ROMANIAN EDUCATION NETWORK

RoEduNet

RoEduNet

Photonic Network for Research and Education

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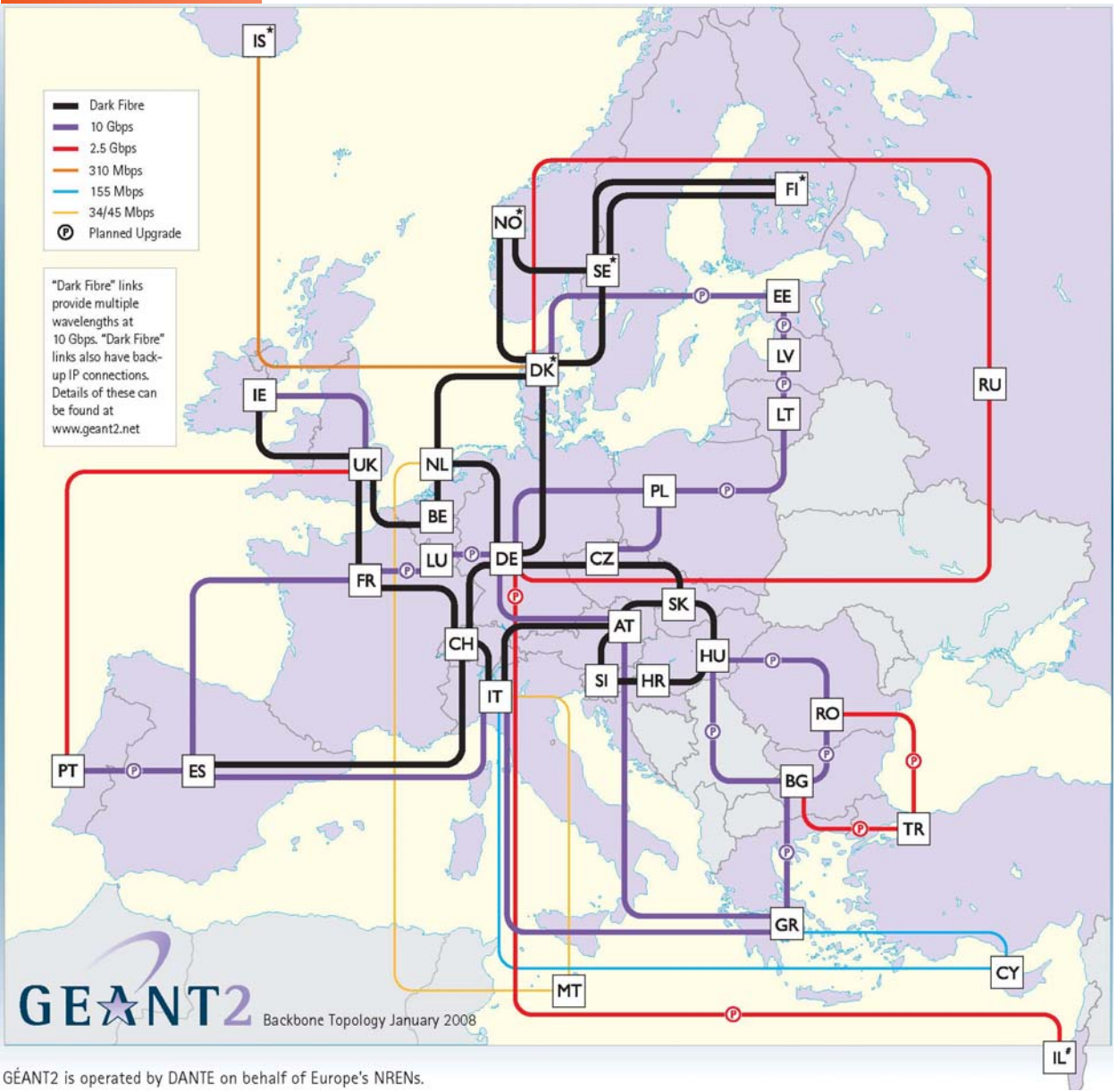
Agenda

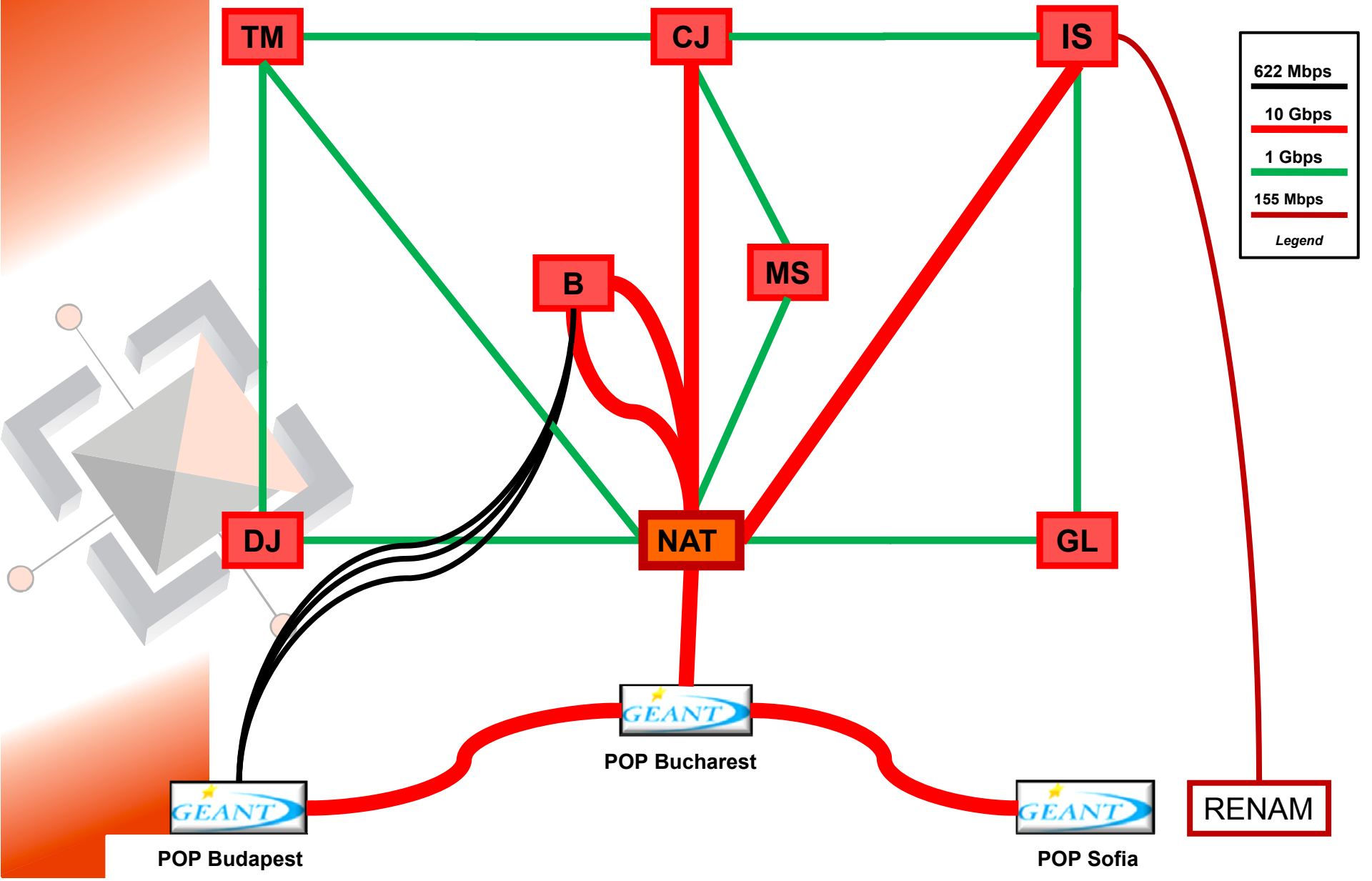
- GEANT network and RoEduNet
  - Connectivity of the Romanian NREN
- RoEduNet – Network Topology
  - National Level Topology
  - Regional Level Topology
- RoEduNet2 – Photonic Network
  - Topology
  - Services
  - Solutions
- Future plans

RoEduNet in GEANT

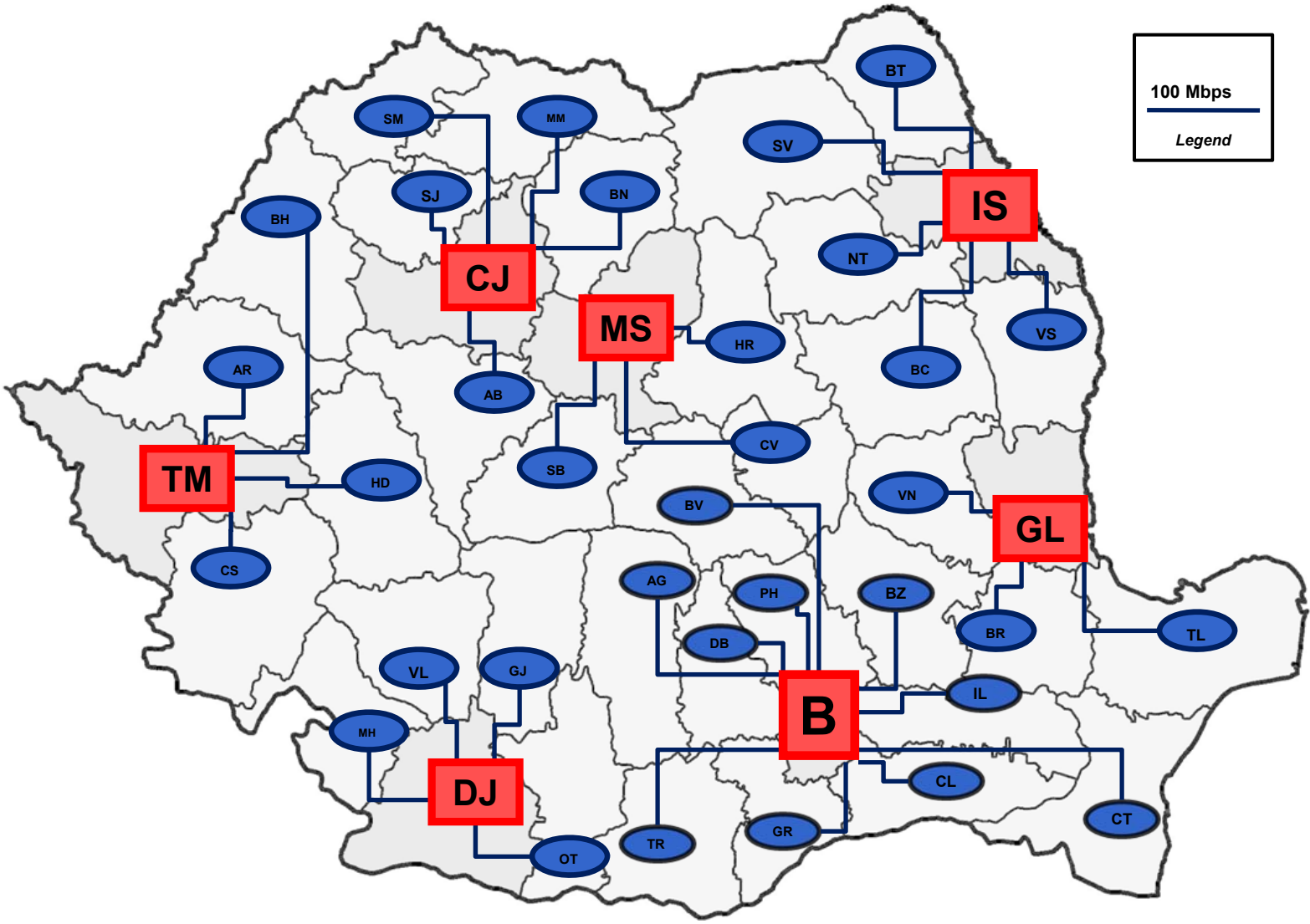


- Connectivity
  - To GEANT POP in Bucharest
  - 10 Gbps to GEANT POP (August 1st 2008) – 6 m optical patch cord
  - Resilience for Bucharest POP available since August 21
  - Backup 3xSTM4 (to be uninstalled)
- Solution for EE – lambda (not in the DF cloud)

RoEduNet National Level Topology



RoEduNet Regional Level Topology

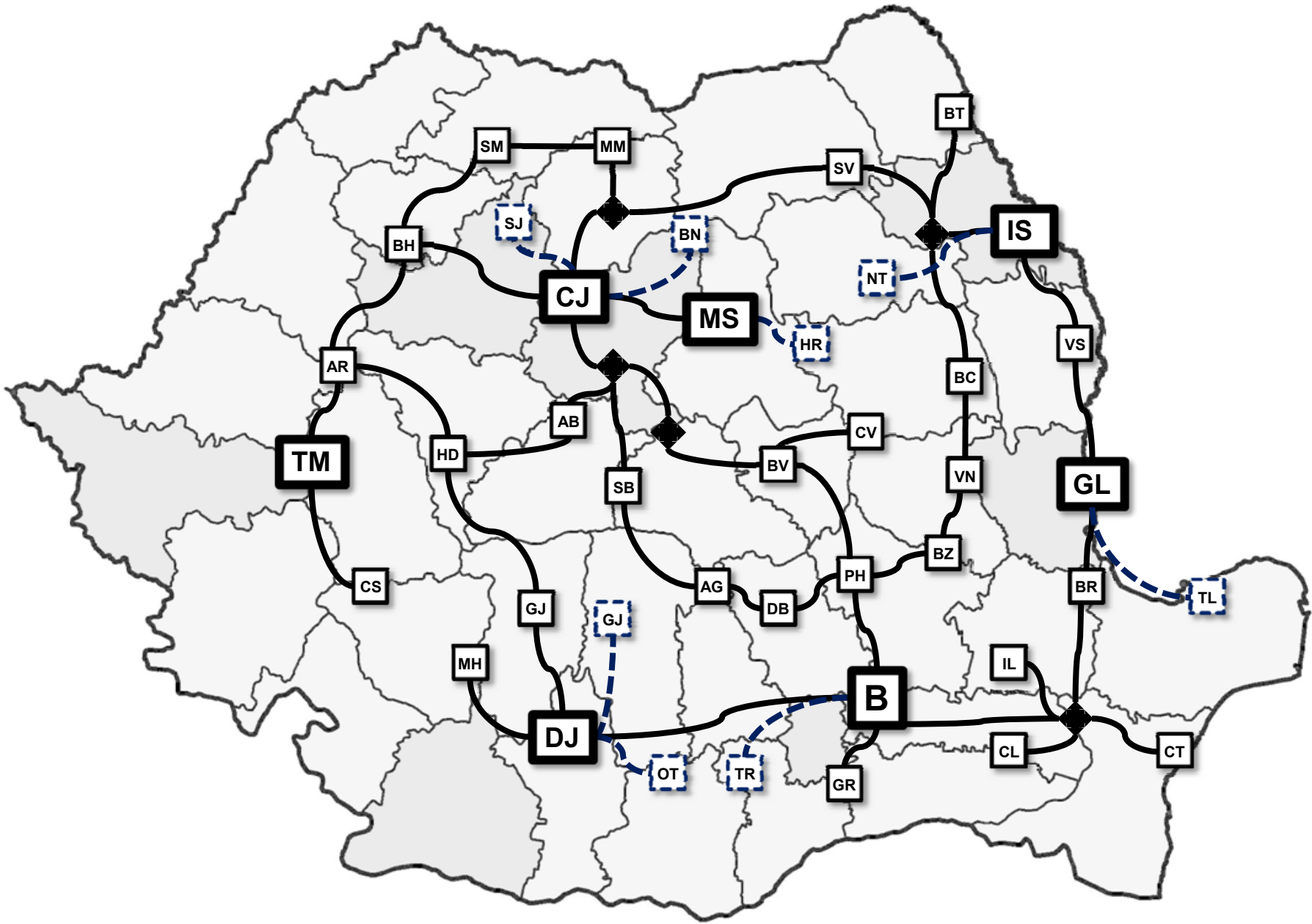


RoEduNet2

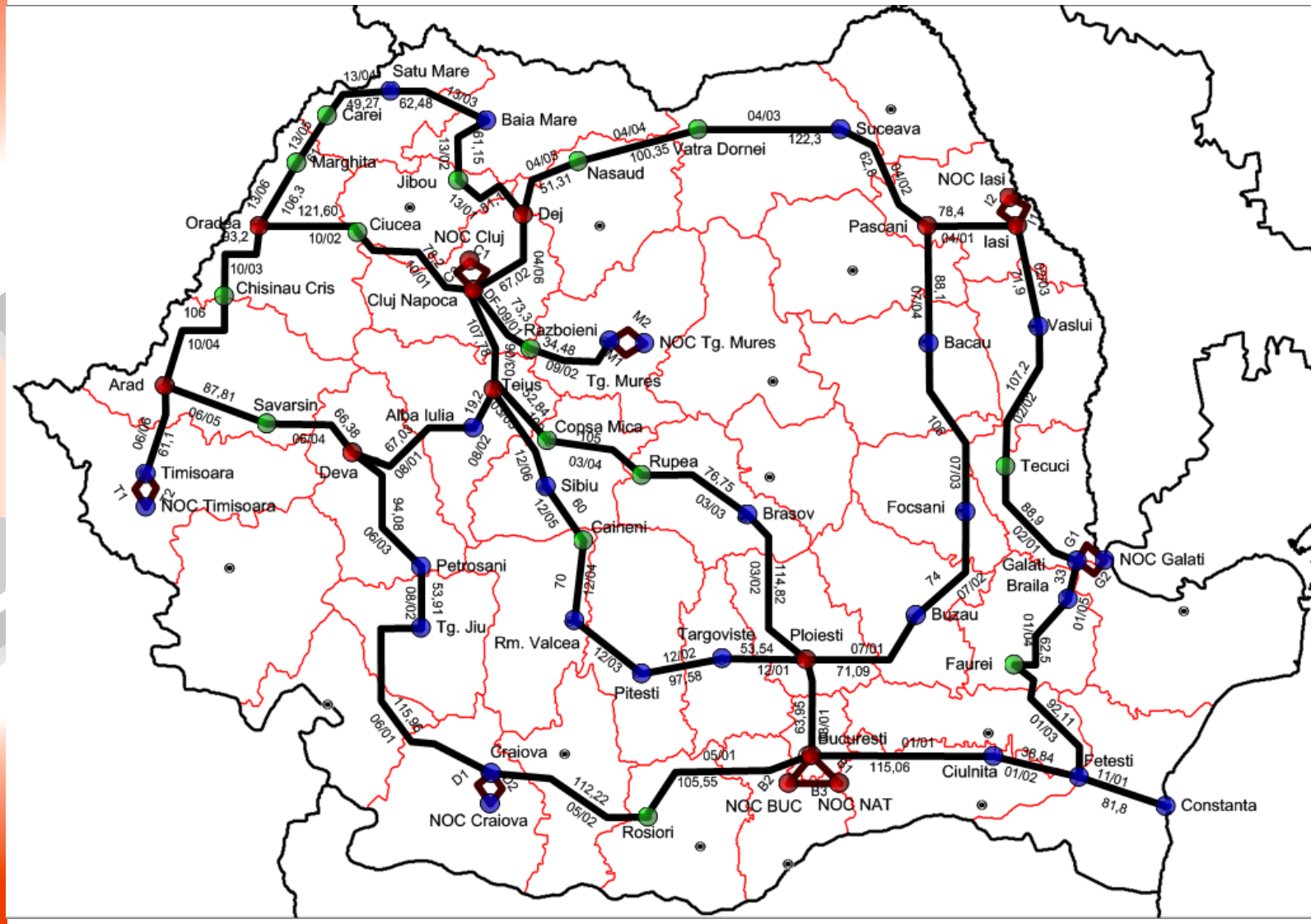
- RoEduNet2 = DF based national infrastructure for 10 years
  - Access to one DF pair on the national network of “Telecomunicatii CFR”
  - Access to high capacity circuits based on DWDM technology and to a scalable optical network to provide necessary circuits for the national network for about 10 years

- Major milestones of the project
  - *March 2006* – bilateral accord between the Ministry of Education and Research and the Ministry of Transport has been signed – one pair of DF to be used for Romanian NREN
  - *November 2006* - the feasibility study for the network has been finished by RoEduNet
    - DWDM technology to be used
  - *December 2006* – bilateral contract between RoEduNet and “Telecomunicatii CFR” has been concluded
    - Access to more about 4800 km of DF
    - RoEduNet will provide necessary equipments to light up the fibre (DWDM equipments)
  - Q1/2007 – IP equipments installed in RoEduNet sites to support the new capacities to be provided by the photonic network
  - *July 2008* – contract signed for optical equipments – 56 locations
    - Installation to be done by November 2008

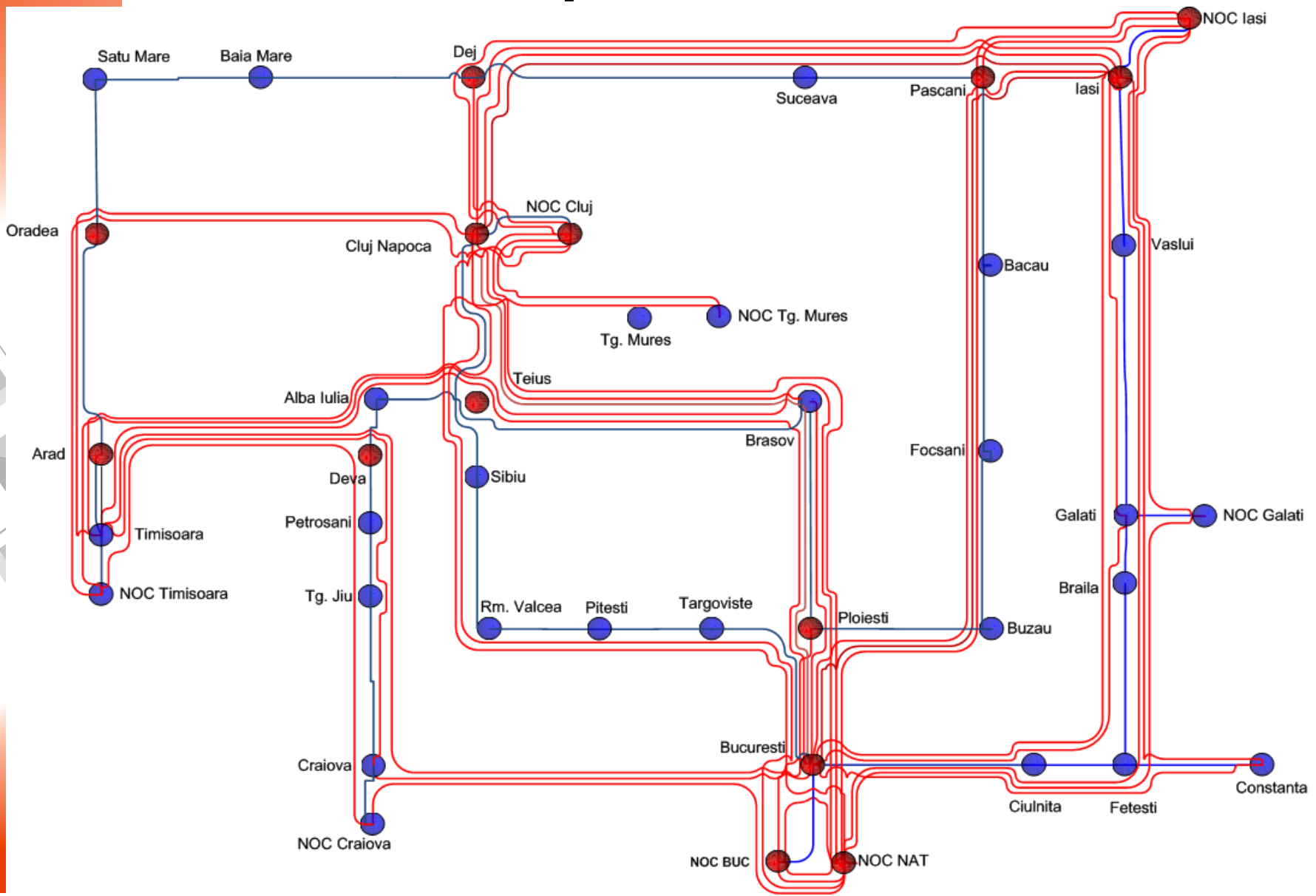
RoEduNet2 – Planned architecture



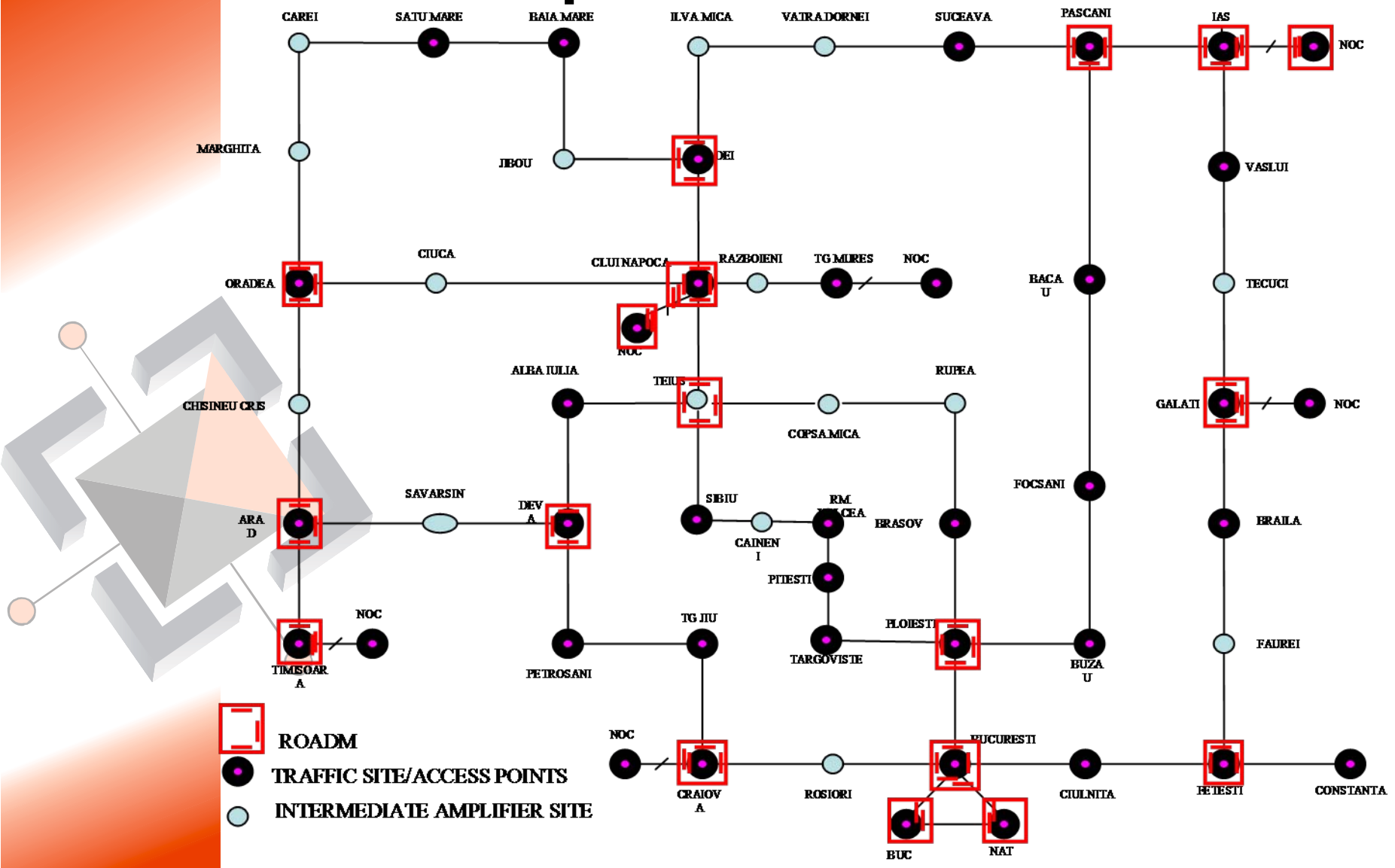
RoEduNet2 – DWDM for the 1st Phase Q4/2008



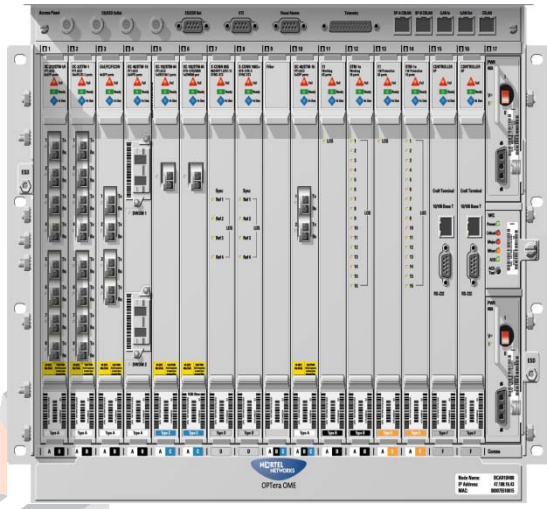
RoEduNet2 – Lambdas for the 1st Phase Operational Q4/2008



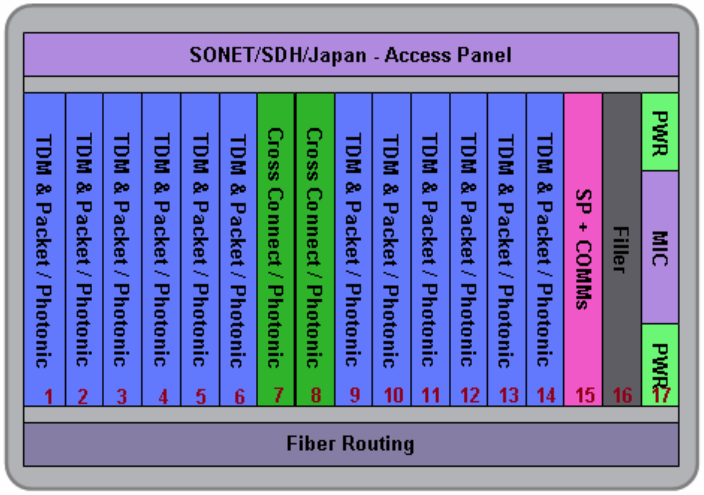
RoEduNet2 – Sites for the 1st Phase Operational Q4/2008



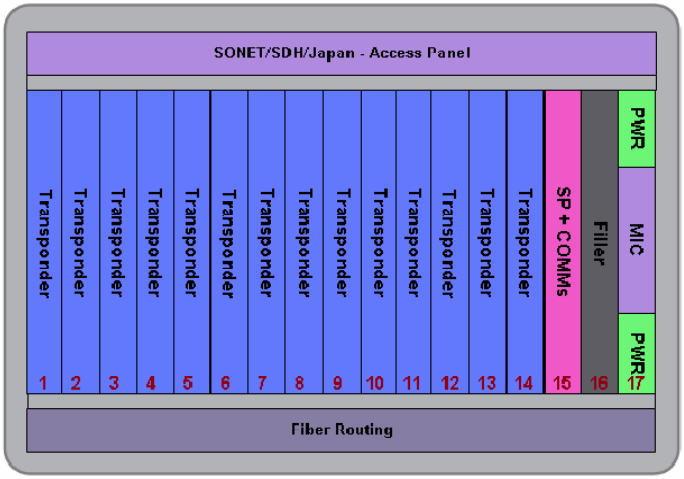
RoEduNet2 – ROADM for the 1st Phase



- OME 6500BB

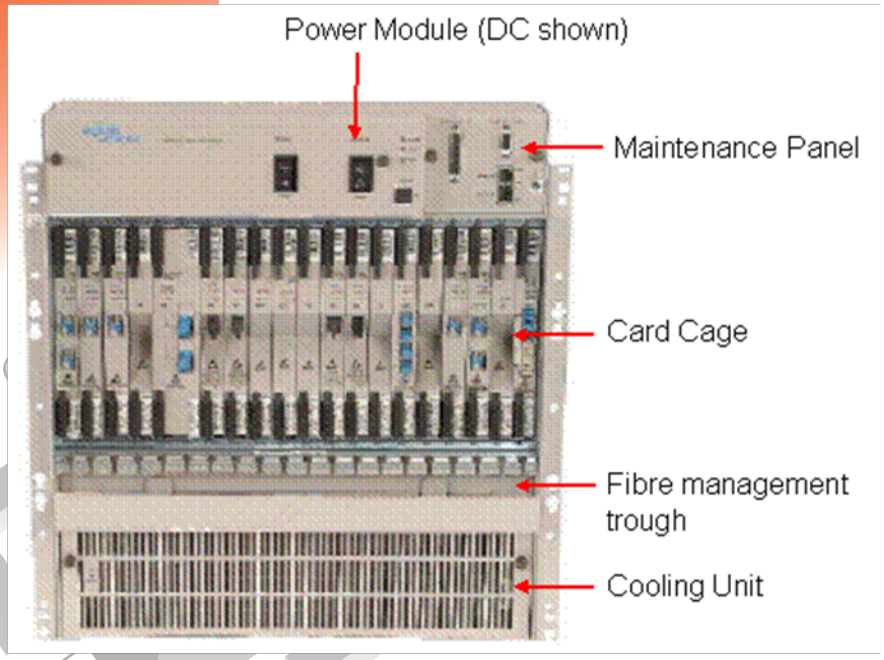


- OME 6500 Shelf Layout

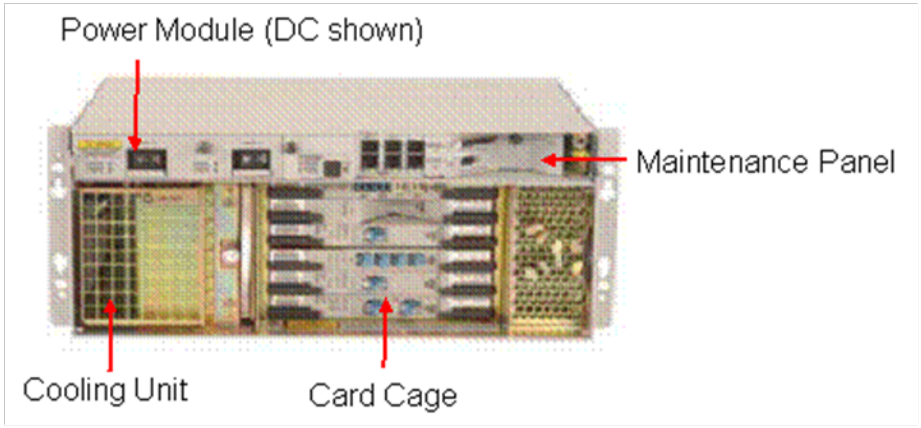


- OME 6500 BB Shelf Layout

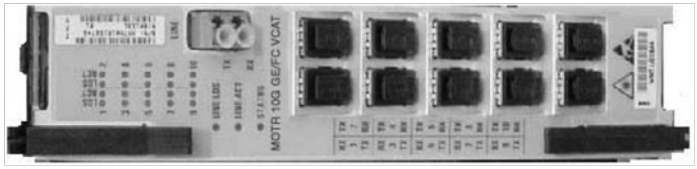
RoEduNet2 – OADM for the 1st Phase



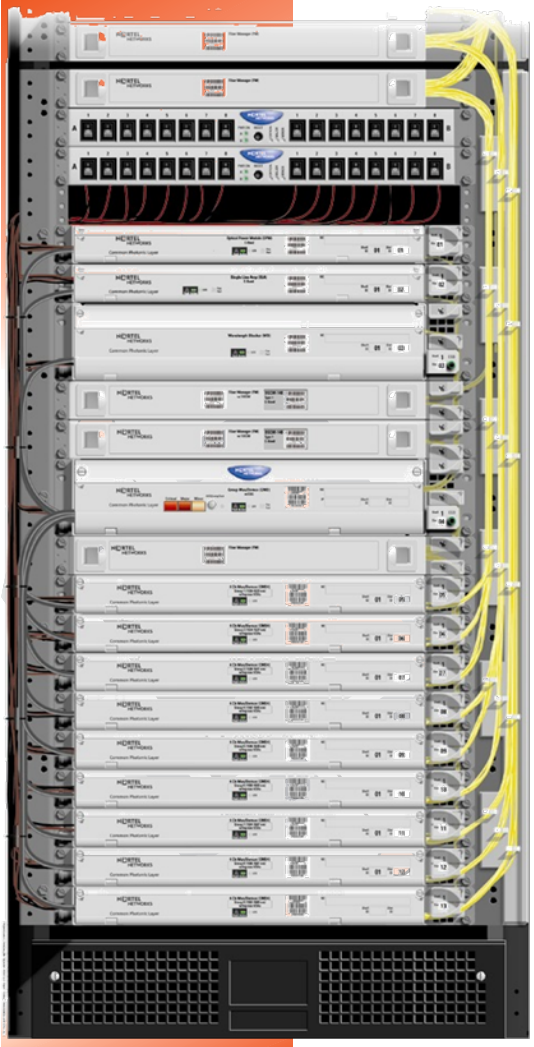
- OM5200 shelf layout



- **OM5100 shelf layout**



RoEduNet2 – Photonic Site



- Main advantages of the solution:
  - Separate Common Photonic Layer – CPL
  - ROADM enabled solution:
    - Reconfigurable lambda path
  - Electronic compensation of dispersion for ROADM sites
    - Automatic lambda reconfiguration paths
    - Moving any lambda within the network as long as the total length does not exceed 1500 km
    - Lambda on demand available – could be offered as service
  - Resilience for each location (except for one NOC – tackle for a solution)

RoEduNet2 – Numbers – for the 1st Phase

- Dark Fiber
  - Total length: 4238.8 km
  - Number of segments: 46
- Sites:
  - In the premises of Telecomunicatii CFR: 48
  - RoEduNet: 8 – redundant connections to the sites of Telecomunicatii CFR
- Type of sites:
  - ROADM: 18
  - ADM: 23
  - Amplifiers: 15
- Lambdas:
  - 10G = 19
  - 8 x 1G = 41

Future Plans - Infrastruture

- Install the local loop (metro fiber from the site of Telecomunicatii CFR to RoEduNet POPs) for all cities where Optical circuits are installed
  - 18 cities in Q4/2009 – Q1/2009
  - 15 cities in Q2 – Q4/2009
- Complete the network with CDWM technology for stub POPs – to be upgraded to DWDM later
- Upgrade the metropolitan area network in Bucharest to 10 Gbps resilient on each MetroPOP (15)
- Upgrade the data centers in each NOC to reach conformity with international standards
  - At least 30 min on battery
  - At least 10 hours on power generator
  - Conformity with international standards
- Install new POPs – no necessary in the county capitals – for the sites where there are high demand for network traffic: planned POP at Magurele

Future Plans - Services

- HelpDesk 24x24, 7/7
  - started – working hours available 5/7
- Integrated monitoring services (NMS) and SLA monitor to be finished and integrated with TTS
- CSIRT – process started (www.csirt.ro) – to be accredited mid 2009 (in contact with TERENA CSIRT-TF)
- Security threads probes to be installed and countermeasures to be taken automatically - integrated with GEANT plans
- QoS – solutions from GEANT to be integrated (PERT)
  - Lambda on demand to be made available for the connected institutions

Conclusions

- DANTE POP in Bucharest installed in the National NOC premises
- 10 Gbps connection to GEANT with standard resilience (two links) in production
- 10 Gbps connectivity available for 3 NOCs: Bucharest, Iasi and Cluj Napoca
- 88% of RoEduNet2 national infrastructure to be finished in november 2008
  - IP equipments installed and operational
  - Photonic equipments ordered – process of installation started – to be finished in Q4/2008
  - Resilient local loops contracted for main sites (Bucharest, Galati, Iasi, Tg. Mures, Cluj Napoca, Timisoara and Craiova)
  - State of the art optical technologies based solution (CPL, ECD, ROADM)

Photonic Network for Research and Education

- Questions

- Thank you