



# PIONIER - POLISH OPTICAL INTERNET

I N F R A S T R U C T U R E F O R e - S C I E N C E

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<http://www.pionier.gov.pl/>

e-science e-science



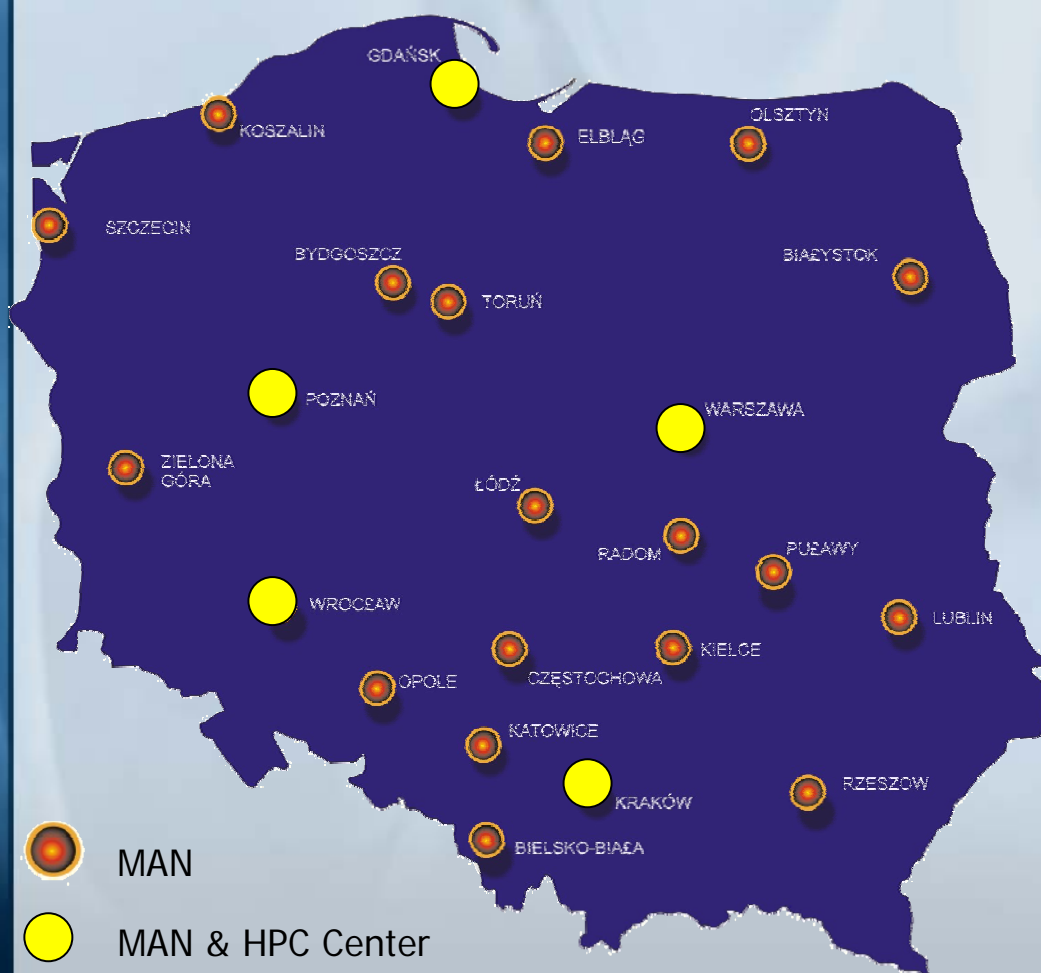
**and then things speeded up...**

- 1993 – starting academic MANs (FDDI)
- 1995 – MANs' transition to ATM
- 1997 – POL-34, 155, 622
- 2000 – PIONIER take-of
- 2003 – 1 lambda - 10GE
- 2004 – multi-lambda

# PIONIER - POLISH OPTICAL INTERNET



## 21 ACADEMIC METROPOLITAN AREA NETWORKS



- Population 38M
- Main academic centers 21
- State universities 120+
- Students 2M+
- R&D institutions and Univ. interconnected via PIONIER network 700+



## What PIONIER is all about

- closing the gap to EC academic communities and more...
- developing country wide optical infrastructure based on the academic community ownership model
- setting up national optical networks interconnecting on separate lambdas: 21 MANs, 5 HPCCs and to-do-research network
- extending optical reach to expensive national laboratories
- grid technology as a main tool to integrate distributed R&D resources
- portal as a main service delivery platform
- broadband IP based services development
- international co-operation enabling and stimulating

This was not that obvious in 1999, as is today...

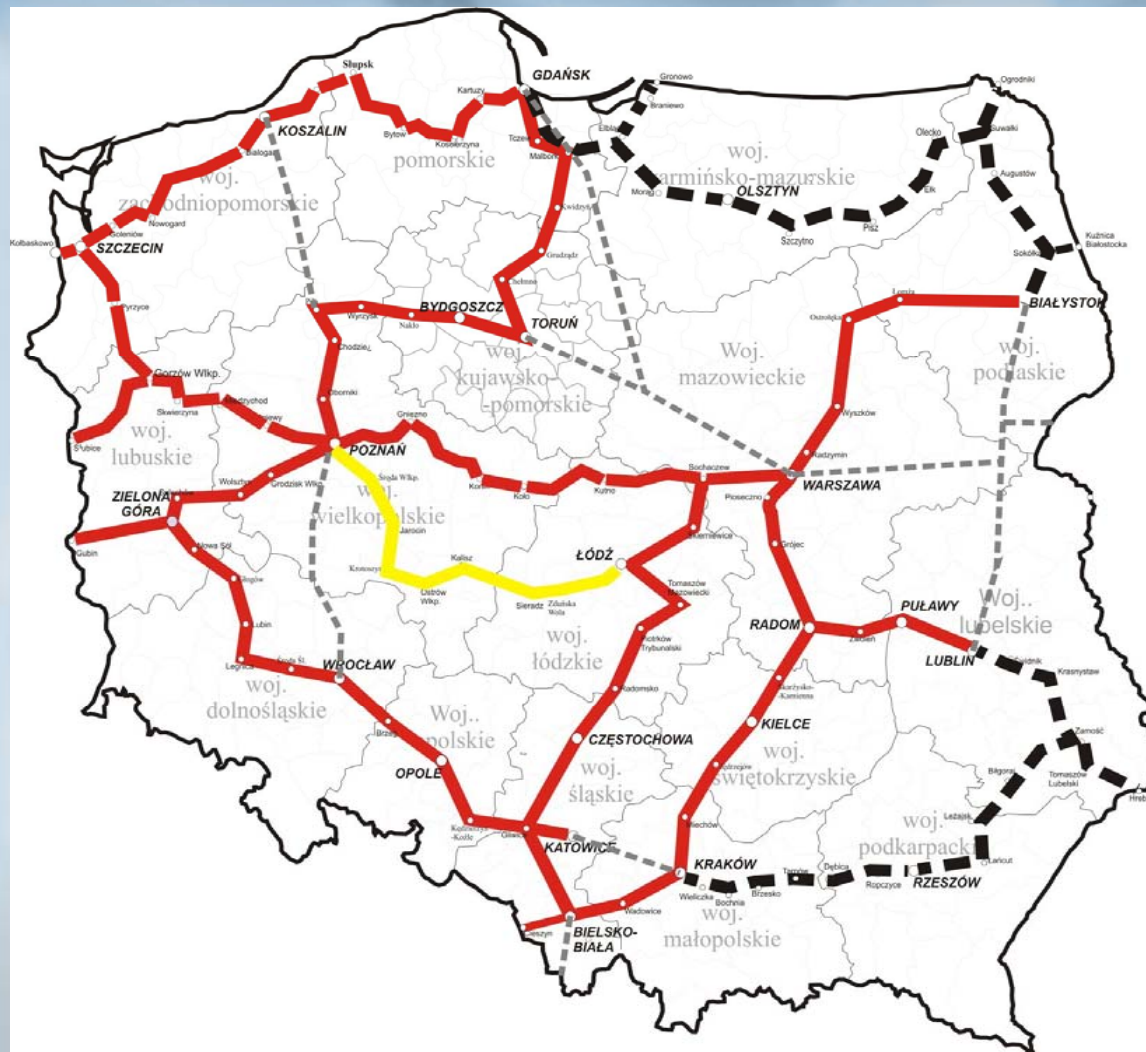




## How PIONIER is organized:

- PIONIER is a consortium of 22 academic MANs and HPCCs
- PIONIER is supervised by PIONIER Board consisting of 22 representatives
- PIONIER is managed by PIONIER Executive consisting of 4 people
- PIONIER network is financed from the member fee
- member fee is based on the cost sharing model
- each year PIONIER Board take a decision about the framework and parameters of a cost sharing model
- one member is selected to play the role of the PIONIER network operator (PSNC)

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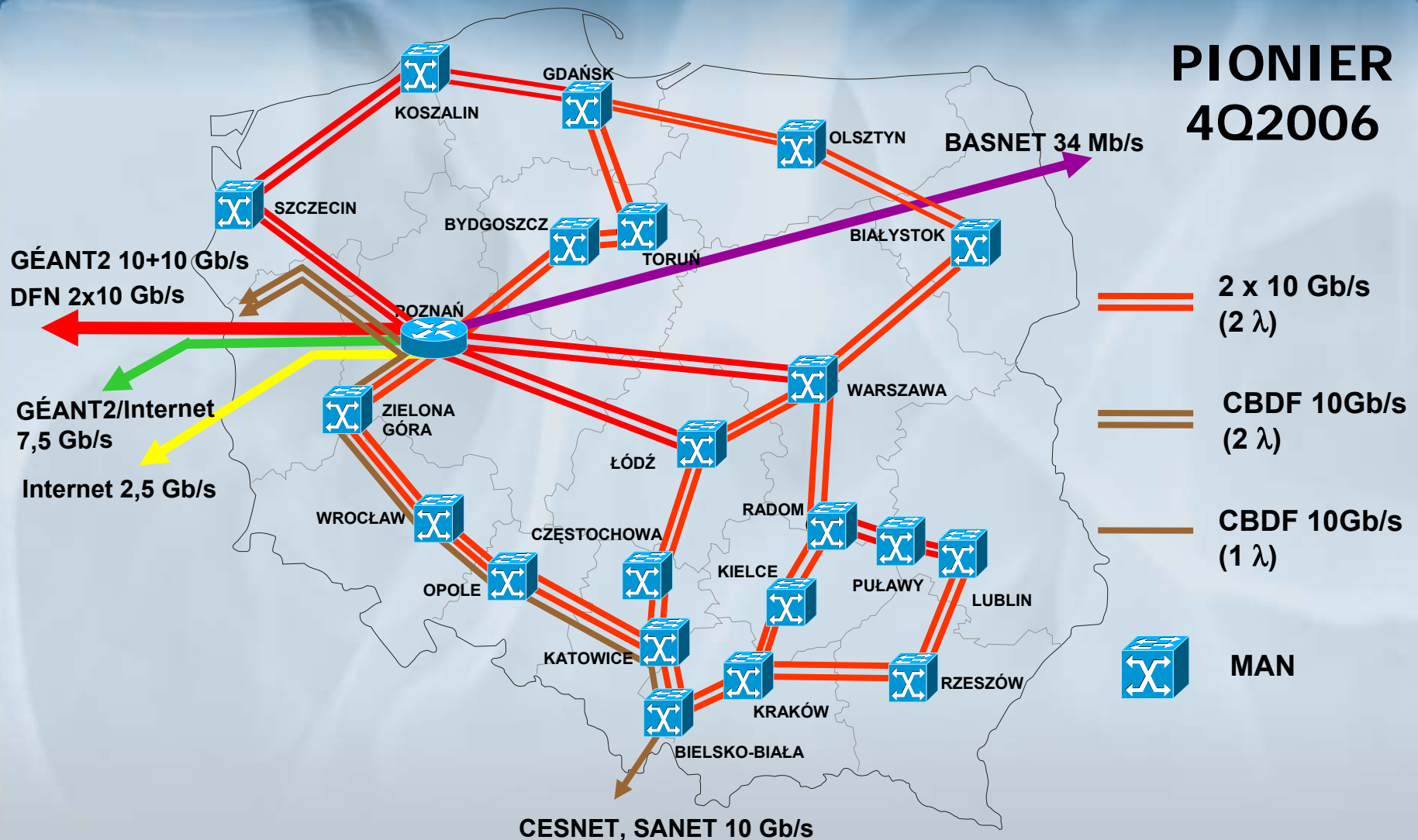
## PIONIER dark fiber topology

- Operational fibers
  - 2K miles of pipes
  - 12 fibers in av.
- Third party fibers
- - - Fibers & pipes expected:
  - - - at the end of 2006
  - - - beyond 2006

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**PIONIER  
4Q2006**





## PIONIER NETWORK MANAGEMENT

- 24 / 7 / 365
- 2 Network Operation Centers
  - Poznan
  - Lodz
- Shared responsibility
  - Optical and Ethernet management (Poznan)
  - IP management (Lodz)
- Smooth switchover in case of malfunction





## **PIONIER services:**

- now only delivered to MANs
- soon also for administration pilot projects
- mainly based on best effort IP, but IP QoS is starting
- MANs interconnection
- access to GEANT2, Internet2, etc... and commodity Internet
- global international and national BGP
- VLANS for national and international projects
- VoIP integration,
- MANs' IPv6 integration and country level peering
- multicast support
- national R&D grids support
- dark fibers, lambdas and bandwidth delivery for regional development and networking R&D projects
- joint procurements coordination



## PIONIER PROJECTS

**PROGRESS**

**PROGRESS**

Construction of an access environment to distributed computing resources and services



<http://progress.psn.pl>

- New flexible architecture for grid-portal environments
- Efficient grid data management
- Open source package for the delivery of grid portal access



**iTVP**

High quality Interactive Television over IP networks for large number of users with value-added services and digital rights protection



<http://projekt.itvp.pl>

- Large scale high quality digital content delivery
- Many types of access: Live, VOD, NVOD
- Interactive and value-added services
- Digital Rights Management
- Access from PC, SetTopBox, PocketPC



**CLUSTERIX**

National CLUSTER of Linux Systems  
A new generation, distributed PC-cluster



<http://www.clusterix.pcz.pl/>

- Large production Grid for the Polish scientists
- Clusters with dynamically changing configuration
- New generation computational applications.



**SGIgrid**

High Performance Computing and Visualization with the SGI Grid for Virtual Laboratory Applications



<http://www.wcss.wroc.pl/pb/sgigrid/>

- Remote access to expensive laboratory equipment
- Backup center for meteorological simulations
- Remote data visualization



**dLibra**

Digital library of Wielkopolska

First Polish digital library framework developed by PSNC

<https://dlibra.psn.pl>

- Multitier, distributed and portable Digital Library platform
- Support for multiple content types, Hierarchic collections, Resources versioning, Advanced support for resources' metadata, Multiple searching mechanism, Extended access management



## iTVP

High quality Interactive  
Television over IP  
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<http://itvp.psnc.pl/en>

# PIONIER - POLISH OPTICAL INTERNET



## Project partners



TELEWIZJA POLSKA

Polish Television S.A.



ACC Cyfronet AGH



Poznań Supercomputing  
and Networking Center



ATM S.A.



Warsaw University  
of Technology



National Institute  
of Telecommunications



Ministry of Scientific Research  
and Information Technology



State Committee for  
Scientific Research



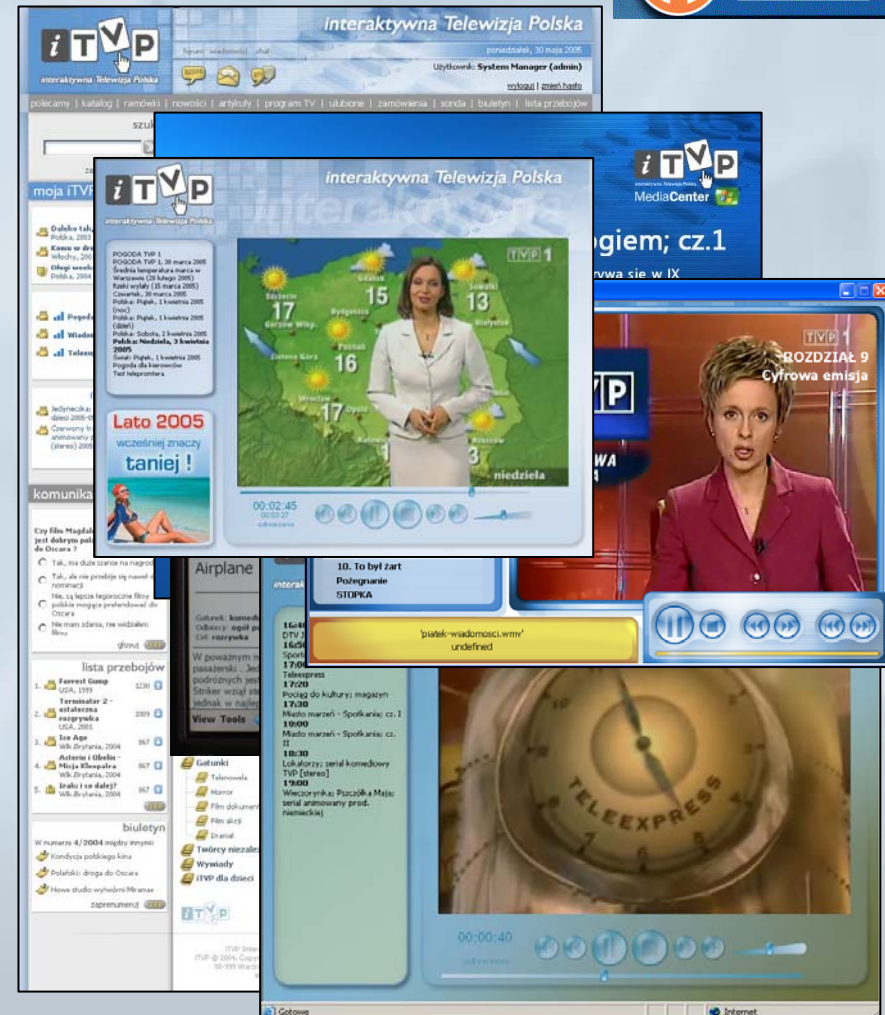
Polish Optical Internet  
Pionier Consortium

- „System for audiovisual services provisioning in Polish Optical Internet allowing to provide interactive TV”
- Project co-financed by Ministry of Scientific Research and Information Technology in Poland



## Interactive user services

- Access from Portal, SetTopBox, PocketPC
- Live, time-shifted live, VOD, nVOD
- Electronic Programme Guide
- Personal Video Recorder
- Enhanced presentation
- MPEG-7 content description and search





## iTVP Features



- built on IP layer
- opened for many content providers and portals
- scales well for worldwide digital content delivery
- based on MPEG-4 encoding
- supports content protection and licencing
- HD quality deployment enabled
- supports interactive applications deployment
- multiple end-user devices support

**3,800 concurrent users and 2,1 Gbps of peak outgoing traffic during International Fryderyk Chopin Piano Competition live Internet broadcast with 5.1 audio – October 2005**



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**<http://dlibra.psnc.pl>**





## Digital Libraries dLibra Digital Library Framework



- First Polish digital library framework, being developed in PSNC since 1999
  - support for multiple content types
  - hierarchic collections
  - resources versioning
  - advanced support for resources' metadata
  - multiple searching mechanism
  - extended access management (LDAP, Single Sign-On)
- Deployed in Wielkopolska Digital Library
- 100+ libraries to come on board soon



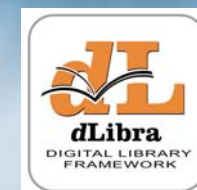
INFRASTRUCTURE FOR e-SCIENCE

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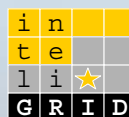
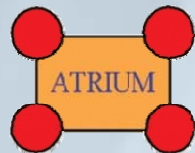


dLibra

-  2002
-  2004
-  2005
-  2006



## EUROPEAN PROJECTS in 5<sup>th</sup> and 6<sup>th</sup> Framework Programme





INFRASTRUCTURE FOR e-SCIENCE

# PIONIER - POLISH OPTICAL INTERNET



**PIONIER**  
Cross Border  
Fiber  
development  
directions

# PIONIER - POLISH OPTICAL INTERNET



## Operational CBF links and NRENs' owned fibers in CE/EE

- Austria
- Czech Republic
- Poland
- Slovakia

Interconnected since late 2004

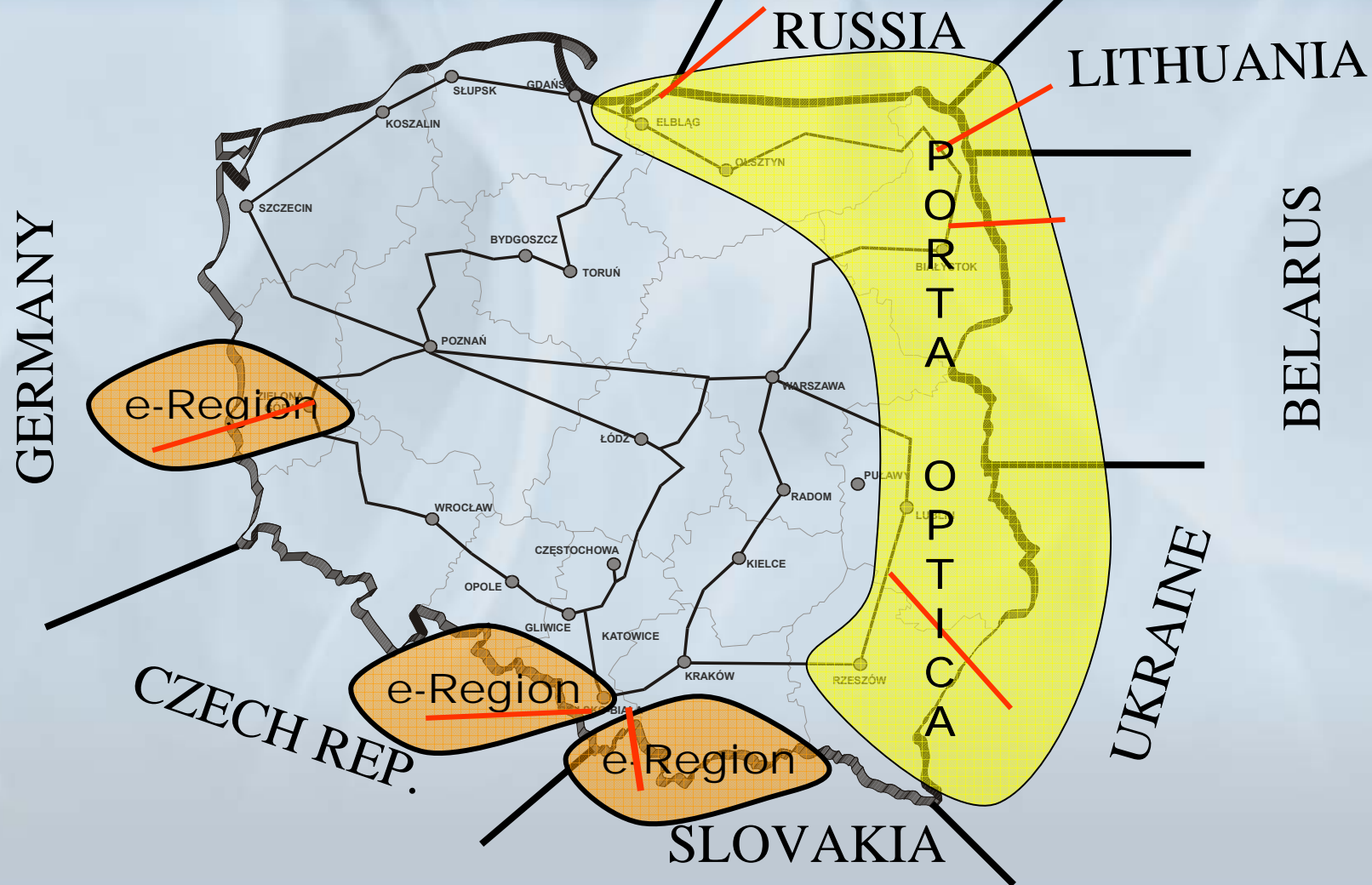




## CBDF results

- Relatively easy installation (@ 1Gbit/s)
- Compatible technology - PIONIER, CESNET, ACONET & SANET operate with 10GE/1GE
- Free of charge access to national peering exchange points
- But: quite difficult coordination of the CBF infrastructure management:
  - link troubleshooting in layer 2
  - VLAN number assignment coordination (how to find a VLAN number which is free in all NRENs?)
  - coordination of configuration tasks
  - free of charge model is limited by the finite bandwidth
  - new partners on board: Germany

## CBDF as e-Region infrastructure





## **PIONIER results as of today:**

- Infrastructure ownership: operation & research
- Unlimited technical development opportunities
- Infrastructure country spread enables wireless distribution network
- 20-30 times more bandwidth for 70% price
- A unique offer on the Polish telecom market
- Creating business models & market demands for broadband IP services (iTVP)
- Braking down traditional telecom monopolies

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**PIONIER - POLISH OPTICAL INTERNET**



**More details on:**

<http://www.pionier.gov.pl>

***Thank you for Your attention!***