



Design issues of a multi-domain Bandwidth on Demand service for the NREN community

MUPBED-NOBEL joint workshop

Torino, 22-23rd November 2005

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GRNET

GN2 project



Connect. Communicate. Collaborate

- Multi-Gigabit European Academic Network
- Project funded under FP6 (Research Infrastructures-Integrated Infrastructure Initiative)
 - 31 partners (NRENs, DANTE, TERENA)
 - Total expected budget: 178.643.730 €
 - EC contribution requested: 93.000.000 €
 - Duration: 4 years
- Combining in a single contract, several activities essential to reinforce research infrastructures and to provide an integrated service at the European level
 - Networking activities (including consortium management)
 - Provision of access to transnational users
 - Joint Research Activities
- Scope
 - Further develops the successful GN1 project which has created the GEANT pan-European network
 - Specific emphasis on end-to-end provision of services across multiple interconnected networks
 - Gaining improved understanding of user needs
 - Direct support and performance monitoring
 - Migration from IP services to combination of routing and switching, network control, light-paths



Goals of JRA3 in GN2 project

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- Joint Research Activity
 - aim for a proof-of-concept and pilot service
 - production service during a subsequent project
- Streamline the inter-domain setup of ‘lightpaths’
 - shorten the provisioning time
 - reduce the amount of human intervention
- Specify and document the manual procedures
- Automate the process step-by-step focus on inter-domain coordination process



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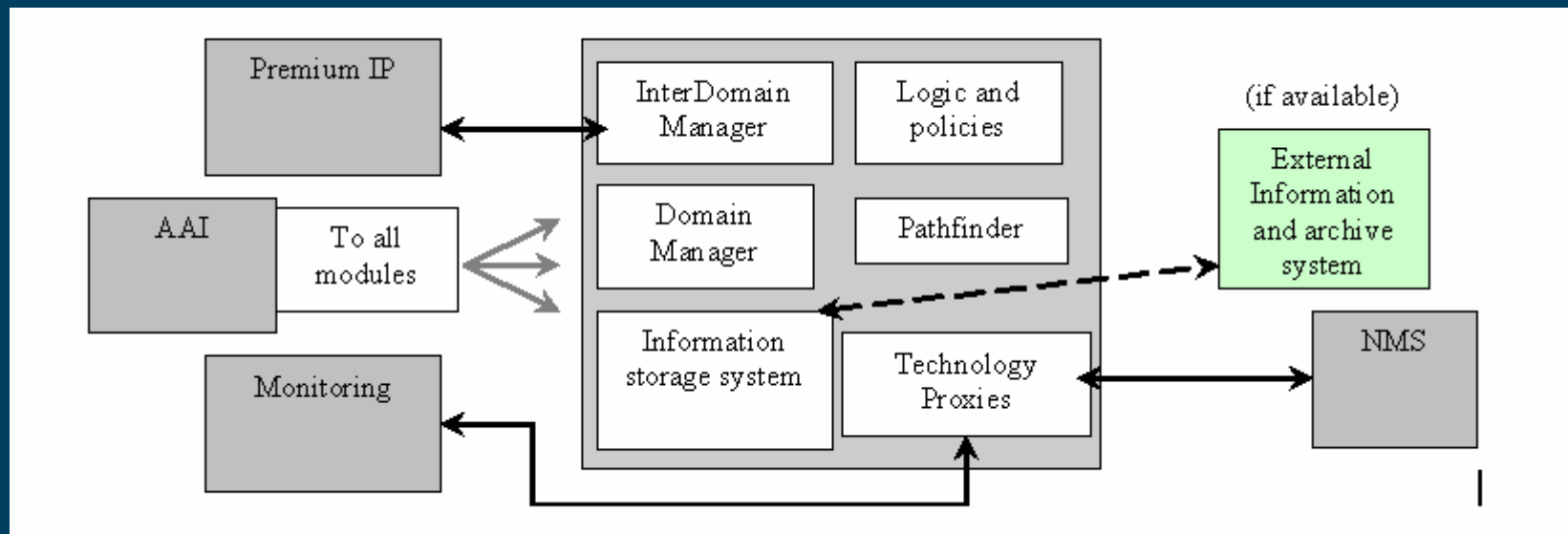
Service Definition

- Point-to-point, connection oriented service
- Layer 1, 2
 - focus on Ethernet services
- Multi-domain and multi-technology
 - e.g. SDH with GFP, MPLS L2VPN, native Ethernet
- Advance reservation



Framework specification

- 'GÉANT2 Bandwidth on Demand Framework and General Architecture' deliverable





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Service characteristics

- Inter-domain: the end user points may be located in different domains.
- Capacity: The minimum amount of capacity that can be requested will depend on local domain policies and restrictions imposed by the technology used (e.g. SDH granularity).
- Point to point: the BoD service provides Point-to-Point services. Point-to-Multipoint may be realised as a set of point-to-point services.
- Bi-directional: the service is a bi-directional service.
- Symmetric capacity
- Symmetric paths
- Advance reservations
- Protection



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Inter Domain Manager

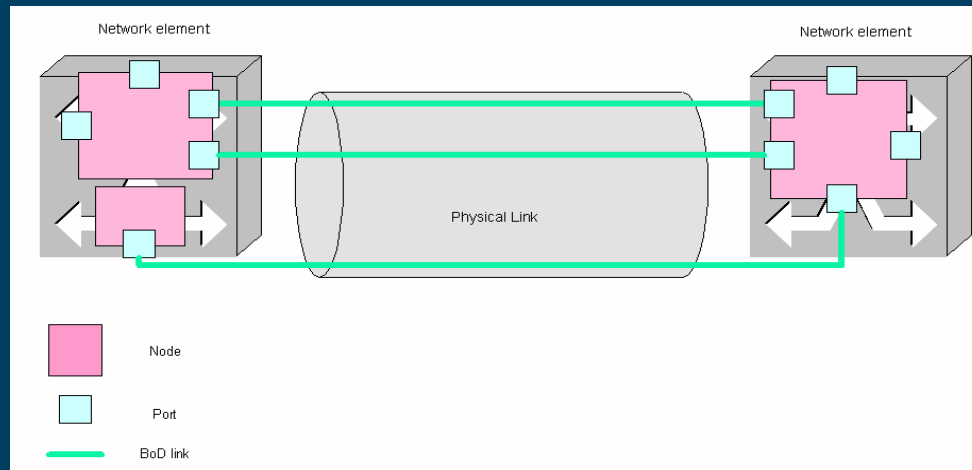
- Path-finding process
 - A set of manual procedures
 - Signaling and routing information
- Functionality
 - Ensure adequate e2e capacity
 - Ensure technical feasibility (e.g. a common VLAN id along the e2e path)
 - Capacity reservation scheduling
 - Path resilience-restoration
- Looking at existing implementations (OSPF-TE extensions)
 - DRAGON (<http://cni.gmu.edu/dragon/software.htm>)
 - Quagga Routing Suite (ex -Zebra) (<http://www.quagga.net/>)



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Inter Domain Manager

- IDM communication model
- AAI module that will interoperate with the eduGAIN architecture (federated AAI produced from JRA5 of GN2 project)
- Addressing
- Abstract representation of resources



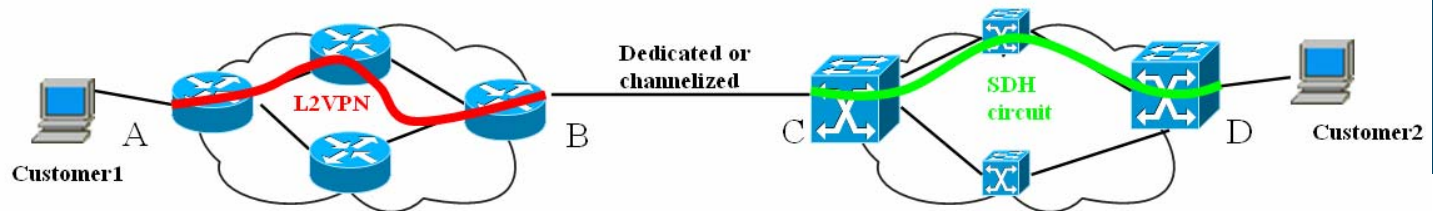
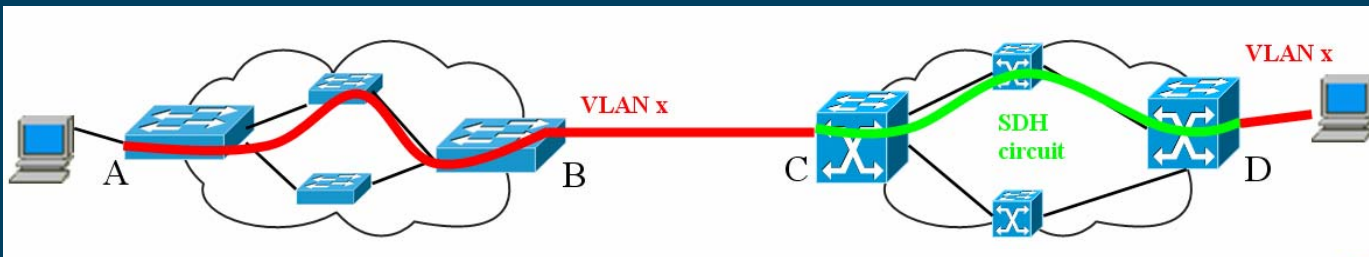


Integration of technologies

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- Evaluating the implementation implications and testing a number of scenarios

SDH	X			
MPLS VPNs	X	X		
PIP	X	X	X	
GE/10GE	X	X	X	X
	SDH	MPLS VPNs	PIP	GE/10GE





Monitoring

- Inter-domain monitoring system must
 - Troubleshoot in case of failure
 - Provide concatenated monitoring data of the quality of the end-to-end service
- Working together with relevant GN2 project activities (JRA1 and JRA4)
 - JRA3 will provide technology-specific monitoring data at L1-2 as well as topology data
 - JRA1 will provide monitoring data management and visualization
- Minimum requirements for monitoring
 - Offered capacity
 - “errors” \leq BER, error counter, errored-seconds
 - “availability” \leq up/down info, unavailable-seconds
- Mapping errors to BoD circuits



Implementation

- Focus on a prototype implementation of the IDM
- Following the Web-services paradigm
 - Each component of the system is implemented as a Web service
 - Interfaces are defined between IDMs, the IDM and the DM of a domain, the DM and the technology proxy within a domain
 - Using Java, MySQL
- Implementation is in initialization phase
 - Communication and message forwarding services will be adopted from relevant activities within GN2



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Liaison activities

- We are looking at:
 - VIOLA (<http://www.viola-testbed.de/>)
 - Testbed
 - ARGON (Allocation and Reservations in Grid-enabled Optical Networks)
 - DRAGON
 - Network Aware Resource Broker (NARB)
 - OSCARS-BRUW projects
 - MUPBED, hopefully also NOBEL
 - HOPI- GLIF
- Working on a Common Service Definition for e2e circuit oriented services
- Joint workshops and meetings in November & December