

# **GARR involvement in monitoring e2e connections and overview of GARR GRID activities**

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# Content

- **GARR Integrated Networking Suite**
  - GINS Architecture
  - GINS & the European Projects
  - Monitoring E2E connections
- **GARR GRIDS Activities**
  - GRIDS projects and their goals
  - GARR involvement
    - EGEE TSA 2.1.3 gLite and IPv6

# User classes requirements

NREN

User Class

Specific Network Service and Engineering

SLA

**Monitoring Service**

# User classes requirements



## Network Services

- On demand circuits
  - Dedicated lambda
  - MPLS
- QoS (IP Premium)
- IPv4, IPv6
- Multicast
- ...

## Network

## User Classes

- High demand
- European projects
- National projects
- ...



## **GARR Integrated Networking Suite**

### **GINs integrates in one common framework**

- all the network monitoring tools
- all the statistics acquisition tools
- the trouble ticket system
- the fault and performance reports

**using a single database from which the tools build their configuration files.**

GINs

## GARR Integrated Networking Suite

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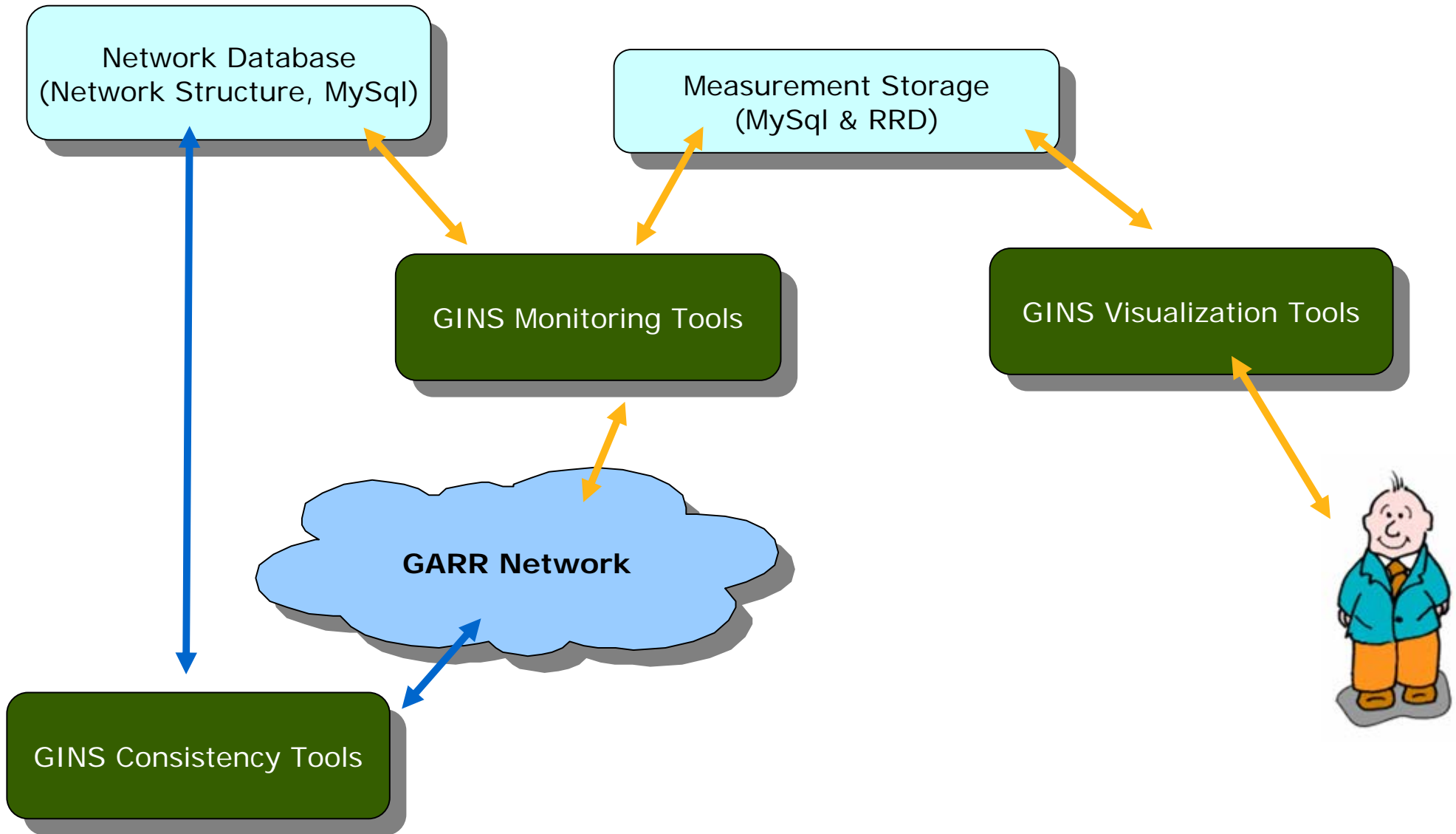
#### **Monitoring Services**

- IP circuits status
- IPv6 circuits status
- Status of Multicast Beacons
- SDH/SONET errors acquisition
- Lambda services
- MPLS
- E2E

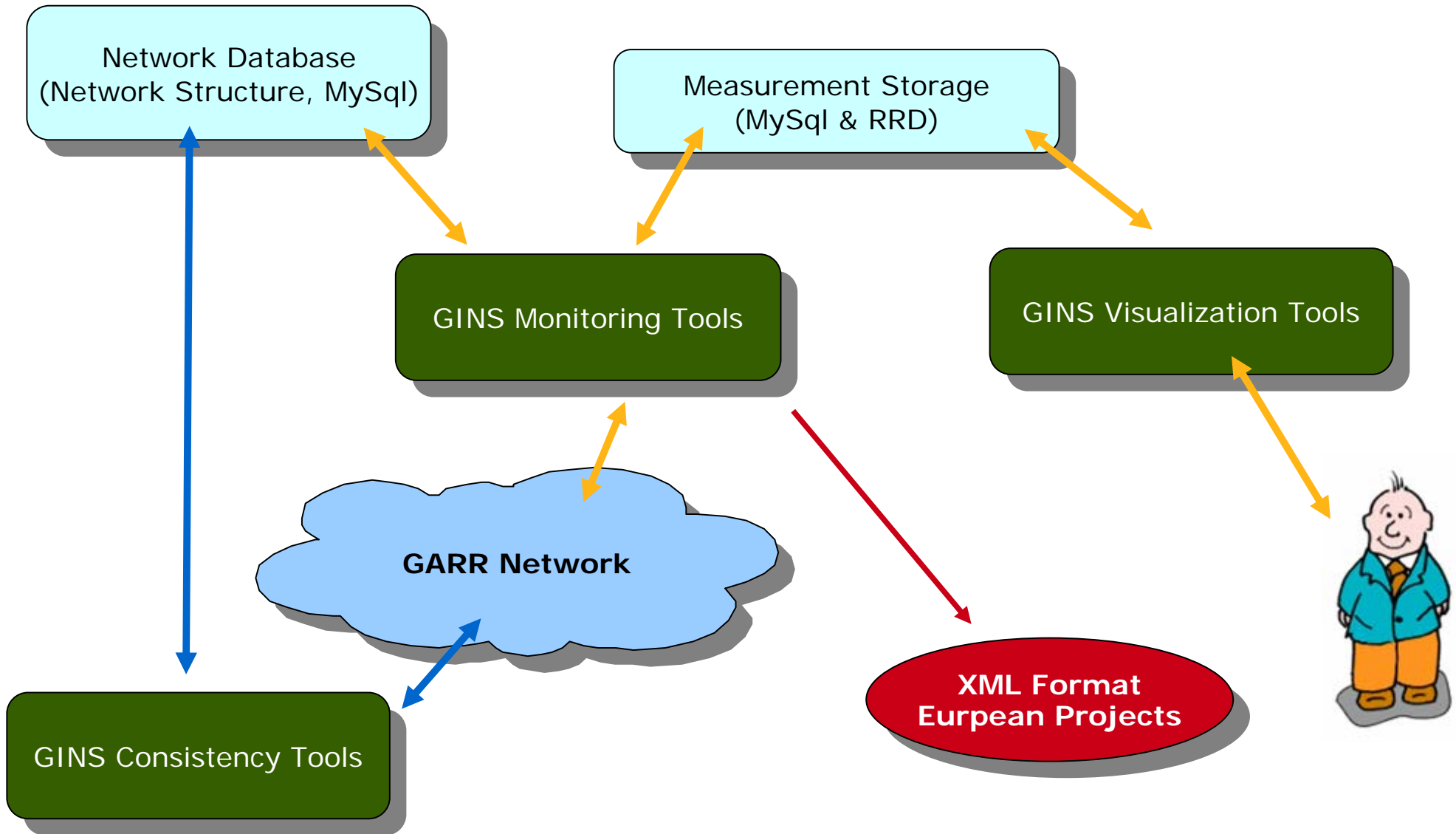
#### **Statistics Services**

- IP traffic
- IPv6 traffic
- Interface errors
- Routers CPU
- Premium IP
- SDH/SONET errors
- Backbone weathermap
- Uncompressed Statistics

# GINS Architecture



# GINS Architecture



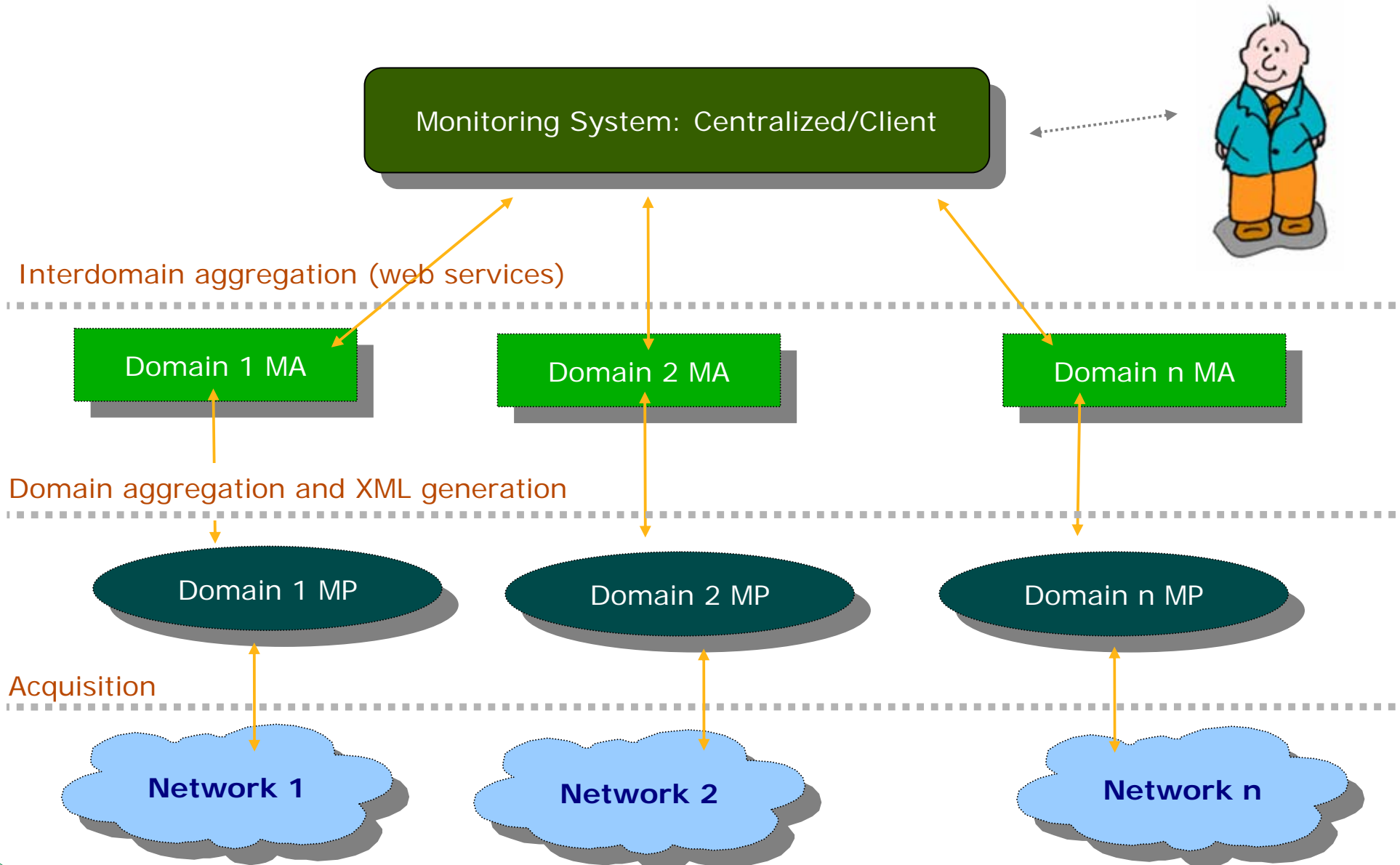
GINs is providing monitoring data to the following European projects activities

- LHC-OPN:  
Monitoring the status of an e2e path between T0-T1 connections through cross border fibers (CBF)  
Activities: GN2:JRA1, GN2:JRA4
- MUPBED:  
Monitoring the status of interdomain MPLS L2 circuits and LSP  
Activity: MUPBED:WP3
- perfSONAR:  
Interdomain traffic statistics, interdomain performance measurement & Co  
Activity: GN2:JRA1
- ENOC:  
Trouble tickets normalization  
Activity: EGEE2:SA2

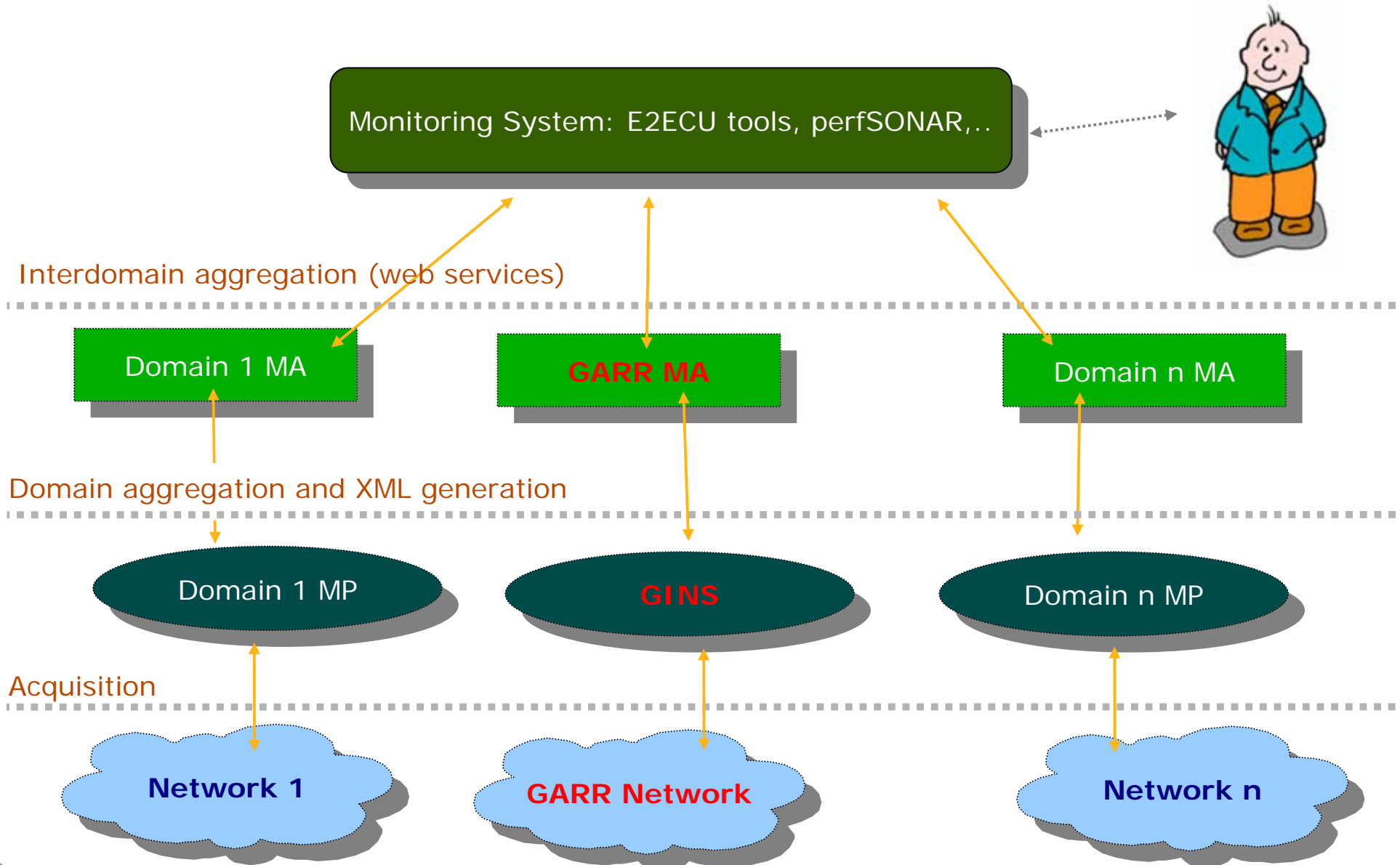
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# A common architecture

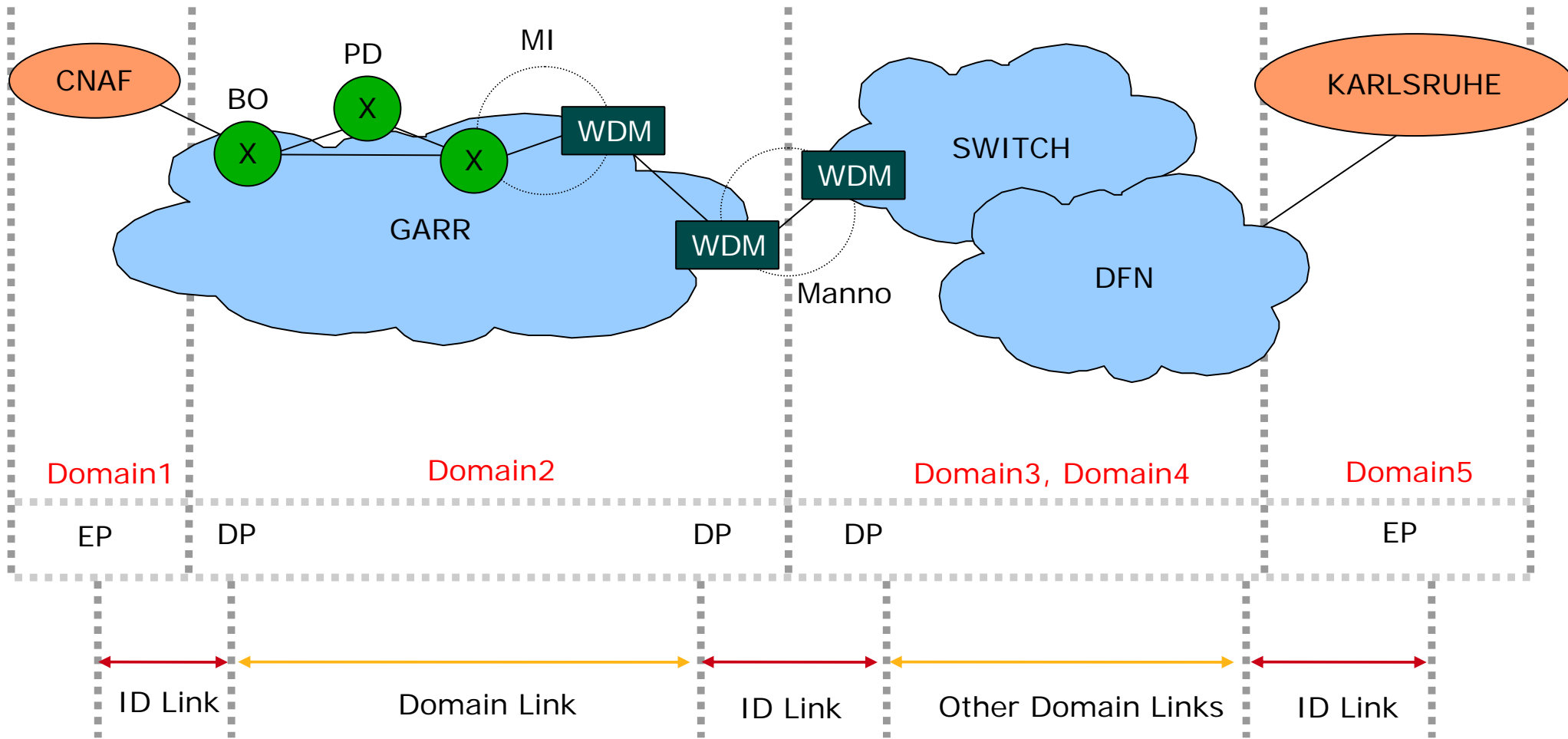


# A common architecture



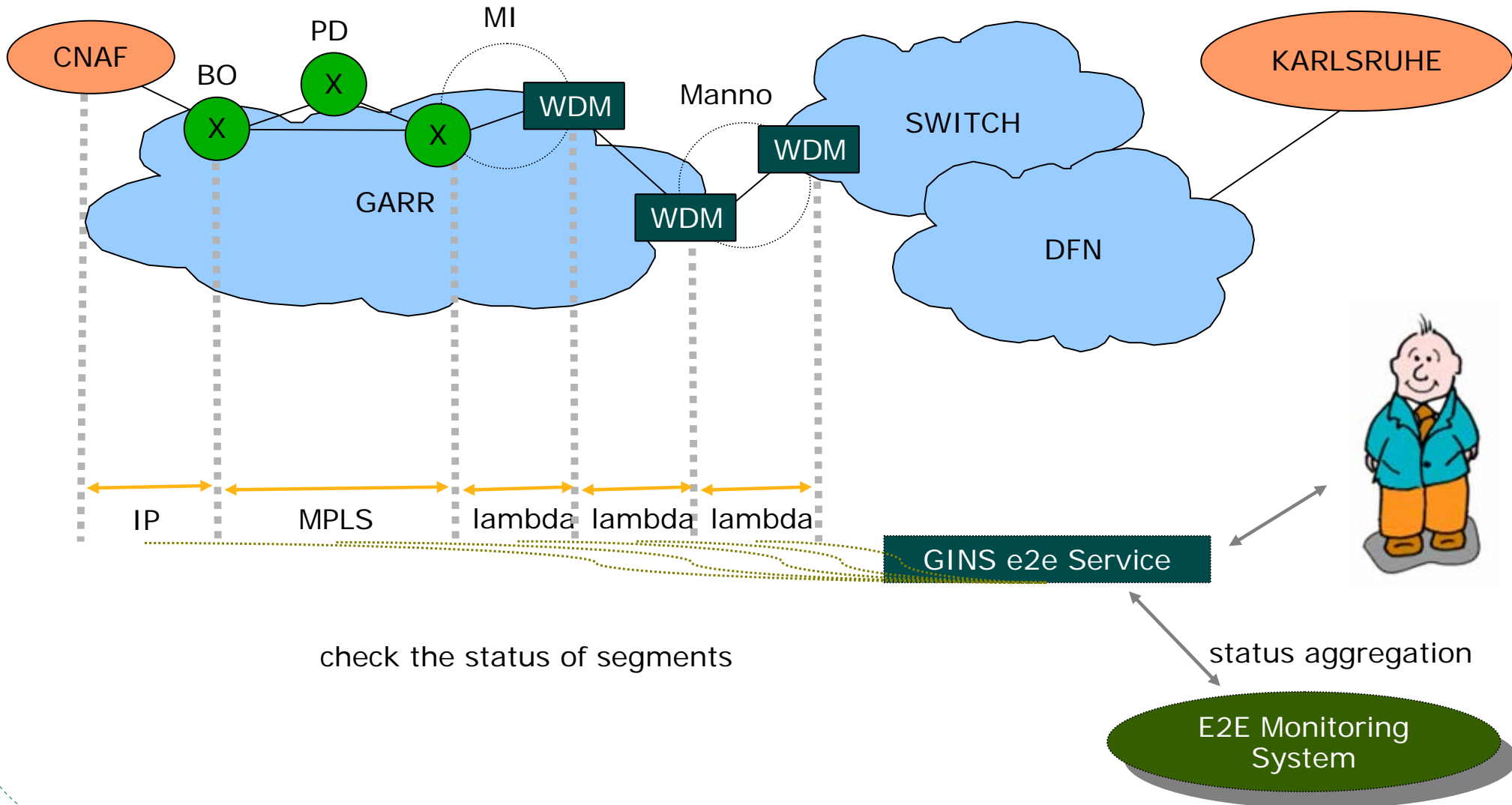
# GINS & LHC-OPN

e2e CNAF – KARLSRUHE, **Monitoring Domains and Abstraction:**



# GINS & LHC-OPN

e2e CNAF – KARLSRUHE, GARR Domain Monitoring (MP):



check the status of segments





















status aggregation

E2E Monitoring System

# GINs & LHC-OPN

e2e CNAF – KARLSRUHE, GARR UI:

CNAF-GRIDKA-LHCOPN-001

<b>EZE Segments</b>															
<b>Segments Names</b>	CNAF	CNAF - B01	rt1.bo1	B01 - MI1	rt1.mi1	RT1.MI1 - ADVA	wdm.mi1	MI1 - MANNO	wdm-ch.mi1	GARR->Switch	DWDM Switch	Switch->DFN->	KARLSRUHE		
<b>Segments Description</b>	End User	Link IP	Router	Link: MPLS	Router	Link: L1	DWDM	Link: L1	DWDM	Link: L1	DWDM	Other Domains	End User		
<b>Segments Info</b>	Tier1	P2P Link	Juno M320	LSP: B01-MI1-direct	Juno M320	Status from: wdm.mi1.garr.net: FA70061001314 Port: local	ADVA FSP3000	Status from: wdm.mi1.garr.net: FA70061001314 Port: remote	ADVA FSP3000	Status from: wdm-ch.mi1.garr.net: FA70061001314 Port: remote	Sorrento	-	Tier1		
<b>Segments Staus</b>	-	UP	-	UP	-	UP	-	UP	-	UNKNOWN	-	-	-		
<b>EZE Monitor</b>															
<b>EZE Description</b>	End Point	NREN Link							Demarcation Point	ID Link (Partial)	Demarcation Point	Other Domains	End Point		
<b>EZE Status</b>	-	UP							-	UNKNOWN	-	-	-		

# GINs & LHC-OPN

e2e CNAF – KARLSRUHE, e2e UI, link view:

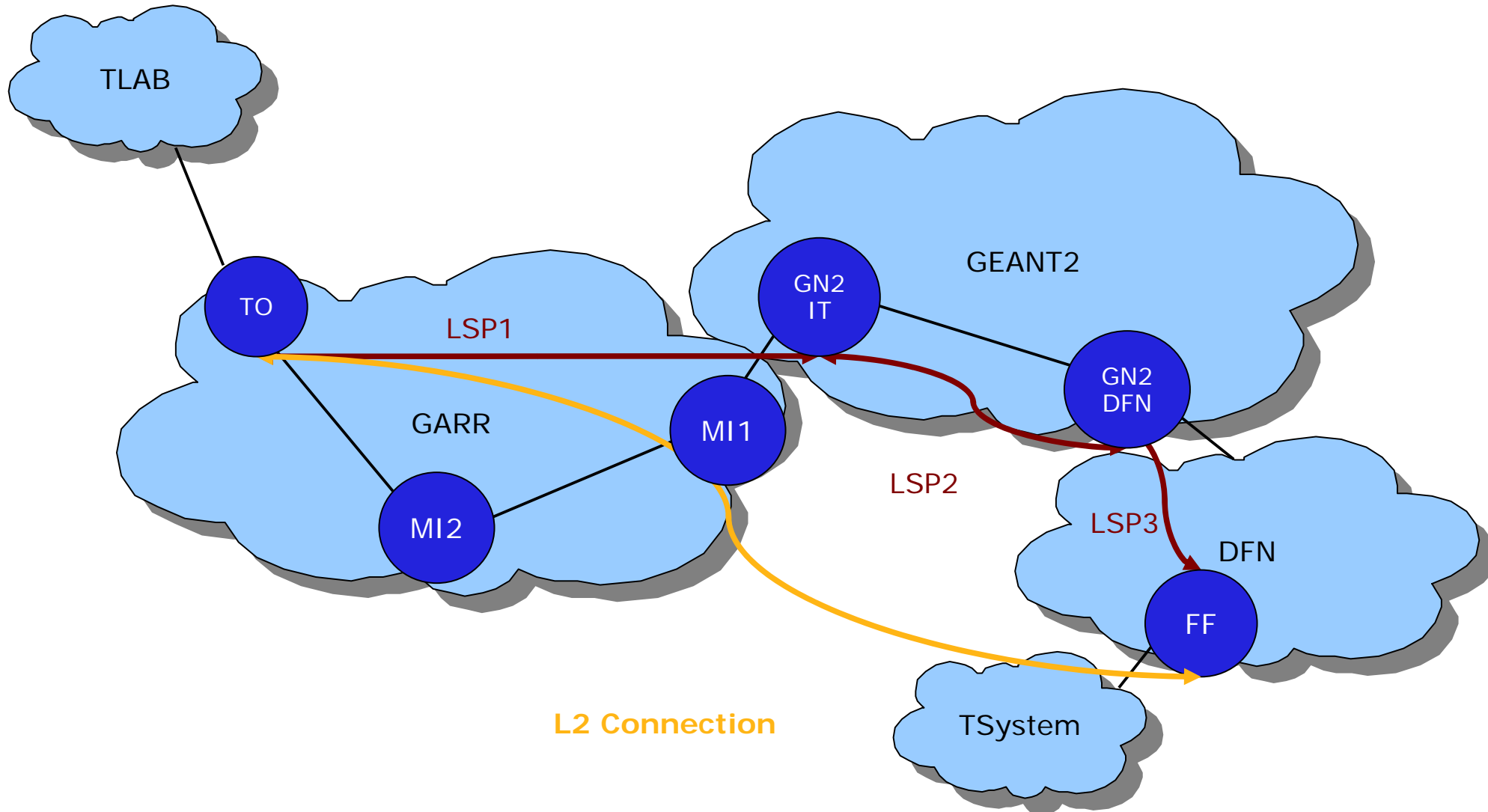
GARR				SWITCH					DFN			
EP	↔	DP	?	.....	DP	↔	DP	.....	.....	DP	↔	EP
EndPoint	Domain Link	Demarc	ID Part.Info	ID Part.Info	Demarc	Domain Link	Demarc	ID Part.Info	ID Part.Info	Demarc	Domain Link	EndPoint
GARR-CNAF	CNAF-MAN	GARR-MAN	GARR-SWITCH	mMA13-c4	SWITCH-MAN	mMa13-c4 to mBA13-c3	SWITCH-BAS	mBA13-c3	DFN-ID_LinkPartialInfo_53814	DFN-BAS3	DFN-DOMAIN_Link-53814	DFN-FZK24
-	Up	-	Unknown	Up	-	Up	-	Up	Up	-	Up	-
-	Normal Oper.	-	Unknown	Normal Oper.	-	Normal Oper.	-	Normal Oper.	Normal Oper.	-	Normal Oper.	-
-	2006-12-05T13:20:43Z	-	2006-12-05T13:20:43Z	2006-12-05T13:22:39+01:00	-	2006-12-05T13:22:39+01:00	-	2006-12-05T13:22:39+01:00	2006-12-05T12:40:00+01:00	-	2006-12-05T12:40:00+01:00	-

e2e CNAF – KARLSRUHE, e2e UI, Domain view:

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-CNAF-LHCOPN-001</a>	GARR-CNAF	E	GARR-MIL	D	CNAF-MILAN	Domain Link	Up	Normal Oper.	2006-10-23T18:50:44Z
<a href="#">CERN-CNAF-LHCOPN-001</a>	GARR-MIL	D	GEANT2-MIL	D	MILAN-GEANT2	ID Part.Info	Up	Normal Oper.	2006-10-23T18:50:44Z
<a href="#">CNAF-GRIDKA-LHCOPN-001</a>	GARR-CNAF	E	GARR-MAN	D	CNAF-MAN	Domain Link	Up	Normal Oper.	2006-10-23T18:50:44Z
<a href="#">CNAF-GRIDKA-LHCOPN-001</a>	GARR-MAN	D	SWITCH-MAN	D	GARR-SWITCH	ID Part.Info	Unknown	Unknown	2006-10-23T18:50:44Z

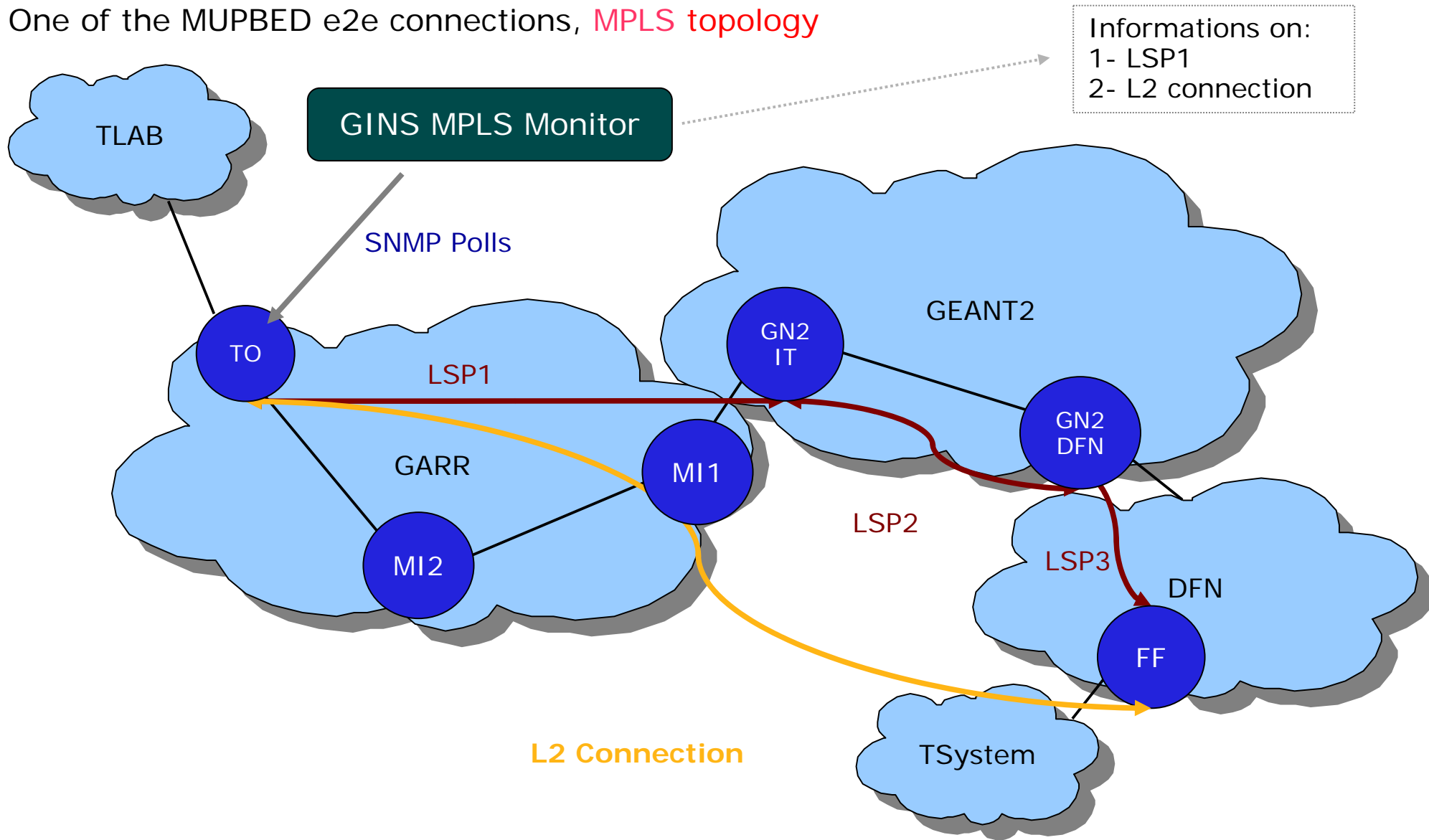
# GINS & MUPBED

One of the MUPBED e2e connections, **MPLS topology**



# GINS & MUPBED

One of the MUPBED e2e connections, **MPLS topology**



## GINs MPLS Monitor UI

### MPLS Layer 2 circuits and Label-Switched-Path Monitor:

Domain							InterDomain		
Domain Circuit	Equipment	Domain Circuit Path	Domain Circuit Status	Source	Destination	Bytes Counter	E2E Circuit Name	E2E Circuit Status	Remote End Destination
BO1-MI1-VPN	rt1.bo1.garr.net	LSP: BO1-MI1-direct	up	193.206.128.252	193.206.129.3	5453960146407		Not configured	-
G2MUPBED_TILAB_TID_Tur_Mil	rt.to1.garr.net	LSP: TO1-MI2-MI1	up	193.206.132.188	62.40.114.25	66888532	L2-VPN-TID-TILAB	up	130.206.206.248:617
G2MUPBED_TILAB_Acreo_Tur_Mil	rt.to1.garr.net	LSP: TO1-MI2-MI1	up	193.206.132.188	62.40.114.25	55433024	L2-VPN-Acreo-TILAB	up	62.40.114.9:616
G2MUPBED_TILAB_TSI_Tur_Mil	rt.to1.garr.net	LSP: TO1-MI2-MI1	up	193.206.132.188	62.40.114.25	8510	L2-VPN-TSI-TILAB	up	188.1.16.1:611
G2MUPBED_TILAB_PSNC_Tur_Mil	rt.to1.garr.net	LSP: TO1-MI2-MI1	up	193.206.132.188	62.40.114.25	147938	L2-VPN-PSNC-TILAB	up	62.40.114.35:614

### Legenda

<b>Domain Circuit</b>	Intradomain MPLS Label Switched Path
<b>Domain Circuit Path</b>	LSP Active Path
<b>E2E Circuit</b>	Interdomain Layer 2 Circuit

# GINs & MUPBED

## GINs MPLS Monitor UI

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### Legenda

<b>Domain Circuit</b>	Intradomain MPLS Lable Switched Path
<b>Domain Circuit Path</b>	LSP Active Path
<b>E2E Circuit</b>	Interdomain Layer 2 Circuit

Domain informations, LSP Status

Interdomain informations, L2 circuit Status

# Conclusion

The monitoring service is necessary

- to provide enhanced services to the network users
- to manage the network itself

We will go on with the development of monitoring systems  
joining the GEANT2 activities

## GARR GRID activities

GARR is involved in the following international GRID projects:

- ▶ EGEE II                      EU FP6, Started 1.4.2006, duration 2 years
- ▶ EuIndiaGRID              EU FP6, Started 1.10.2006, duration 2 years
- ▶ EuChinaGRID            EU FP6, Started 1.1.2006, duration 2 years
- ▶ EUMEDGRID              EU FP6, Started 1.1.2006, duration 2 years

## EGEE II : goals

- ▶ build on the work of the EGEE project to **provide a production quality, seamless Grid infrastructure across the globe.**
- ▶ simultaneously **support many applications** from diverse domains.
- ▶ **spread knowledge about the Grid** to researchers in High Energy Physics, Biomedicine, Earth Sciences, Astrophysics, Computational Chemistry, Fusion.
- ▶ **extend and consolidate the infrastructure**, to link national, regional and thematic Grid efforts and provide interoperability with other Grids, establishing a worldwide Grid infrastructure.
- ▶ provide researchers with **round-the-clock access** to a common pool of major storage, compute and networking facilities, independent of geographic location.
- ▶ provide a unique tool for collaborative compute-intensive science (**e-Science**).

# GARR in EGEE II

## ▶ SA2

### – TSA 2.1.1

- TroubleTicketing system normalization

### – TSA 2.1.3

- IPv6 follow-up: testbeds, JRA1, related projects, NRENs
  - Test the **gLite IPv6 compliance**

### – TNLC Technical Network Liaison Committee

## ▶ NA5

- Policies and International cooperation

## ▶ Relevant contribution to the design of the **LHCOPN** (LCG GRID)

- GARR-CNAF-CERN network engineering

## TSA 2.1.3 : gLite WMS tests

- ▶ Perform preliminary basic functional tests on the gLite Workload Management System using IPv6
  
- ▶ Evaluate the provided functionality under IPv6
  - Service configuration and management
  
  - The gLite code itself w.r.t. IPv6 compliant programming guidelines
  
- ▶ Identify critical issues and provide feedback to the gLite developers community

# IPv6 testbed @GARR


- ▶ Hardware: VMWARE ESX server based virtual nodes
- ▶ Software:
  - Operating System: **Scientific Linux CERN 3.0.8**
  - gLite middleware : **gLite 3.0.6** + recommended patches

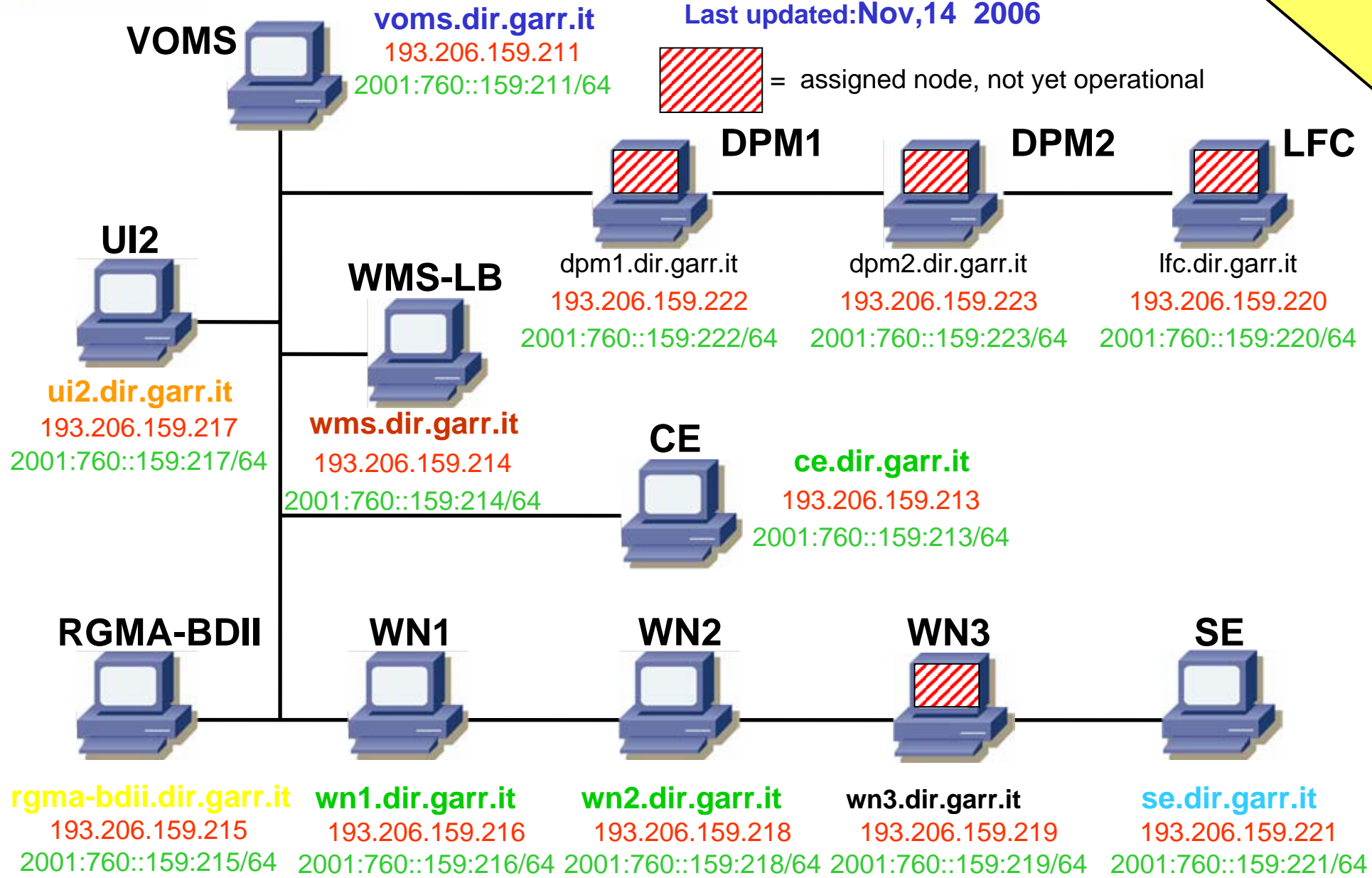
Avoided ad-hoc hacks and tricks to get things to work “by any mean” : stucked to reference OS and gLite version.

# Testbed set up

- ▶ The following gLite services have been installed and configured:
  - **UI**     **User Interface**
  - **WMS**   **Workload Management System**
  - **LB**     **Logging and Bookkeeping server**
  - **CE**     **Computing Element (Torque)**
  - **WNs**    **Worker Nodes**
  - **VOMS** server (mysql) **VO Management System server**
  - **RGMA**   **Information System**
  - **BD-II**   **Information System**
  - **SE (classic)**   **(gridFTP , local disk fs based)**

Last updated: Nov, 14 2006

 = assigned node, not yet operational



# Test operational procedure

- ▶ Install and configure gLite using IPv4 only
- ▶ Start up all services
- ▶ Test and successfully verify the system under IPv4
- ▶ Configure IPv6 on the nodes
- ▶ Let the system work on dual stack
  - Register nodes with double hostnames on a dual stack DNS server (verify DNS resolving)
- ▶ Switch off IPv4 and restart networking
- ▶ Re-configure and restart services when required (and possible!)
- ▶ Perform basic WMS functional tests from the UI node

## WMS tests to validate IPv4 and IPv6:

- ▶ Obtain a valid user proxy using VOMS
- ▶ Get a list of available resources using *glite-job-list-match* and *glite-wms-job-list-match*
- ▶ Successful execution of a set of basic jobs and successful output retrieval
- ▶ Successful execution of a set of structured jobs (Input filebox, globus-url-copy on SE) and successful output retrieval
- ▶ Successful execution of a WMproxy job collection and corresponding output retrieval

# Tests outcome

## ▶ Functionalities for the user immediately failing:

- voms-proxy-init **failing** [VOMS]
- glite-job-submit **failing** [WMS NS]
- glite-job-list-match **failing** [WMS NS]
- glite-wms-job-delegate-proxy **failing** [WMS WMproxy]
- glite-wms-job-list-match **failing** [WMS WMproxy]

# deployment modules: service management

- ▶ Web based site config gLite configuration impossible [ ERROR: siteconfig URL...not valid]
  - **Only local config possible**
  - Most service management scripts fail
    - /etc/init.d/gLite start
      - For example: WMSLB node : condor\_q failed !
      - VOMS node : db init failed: wrong db vs
- ▶ Some external packages (e.g. Condor) are failing to restart under IPv6

## EuchinaGRID code checker

- ▶ IPv6 compliance check: Euchina GRID developed a code checker looking for non RFC-3493 compliant calls in specific patterns
- ▶ Ref URL:  
[http://www.euchinagrid.org/IPv6/cod\\_checker.html](http://www.euchinagrid.org/IPv6/cod_checker.html)
- ▶ Run on 52 gLite WMS CVS modules :  
**16 failed**

# IPv6 Code checker

## ► Output example

```
org.glite.security.voms
INADDR_ [ FAILED ]
addr_in [ FAILED ]
F_INET$ [ PASSED ]
gethostbyname [ FAILED ]
inet_addr [ PASSED ]
inet_ntoa [ PASSED ]
Inet4Address [ PASSED ]
inet_aton [ PASSED ]
gethostbyname_ex [ PASSED ]
INADDR_BROADCAST [ PASSED ]
0.0.0.0 [ FAILED ]
127.0.0.1 [ PASSED ]
255.255.255.255 [ PASSED ]
```

# EGEE SA2 TSA 2.1.3: conclusions

- ▶ The very first skin impression of gLite under IPv6 is in fact **quite deceiving**
  
- ▶ IPv6 non compliance is evident in
  - The gLite middleware modules
  
  - External dependencies
  
  - Deployment ( configuration ) scripts
  
- ▶ Work should continue on other middleware components (DM, InfoSys)
  
- ▶ We would be glad to improve the coordination in our further work on this subject within EGEE SA2 , EuChinaGRID and EGEE JRA1 and join a larger scale testbed if required

## EuIndiaGRID (just started) : goals

- ▶ make available a common, interoperable Grid infrastructure to the European and Indian Scientific Community
- ▶ enable the interconnection between the most relevant European Grid infrastructure, EGEE, and the Indian Grid

# GARR in EU India GRID

## ▶ PO

- Project office management

## ▶ WP3: Network Planning and Support

- GARR: WP leadership

- Status and perspectives of Network connectivity to India
- Proposed Network connectivity roadmap

## EuChinaGRID : goals

- ▶ **interconnection** and **interoperability** between EU and China
- ▶ support the interoperability of the Grid infrastructures in Europe and China for the benefit of eScience applications.
- ▶ dissemination and training, aimed at improving the accessibility of the Grid infrastructure for new applications and promote scientific and, possibly, industrial developments

# GARR in EUChinaGRID

## ▶ PO

- Project office management

## ▶ WP2 Network Planning and Support (WP leadership)

- Initial interoperability report

<http://www.euchinagrid.org/deliverable/D2.2.html>

## ▶ WP5

- Dissemination and outreach ( WP leadership)
  - Tutorials organization

## EUChinaGRID : WP2

- ▶ Initial Interoperability report (D 2.2)
  - Code Survey ( Code Cheker) w.r.t. IPv6 compliance ( RFC 3493 )
  - Third-party applications compatibility report
  - **IPv6 guidelines for GRID developers**
    - C
    - Perl
    - Python
    - Java

## EUMEDGRID: goals

- ▶ Bring the less-experienced and less-resourced countries of the Mediterranean region to the level of European developments in terms of the eInfrastructures

# GARR in EUMEDGRID

- ▶ PO
  - Project Office management
  
- ▶ Dissemination and Outreach ( WP leadership)
  - Tutorials organization

# Conclusions

- ▶ GARR is contributing and managing many international GRID projects to bring closer the NRENs worldwide, test and disseminate the GRID technology.
- ▶ GARR aims at maintaining a significant activity in this area.
- ▶ Expectations from the various GRID projects are many and different:
  - Bringing e-Science to researchers all over the World
  - Allow real time distributed access to multi-domain resources, computing power, storage to users and applications
- ▶ The network is the key enabler for the accomplishment of these goals.
  - IPv6 is a demanding requirement for the current status of the middleware
- ▶ GARR – and NRENs in general - are keen to satisfy user requirements on engineering and monitoring network services
  - contribute to the success of GRIDs