



# *Introductory Remarks from One of the Hosts*

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## *Main workshop topics:*

- EC Communications on the ICT Infrastructures for e-Science
- Regional issues and their impact to the ERA structure

## *Other topics:*

- Data management
- Future of networking session
- Federated e-Infrastructures
- OGF and standardization
- Legal aspects of the e-Infrastructure in ERA



## *CESNET basic data*

CESNET (Czech Educational and Scientific Network)

- NREN in the Czech Republic

Not for profit legal entity

Association of Legal Entities (z.s.p.o.) . Members:

- 25 Universities
- Czech Academy of Sciences

55 staff members in Prague

More than 180 part-time universities and Academy of Sciences staff working on projects



## *Funding*

- Research plan: „Optical High Speed National Research Network and its New Applications“
- 2004 – 2010
- Funded by Ministry of Education, Youth and Sports of the Czech republic and association members
  - budgeted cca 14 Mil EURo/year

Research activity annual reports available

[\*www.ces.net\*](http://www.ces.net)



## *Research Plan Activities*

CESNET2 backbone network development

Optical networks

Programmable hardware

Network and traffic monitoring

Performance monitoring and optimisation

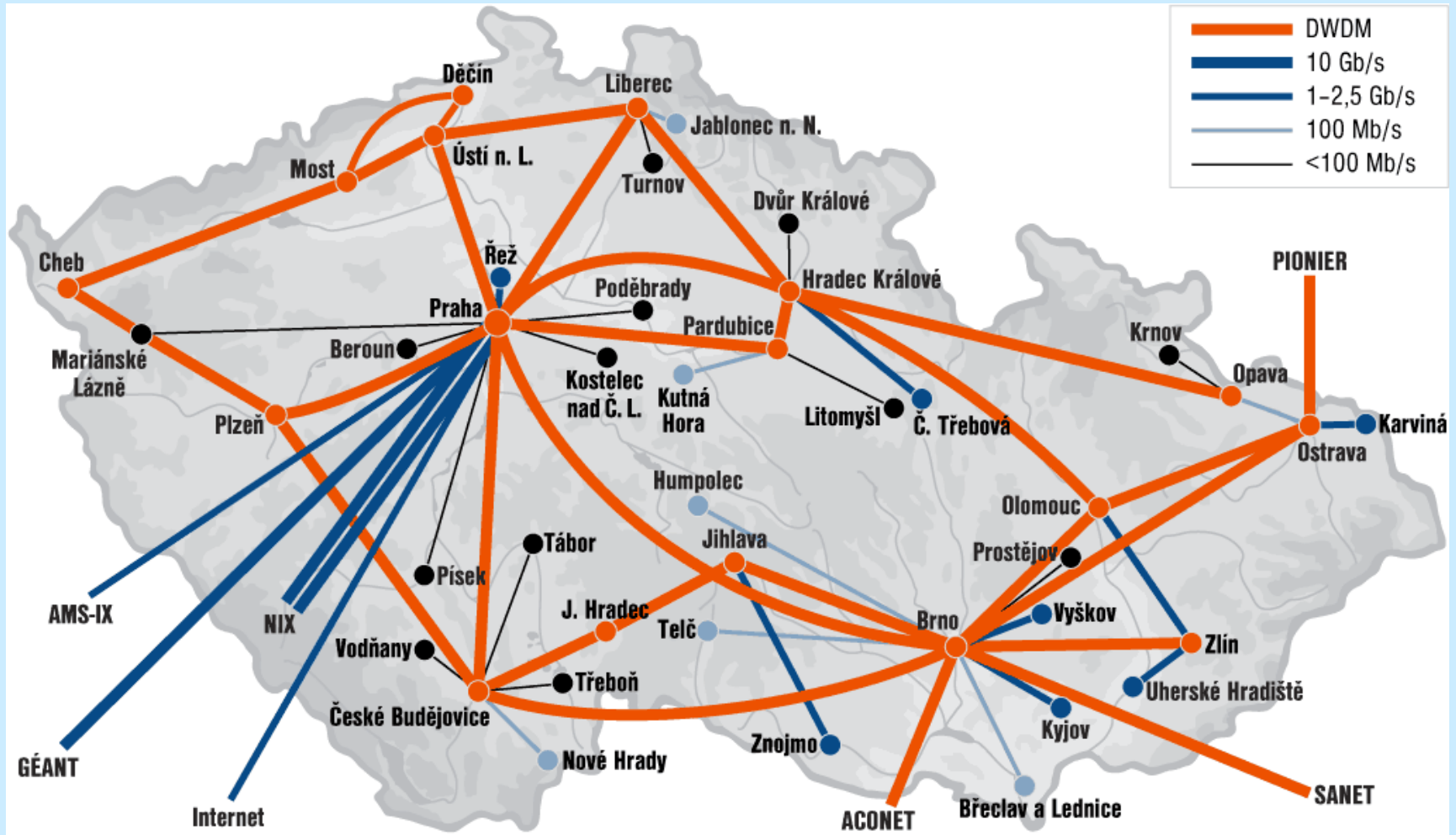
AAI and mobility

META Centre (Grid related activities)

Virtual collaborative environments

CESNET CSIRT

Applications Support

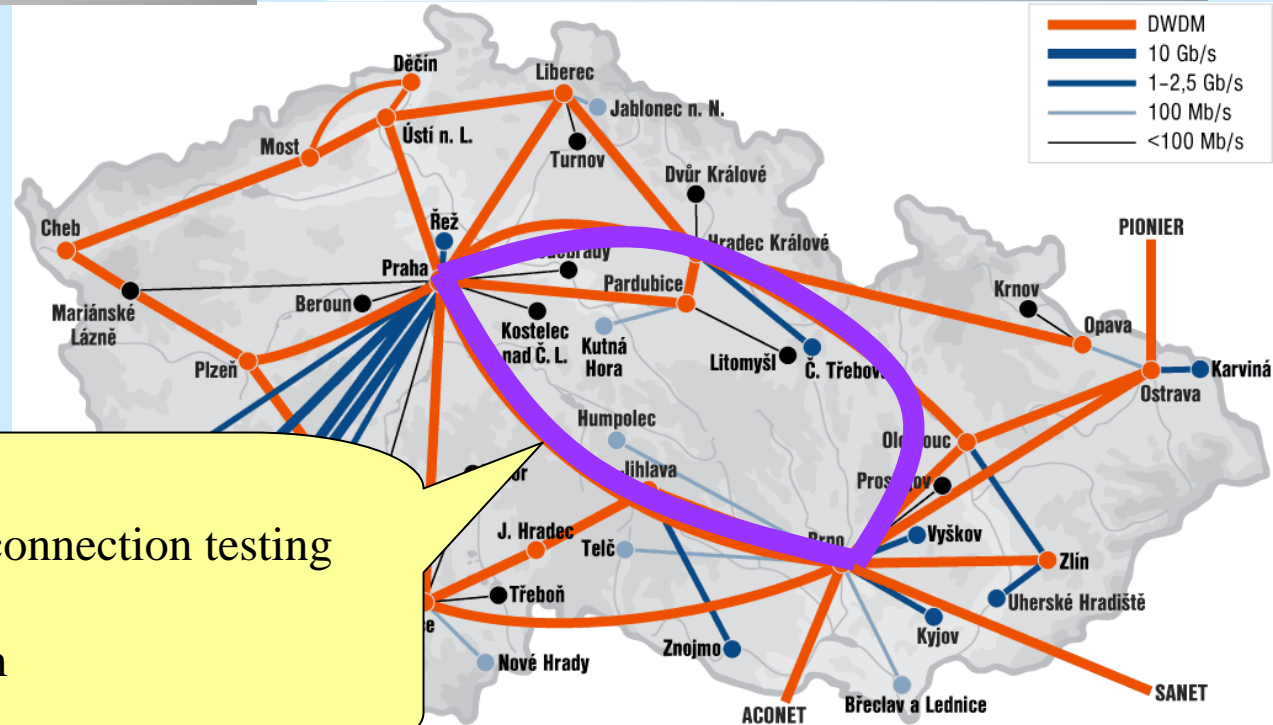


Topology of CESNET2+ Network

CESNET is a long-time Czech academic network operator and participant of corresponding international projects.

- Cesnet network interconnects academic institutions in CZ
- Users are universities, academies, secondary schools, selected hospitals, libraries, etc.

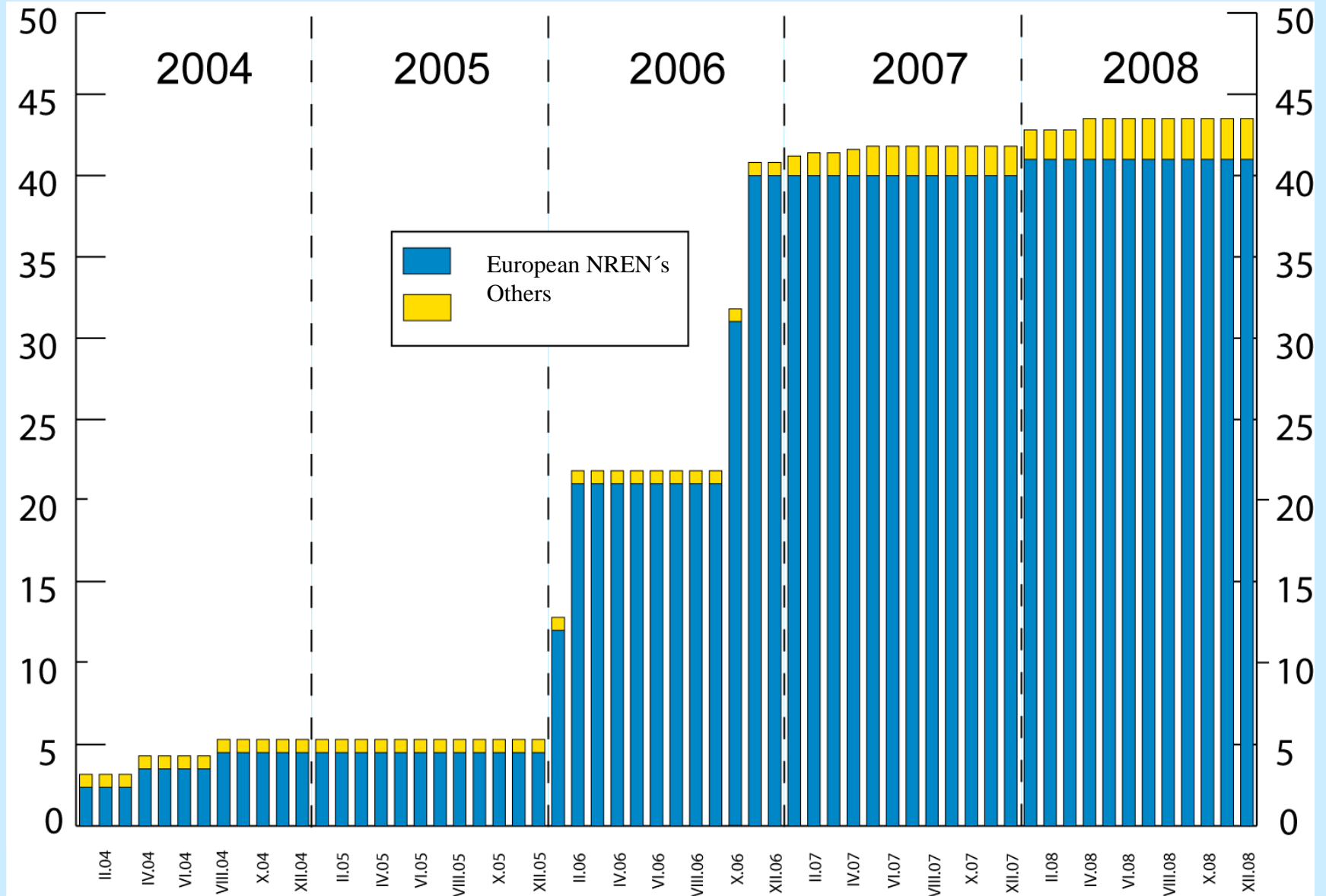
- Optical backbone is based on Cisco ONS 15454 DWDM technology
- Data network based on Cisco CRS-1 and Cisco OSR7600 routers



April 2009:  
 First long distance 40Gbps connection testing  
 between Prague and Brno  
 Distance: 300km and 460km  
 Cisco CRS-1 routers



# International connectivity of the CESNET2 (Gbps)



*Example of regional cooperation  
- cross border connection of NRENs*

**CESNET Cross Border Fibres (CBF)**

- Brno (CZ) - Bratislava (SK) since 2003
- Ostrava (CZ) - Cieszyn (PL) since 2004
- Brno (CZ) – Wien (AT) since 2006



## Open DWDM system 10G with using of CzechLight Amplifiers (CLA) - NIL solution

<b>CESNET2</b>	<b>Type of CLA</b>	<b>Number of CLA</b>	<b>Length (km)</b>
Brno - Bratislava	PB01	2	182
Ostrava – B. Biala (prepared change)	PB01F	2	105
Brno - Vienna	PB02	2	224

Total deployed CLA in CESNET2 and Experimental Facility up to May 2009	38
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# CBF triangle for reliability



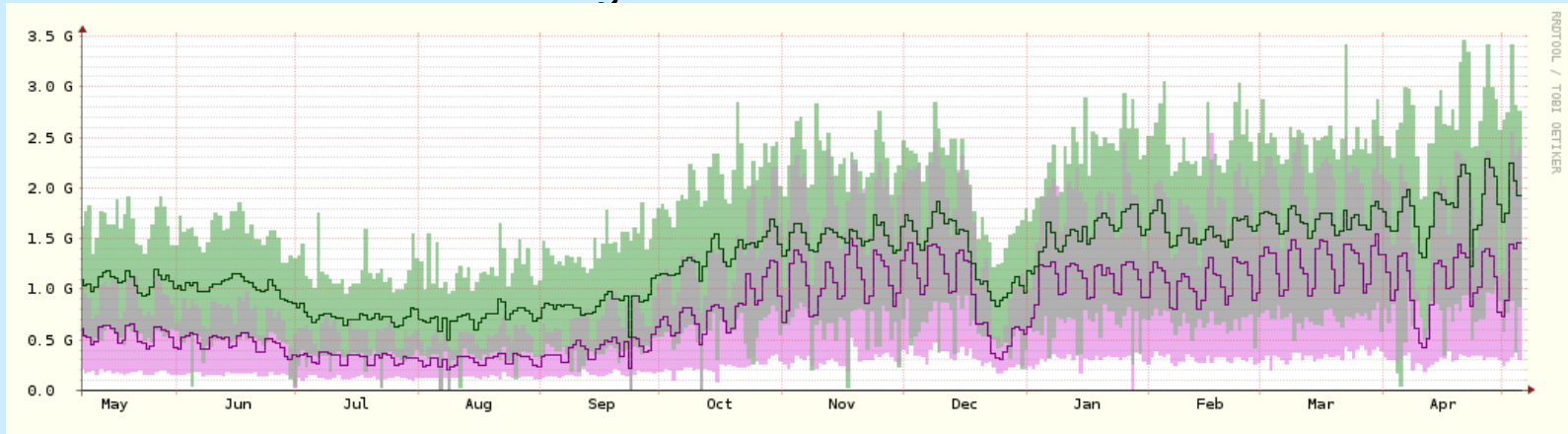
# CBF one year statistics

## Input bitrate

min=0.000  
 max=2.552G  
 avr=792.124M

## Output bitrate

min=0.000  
 max=3.456G  
 avr=1.281G



One year load of Brno - Vienna

author: Tom Kosnar, copyright: © 2004-2009 , CESNET a.i.e

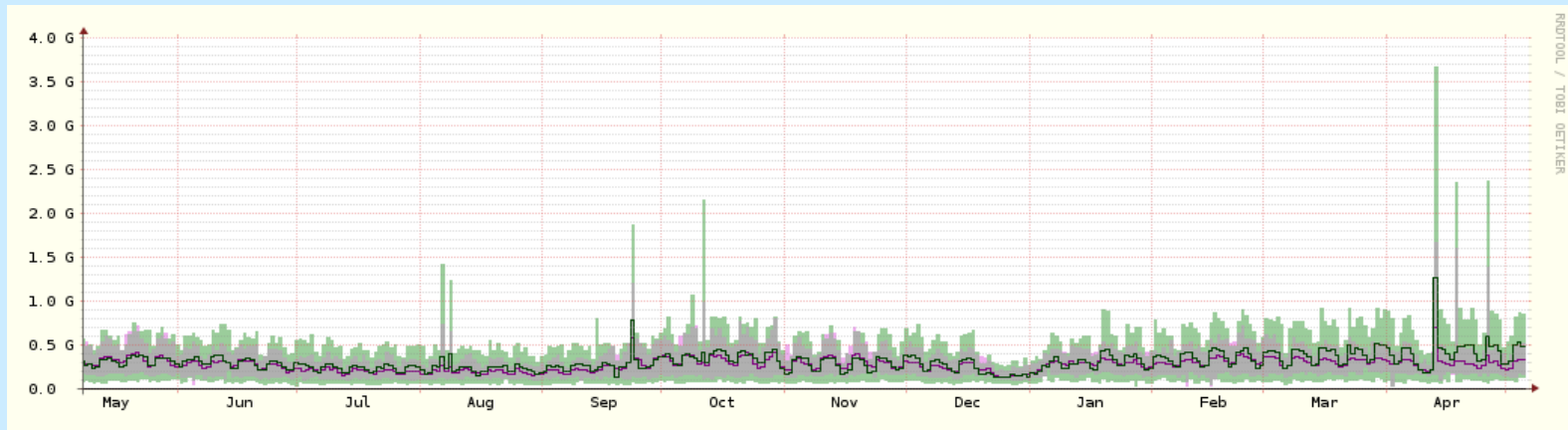
## Bit rates [bps]

### Input bitrate

min=12.421M  
 max=1.663G  
 avr=274.505M

### Output bitrate

min=7.633M  
 max=3.656G  
 avr=309.706M



One year load of Brno - Bratislava

author: Tom Kosnar, copyright: © 2004-2009 , CESNET a.i.e



Charles University – Carolinum, founded 1348



Charles Bridge – founded 1357



*You are invited today to dinner at 19:30 at*

*Restaurant and Beerhouse **Vojanův dvůr**,*

*U Lužického semináře 21, Prague 1*

*[www.vojanuvdvur.cz/en](http://www.vojanuvdvur.cz/en)*





Enjoy your stay in Prague!

# Links

- CBF triangle Press release is available on <http://www.ces.net/doc/press/2006/pr061106.html>
- IP traffic statistics Brno – Vienna are available on [http://www.cesnet.cz/provoz/zatizeni/ten155\\_mapa\\_static\\_output/Line\\_usage\\_Brno-ACONET.10min.current.html](http://www.cesnet.cz/provoz/zatizeni/ten155_mapa_static_output/Line_usage_Brno-ACONET.10min.current.html)
- IP traffic statistics Brno – Bratislava are available on [http://www.cesnet.cz/provoz/zatizeni/ten155\\_mapa\\_static\\_output/Line\\_usage\\_Brno-SANET.10min.current.html](http://www.cesnet.cz/provoz/zatizeni/ten155_mapa_static_output/Line_usage_Brno-SANET.10min.current.html)



Europe CBF in operation

(Stanislav Sima:Porta Optica Study Regional workshop,  
Kiev, October 11th, 2006)

Bratislava (SK) – Wien (AT) since 2002

Subotica (YU) – Szeged (HU) since 2005

Since 2006:

Frankfurt/Oder (DE) – Slubice (PL)

Como (IT) – Manno (CH)

Basel (CH) - Kehl (DE)

Kehl (DE) – Strasbourg (FR)

Enschede (NL) - Münster (DE)