario

E2E Link LRZ-SARA-DEISA-001   Domain

SURFnet

SURFnet-MUE

SURFnet-SARA

DFN

DFN-MUE   DFN-LRZ

E2E Link CERN-SARA-LHC-001

GEANT2-AMS

GEANT2-GEN   SWITCH

GEANT2   SWITCH-CERN

Topology Points: ■ End Point   ■ Demarc. Point

Monitored Links: —— Domain Link — — ID Link ······· ID-Link Partial Info (shared mon.)

Common Network Information System cNISv2

coordinate concepts of operations

adapt NREN business processes to accommodate multi domain operations use cases

adapt trouble ticket systems, database schema

perfSONAR, AMPs, AutoBAHN, AAI

E2EMON

E2ECU

cNISv2