The PerfSONAR framework for inter-domain monitoring in the GLIF infrastructure

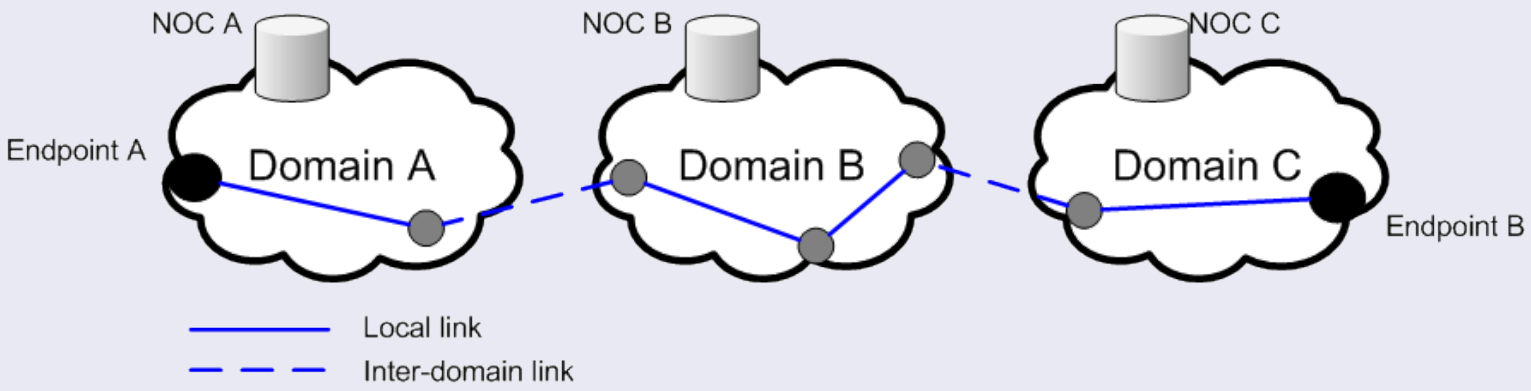
Authors: ing. Tijmen van den Brink and ing. Peter Tavenier
Supervisors: R. van der Pol, MSc and A. Toonk, MSc (SARA)
dr. P. Grosso (UvA - SNE research group)

July 4, 2007

Outline

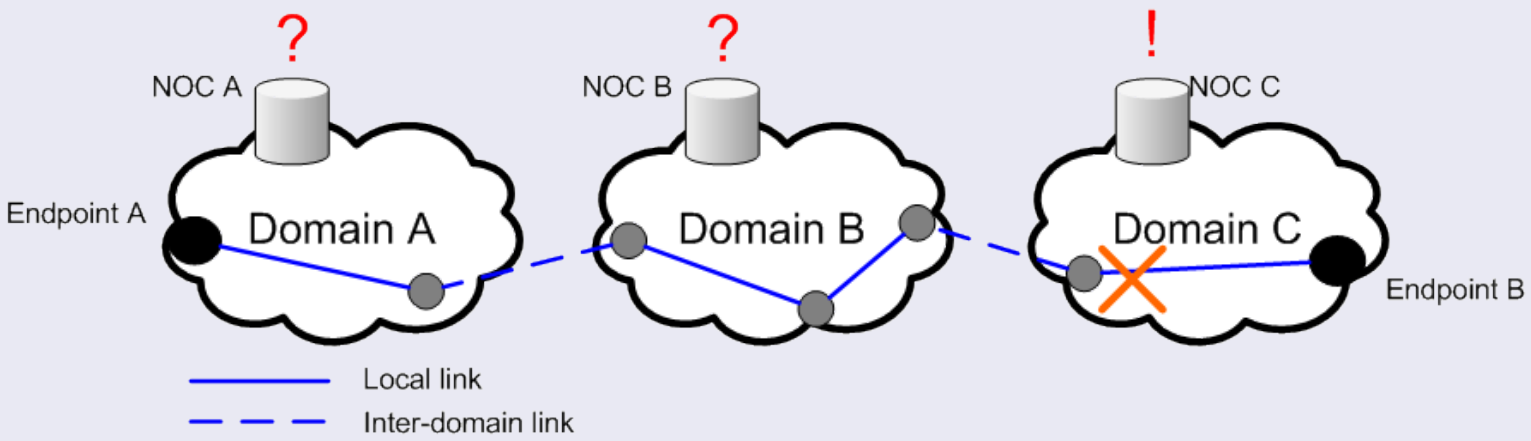
Problem description

Problem of inter-domain lightpath monitoring



Problem description

Problem of inter-domain lightpath monitoring



Research question

"Is PerfSONAR suitable for inter-domain monitoring in the GLIF infrastructure?"

Context

What is the Global Lambda Integrated Facility (GLIF)?

- International virtual organization.
- GLIF participants are:
  - National Research and Education Networks (NRENs).
  - Consortia and institutions working with lambdas.
- Provides lambdas internationally.
- Supports data-intensive scientific research and more...

Global Lambda Integrated Facility

Requirements for monitoring the GLIF infrastructure

Some questions...

- Who are involved?
- What are their requirements?
- Is PerfSONAR suitable for monitoring the GLIF infrastructure?

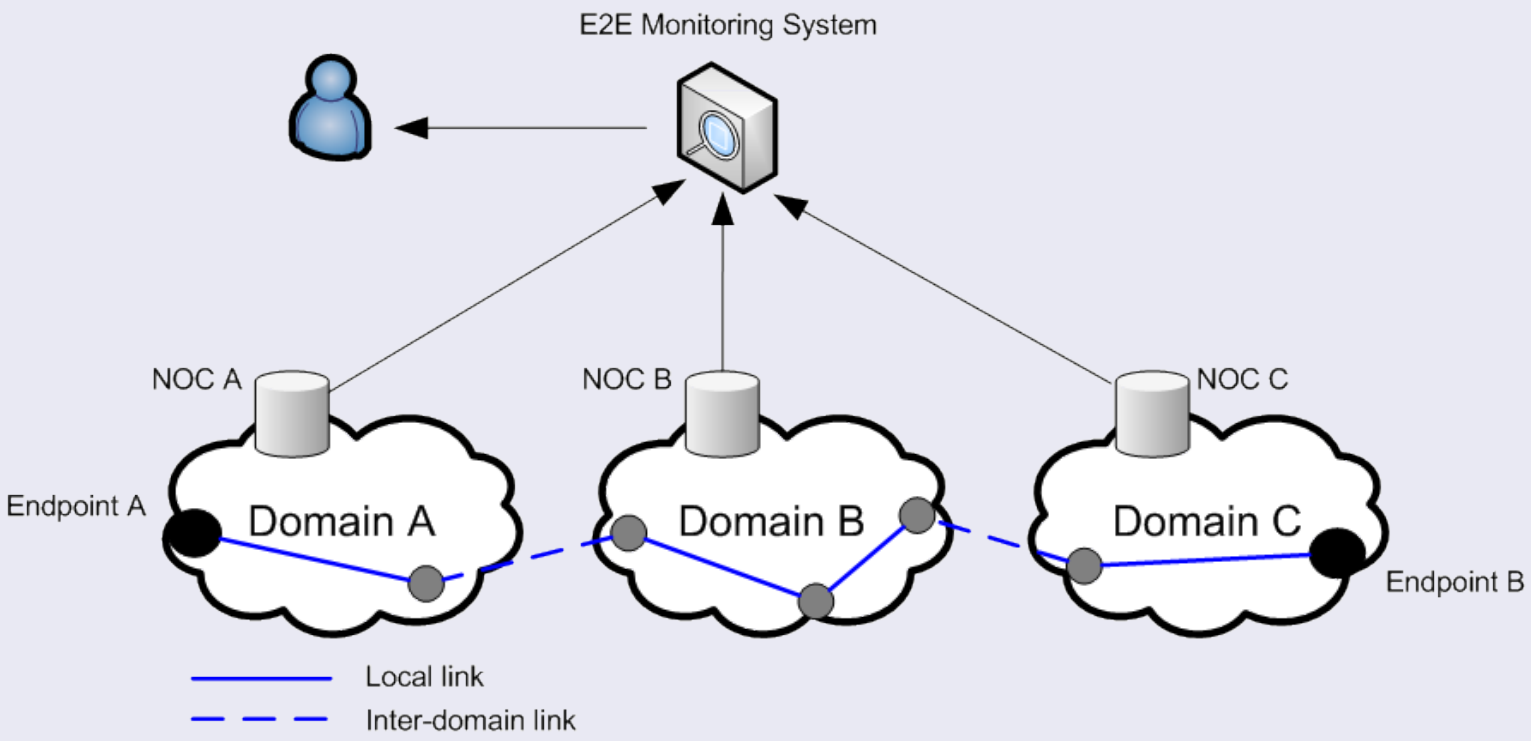
Stakeholders

Stakeholders

- The general public and policy makers
- Connected organizations
- The network operator

Monitoring requirements in the GLIF infrastructure

Sharing network information in a distributed way



Monitoring requirements in the GLIF infrastructure

Functional requirements

- Support for protected lightpaths

Metrics

- Layer 0 (Dark Fibers/WDM)
  - The signal strength/optical loss of the wavelengths
  - Link status; up/down - availability
- Layer 1 (SDH/SONET)
  - Available timeslots
  - Errored Second Count (ES)
  - Unavailable Seconds (US)
  - Link status; up/down - availability

Introduction

PerfSONAR framework

- What is PerfSONAR?
- Design principles
- Services

About PerfSONAR

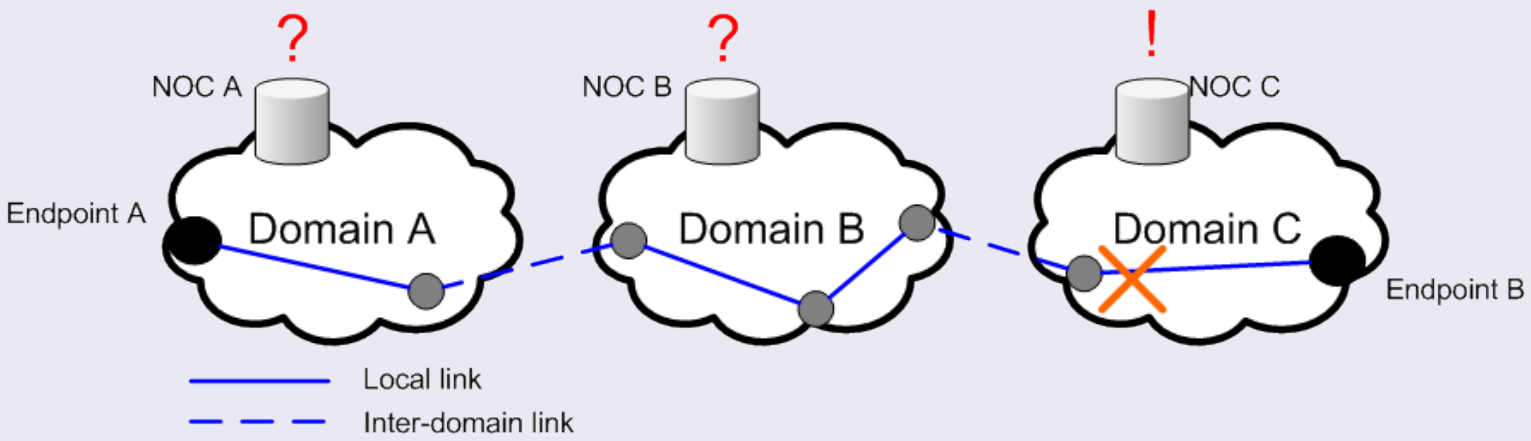
PerfSONAR stands for:

PERformance Focused Service Oriented Network monitoring ARchitecture.

perfSONAR

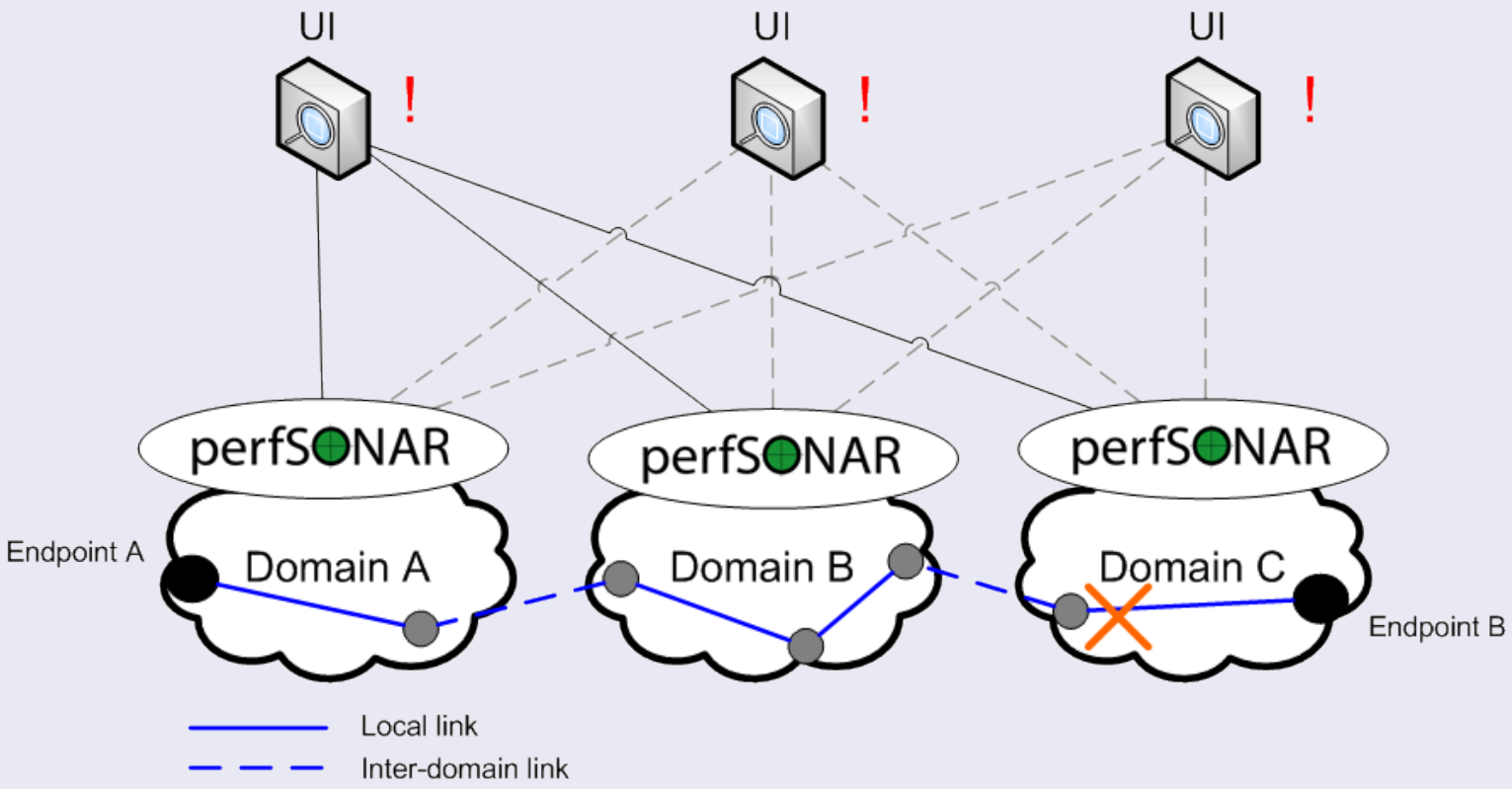
PerfSONAR multi-domain monitoring

The problem



PerfSONAR multi-domain monitoring

A solution



About PerfSONAR

What is PerfSONAR?

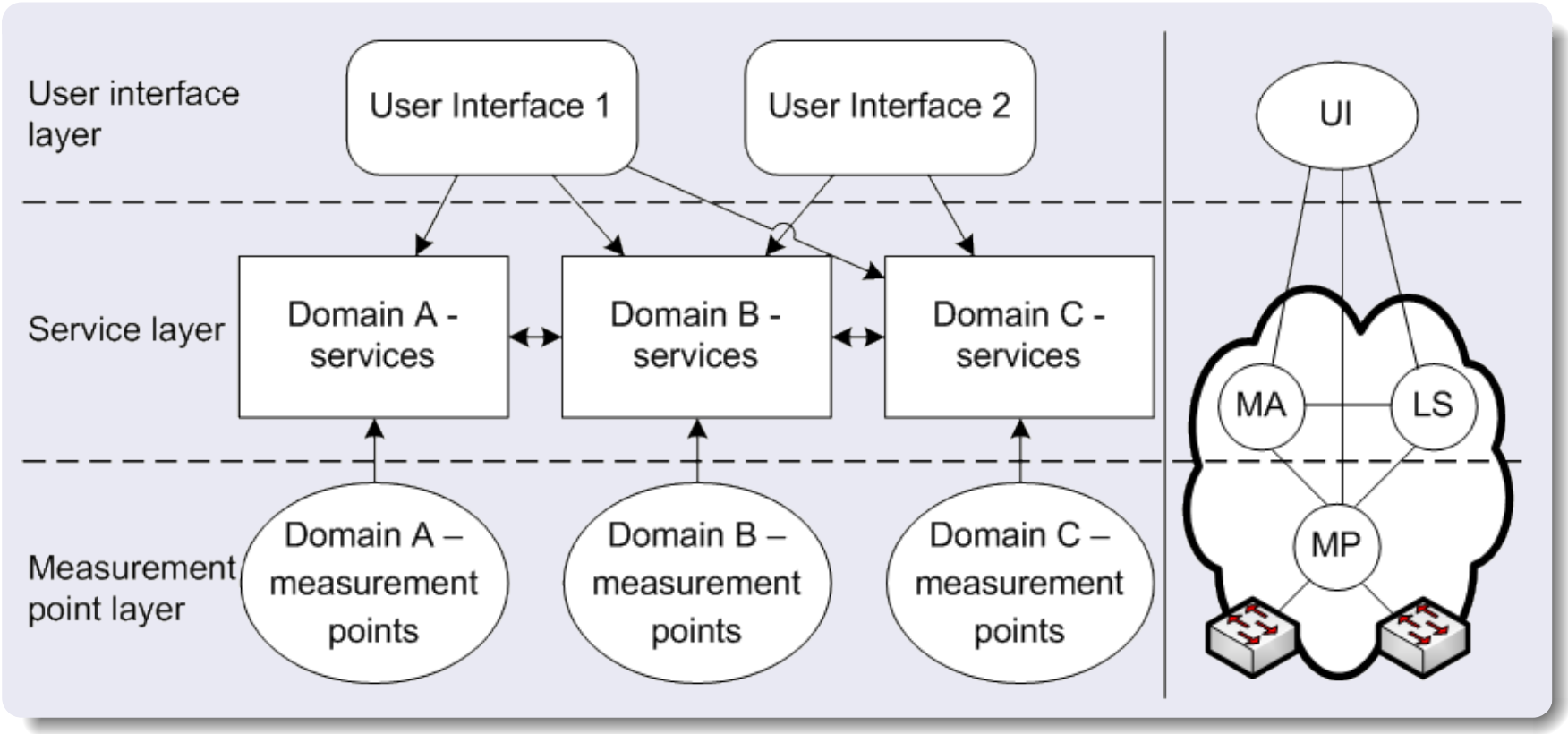
- Framework for network monitoring.
- Support for multiple network domains.
- Based on a service oriented architecture.
- Set of services with different functionalities.

Design principles

Service Oriented Architecture (SOA)

- Services are independently.
- Using web services.
  - Communicates via Simple Object Access Protocol (SOAP).
    - XML over HTTP
  - Global Grid Forum (GGF) Network Measurement Working Group (NMWG) compliant XML schema.

3 layer model



Services

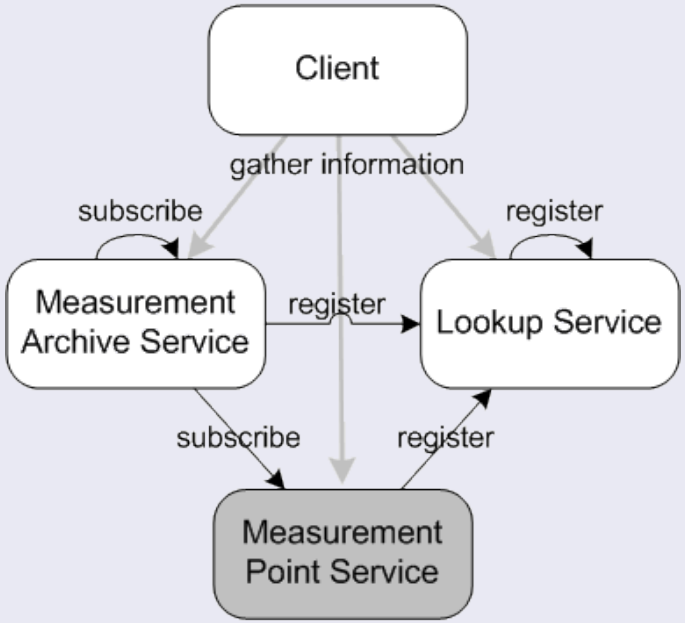
PerfSONAR services

- Measurement Point Service
- Measurement Archive Service
- Lookup Service

Services

Measurement Point Service

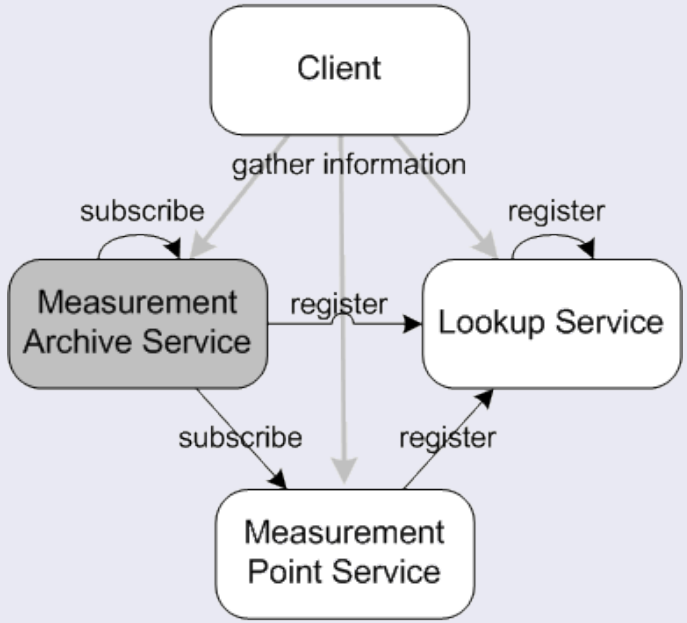
- Acquire measurement data from hardware.
- Publish monitoring information.



Services

Measurement Archive Service

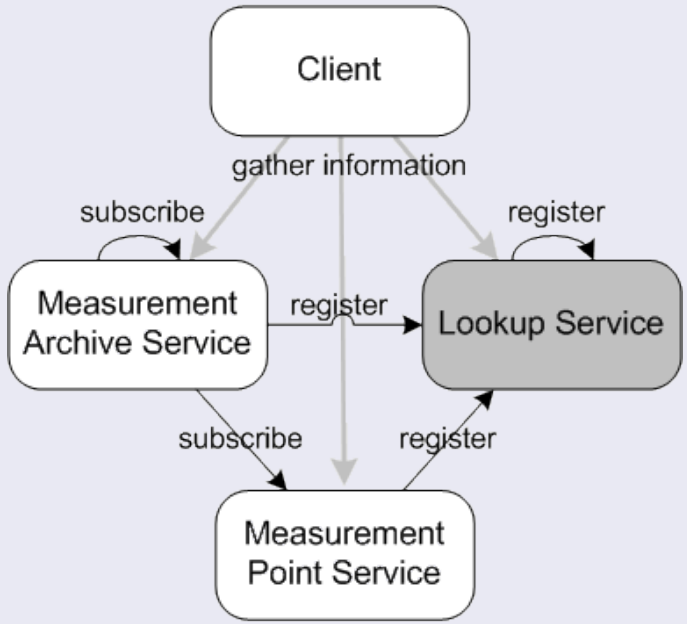
- Retrieve monitoring information.
- Store historical monitoring information.
- Publish monitoring information.



Services

Lookup Service

- Participating services register here.
- Lists participating services with capabilities.
- Client can ask for directions.



E2E link monitoring system

What is it?

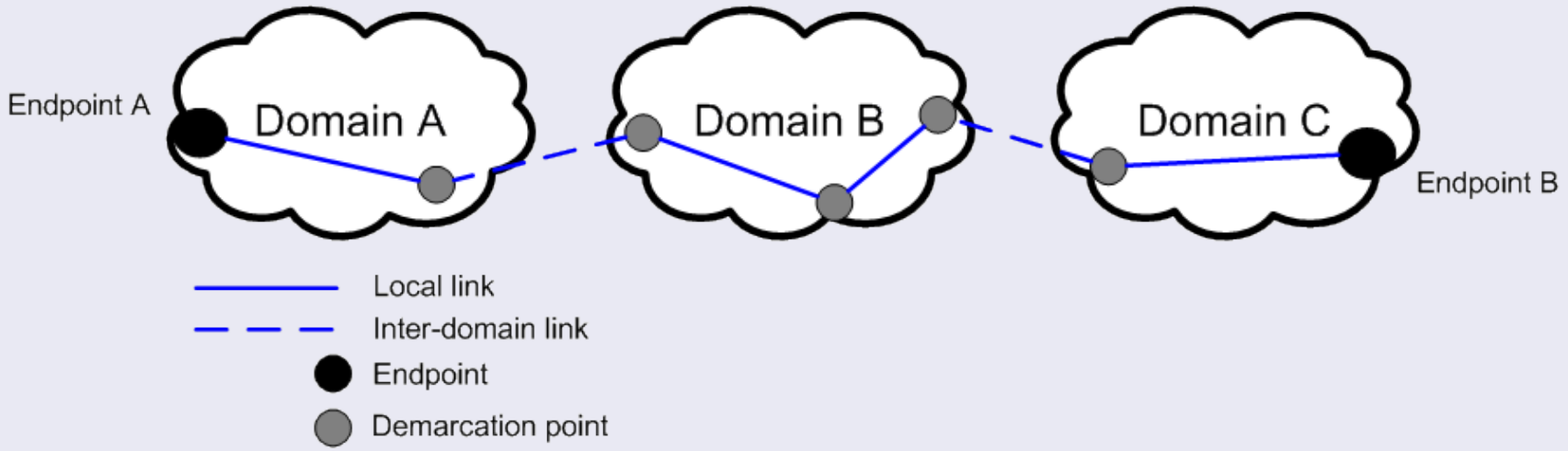
- Web based visualization tool
- Part of the PerfSONAR framework
- An agreement on how to provide network information to others

What does it do?

- Make intra-domain information available to other domains;
  - Link status; up/down - availability
- Aggregates multi-domain information to get an overview

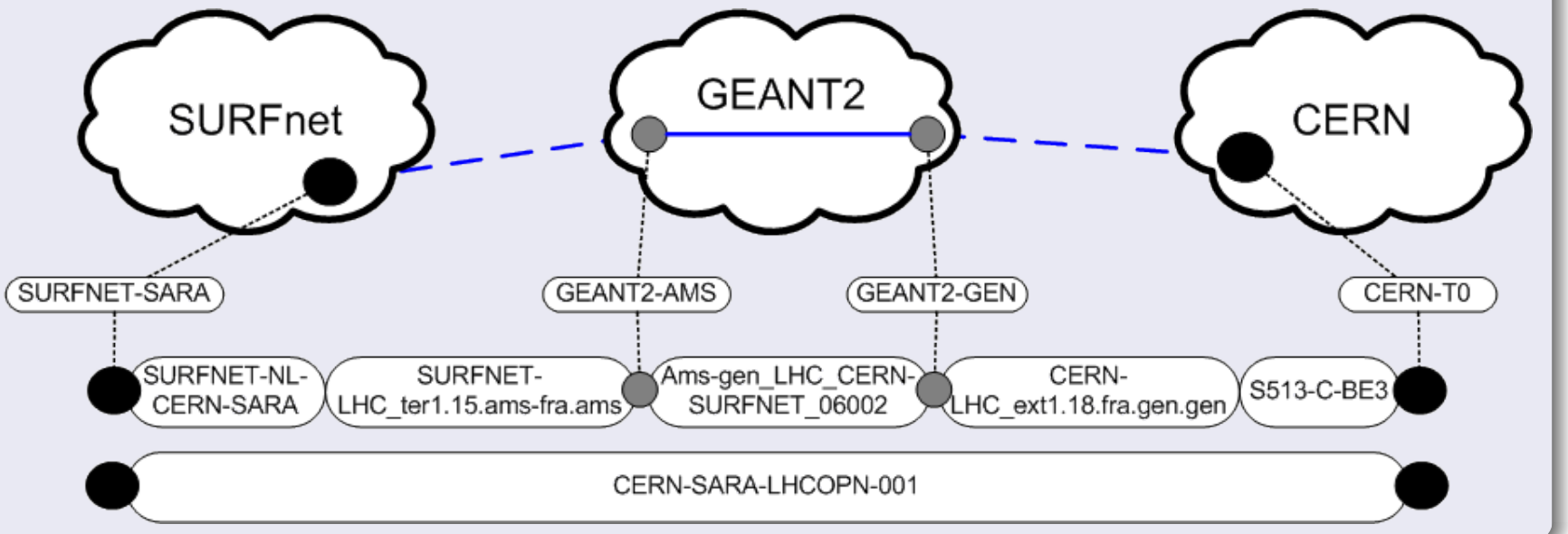
E2E link monitoring system concepts

Concepts



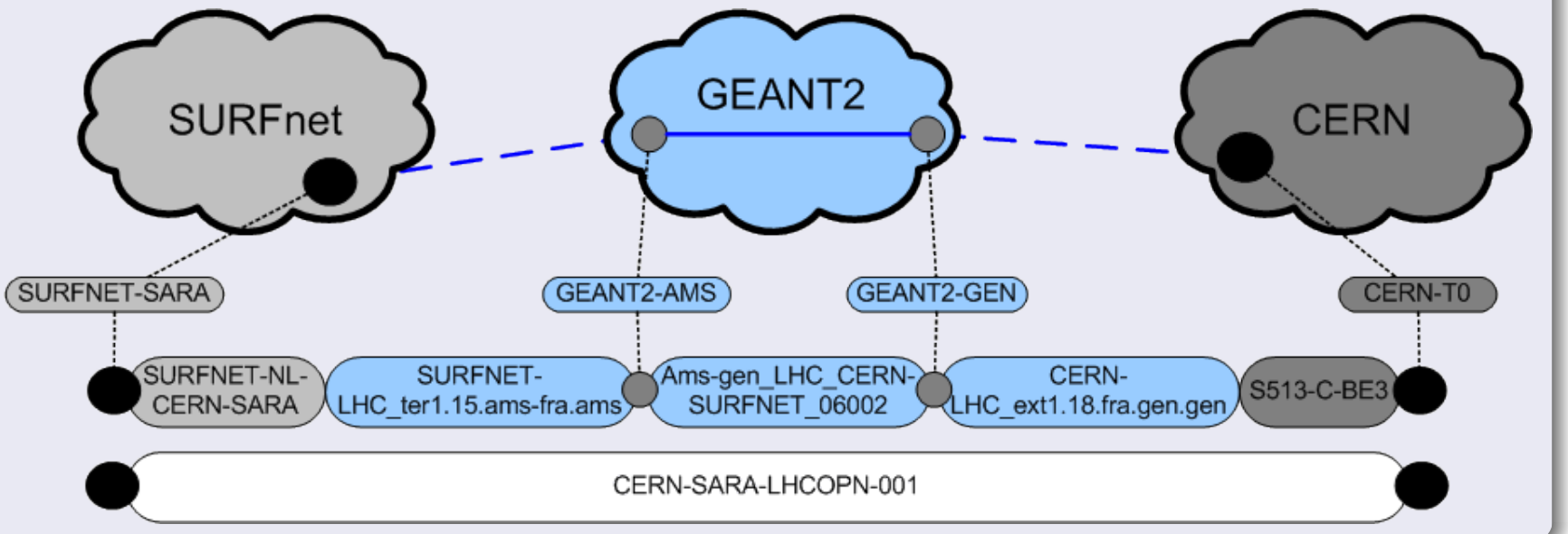
E2E link monitoring system concepts

Describing the topology



E2E link monitoring system concepts

Describing the topology



Visualizing the E2E link

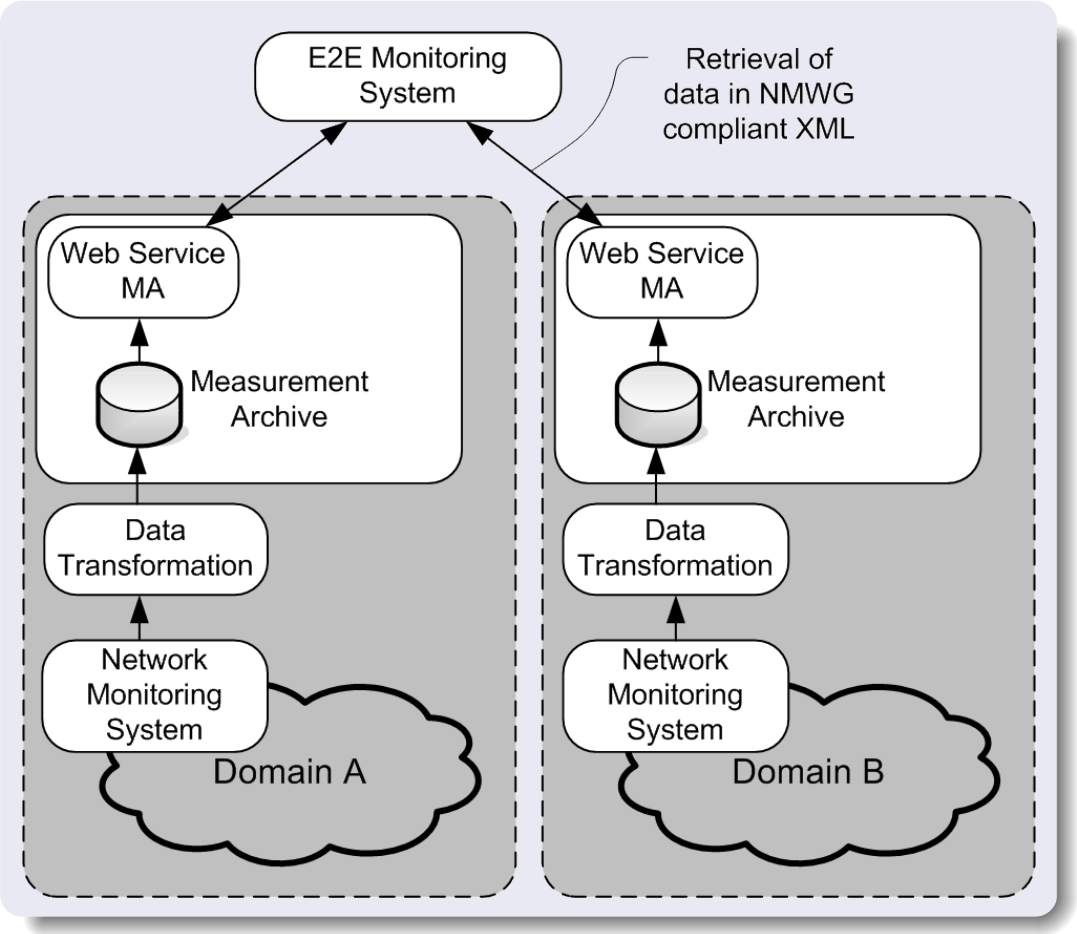
Aggregating multi-domain information to get an overview

Status of E2E Link CERN-SARA-LHCOPN-001

Time of State Aggregration: 2007-06-28, 14:08:18 MEST (Cycle time: 60 s.)
Operational State: Up
Administrative State: Normal Oper.

Domain	SURFNET (?)		GEANT2					CERN (?)	
Link Structure	EP	◄·····	·····►	DP	◄———►	DP	◄·····	·····►	EP
Type	EndPoint	ID Part.Info	ID Part.Info	Demarc	Domain Link	Demarc	ID Part.Info	ID Part.Info	EndPoint
Local Name	SURFNET-SARA	SURFNET-NL-CERN-SARA	SURFNET-LHC_ter1.15.ams-fra.ams	GEANT2-AMS	ams-gen_LHC_CERN-SURFNET_06002	GEANT2-GEN	CERN-LHC_ext1.18.fra-gen.gen	S513-C-BE3	CERN-T0
State Oper.	-	Up	Up	-	Up	-	Up	Up	-
State Admin.	-	Normal Oper.	Normal Oper.	-	Normal Oper.	-	Normal Oper.	Normal Oper.	-
Timestamp	-	2007-06-28 T14:05:08.0+0200	2007-06-28 T13:07:20.0+0100	-	2007-06-28 T13:07:20.0+0100	-	2007-06-28 T13:07:20.0+0100	2007-06-28 T14:07:53+02:00	-

Data provisioning



- Data provisioning
- Data population
- Data transformation & aggregation
- Measurement acquisition

Conclusions

Is PerfSONAR suitable for inter-domain monitoring in the GLIF infrastructure?

- E2E Monitoring System
  - Covers the following requirements:
    - Link status; up/down - availability
  - Does not cover the following requirements:
    - Metrics; Errored Second Count, Unavailable Seconds, Optical loss, Available timeslots, ...
    - Support for protected lightpaths
- The framework can be extended with customized metrics and services

Future work

- Is the PerfSONAR framework suitable for performance monitoring in the StarPlane network?
- Support for protected lightpaths

Thank you!