"RENAM - Research and Educational Network of Moldova"

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RENAM

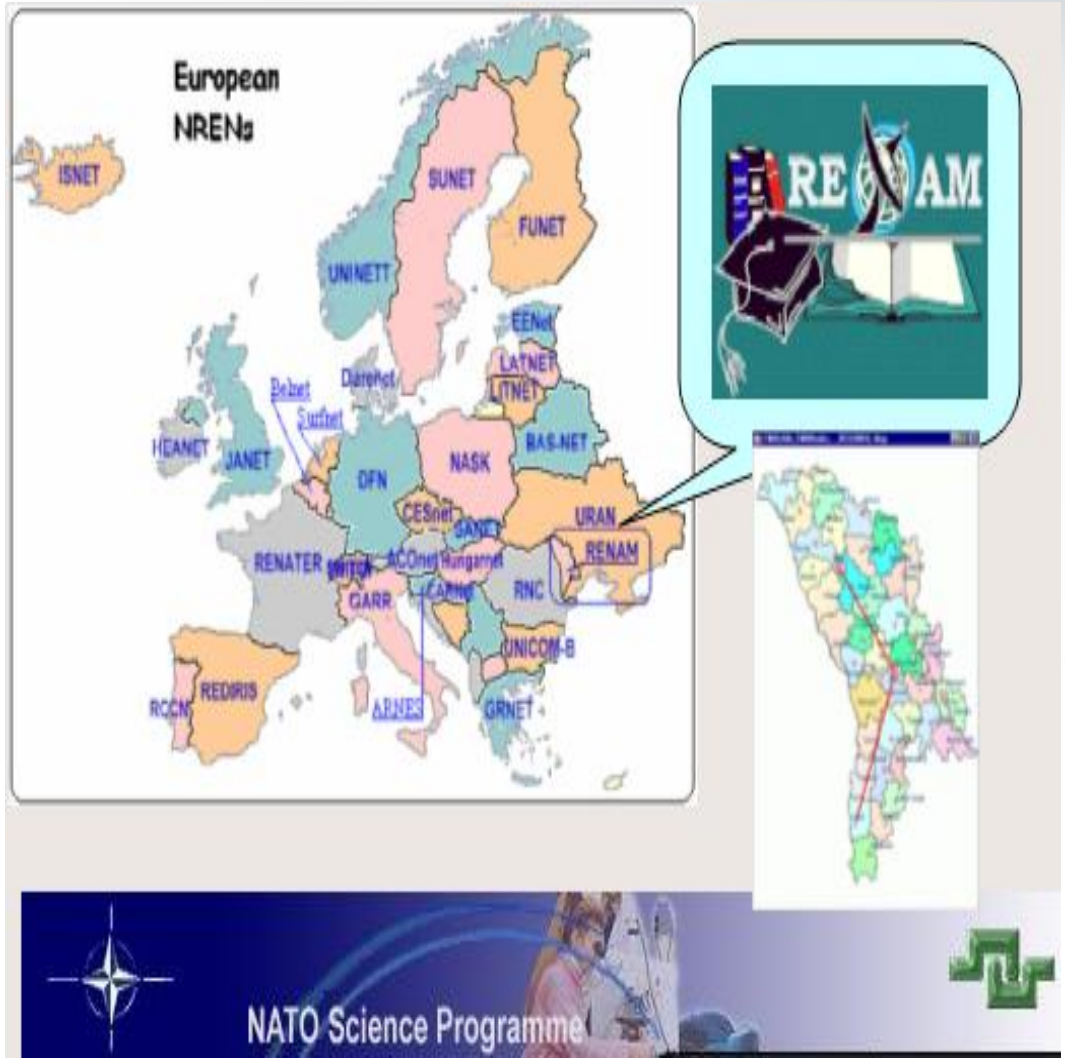
www.renam.md

Chisinau, 20 May 2010

Introduction

- The road of building the New Global e-Society based on leading Information Technologies becomes a real power for consolidation of progressive mankind around of widely disseminated knowledge.
- The role of RENAM as National Research and Education Networks is of great value for a free exchange of ideas, best practices and concepts that under the umbrella of education and research encourage to establish democratic, market oriented mechanisms and institutions in Moldova.

Research and educational networks in Europe



RENAM (www.renam..md) is National Research and Educational Network of Moldova is a non-governmental, non-commercial and non-profit network and R&E Association, established in 1999 grace to NATO Science Programme support.

Main activity of RENAM is focused on continuous development of communi-cation and information infrastructure of the scientific and educational community of the Republic of Moldova and interaction with European R&E informational and communicational infra-structure.

Strategy aims of scientific-educational networking infrastructure development in Moldova

- Creation and development of **basic infrastructure** (nodes and highways) of Nation-wide scientific-educational network and providing a stable mutual access to national and foreign information resources;

- Elaboration of new **information resources and technologies** in order to achieve a high level of investigations and close interaction with the European and the world scientific and educational community;

- Development of **communication media** for new educational technologies deployment.

Stages of scientific-educational networking segment development in Moldova
(supported by NATO NIGs):

- Independent networking segments of Universities and Scientific Institutions of Moldova – before 1996
- Moldnet project - 1996-1997

AMNET project - 1997-1999

Before RENAM

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with RENAM

- RENAM network (Stage I) - started in 1999
- RENAM network (Stage II) - started in 2000
- RENAM – RoEduNet link - started in 2001
- RENAM – Satellite link for Internet Access Improvement – started in 2003
- RENAM – Wireless Backbone – started in 2004
- Creation of Infrastructure for CERTs in Belarus, Moldova, Ukraine and their Initial Operation - 2006-2008
- Silk NetAcad Alliance - 2006 - 2008
- New RENAM-RoEduNet gateway based on CWDM technologies implementation - 2009 - 2010

International Support of NREN of Moldova Development

NATO		
NIG 960520	Academy of Science of Moldova Networking Project (AMNET)	1996-1997
NIG 972759	AMNET-Development of the Sciences and Educational Network in Moldova	1998-1999
NIG 975476	The Informational Corporate Network of the “Politehnica” Community	1998-2000
NIG 977228	RENAM Network-Second Stage	2000-2003
NIG 978385	RENAM-RoEduNet networks direct link and gateway construction	2001-2003
NIG 979922	Providing satellite Internet Access for RENAM Network Academic Community	2003-2004
NIG 980321	RENAM 5Ghz – band wireless Network Construction	2004-2005
NIG 982338	Creation of Infrastructure for CERTs in Belarus, Moldova, Ukraine and their Initial Operation	2006-2008
NIG 982517	Silk NetAcad Alliance	2006 - 2008
NIG 982702	New RENAM-RoEduNet gateway based on CWDM technologies implementation	2009 - 2010

International Support of NREN of Moldova Development

Cod	Project title	Period of realization
SOROS Foundation		
	Internet for Moldova academic community (MoldNet)	1995-1998
EURASIA Foundation		
K96-0919	Академическая научная информационная сеть (АНИС)	1996-1997
European Commission		
026617	Distributed Optical Geteway from Eastern Europe to GEANT (POS)	2006 - 2007
31775	South-Eastern European GRID-enabled eInfrastructure Development 2 (SEE-GRID-2)	2006 - 2008
211338	SEE-GRID eInfrastructure for regional eScience (SEE-GRID-SCI)	2008 - 2010
228052	South East European Research Area for eInfrastructures (SEERA)	2009 - 2012
261323	"European Grid Initiative: Integrated Sustainable Pan-European Infrastructure for Researchers in Europe“ (EGI-InSPIRE)	2010 - 2014
261499	High-Performance Computing Infrastructure for South East Europe’s Research Communities (HP-SEE)	2010 - 2012

Implementation of RENAM projects allows:

at national level:

- to develop **the infrastructure of the local links** for close interaction of more then 30 research institutes of ASM, 10 Universities, other organizations having research, educational, medical and cultural orientation;

- to organize **an effective access to the information resources** and services of the national and regional information systems, databases and WWW-servers to widen scientific cooperation, interchange of ideas and experience;

- to assist **the formation of joint national information resources** and their effective usage by the members of scientific and educational community of Moldova and other countries;

- to ensure **modern technologies dissemination, training and raising of skill** on the basis of new learning methods (virtual laboratories, distance education, open universities, etc).

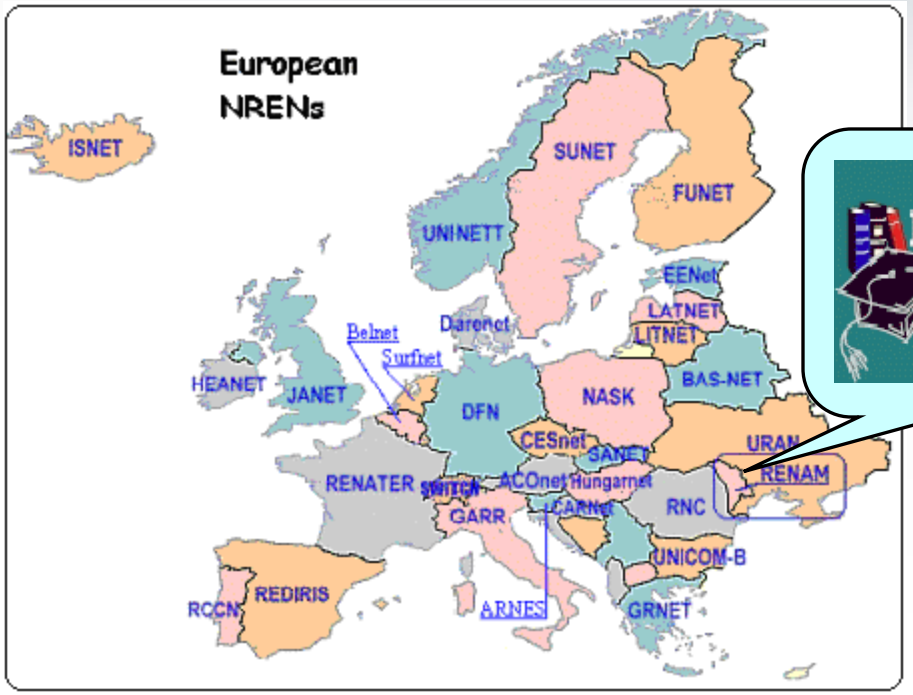
Implementation of RENAM projects allows:

at international level:

- **to create conditions for a wide integration** of research and educational institutions' scientific information resources of Moldova into the world wide information process;

- **to ensure information exchange** with international and national networks on the base of modern communications technologies in order to gather and spread the scientific and other information being of mutual interest.

RENAM: Research and Educational Networking Association of Moldova



ASM

TUM

AGREEMENT

of collaboration in the field of information technology

The Ministry of Education of RM, The Department of Informational Technologies of RM, The Academy of Sciences of Republic of Moldova, State Superior Council of Science and Technology Development, State University of Moldova, Technical University of Moldova, named below "Sides" had accepted the present agreement about following:

1.The sides realize the importance of promoting of the research and educational institution's collaboration with the aim of coordination and consolidation of joint efforts in foundation of developed informational media of the science-educational community of Moldova. It's the essential element of the social progress and the development of the informational society in Moldova.

2. Taking in consideration the positive practice of the European countries, the sides promote and distinguish as the main subject of this agreement the creation of the necessary premises for continued and efficient development of the existent academic scientific-educational data network - the joint strategic platform for building of informational system for the whole area of the science and education community of Moldova, integrated into European and world informational system. Having this aim the sides accept following:

To consider the opportune creation of the NREN (National Research and Education Network) of Moldova as a joint structural base in the creation and development of the infrastructure of the specialized informational network for the branch of the science and education.

To assign the functions of NREN of Moldova to existent network named RENAM (Research and Educational Networking Association of Moldova), represented by the RENAM Association and created on the NATO Scientific Council's base of grants and other international organisms with the aim of providing the scientific-educational societies of Moldova with a developed infrastructure of data communications network.

To create the Coordination Council of the NREN, which consists of the representatives of the Sides with the functions of generation of joint initiatives of planning, coordination and appreciation of the realizes, accenting the importance of the agreed elaboration of the national and international projects wit the aim of the efficient utilization of the human, material and financial resources, orientated to the development of the informational corporate branch of the science and education of Moldova.

3.The sides supports the activities of the cooperation in the field of the information technologies having the aim to provide the help of the international organisms in active integration of Moldova in the scientific-educational and world international area with the access to GEANT and other trans-European networks.

Mr. G. Sima,
The Ministry of Education

V. Molojen,
General director of The Department of IT

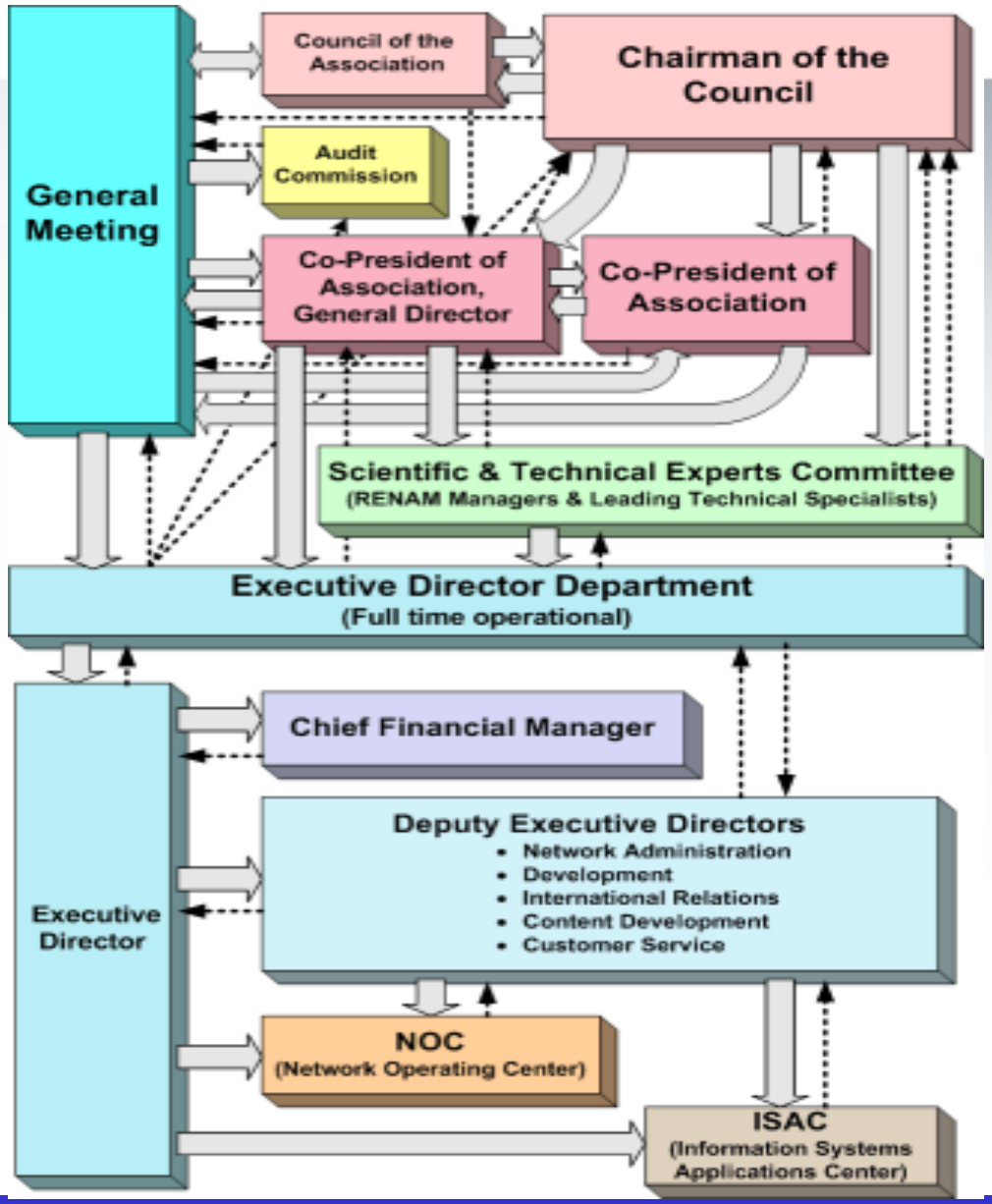
Prof. A. Rotaru,
The President of The State Council of Science and Technological Development

Acad. A. Andries,
President of the Academy of Sciences of Moldova.

Prof. G. Rusnac,
Rector of the State University of Moldova of the Informational Technologies

Acad. I. Bostan,
Rector of the Technical University of Moldova

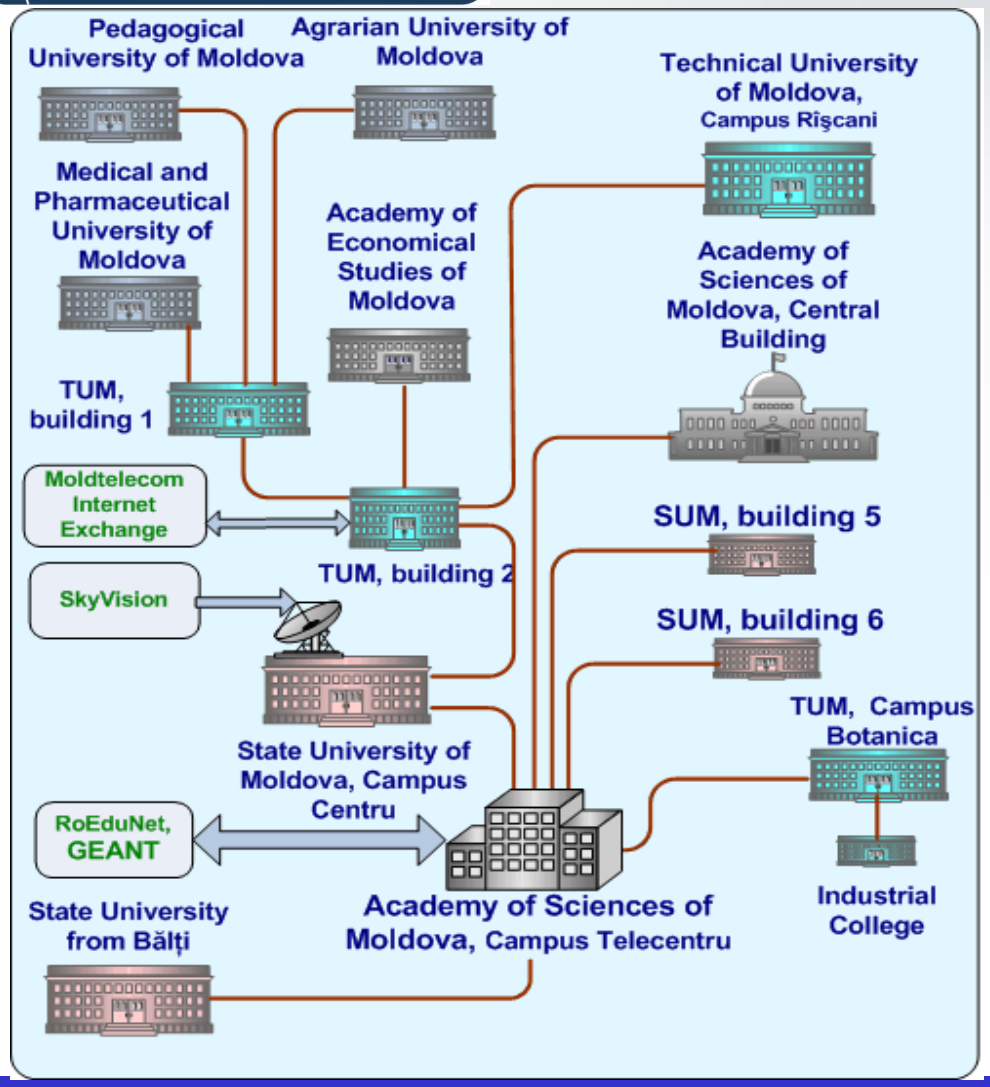
RENAM: Organization Structure



RENAM network general information

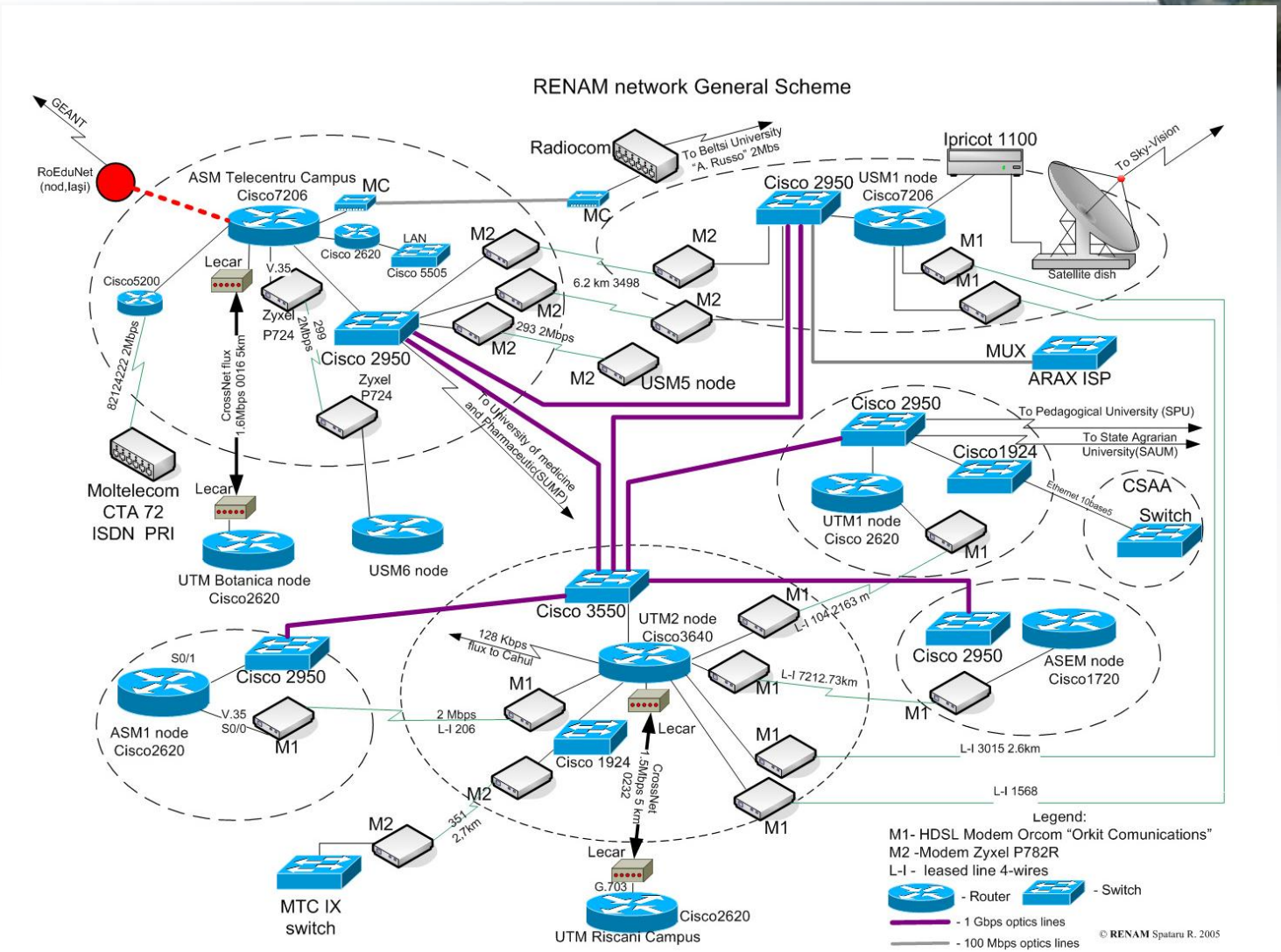
- RENAM network has multi-home Internet connectivity and access to the Moldovan Internet Service Provider's information exchange point, which are realized through RENAM external information exchange nodes
- Main external connection is provided through direct gateway of to RoEduNet – Romanian NREN and consequently - to GEANT Trans-European Academic network.
- RENAM Chisinau metropolitan backbone at present has twelve nodal access points, distributed at distances of 1 to 12 km and being interconnected via fiber channels of 1 Gbps or 100 Mbps capacity,
- Access network is based on fiber channels of of 1 Gbps or 100 Mbps capacity, xDSL technology leased channels and various wireless radio-channels.
- Network node was realized in Balti State University “A. Russo”, which joins also four technical colleges from Balti City.

Existing infrastructure

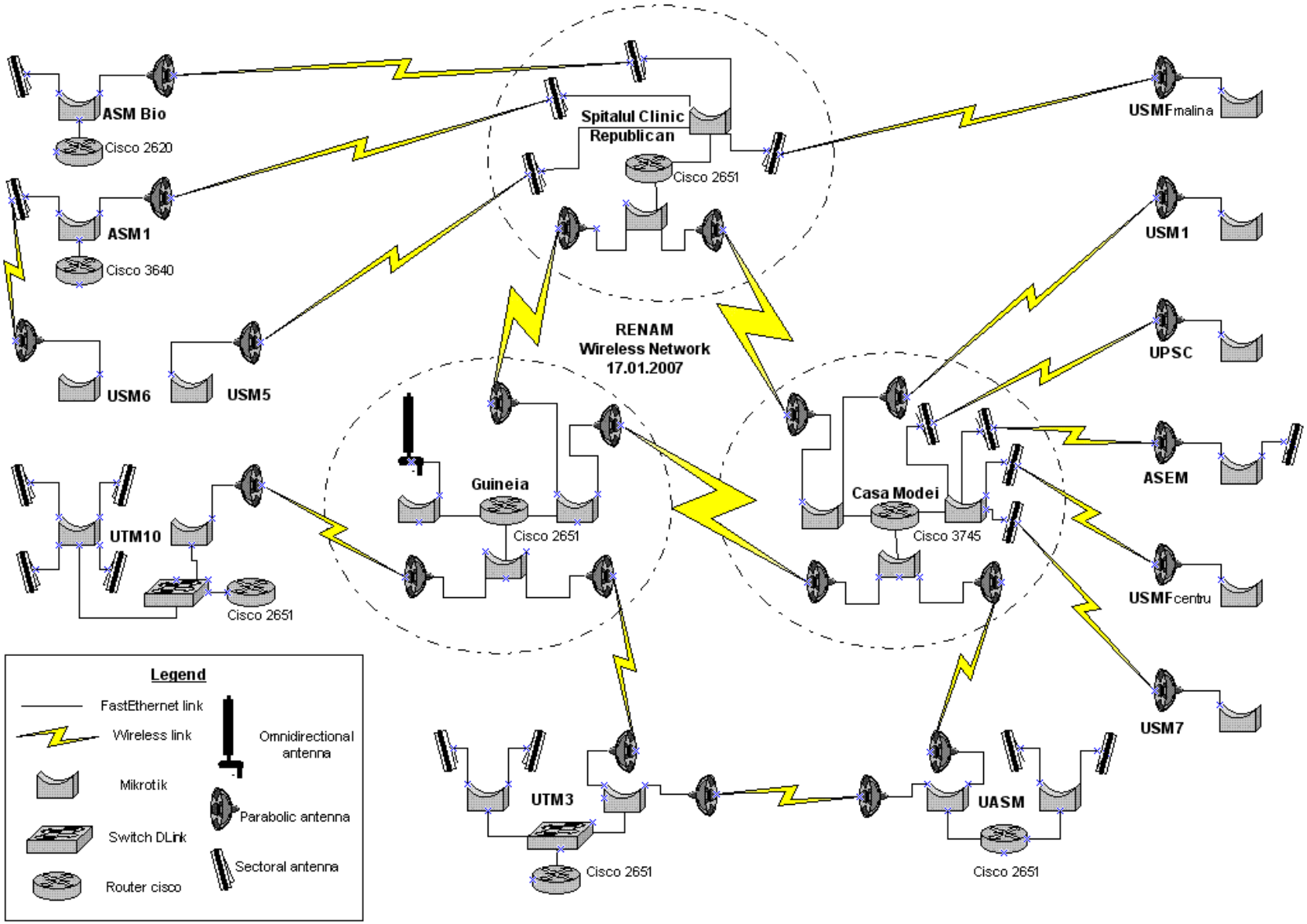


RENAM network provides connectivity to about 5000 scientists and professors, 1000 Ph.D. students and more than 80 000 university and colleges students. Now RENAM networking infrastructure unites 22 research institutes, 9 universities and 5 colleges. RENAM infrastructure provides to the universities and organizations placed in other localities of Moldova. The network node was realized in Balti State University, which joins also four technical colleges from Balti City.

RENAM Backbone in Chişinău



Current topology of RENAM wireless network

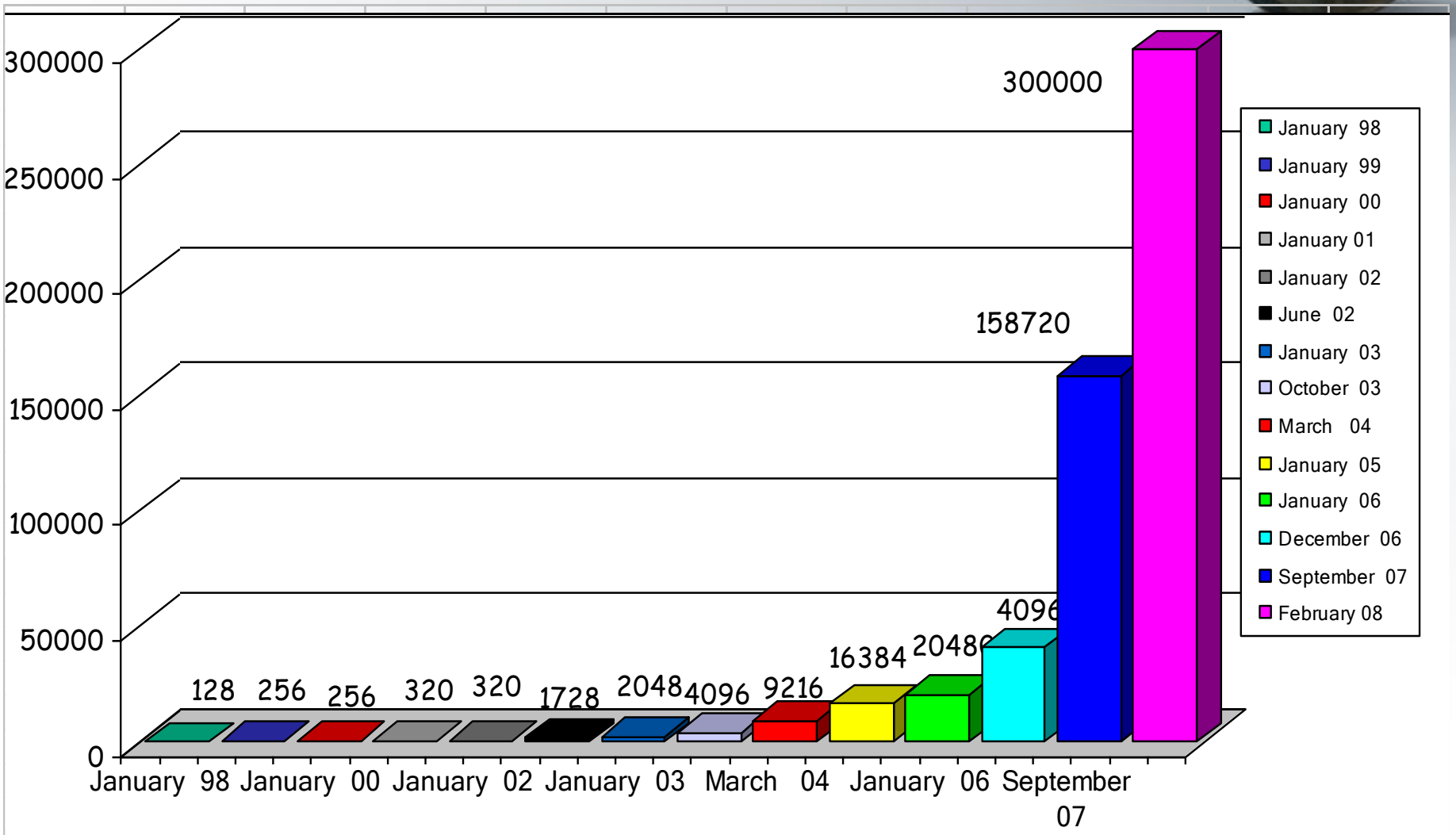


RENAM external connections evolution

Various types of external Internet connections were realized and available for RENAM network users since Moldavian NREN operation start:

- Satellite channel of 4,5 Mbps downlink capacity built with financial support of NATO projects CN NIG 972759 and CN NIG 979922 (2002).
- Terrestrial radio relay channel was created together with SI Radiocom within NATO project CN NIG 978385 and had 4 Mbps capacity to Romania – Romanian NREN RoEduNet that ensured RENAM connection to Trance-European Academic Network GEANT (2003).
- For providing the necessary level of the network reliability special 10 Mbps back up connection with "Moldtelecom" for Internet access (2004) and 1 Gbps back up Internet connection with StarNet (2010) were realized .
- Fiber optics links of 100 Mbps capacity (1 Gbps now) to National Internet Exchange point (2005) and StarNet IX (2007) that provide information exchange with all local Internet segment.
- New radio relay link of 2x155 Mbps Mbps capacity to RoEduNet that allowed upgraded connection to Trance-European Academic Network GEANT was provided by StarNet (2007-2009).
- Installation of new dark fiber channel for 10 Gbps capacity connection organization to GEANT network through RoEduNet (started in 2009)

Dynamics of RENAM external channel capacity growth



Benefits and new approaches for informational resources access

- Services offering by RENAM to the members of the Association have to be more effective. New approaches are elaborating for increase benefits for users of RENAM network. On the base of analyzing existing experience of European NRENs' interrelations with customers the current financial model of providing services has to be modified:
- To refuse from the widespread in Moldova model of traffic capacity cost;
- To introduce new model of access cost based on bandwidth of the institution interconnection to RENAM backbone that will also take in consideration the number of resources' consumers in the connected institution;
- New charging model will be presented for evaluation to all members of RENAM community and will be accepted after open discussions

IN FOCUS OF RENAM

The RENAM Association's activities have as the principal purpose:
to continue the development of communication and information infrastructure for the scientific and educational community, as well as for hospitals, museums, libraries and other non-profit organizations in Moldova.

Main directions of future activity

- External connections development and participation in international and regional projects;
- Wide installation of “Dark Fiber” (DF) links for transferring principal arterial RENAM network connections to new technological basis. The central, mostly overloaded traffic exchange highways proposed to be realized by means of DF optic communication media and creation multi Gbit Ethernet technology fiber segments.
- Implementation of xWDM communication technology in optical Chisinau MAN backbone taking in account the necessity to implement in near future 1-10 Gbps Optical connections.
- Chisinau & Belti MAN backbones infrastructure development
- New territorial links construction.

New networking projects - objectives, benefits and proposed solution

The next stage of the regional integration of research and educational communities presumes creation of regional networking infrastructure based on Fiber Optics data transfer technology that is envisages construction of direct fiber optics links between NRENs of Moldova and the Ukraine. The ways and approaches of these regional connections creating were elaborated in the framework of EC project “Porta Optica Study - Distributed Optical Gateway from Eastern Europe to GÉANT”.

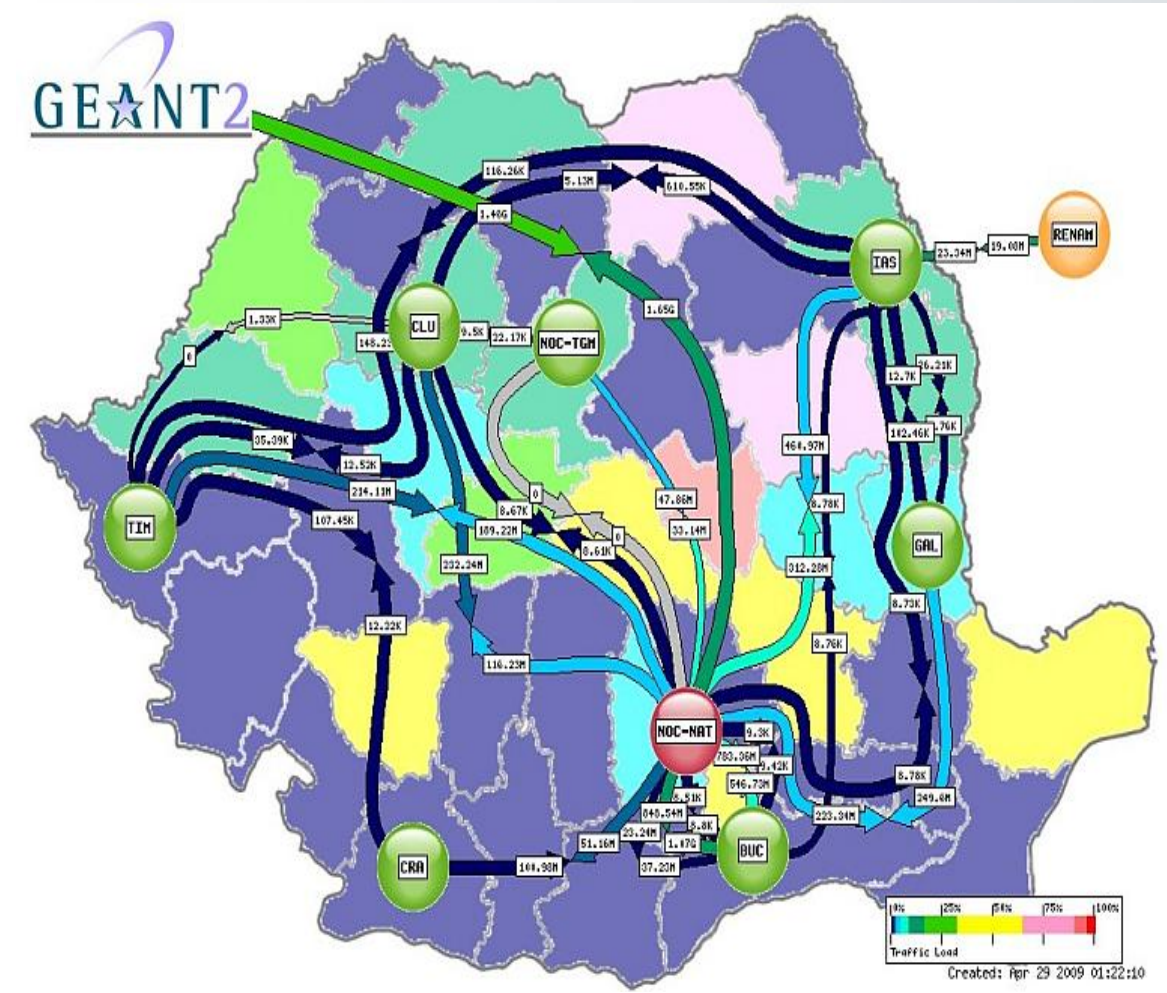
Another ambiguous project of regional infrastructure development where Moldova is actively participating is Black Sea Initiative that has the goal to integrate all NRENs of Black Sea basin states.

Creation of the optical channels between NRENs of Moldova and the Ukraine and BSI project practical realization is impossible without financial assistance from NATO, EC and co-funding from all states that are involved in the mentioned regional programmes

Main strategic goals of "RENAM – RoEduNet Fiber Optic Link Construction" project

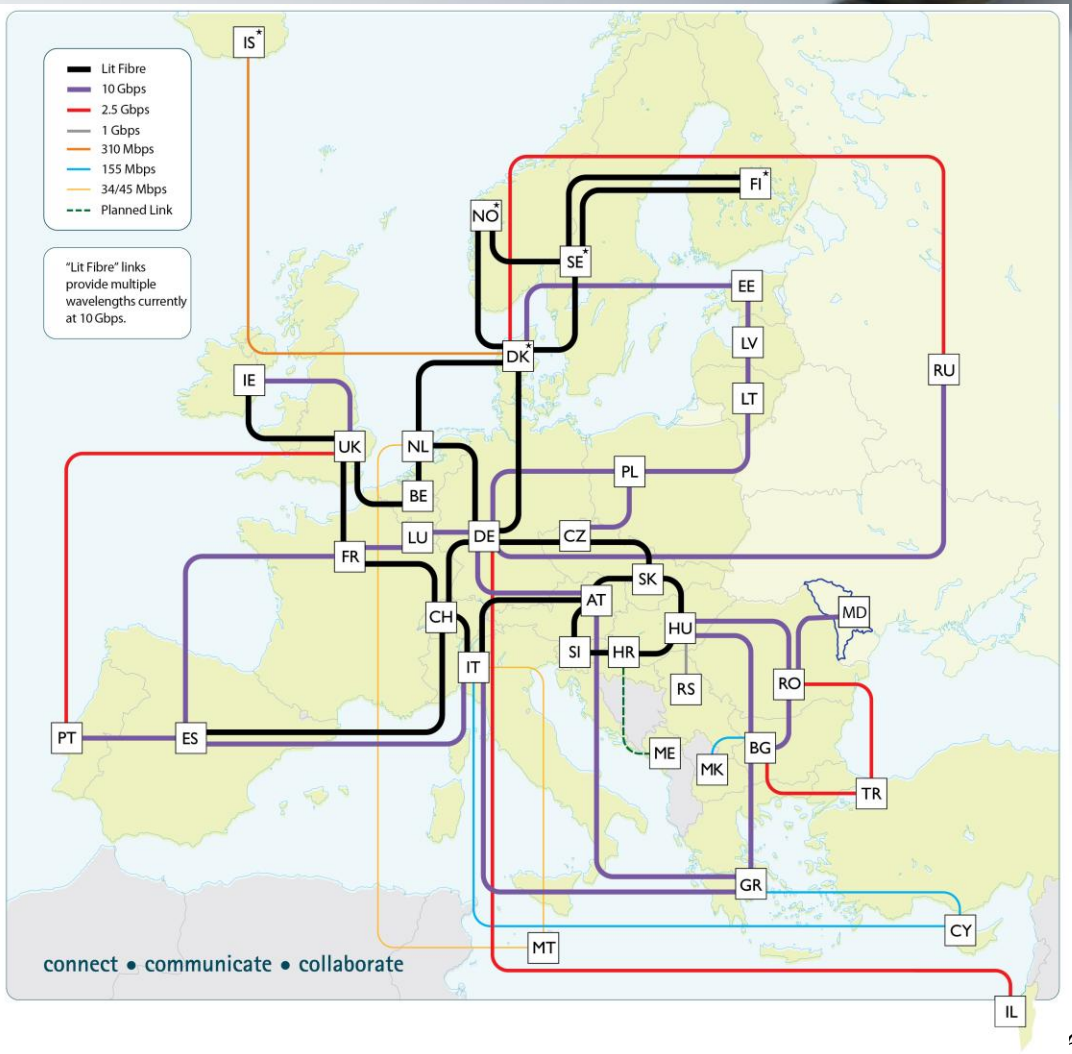
- Improve the efficiency of direct link between research and educational institutions of Moldova and Romania;
- Improve integration of Moldovan National Research and Educational Network with Trans - European network GEANT through RoEduNet.
- Project realization allows to consolidate and wider information exchange with European Research Area community using new FO communication bridge.

RoEduNet – RENAM FO gateway

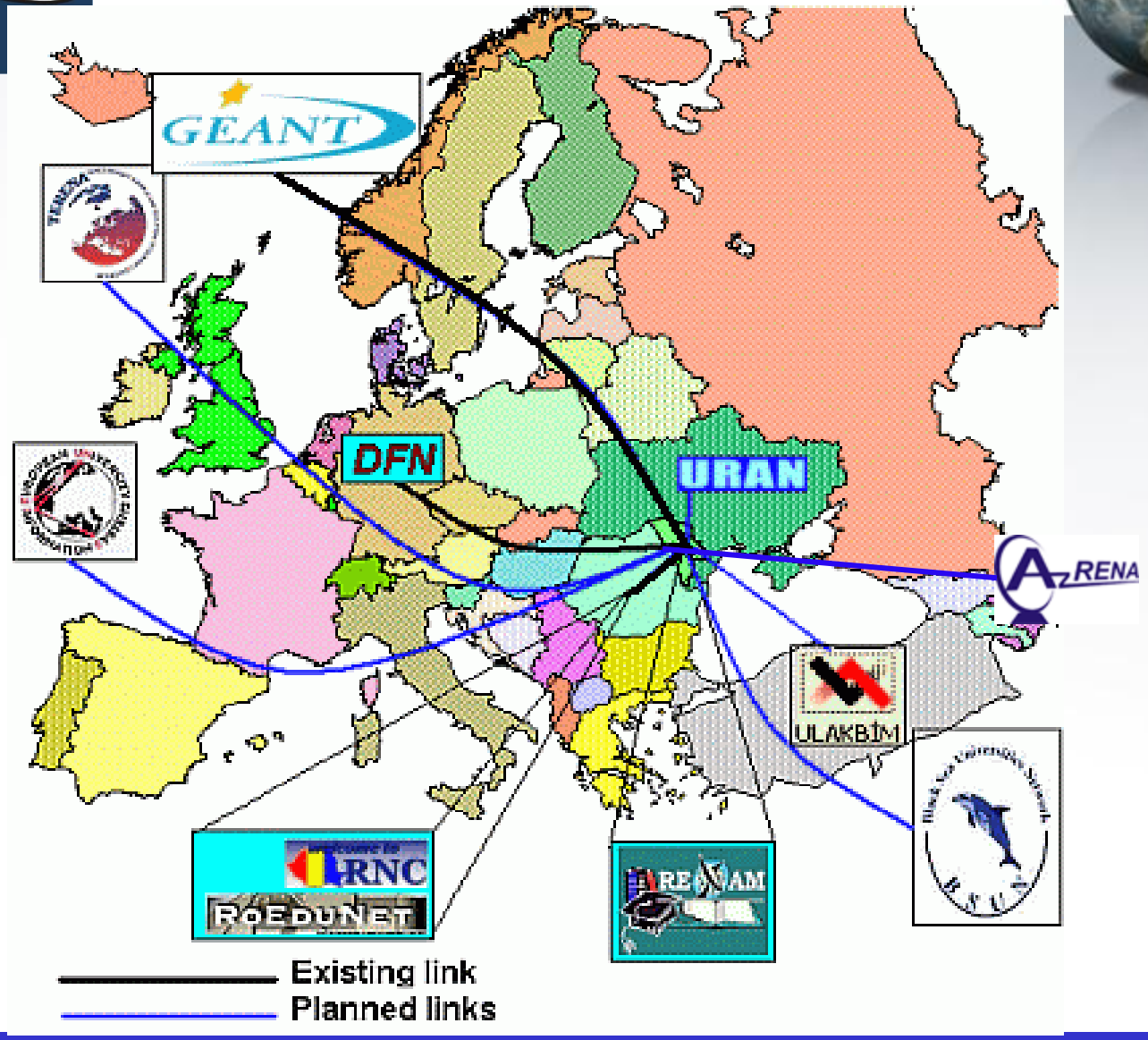


Integration with European NRENs via GEANT

- Pan-European coverage (34+4 Countries/NRENs)
- Gigabit connectivity at 10 - 40 Gb/s
- Linking more than 3600 Universities
- Total 200 MEuro over 4 years (95 MEuro from EU)
- Extend to Mediterranean, Asia Pacific Rim, Latin America...



Existing external links for supporting international collaboration

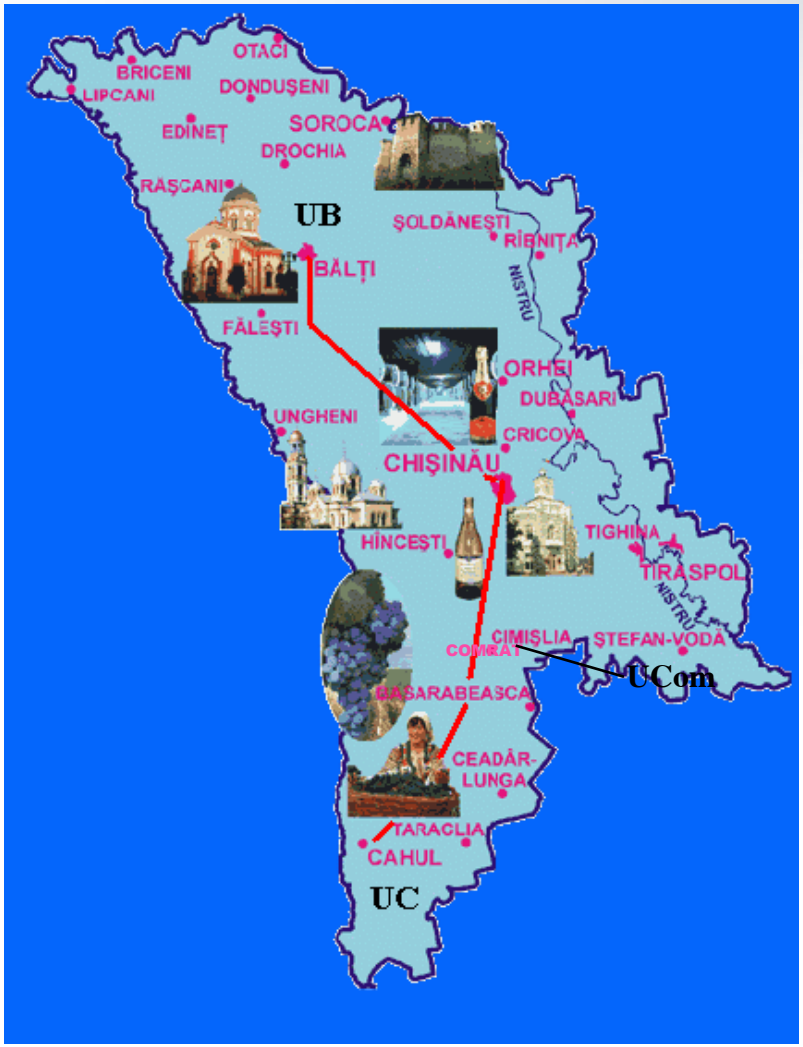


Black Sea Initiative

- The aim of the BSI is interconnection of NRENs in countries of Black Sea region with fiber optic communication infrastructure.
- Meetings of several NRENs were held in May and November 2006 in Istanbul and in August 2007 in Poznan.
- NRENs from Armenia, Azerbaijan, Belarus, Bulgaria, Moldova, Georgia, Greece, Poland, Romania, Russia, Turkey and Ukraine expressed interest to participate in BSI.
- Cooperation with BSUN – the Ukraine is now in the chair of this organization and intensively promote Black Sea networking initiative

Black Sea Initiative

RENAM: National-Wide WAN Backbone



- **UB**: University of Balti;
- **UC**: University of Cahul.
- **Ucom:** University of Comrat.

NREN of Moldova – parameters of the network development

10 Gbps GÉANT connectivity required for 2010
1 Gbps main territorial backbone
Leasing lambda channels
About 1400 km of leased lambda lines
Possible construction of DF on the territory

Potential Impact

7 cities

50 scientific institutions

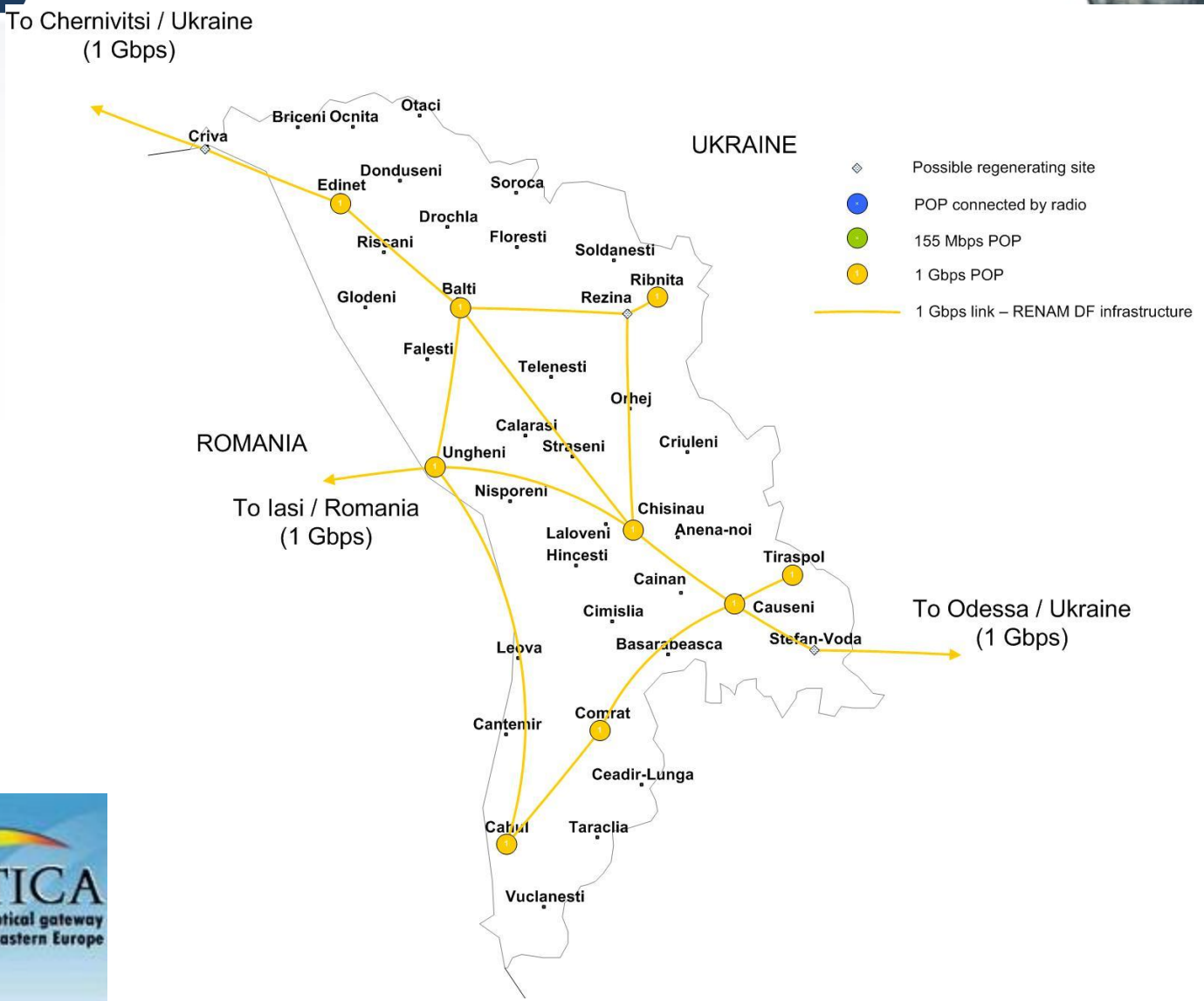
35 higher education institutions

80 000 university students

Information Society and Media

PORTA OPTICA
distributed optical gateway to Eastern Europe

Perspective Infrastructure development plan



PORTA OPTICA
distributed optical gateway to Eastern Europe

MD-Grid NGI/JRU

- **RENAM –** Coordinating body
- **FRT -** Faculty of Radioelectronics and Telecommunications of Technical University of Moldova
- **IMI/IMCS -** Institute of Mathematics and Computer Science of Academy of Sciences of Moldova
- **IGS -** Institute of Geophysics and Seismology of ASM
- **SHMS -** State Hydrometeorological Service
- **SPH -** School of Public Health. State Medical and Pharmacy University of Moldova
- **IAPh -** Institute of Applied Physics of ASM

MD-GRID - applications area

MD-GRID NGI is focusing now on forming regional research teams that are engaged in elaboration large scale applications of common interest. Three SEE-wide regional users' communities are actively developing:

- **Seismology VO**
- **Meteorology VO**
- **Environmental VO**

The work programme envisages analysis of the mentioned VOs requirements, their gridification and run-time support of the target applications.

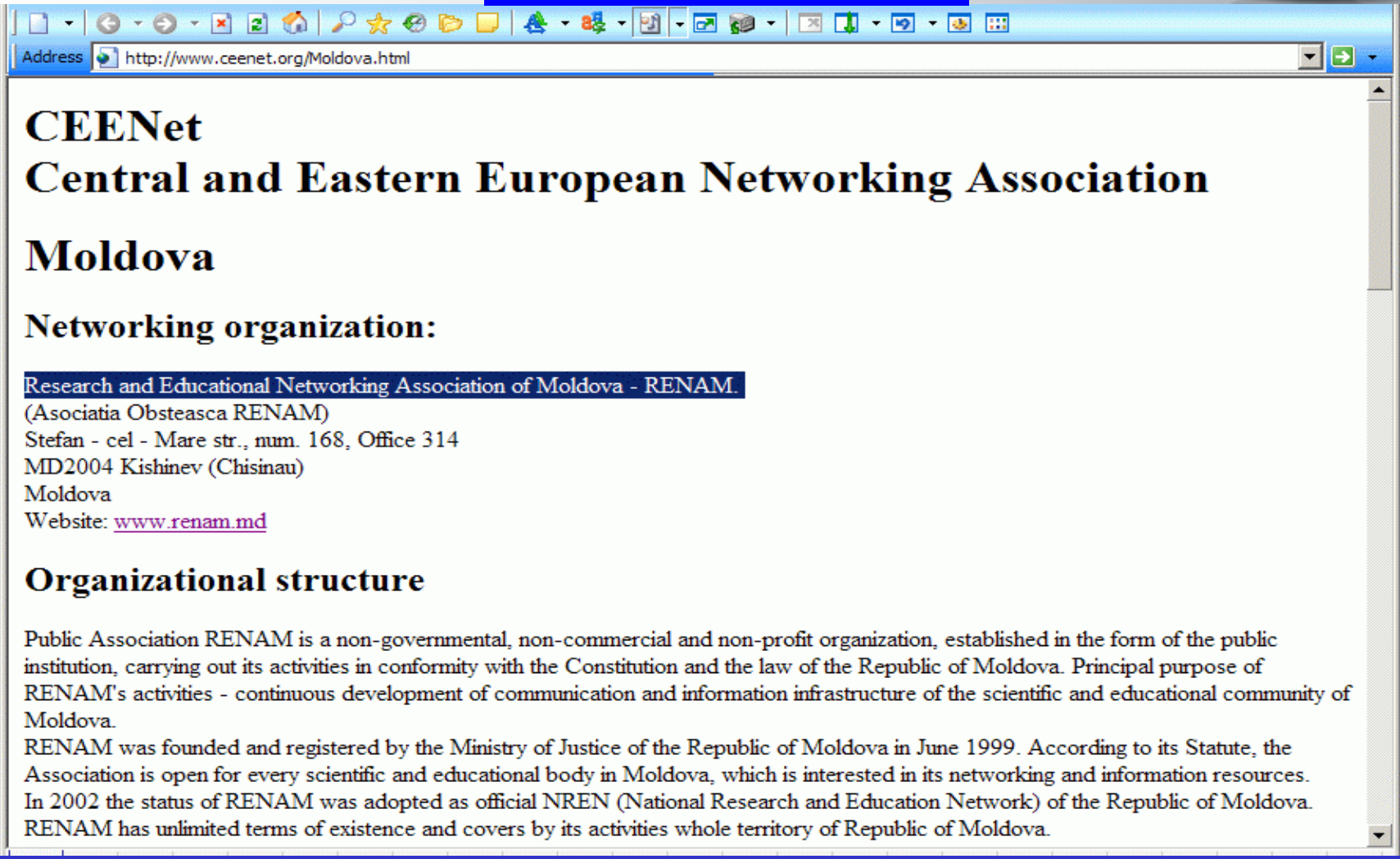
These three strategic Virtual Organisations will bring together users across the region within a common research space, enabling them to share data, applications, tools and results of their work.

SEERA-EI Project objectives

- Engaging national program owners in common dialogue and planning
- Analyze the state of the art of national eInfrastructure activities and identify commonalities and complementarities;
- Structuring and harmonizing national policies and producing related guidelines;
- Identifying areas for potential joint activities and implementing pilot activities;
- Promotion of international collaboration

RENAM in CEENet http://www.ceenet.org/Moldova.html

INTERNET INFRASTRUCTURE
DATABASE
Project



CEENet
Central and Eastern European Networking Association

Moldova

Networking organization:

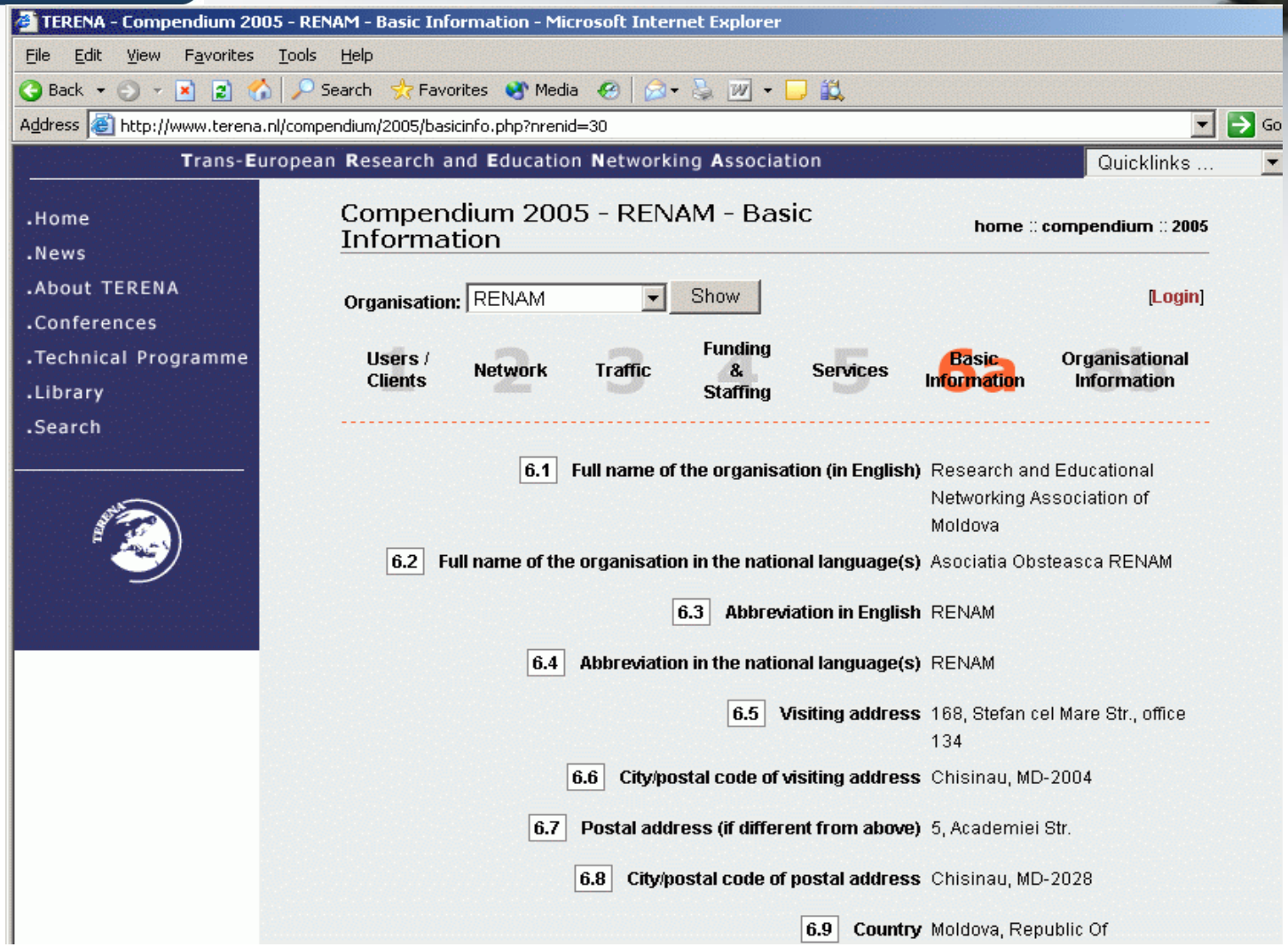
Research and Educational Networking Association of Moldova - RENAM.
(Asociatia Obsteasca RENAM)
Stefan - cel - Mare str., num. 168, Office 314
MD2004 Kishinev (Chisinau)
Moldova
Website: www.renam.md

Organizational structure

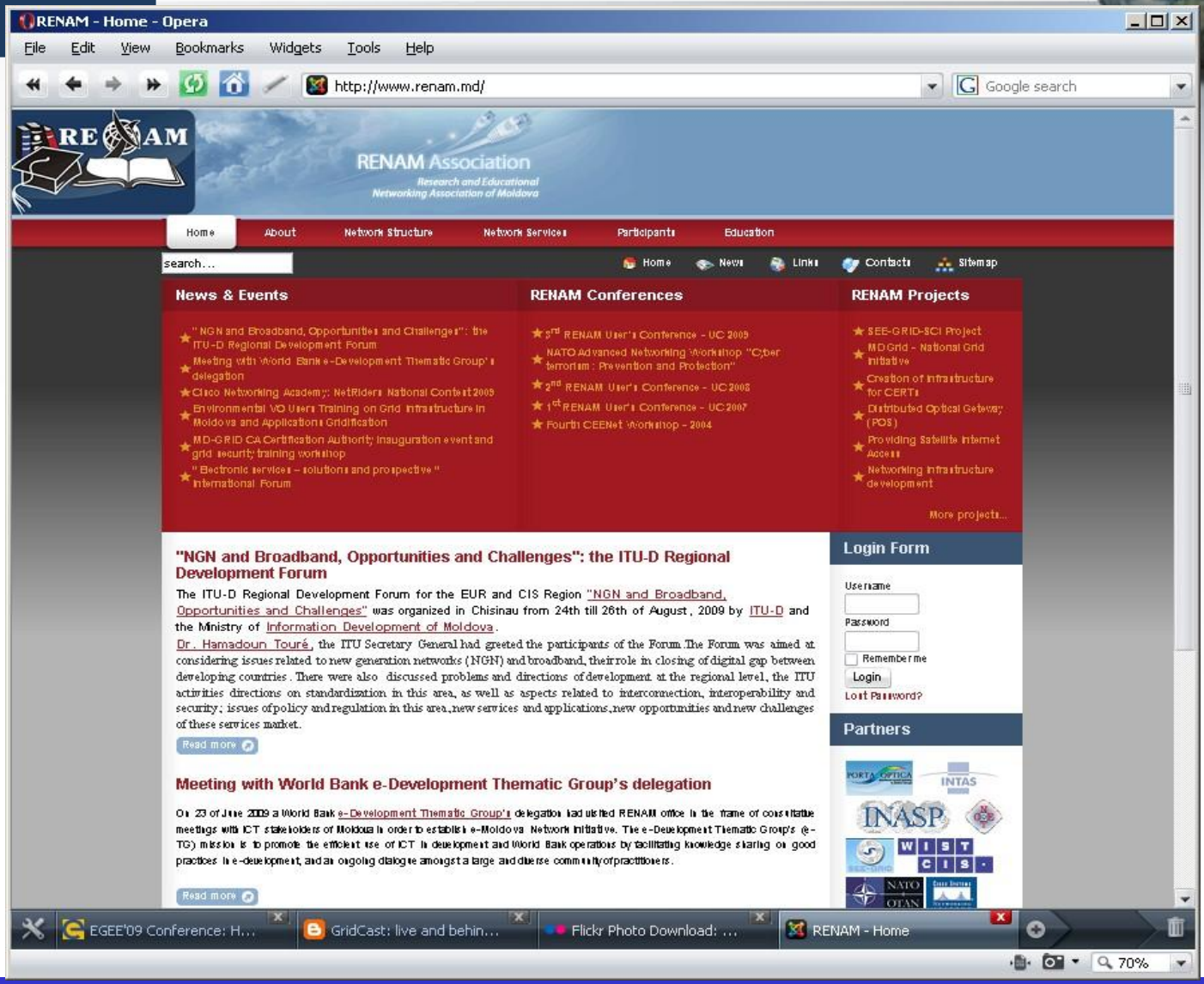
Public Association RENAM is a non-governmental, non-commercial and non-profit organization, established in the form of the public institution, carrying out its activities in conformity with the Constitution and the law of the Republic of Moldova. Principal purpose of RENAM's activities - continuous development of communication and information infrastructure of the scientific and educational community of Moldova.
RENAM was founded and registered by the Ministry of Justice of the Republic of Moldova in June 1999. According to its Statute, the Association is open for every scientific and educational body in Moldova, which is interested in its networking and information resources.
In 2002 the status of RENAM was adopted as official NREN (National Research and Education Network) of the Republic of Moldova.
RENAM has unlimited terms of existence and covers by its activities whole territory of Republic of Moldova.

About RENAM in TERENA Compendium

http://www.terena.nl/compendium/2008



RENAM Home Page www.renam.md



Conclusions

Realization of RENAM projects is directed toward:

- Introduction of the global informational society technologies and services into scientific-educational community of Moldova through integration of RENAM with Trance-European R&E GEANT (GN3) and other research and educational networks
- involving joint potential of Moldovan specialists into collaborated research and training activity
- creating conditions for national scientific-educational information resources designing, development, accumulation and dissemination.
- Implementation of RENAM projects can significantly improve the quality and efficiency of networked learning and eScince capabilities of Research and Higher Education community of Moldova at the beginning of new Information Society Era.

Thank you very much for your attention!

Questions ?

Research and Educational Networking Association of Moldova,
www.renam.md