



Grid Initiatives & Networking in Romania

A Modern R&D Infrastructure for Advanced
Grid Computing

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Agenda

- National context in Grid Computing & Networking
- Grid Computing Activities in Romania
 - RODICA Collaboration
 - SEE-GRID, EGEE
 - EquiPoly
 - The EU-NCIT FP6 Project
 - GRID Summer School
- Outlook



National Context – RoGrid

RoGrid consortium

- Aims to promote a strategic vision in the field of Grid Computing
- Coordinate the implementation of this programme at the national level

The agreement was signed on May 17th 2002 by:

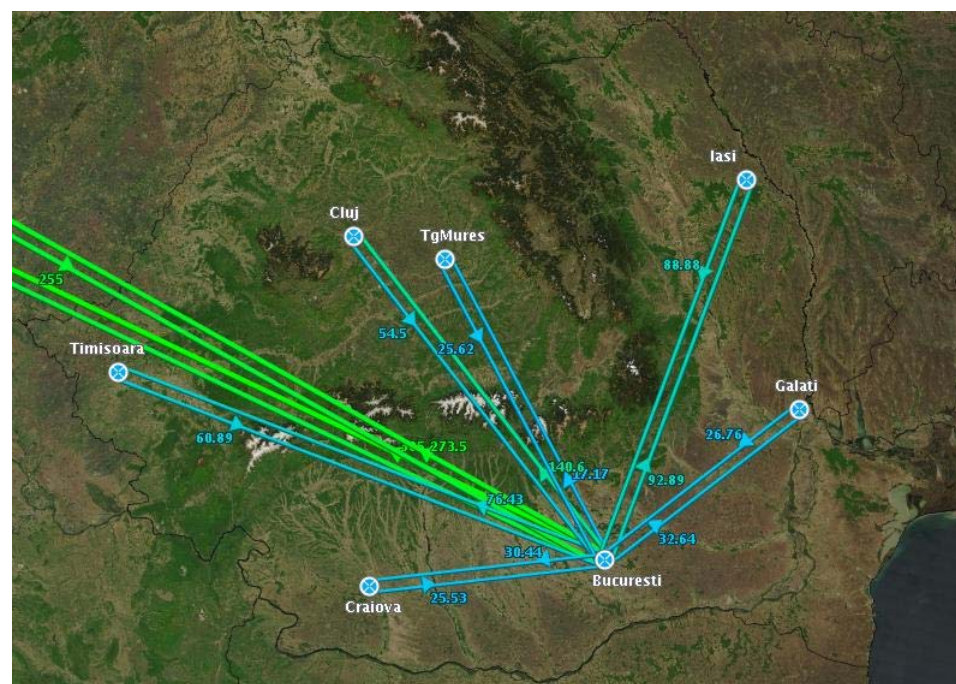
- The National Institute for R&D in Informatics – I.C.I.
- University Politehnica of Bucharest
- University of Bucharest
- Horia Hulubei National Institute of Physics and Nuclear Engineering – IFIN-HH
- The National Institute for Aerospace Research "Elie Carafoli" – INCAS





Academic Networks

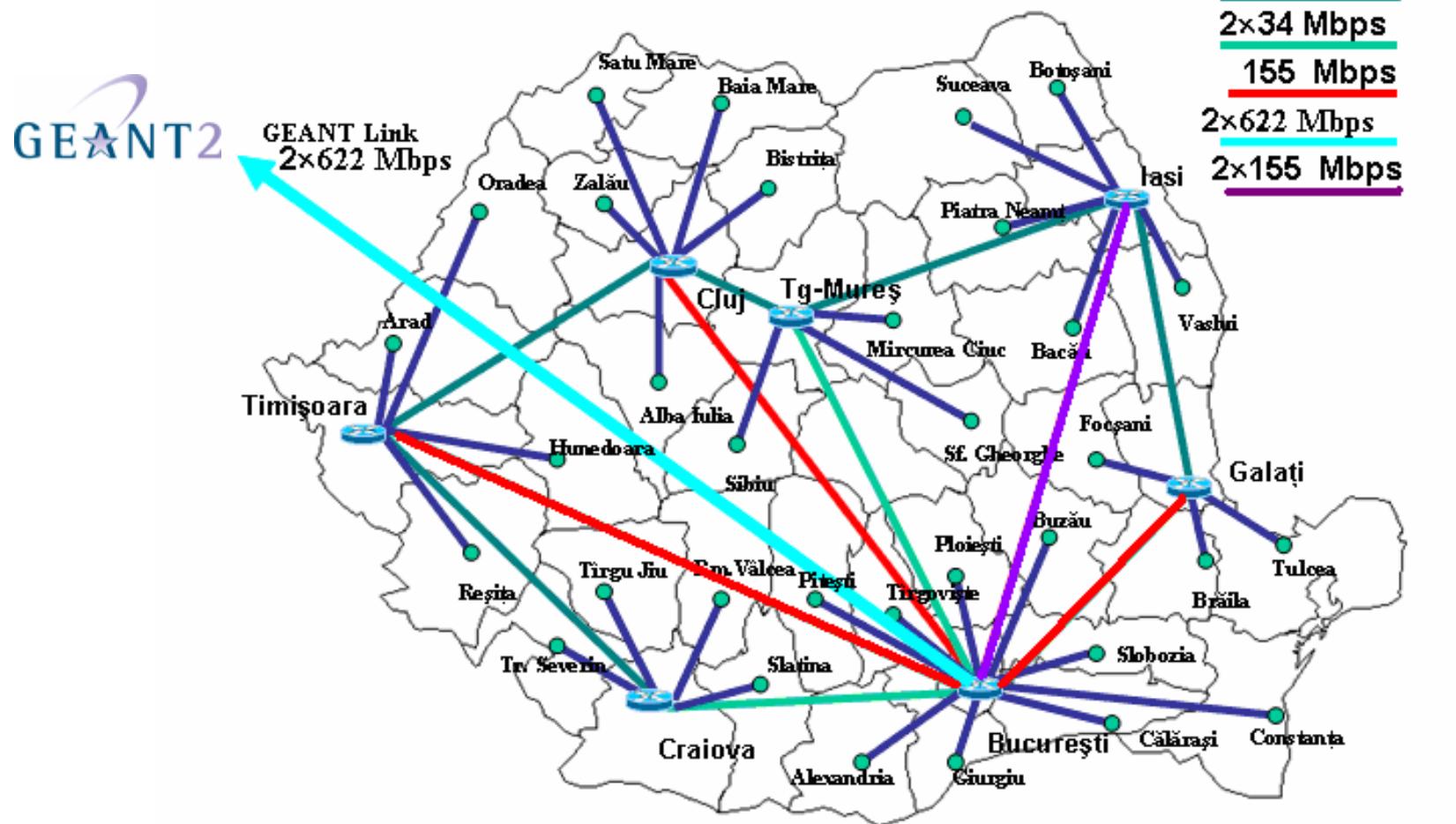
- RoEduNet (Romanian Higher Education Data Network) provides connectivity to about 610 institutions
 - Universities
 - High-level education institutes and research institutes
 - High schools, elementary schools
 - Governmental institutions as well as NGOs
- The RoEduNet backbone
 - Operates at 2x34 Mbps and 2x155 Mbps
 - Connects 7 NOC situated in the cities with large universities
- The uplink to GÉANT is 2x622 Mbps





RoEduNet Topology

- Level 0 has a star topology with 7 NOCs
- Level 1 is formed of 33 PoPs





RoEduNet Improvements in 2005

- Link to GEANT upgraded from 622Mbps to 2x622 Mbps
- Link to Iasi upgraded from 155 Mbps to 2x155 Mbps
- Link to Timisoara upgraded from 34 Mbps to 155 Mbps
- Link to Galati upgraded from 34 Mbps to 155 Mbps
- Link to Craiova upgraded from 34 Mbps to 2x34 Mbps
- Link to Targu Mures upgraded from 34 Mbps to 2x34 Mbps
- All links to POP upgraded from 2 Mbps to 10 Mbps
- The Bucharest Gigabit MAN is now extended
 - It is based on 1Gbps switches and dark fiber owned by RoEduNet
 - It gives the research institutions in Bucharest the possibility of connecting at 1Gbps



RDS – National Network

RDS – Romania Data System

- Network length 9000km





Optical Fiber Backbone – CFR

- Implemented near railways
- Network length is 3530km
 - 2400km aerial
 - 1130km underground
- Extensions to improve national coverage
 - Another 1000km





SDH Backbone – CFR





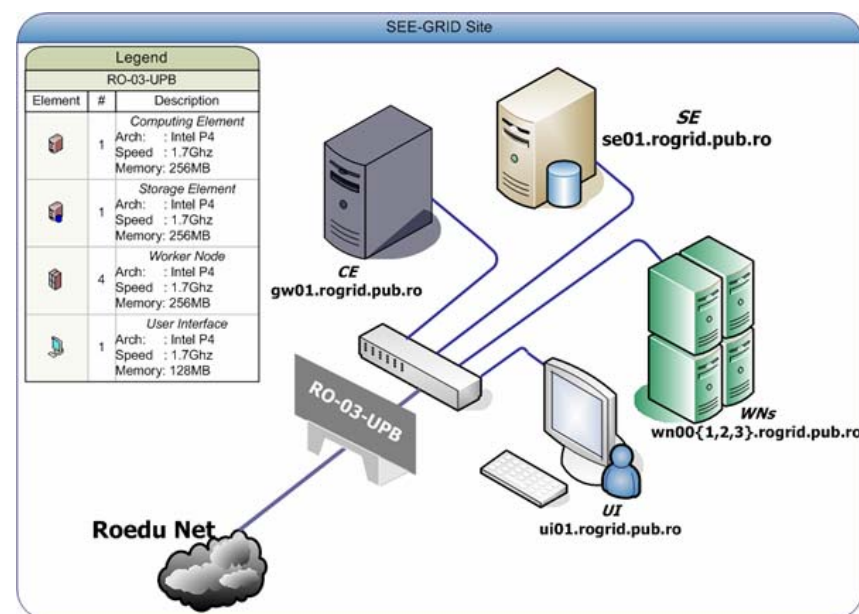


Romanian Distributed Collaborative Architectures (RoDiCA)

- RoDiCA is a collaboration consortium formed by CERN, Caltech (H. Newman & I. Legrand) & the NCIT (UPB)
- Main research and development targets:
 - Distributed dynamic network services
 - Optimization algorithms for complex distributed systems
 - Development of collaborative applications and videoconferencing, high performance networking
- Supported by the DoE, NSF, and Romanian Government
- Website: rodica.pub.ro
- Collaboration projects include:
 - MonALISA – MONitoring Agents in a Large Integrated Services Architecture
 - DIAMOnDS – Distributed Agents for MObile & Dynamic Services
 - MONARC2 – simulation framework providing a design and optimization tool for the LHC experiments
 - GridDT – aims to improve performance in TCP transfers

South Eastern European GRid-enabled e-Infrastructure Development

- Goals of the SEE-GRID project:
 - Strengthening of the bonds among the scientific communities of SE Europe
 - Support overall European research initiatives in the fields of high performance computing, storage and application sharing over high bandwidth networks
 - Development of a unified distributed eScience platform
- As a member of the RoGrid Consortium, the National Grid Initiative in Romania, Politehnica University of Bucharest actively participates in the SEE-GRID (2) and EGEE (II) projects



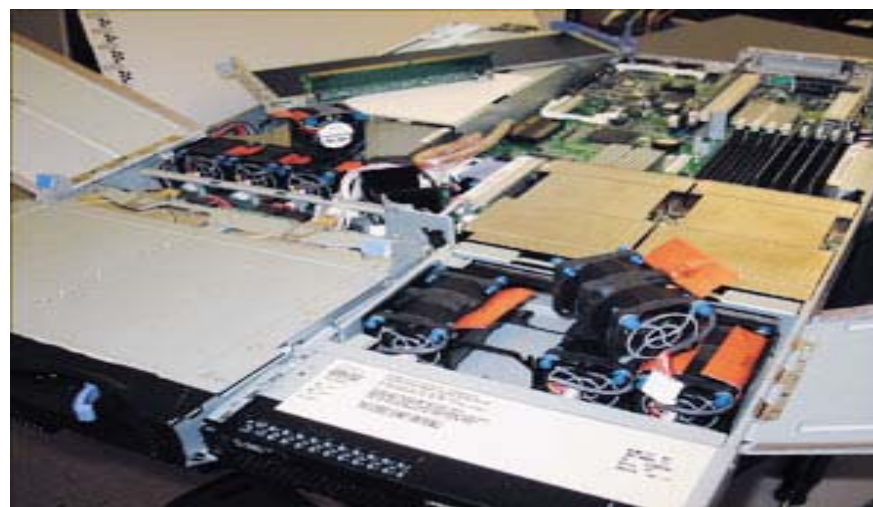


- Goal: provide a modern R&D infrastructure for Grid computing
- The IBM Equinox program identifies & supports student and research communities starting visible IT projects
- Politehnica University Bucharest has been included in the group of twenty-one universities involved in the program
- The IBM grant consist of xSeries entry-servers
- The Computer Science and Engineering Department will use the EquiPoly infrastructure to:
 - Develop a cluster based on xSeries servers and Linux
 - Develop Middleware software for Clusters
 - Conduct research on optimization algorithms for distributed systems
 - Research distributed dynamic network services and the development of collaborative applications



EquiPoly

8 IBM x336 dedicated servers





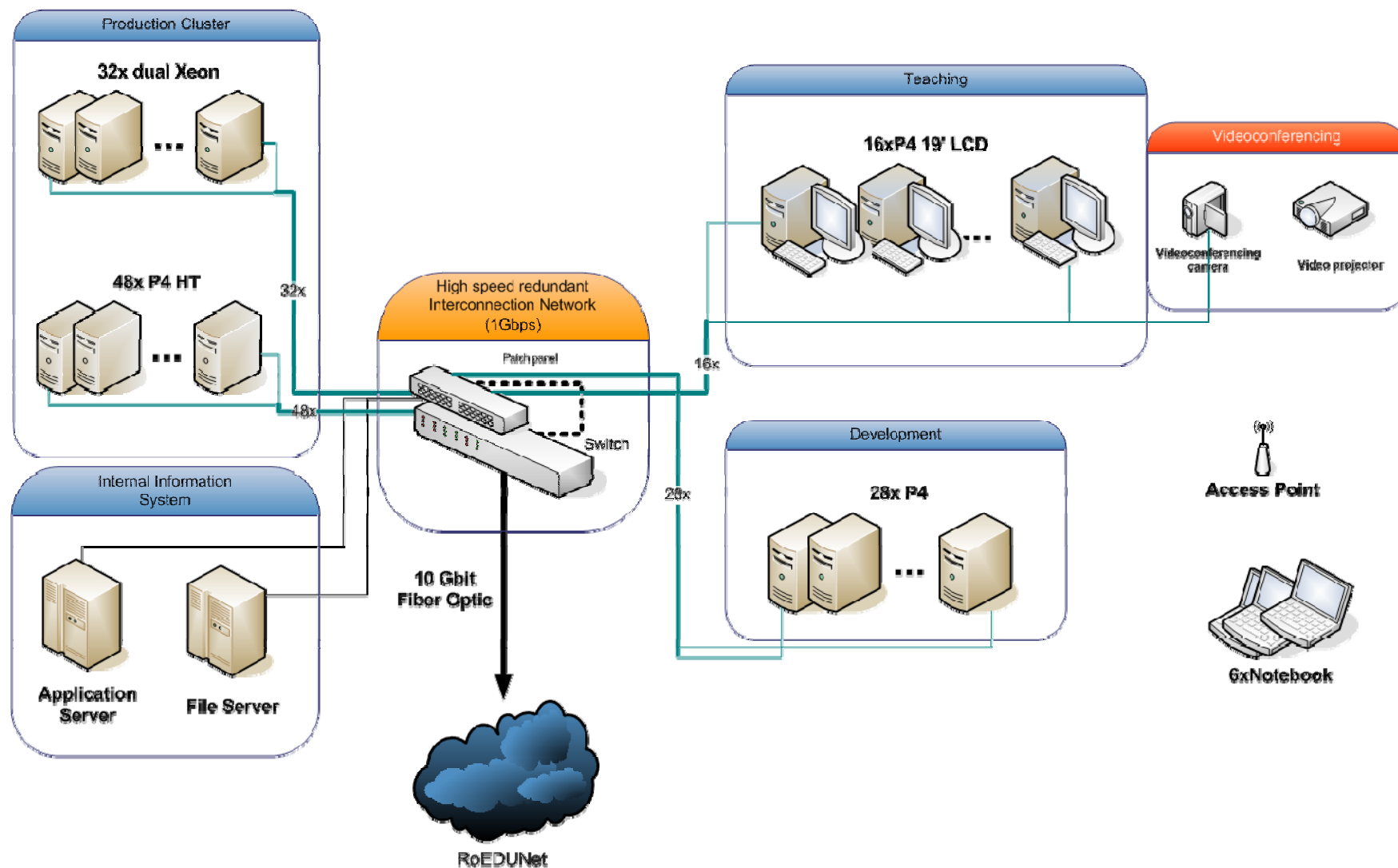
The EU-NCIT FP6 Project

Strategic objectives:

- Reinforcement of the S&T potential in .ro
- Provide know-how and experience in elaborating and coordination of proposals and projects
- Strengthen the research within the Romanian National Center for Information Technology in the following priority areas:
 - GRID based systems for solving complex problems
 - Semantic based knowledge systems
 - eLearning
 - Collaborative (mobile) working

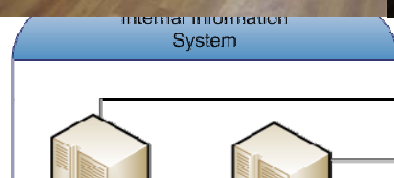


EU-NCIT Cluster Site





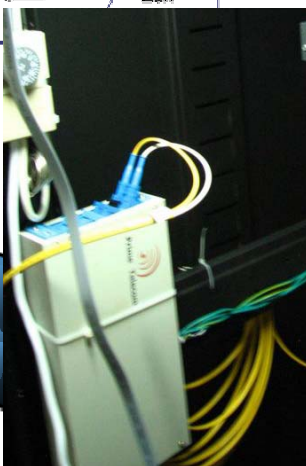
EU-NCIT Cluster Site



10 Gbit
Fiber Optic

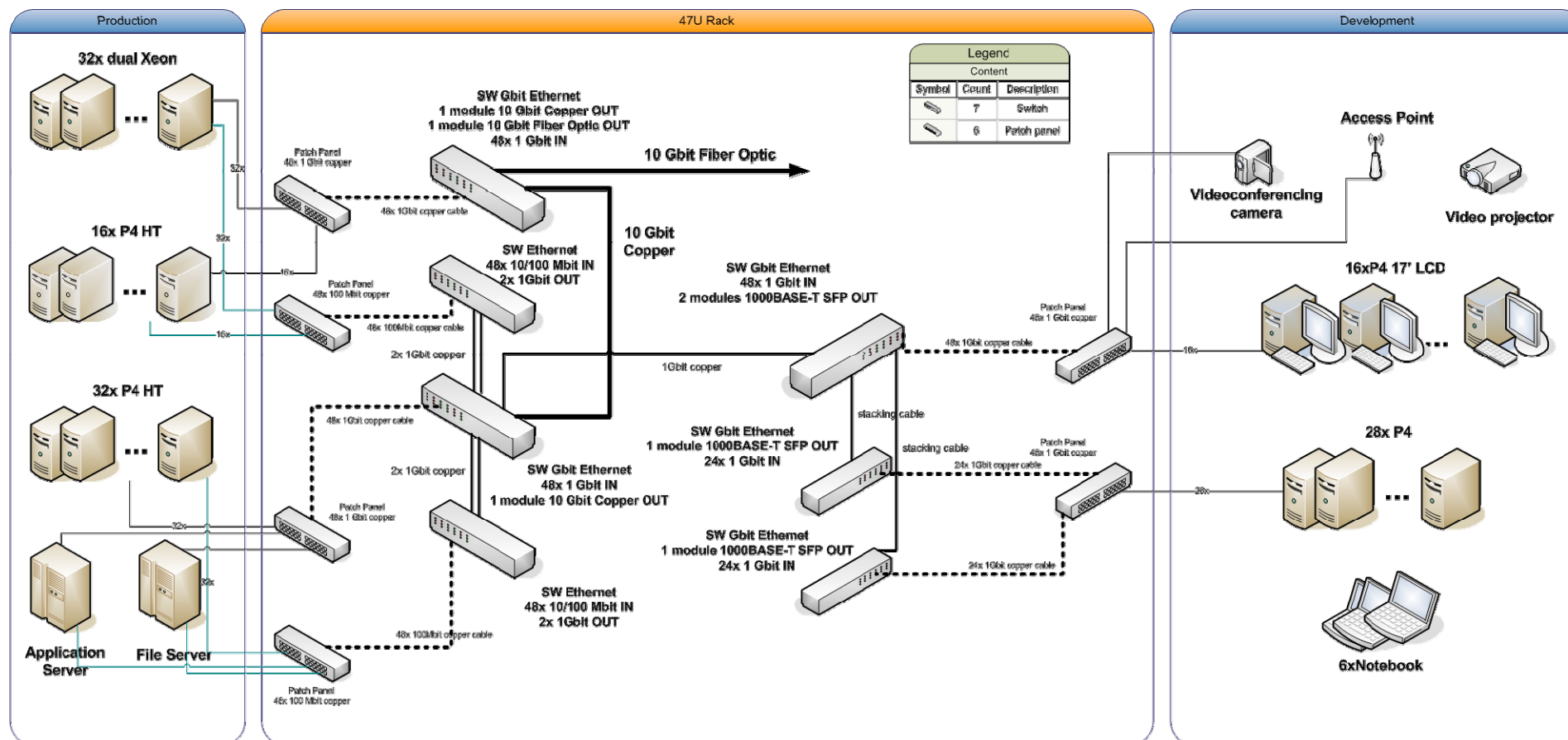


RoEDUNet





EU-NCIT Cluster Site Architecture





EU-NCIT Cluster Resources

- System characteristics:
 - 147 processors
 - 115 nodes organized into several groups:
 - One computing cluster with 32 dual Xeon processors
 - One high throughput cluster with 48+16 Intel P4 HT processors
 - One application testbed and training cluster with 16 workstations with P4 HT processors
 - One storage server with 1TB of space, in RAID configuration
 - One main application server with 4 GB RAM and dual Xeon processor
- Connection to RoEduNet using a 10Gbps link
- Total main memory of 230 GB
- A 45 TB storage system distributed on cluster nodes
- The interconnection network is a 1Gbps Gigabit Ethernet
- Additional 100Mbps Ethernet is used for redundancy
- The CISCO switches that form the backplane work at 32 Gbps
- Total power consumption is estimated at about 19kW



Grid Summer School

- The UPB Grid Training Initiative
- Yearly event (2006 was 3rd Edition)
- Targeting mainly an undergraduate audience
- Focuses on
 - Helping students grasp the fundamentals of Grid technologies in a hands-on approach
 - Select, by a quantitative and qualitative comparison, the Grid components best-suited for our future Grid projects
 - Select and recruit the most skilled attendants for future Grid projects



Outlook

- RoEduNet future development:
 - Upgrading the link to GEANT (10Gbps – Winter 2006)
 - Acquiring a back-up link to GEANT
 - Increasing the capacity of the links to the NOC's (10Gbps – Spring 2007)
 - Participation in new NREN related projects
 - Implementing MPLS
- RoGrid strategy:
 - Install a 10Gbps link UPB – RoEduNet – IFIN (done)
 - Develop a high performance cluster for GRID application at UPB (in progress)
 - Upgrade the network with 3-4 local centers at 2.5 Gbps
 - Experimental implementation of 3-4 GRID specific applications at the national level



Thank you

Q & A