

URAN

# Ukrainian Research and Academic Network

By

Dr. Mikhail Leshchenko and Prof. Yu.I. Yakimenko

URAN Co-ordination Committee

At the International Workshop

“Computerbasierte und multimediafähige Datennetze”

10.05.98 - 14.05.98

Mengerskirchen-Probbach , Germany

# Contents

- General remarks
- Present situation with INTERNET connectivity within the Universities and research institutions in Ukraine
- URAN Idea and key players
- URAN Evolution
- URAN as an Organisation
- URAN as a Network
- Perspectives
- Problems
- Conclusion and acknowledgements



# URAN

is planned and designed as

1. an Intranet for the Ukraine's research and academic community

and

2. a tool for their connection to the world INTERNET

## Who are the users and beneficiaries of URAN ?



The higher education system in Ukraine comprises 911 higher education establishments distributed among four (I-IV) accreditation grades.

We consider all of them as a potential users of URAN and members of URAN association

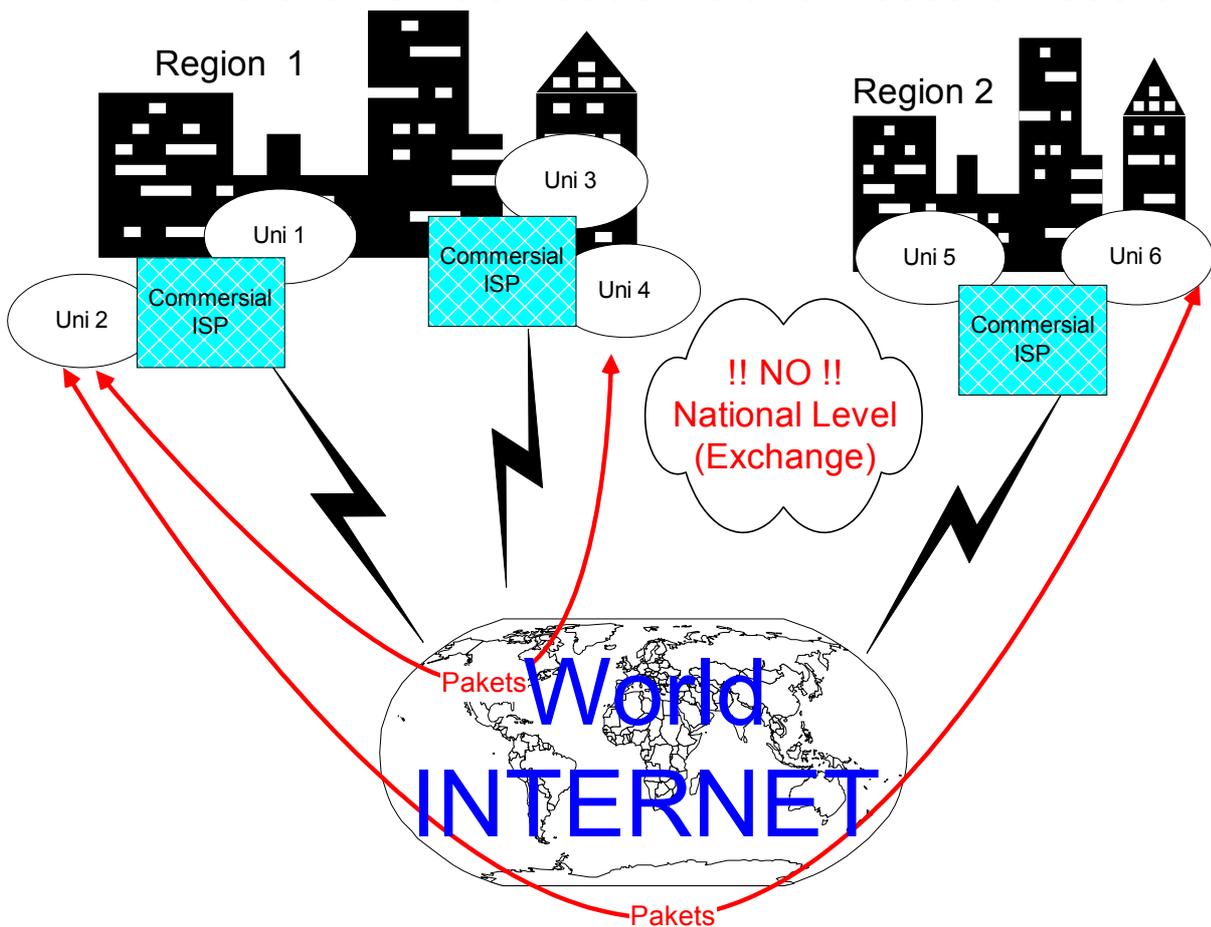
Scientific Potential of Higher Education Establishments (III – IV grade) and Research Institutions of the National Academy of Sciences of Ukraine

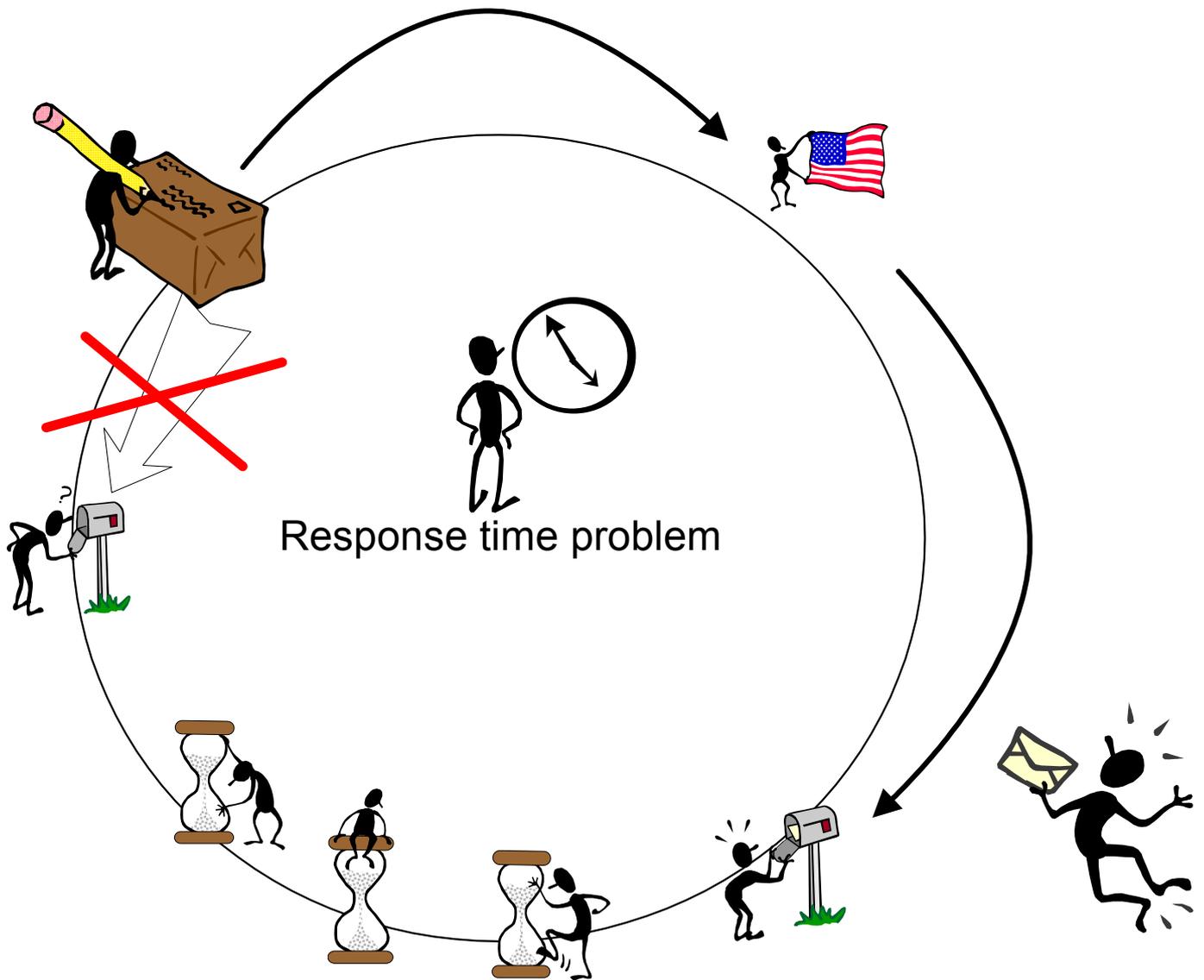
Number of higher Institutions		scientific staff	Persons with academic ranks		
			Doctors and Professors	PhDs	% from total staff
HEE (III-IV)	159	72204	6251	36551	59%
NASU	150	50221	2415	8538	25%
Total	309	122425	8666	45089	42,2%

Approximately 1'300'000 full-time students within the establishments of III-IV grades

Number of higher Institutions		Among them already connected to the INTERNET	% of total amount
HEE (III-IV)	159	82	52%
NASU	150	112	75%
Total	309	194	63%

### Present Situation with an INTERNET Connectivity of the Ukraine's Academic and Research Users





Example :  
two Institutions in Kharkiv ; 300m direct  
distance  
! 3000 ms response time !

## Critical Requirements for the national Research Network

- Bandwidth of the Backbone and user's connection
- Connection to the INTERNET in Europe and USA
- Response time
- Reliability – 24 hours a day 7 days a week
- Networking Services - Support of heterogeneous systems, TCP/IP, DNS, FTP, Telnet, http, e-mail, etc.
- Information Services - Search engines, Databases, Help Desk etc.

# How to overcome present problems and to achieve connectivity on the national level ?

## Solution 1 .

To build own Network from the very beginning – laying of own cable lines, installing of own terrestrial or radio connections etc.

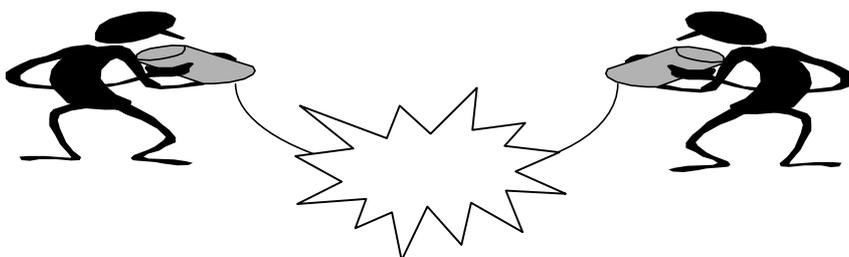
Very Successful example - RADIO-MSU in Russian Federation  
Examples in Ukraine UARNet –Lviv ; KS-Net in Kiev (Soros foundation) characterised by massive investments with no affect on the situation with the national wide connectivity.

Solution 1 is the best way to install a Campus Network for the single or a nearly situated institutions or for “Last Miles”	Solution 1 is a wrong way for the National Research Network
---	---



## Solution 2.

Transfer the responsibility for the Network’s transportation level to the strong provider (national telecom), who is able to offer a virtual private network service based on it’s national wide connectivity .

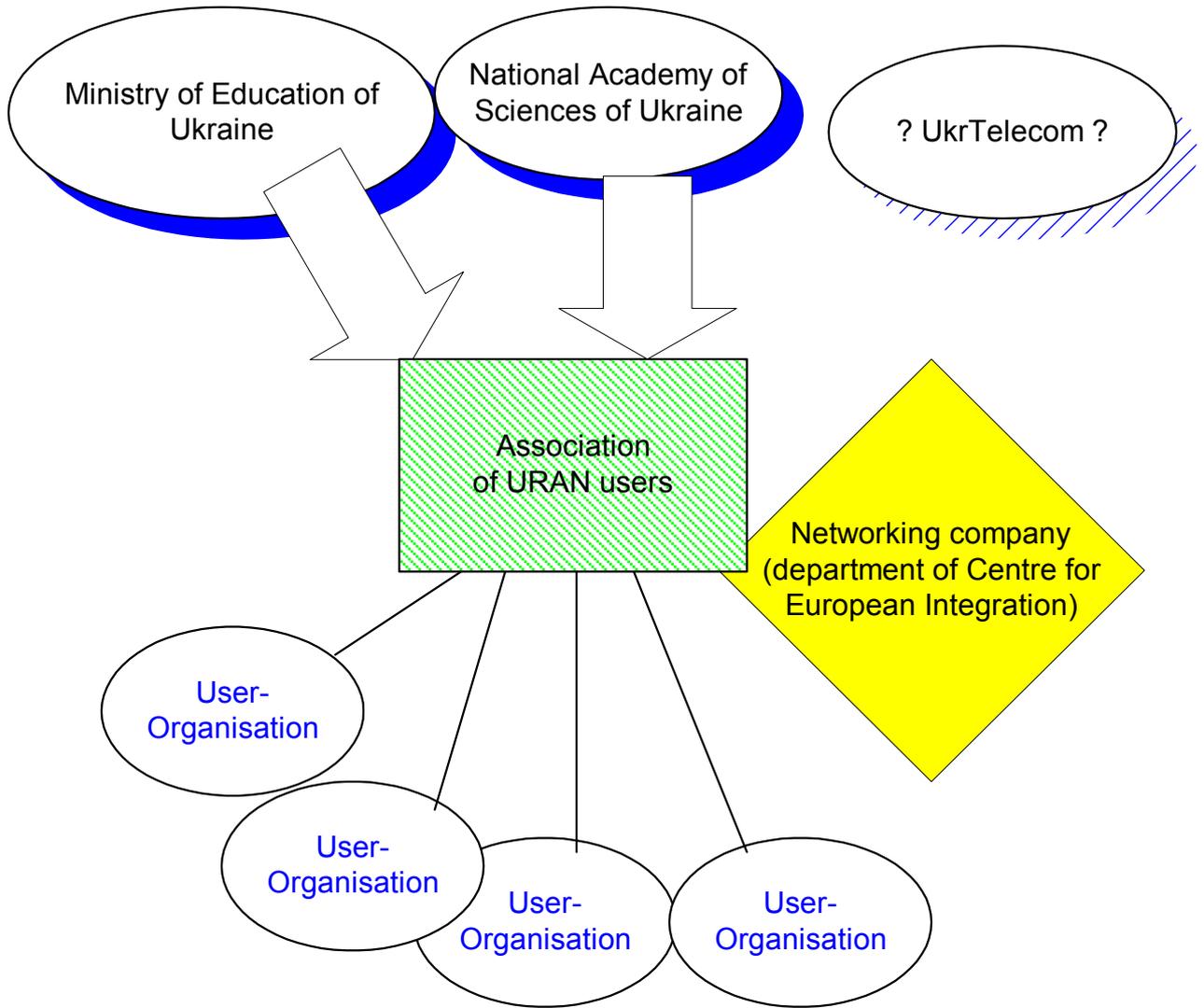


! “Last Mile” Problem !

## Idea of URAN as a national research network

- Satisfies to the requirements of the best technical solution
- Based on a strong National wide User's organisation to become a single representative of Ukraine's academic and research community on the market of service providers, from the one hand, and governmental regulations from the other

# Key Players



## Evolution of URAN idea

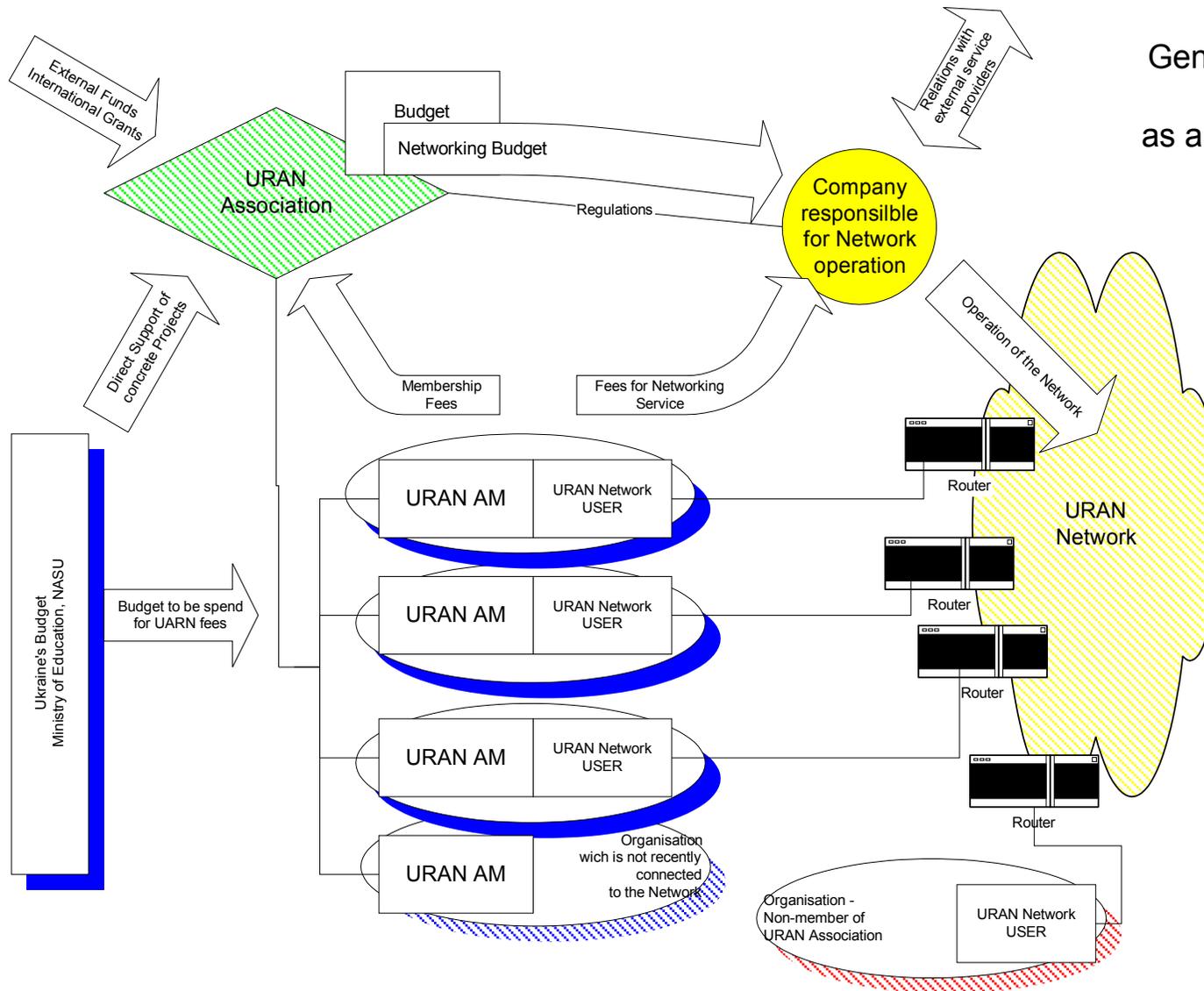
June 1996	<ul style="list-style-type: none"> <li>• in Kiev - Creation of the Initiative group of the ministry of Education and NASU</li> <li>• in Berlin - First meeting in DFN Office</li> </ul>
February 1997	Conference in Mengers-Kirchen – First approach to the concept of UARDN
April 1997	NATO workshop in Kiev. Concept of UARDN was formulated and discussed with wide auditorium of representatives of Ukraine’s Universities and research institutions with a participation of western experts.
May 1997	EDUNet’97 conference in Kiev . UARDN got a broad support from potential users and governmental authorities
September 1997	Seminar in Aachen of the UARDN working group with western experts. Technical solution for the Network was discussed
February 1998	<ul style="list-style-type: none"> <li>• NATO Scientific Programme Grant for pilot project “UARDN Step 1”</li> <li>• Meeting of the User’s association in Kiev. Network got it’s present name URAN</li> </ul>

Financial Support from NATO Scientific Programme  
 NIG 971779,  
 active and informal participation of the western experts  
 and joint efforts of initiative people and organisations in  
 Ukraine gave a chance to the URAN idea

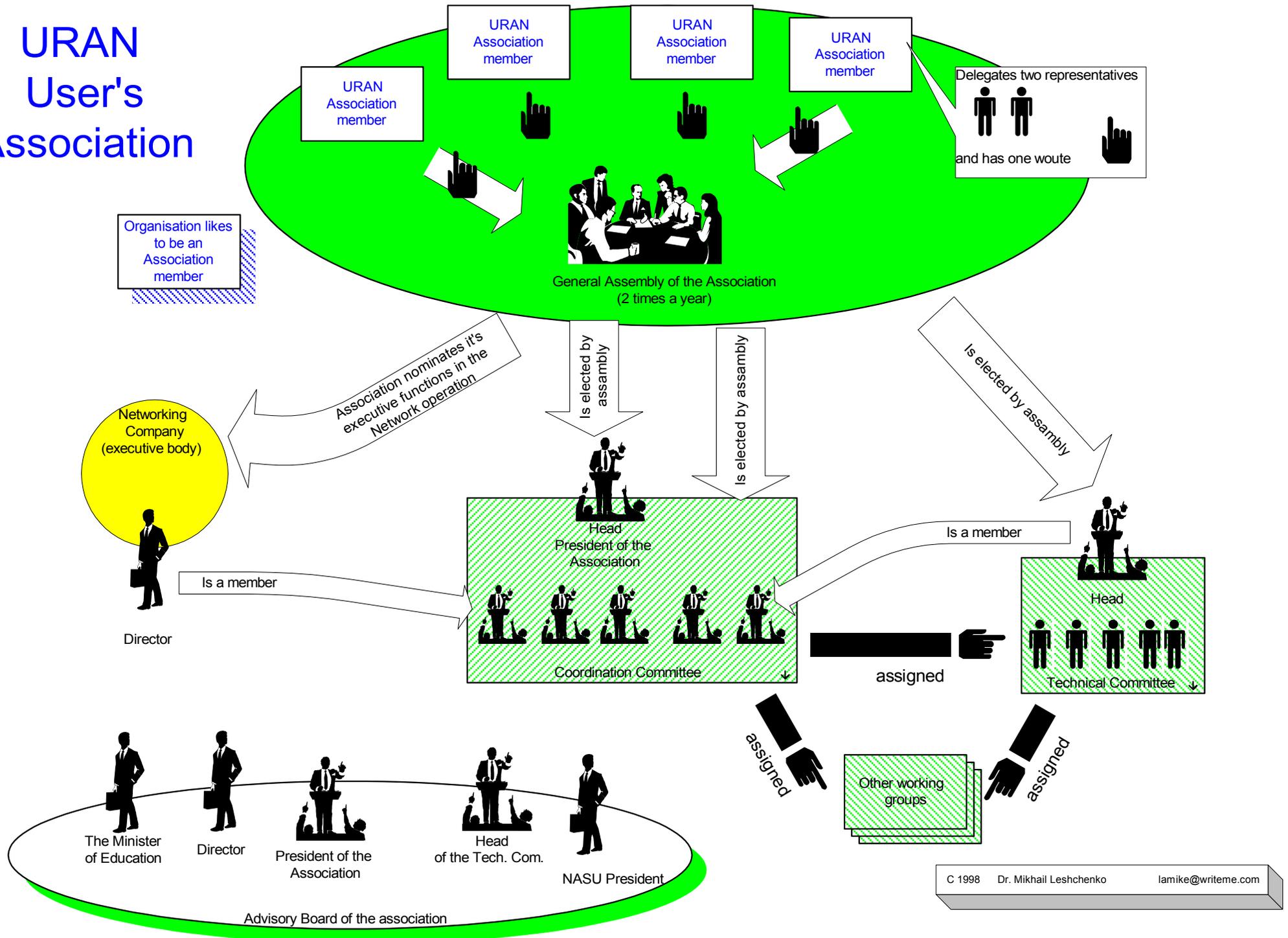
## URAN as an organisation

- General Model for URAN as an Organisation
- URAN User's Association
- Advisory Board of the URAN Association
- Networking Company as an executive body of the URAN Association, responsible for the URAN Network operation

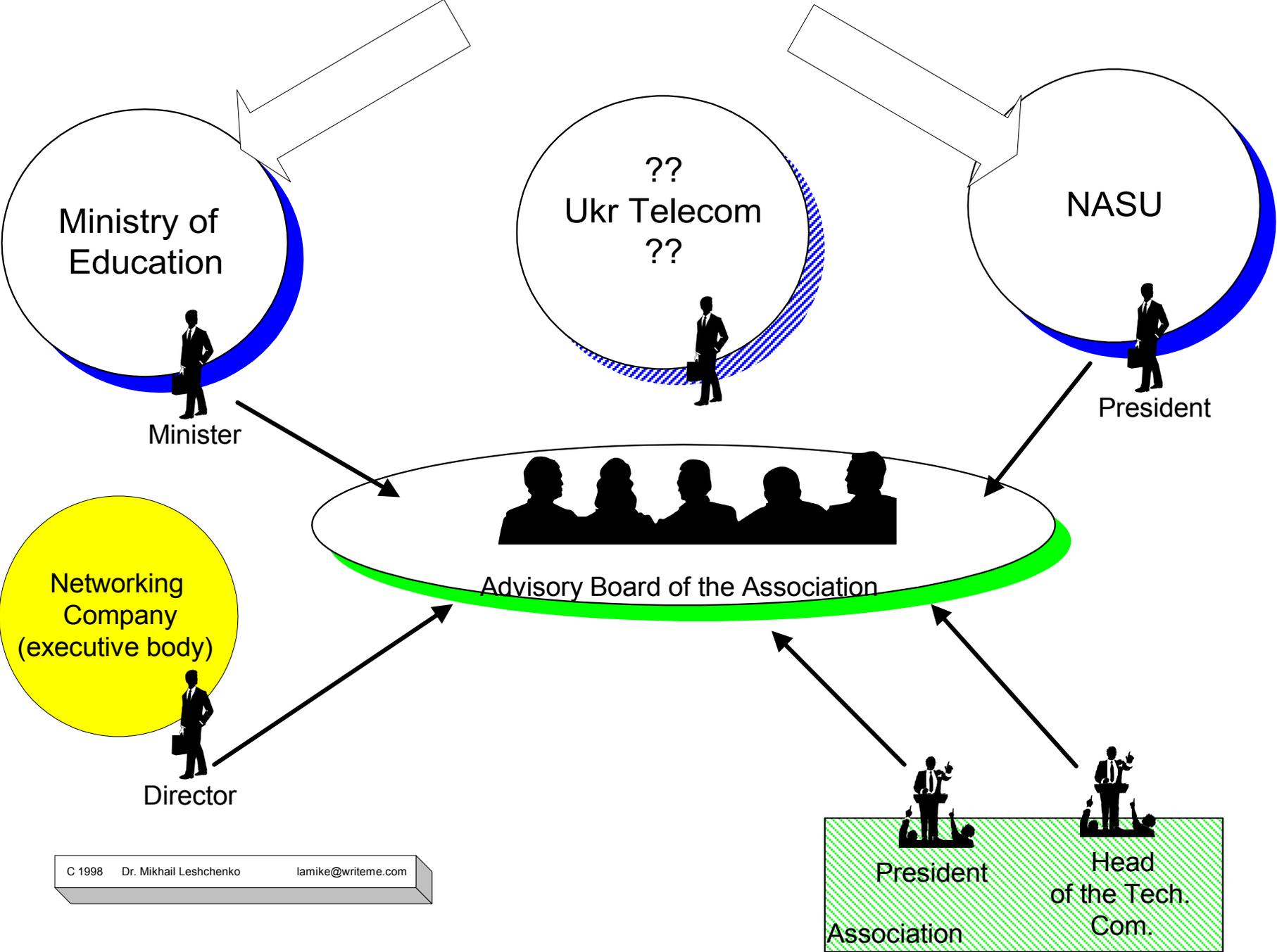
# General Model for UРАН as an Organisation



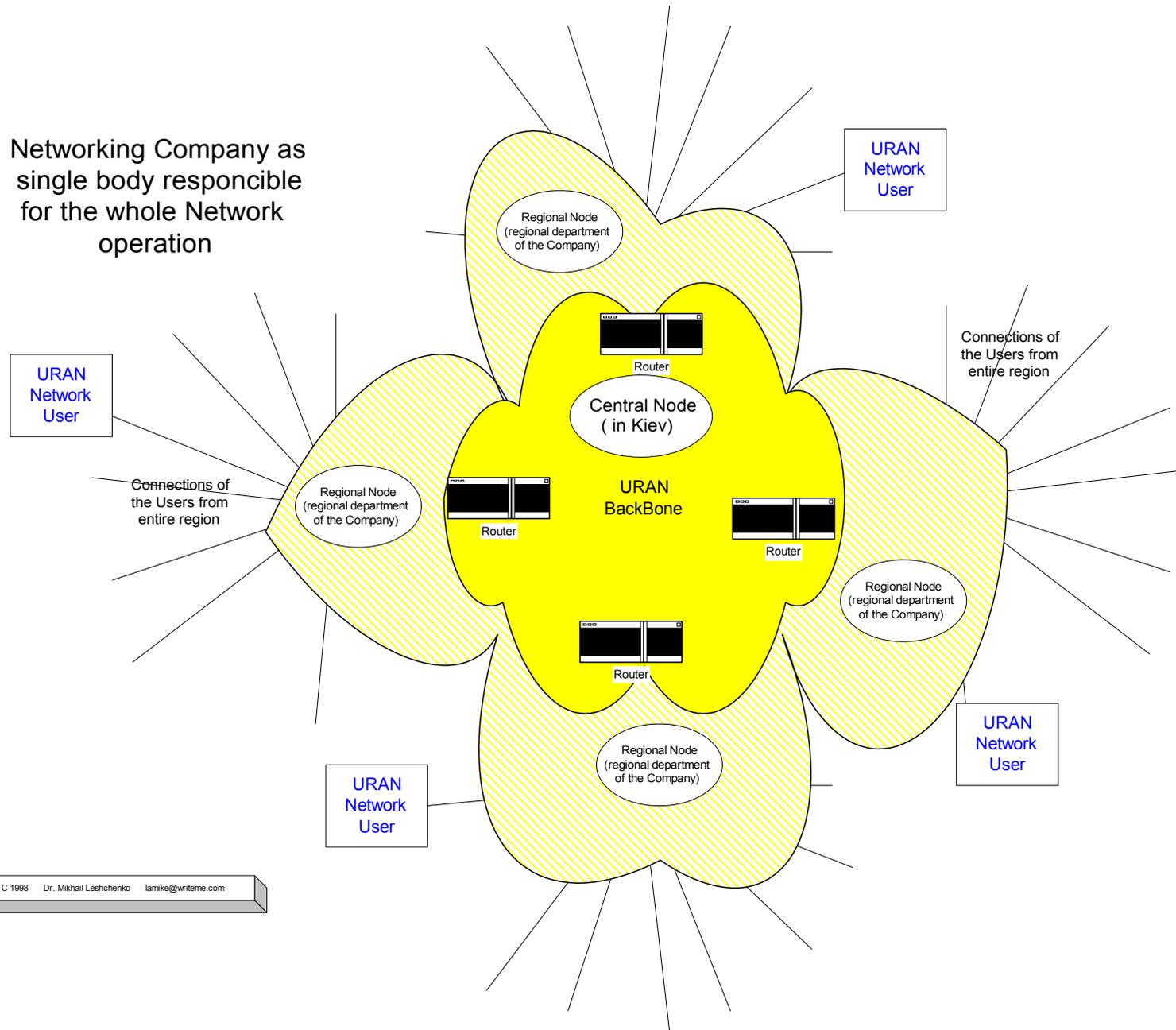
# URAN User's Association



Founders of Association



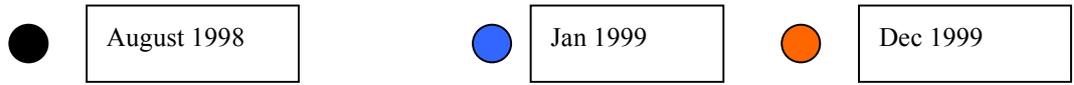
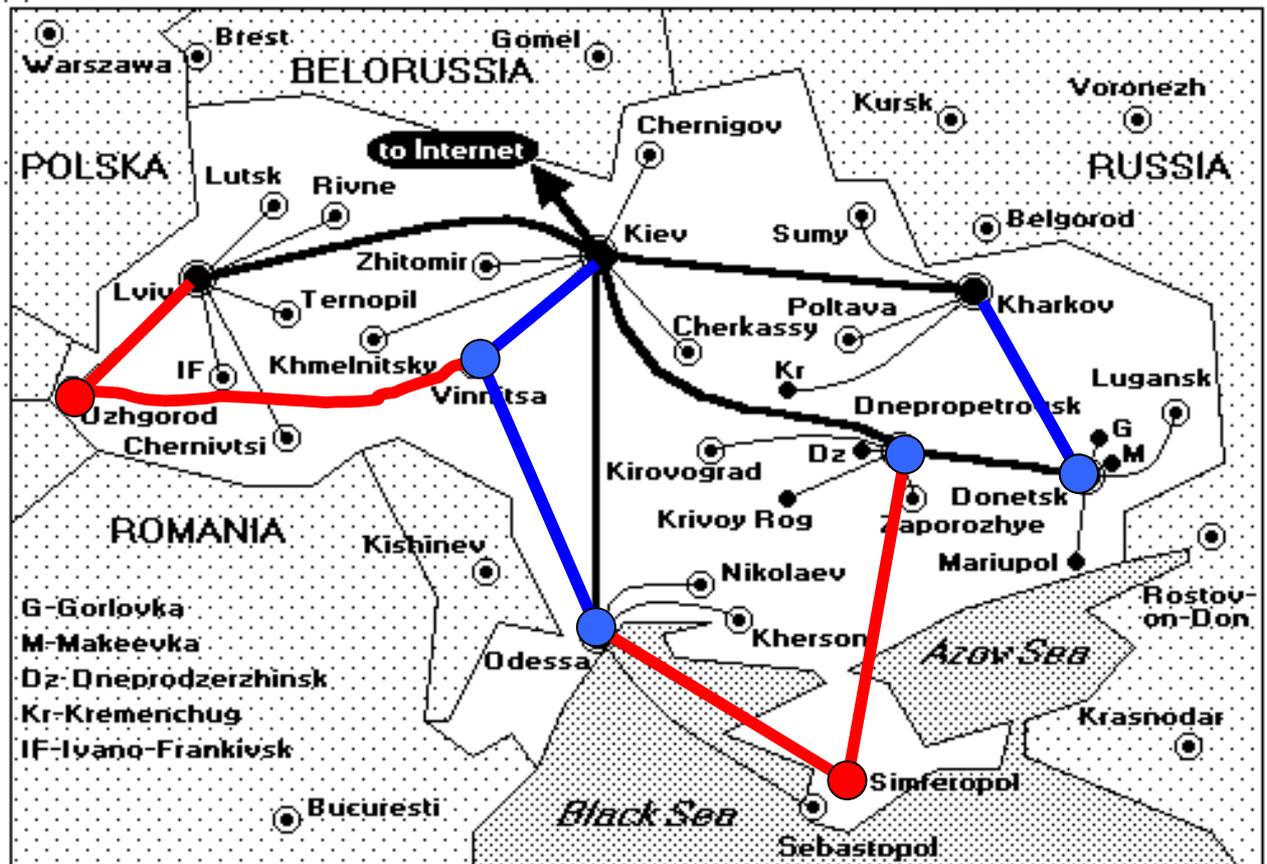
Networking Company as  
single body responsible  
for the whole Network  
operation



## URAN as a Network

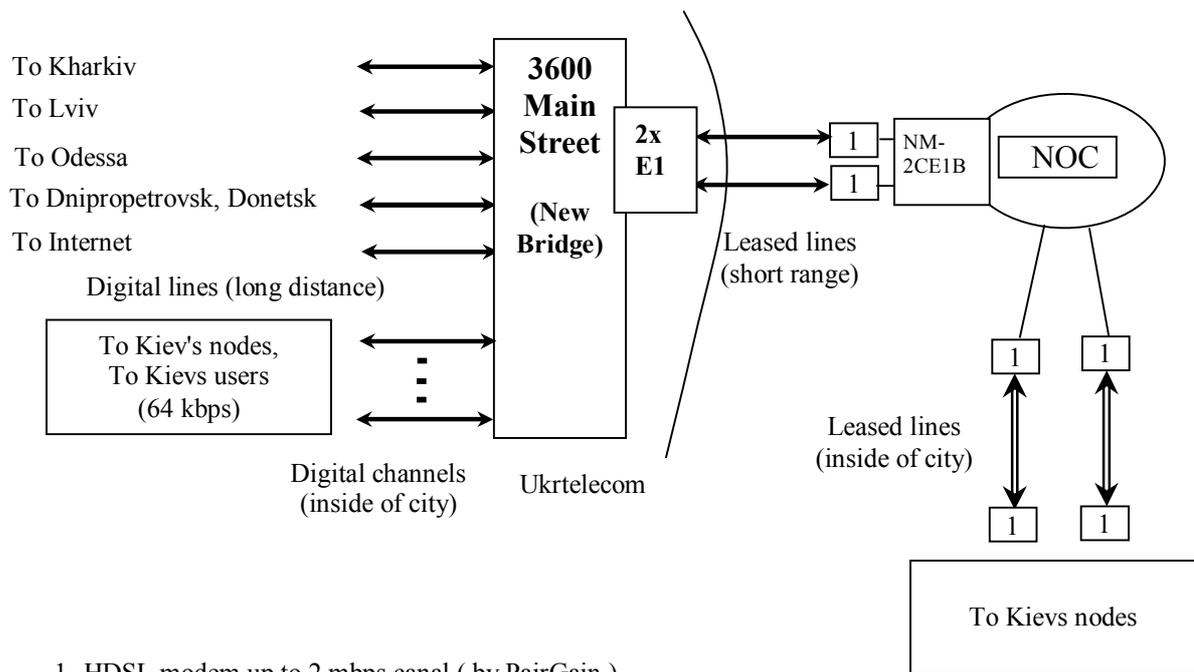
- URAN Backbone
- Network structure
- Networking services

# URAN Backbone Topology



## Solution for the Backbone:

1. Channelized E1/ISDN PRI interfaces in Cisco routers and their interconnection through E1 interfaces in Ukrtelecom (the E1 switch/Multiplexer 3600 MainStreet).
2. All digital channels in Ukraine (long distance and inside city) are connected to Ukrtelecom node switch.
3. Scalability in Backbone Bandwidth - integrated bandwidth up to 2...4 Mbps on first steps and up to 8 mbps by adding second Channelized E1/ISDN PRI 2-interfaces module in Cisco 3600 router.



## Servers of URAN

Central Node:	IO – base technological server	<ul style="list-style-type: none"> <li>• Feed-only nntp (Diablo)</li> <li>• http/ftp/gopher proxy (Squid)</li> <li>• smtp relay1</li> </ul>
	Babbler – additional technological server:	<ul style="list-style-type: none"> <li>• DNS (BIND v.8.*)</li> <li>• IRC (on demand)</li> <li>• Reserve for Relay1</li> <li>• Collecting of the Network statistics and it's preliminary analyses</li> <li>• Ethernet router for the Node's demands</li> </ul>
Eastern Node (NTUU – KPI)	Odin – technological server:	<ul style="list-style-type: none"> <li>• nntp/nrpd news server (Incoming news feed – from satellite receiver ; Outgoing – threw IO - feed)</li> <li>• smtp relay2</li> </ul>
	Holder – technological server:	<ul style="list-style-type: none"> <li>• ftp server (mirroring of popular sites)</li> <li>• system server (system configuration and source records)</li> <li>• DNS server (BIND v.8.*)</li> <li>• Reserve for relay1</li> </ul>
	Loki – administrating server:	<ul style="list-style-type: none"> <li>• Working place for the Network administrator</li> <li>• Analyses of statistics etc.</li> </ul>
South Node	Nazgul - technological server	<ul style="list-style-type: none"> <li>• Sntp relay</li> <li>• http/ftp/gopher proxy (Squid)</li> </ul>
Regional Nodes	See Eastern Node	

Hardware Platform for servers Intel P-II.  
Main driving Operating System – Free BSD

## Services of URAN

DNS	<ul style="list-style-type: none"><li>• primary in rz.rwth-aachen</li><li>• Secondary – in dfn.de; TU-delftd.nl;</li><li>• Local – on Babblar and Holder in Kiev.</li><li>• Software - BIND v. 8.*</li></ul>
SMTP	<ul style="list-style-type: none"><li>• Relay1 and Relay2 for the common URAN usage</li><li>• regional Relays in regional Nodes</li><li>• local Relays by users</li><li>• Software - SENDMAIL 8.8.*</li></ul>
Proxy	(squid v-1.2.*)
News	<ul style="list-style-type: none"><li>• Incoming traffic &gt;&gt; outgoing traffic</li><li>• Incoming News feed via Orion-satellite (<a href="http://www.planet.com">www.planet.com</a>) to be installed in Eastern Node (in Kiev)</li><li>• Like DFN does (<a href="http://www.pilhuhn.de/mcntp">http://www.pilhuhn.de/mcntp</a>).</li><li>• Outgoing via parity links or via external URAN INTERNET link</li><li>• Software inn-1.7.* (nntp/nnrp), diablo – 1.1.* (nntp only)</li></ul>
FTP	<ul style="list-style-type: none"><li>• Mirroring of popular sites : <a href="ftp://netscape.com">ftp.netscape.com</a> <a href="ftp://freebsd.org">ftp.freebsd.org</a> squid.nlanr.net <a href="ftp://apache.org">ftp.apache.org</a></li></ul>

## URAN Perspectives

	Number of organisations-URAN users	Backbone topology		Funding
July 1998	25-50	Central Node in Kiev, 2 Regional Centres in Lviv and Kharkiv	64kB Backbone  IP services	NATO NIG "UARDN Step1" \$150'000  Ukrain's internal funds \$ 60'000
January 1999	80-100	Connection to the INTERNET + 4 Regional Nodes in Odessa, Dnipropetrovsk, Donetsk, Vinnitsa	512kB to INTERNET 128kB Backbone  IP services	NATO NIG "UARDN Step2-4" \$100'000  Ukrain's internal funds \$ 225'000
Short term perspective Year 2000	300 (All of III-IV grade)	+ 2 Regional Nodes in Uzhgorod and Krim Complete Backbone topology	Introduction of IP over ATM services	Approx. \$ 2'000'000
Long term Perspective Year 2003	+ 600 (including colleges I-II grade and some secondary schools)		High Speed Network	

Membership in International Networking organisations like TERENA, TEN

# URAN Problems

Financial problem:

- International sponsors (NATO, EU, etc.)
- Optimal management of URAN in order to attract Ukraine's internal funds and to collect User's fees.

Recognition of URAN by Ukraine's government authorities as a National Task!

Technical Problems :

- In comparison with Europe – General cabling infrastructure in Ukraine is not so good developed.
- We still looking for the best solution for the External connection of URAN to the INTERNET!

## Conclusion

- UARDN Project is aimed on the creation of the National wide Backbone for the research Network URAN in Ukraine and it's connection to the INTERNET
- User's organisations are self responsible for their connections to the URAN network – Last mile Problem should be solved by Users themselves .

So future success of the National Research Network in Ukraine  
is a common Task for the URAN itself and User's Organisations

Subsidy from the West (INTAS, NATO, EU Commissions, etc.) should be considered as a starting but temporary solution for the financial side of the problem

National research Network in Ukraine should become a not-for-profit but self-supporting Network, which can attract national and international support. It is possible only under the following conditions:

- Users should realise importance of fees
- Co-operation with Ukr.Telecom
- Reasonable integration of “third” subscribers from the market at commercial rates to support the budget.
- Support of the State
- Membership in the international Networking organisations TERENA, TEN, etc.