

**BELNET**

# Annual Report

# 2005

# The Network of Knowledge

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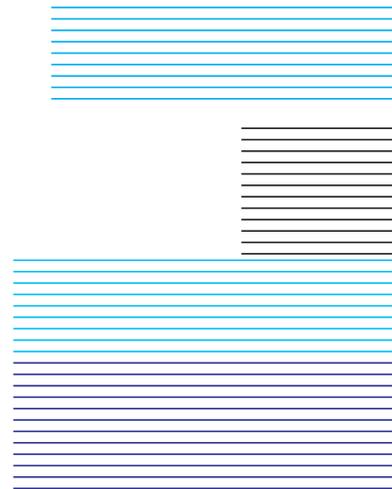
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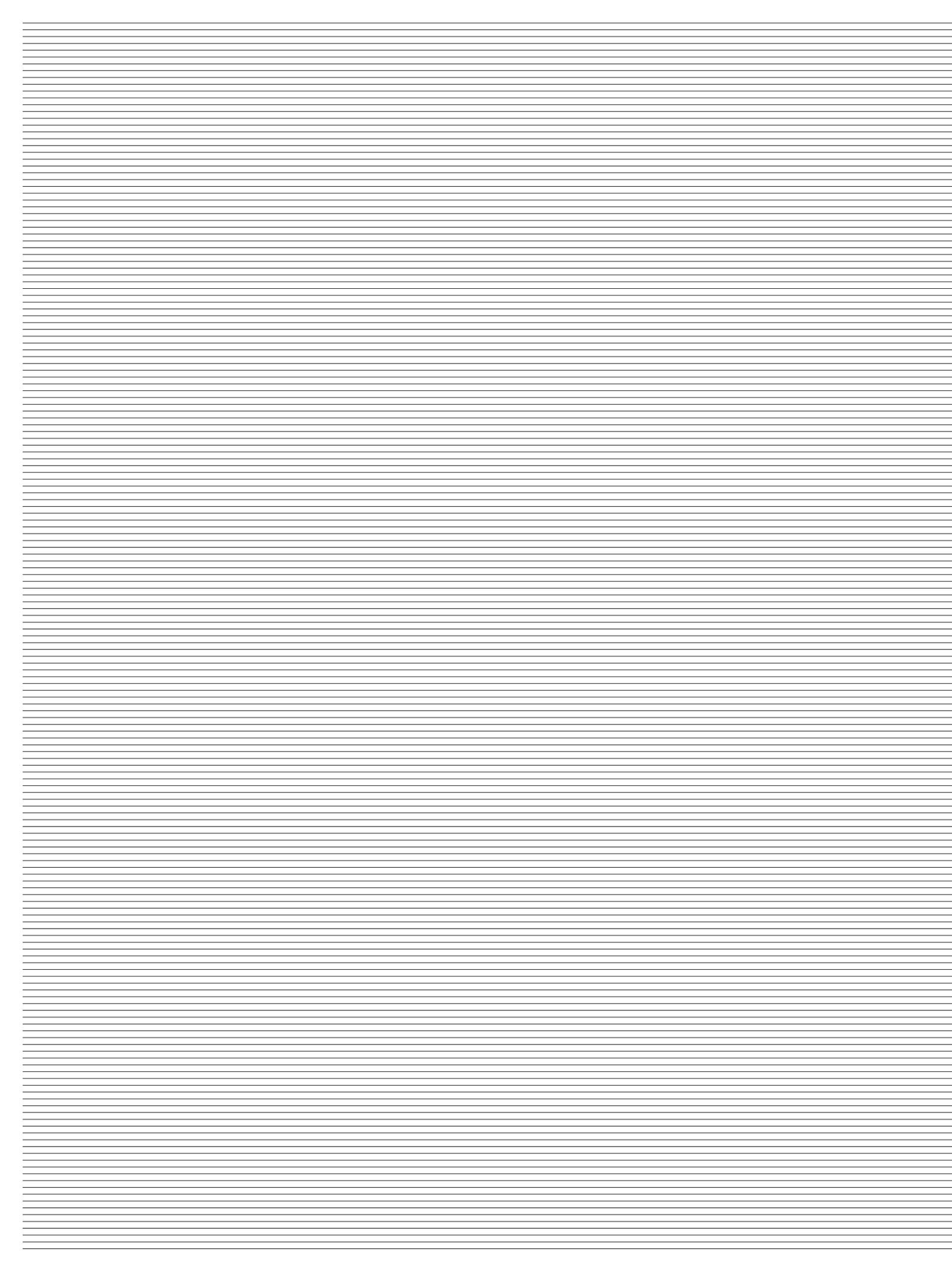
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Annual Report 2005  
The Network of Knowledge





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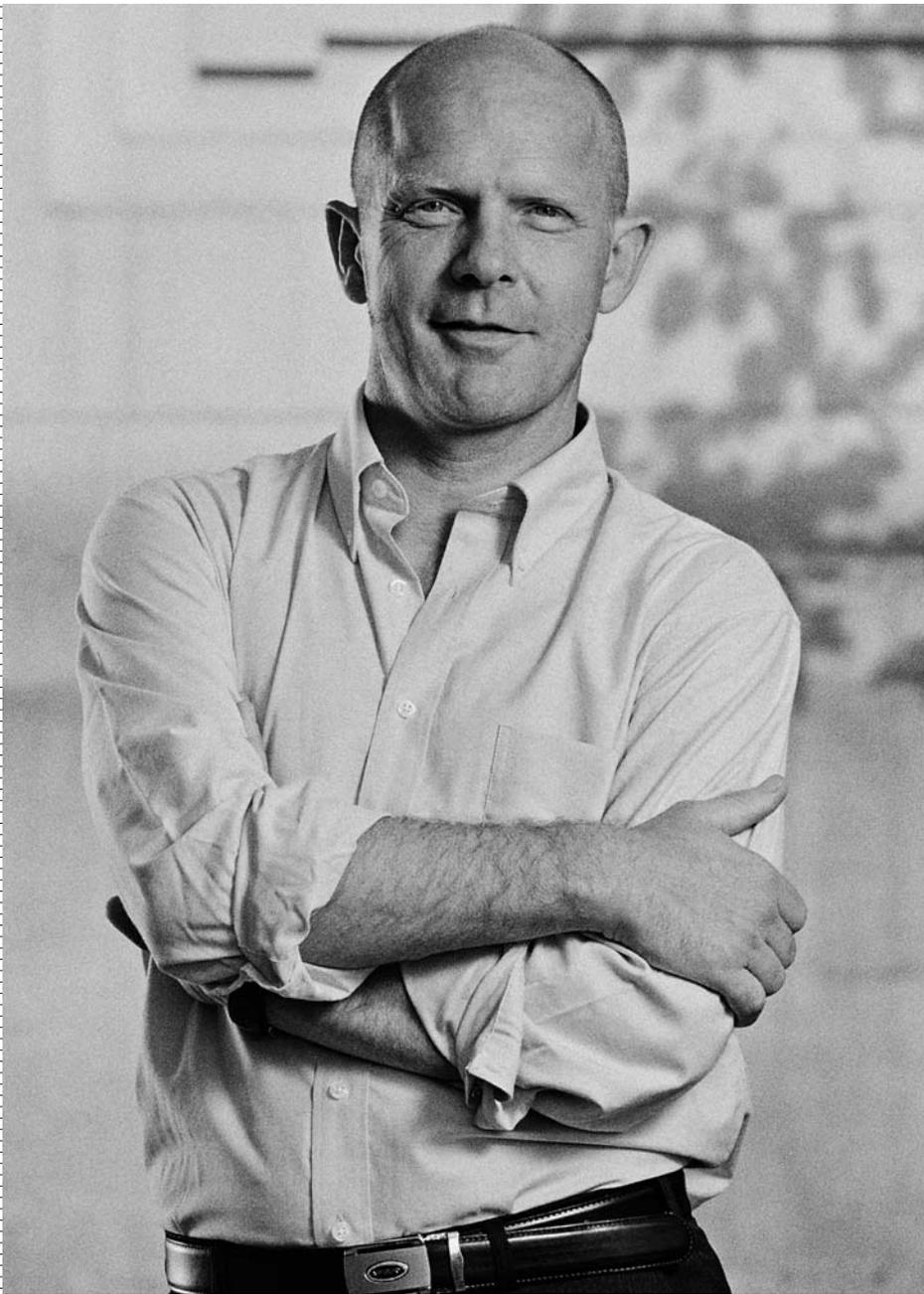
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At the back of this Annual Report, you will find our 2005 Activity Report with details of the activities, projects and services that we carried out and provided in 2005.



Pierre Bruyère, Director

## Foreword

BELNET's mission is to make a substantial contribution to the new knowledge society that is coming into being. This is no mean challenge. Our task today is to do the things that, tomorrow, will determine how we work on a day-to-day basis. It was this that, in 2005, persuaded BELNET to create an internal strategic 'think-tank' charged with setting out the framework in which BELNET is to evolve over the coming years.

Our principle target group, research and higher educational institutions, lies at the very core of this project. Now more than ever, we strive to anticipate their needs in a manner that is coherent and effective. Their end-users need specific solutions at the forefront of technology, which private undertakings cannot or will not provide. BELNET can and will do so. We have the know-how, the experience, the people and the resources to help them. Free from the constraints imposed by the imperatives of commercial logic, we are better able to concentrate on the real needs of our target group.

Therefore, it is essential that we plan into the future. BELNET wants to identify, launch and stimulate solutions for tomorrow's world. By anticipating the arising needs of education and research, we bolster our country's position in Europe and the world and make an effective contribution to the knowledge society.

Every higher education and research institution has to be able to profit fully from the benefits we offer them. In addition, we also provide the benefits of our technology and know-how to public authorities, agencies and regional networks here at home.

In order to fulfil our mission, we must be able to rely on having an efficient organisation and a solid client base. Even though the resources and competences currently at our disposal are already utilised to the maximum, we shall nonetheless continue to strive towards even more intensive optimisation of our activities.

In this context, our current status as an autonomously managed federal service is a real obstacle, since it constitutes a hindrance to developing our organisation, especially as regards HR management. For this reason, since 2005 we have been looking into an alternative legal status that will enable us to realise all our ambitions. We therefore look to the future with confidence.

Pierre Bruyère  
*Director*

## **Mission**

BELNET is intended to be the network of knowledge. We promote scientific development by providing and maintaining quality, innovative network infrastructures and related services for the requirements of higher education and research in Belgium. Thanks to its acquired expertise, its unique position in the market and its economies of scale, BELNET is quickening the pace of development in the knowledge and information society.

## Objectives

Our mission incorporates four strategic objectives:

1. BELNET means to give an optimum response to the needs of educational and research institutions and their end-users in terms of network infrastructure and relevant services.

2. BELNET means to provide innovative networks and applications that already anticipate the needs of tomorrow.

3. BELNET means to be a robust, acknowledged organisation that has an effect on all educational and research institutions.

4. BELNET means to deploy its resources and personnel in an expedient, efficient manner within an optimised structure.

**Our own organisation** BELNET was created in 1989 as part of the Impulse Programme on Information Technologies as developed by the Belgian Science Policy Office's programming department. The aim of the programme was to promote the use of super-computers by the scientific community in Belgium and look into the possibilities of a research network. This network is now in place and the accent therefore mainly lies on developing top link services in terms of support, information and training.

**Background** BELNET's first-generation network came on line in 1993. During the first few years, our activities were mainly devoted to extending capacity and the number of network connections. At present, this capacity no longer constitutes a problem. Since 2003, BELNET has therefore been concentrating on developing entirely new services for the research and higher education sectors, such as IPv6, multicast and grid computing. Security is also a major preoccupation. In 2004, therefore, we created a Computer Emergency Response Team (CERT), which is widely acknowledged in Belgium. The CERT provides information on security issues and combats improper use of the internet. We have also been active on an international scale for some considerable time. For several years, we have worked on Géant, the pan-European research network.

**Legal Status** It was in 1997 that BELNET became a permanent operating unit within Federal Scientific Policy. In 2000, we were given the status of an autonomously managed federal service within Belgian Science Policy. Since then, our official name has been Belgian Telematic Research Network, BELNET. In 2001, responsibility for monitoring BELNET's general framework programme and financial management passed to a board of management of seven voting members appointed for a renewable term of four years.

Because the present status of BELNET encumbers it in carrying out its statutory mission and developing new activities, in 2005 BELNET launched a judicial inquiry into the alternative structures that might be conceivable for our organisation. The main obstacles pertain to recruitment policy, execution of the assignments entrusted to us by the authorities and a lack of independence when leasing or purchasing real estate. The fact that BELNET is not subject to VAT is a further problem. However, the greatest hurdle lies in the lack of flexibility in terms of recruitment and pay.

**A unique service for scientists**  
BELNET provides a whole range of services and solutions that private companies are unwilling or unable to offer. Grid computing is one example. This is a technology by which a number of computers are able to work together as one supercomputer and is of great importance to highly specialised scientists. However, because the target group is so small, commercial undertakings give it low priority. BELNET, on the other hand, places scientists high on its list of priorities. We offer BEgrid, a major contribution to the onward development of grid computing, science and the knowledge society. And, eventually, commercial concerns will also reap the benefits of this innovative technology.

Since 2003, BELNET has concentrated on the development of innovative services for research and higher education, such as IPv6, multicast and grid computing.





“My short film ‘De laatste zomer’ (The Last Summer) was entered in the short film festival ‘Het Grote Ongeduld’ (The Great Impatience) of the Vrije Universiteit Brussel. It was a truly fantastic experience. I was among the prize-winners and also immediately found out what it means to reach a wide audience. The public don't even need to come into the movie theatre. All the films can be viewed via the BELNET network thanks to their multicast technology.”

Joost Wynant, film director, Ghent

**Network-connected organisations** BELNET's main target groups are higher education, adult education and research institutions. Together, they represent 71% of our customer base. The other network-connected organisations are government authorities and agencies (22%) and regional networks (7%). In 2005, the number of network-connected organisations rose by 16, including 3 higher education institutes and 6 research centres. A further 6 government authorities and 1 regional network also joined up to BELNET. In total, BELNET had 155 network-connected organisations in 2005.

**Research institutions** The majority of research centres and laboratories use BELNET's services – a total of 54 institutions, which constitute 35% of our customer base. In 2005, 6 new centres joined up: the National Scientific Research Centre (Brussels office), the Inter-disciplinary Institute for Broadband Technology, Antwerp University Hospital, the Flemish Institute for Technological Research (TAP department), East Limburg Hospital and the NATO Research Agency.

**Higher education** Alongside the Provincial Technical Institute in Kortrijk, two support organisations joined up to BELNET for the first time in 2005: the Flemish Inter-university Council and the Flemish Secretariat for Catholic Education. Thanks to the good cooperation between BELNET and the Flemish Community, all the Flemish universities and colleges make use of BELNET. Elsewhere in the country, too, a third of higher education institutions are connected.

In 2005, BELNET commenced negotiations with the Flemish Community and the Walloon Region to increase the bandwidth for colleges.

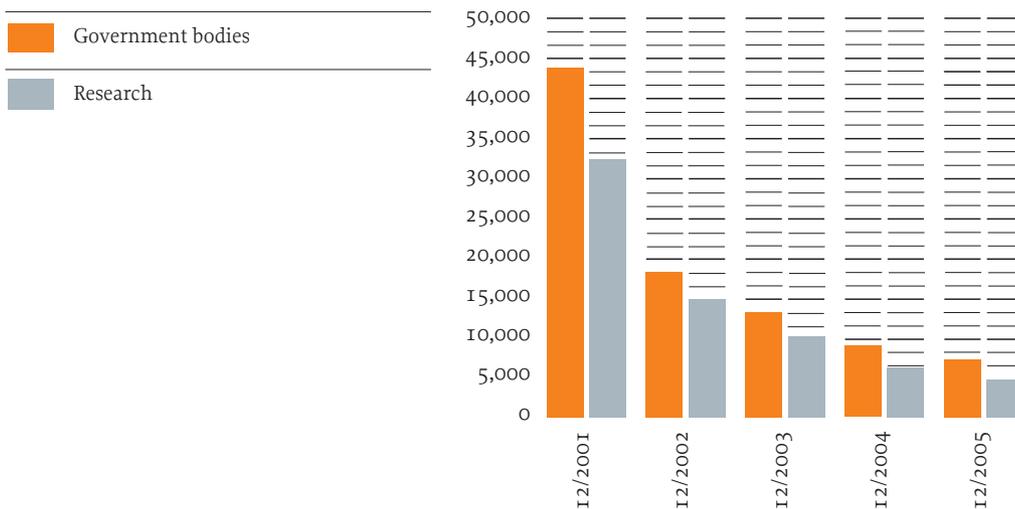
**Government authorities and agencies** BELNET also provides network infrastructure and services to government authorities and agencies. They represent 22% of our customer base, comprising a total of 34 institutions. In 2005, 6 government bodies were connected, including the Walloon Parliament, the Province of Namur and the Flemish Parliament.

Over half a million people use the BELNET network every day: researchers, academic staff, civil servants and many more.

**Regional networks** 2005 saw the Walloon Ministry for Facilities and Transport connect to the BELNET network. A total of 11 regional networks are connected. Together, they represent 7% of our clientele, but 40% of end-users.

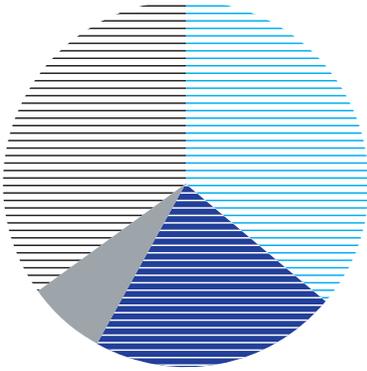
**End-users** The number of BELNET end-users rose slightly in 2005 to 584,000, with over half a million people thus making daily use of our network. This group predominantly comprises students and academic staff (56%). BELNET further has a large number of end-users via the affiliate regional network (44%). In May 2005, for all end-users, the minimum bandwidth was increased fivefold and the connection type improved. Thanks to dynamic management of our international bandwidths, we have again been able to reduce rates for our network-connected organisations.

Changes in the rates for basic 10 Mbit/s connections in the period 2001-2005, in euros



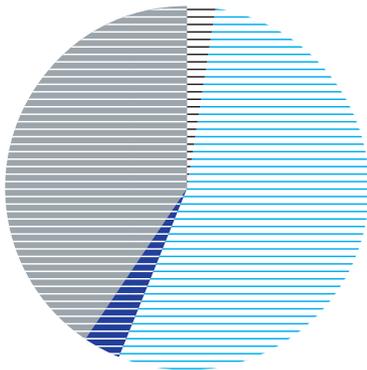
BELNET is close at hand for its network-connected organisations and end-users.

## Number of institutions per customer group



Research	54	34.84%
Higher education	56	36.13%
Government departments and bodies	34	21.93%
Regional networks	11	7.10%
<b>Total</b>	<b>155</b>	<b>100%</b>

## Number of end-users per customer group



Research	15,150	2.60%
Higher education	314,100	53.78%
Government departments and bodies	18,450	3.16%
Regional networks	236,300	40.46%
<b>Total</b>	<b>584,000</b>	<b>100%</b>

Higher education and research institutions make up 71% of BELNET's customer base.





“Recent research into shipwrecks shows that wavetrains from differing directions may be responsible for exceptional and dangerous conditions at sea. In order to verify these findings, we set up and conducted a number of numerical experiments on BEgrid. The total computing time would have taken around 30,000 CPU hours or 41 months. By using BEgrid, we completed our calculations in 4 months, a reduction of a factor of 10.”

Engineer Alessandro Toffoli, KULeuven  
depicted with his daughter.  
Laboratory for Hydraulics, Civil Engineering

**Services** Network access for research and teaching is BELNET's core activity. It's not for nothing that we're the 'Network of Knowledge'. In addition, we promote scientific development by delivering and supporting innovative network infrastructure and services. New technologies such as IPv6, multicast and grid computing are hardly, if at all, developed by the private sector, owing to commercial considerations. Thanks to BELNET, headway is being made in these areas in Belgium. Alongside innovative technologies, we also offer our network-connected organisations a wide range of practical services, enabling them to make full use of the knowledge and information society.

**Network access** BELNET offers network access via three high quality networks: the BELNET network, FedMAN and BNIX.

For Belgian researchers, the **BELNET network** is of strategic importance because it enables them to communicate with colleagues across the entire world. It gives them access to the commercial internet, but also to the Géant2 European research network and the North American and Asian research networks. Some 5,000 terabytes of data are exchanged annually via the BELNET network.

The **FedMAN network** is an important fundament of e-government in Belgium. It was developed at the request of the Federal Public Service Information and Communication Technology, FedICT. In 2002 it was looking for a partner to accelerate development of the knowledge and information society, and for that reason called on the competence and expertise of BELNET. FedMAN connects the federal departments with one another and with the internet.

The **BNIX network** is essential for the internet in Belgium. It makes the internet better and cheaper by offering Belgian Internet Service Providers (ISPs) a central infrastructure for very fast, unencumbered mutual internet traffic exchange. BNIX thus improves the quality of local connections. Thanks to BNIX, BELNET users have a high-quality connection at a low cost price.

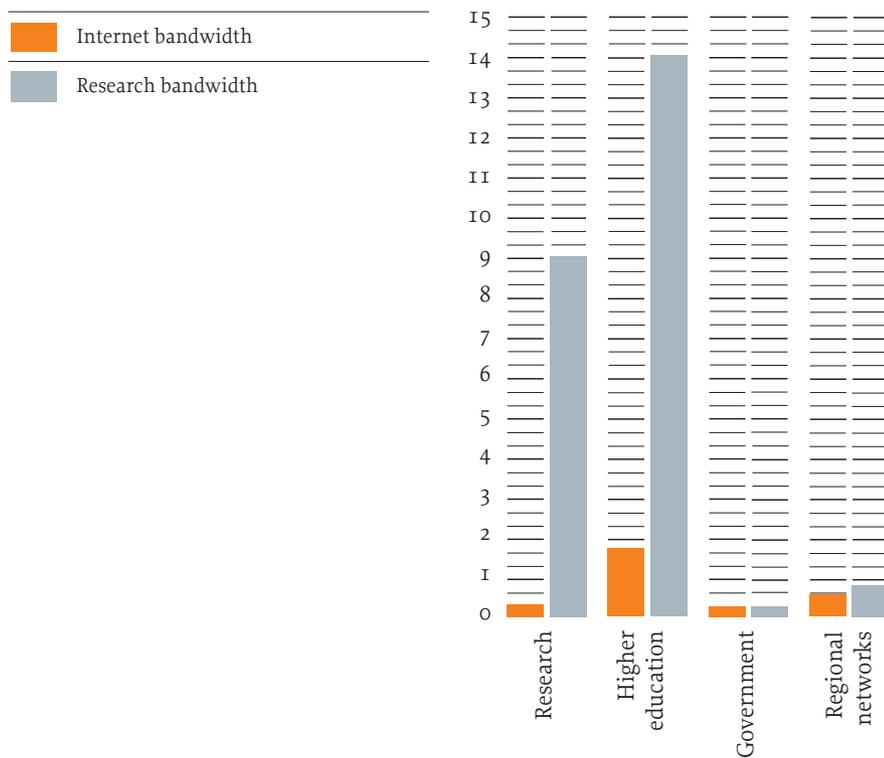
#### Permanent quality assurance

The quality of the network and server infrastructure is permanently monitored at the BELNET Network Operations Center (NOC). The NOC takes direct action in the event of problems. It also carries out upgrades of software and hardware. Moreover, the NOC acts as the helpdesk for technical support services.

**Secure infrastructure** For administering its networks, BELNET has an extensive set of servers housed in two separate, secure rooms, each with its own, powerful electrical generator and air conditioning system. The secure infrastructure is intended to ensure that the network remains operational at all times – which it does.

The secure infrastructure ensures that the network remains operational at all times, come what may.

## Distribution of bandwidth types per network-connected organisation, end of 2005, in Gbit/s

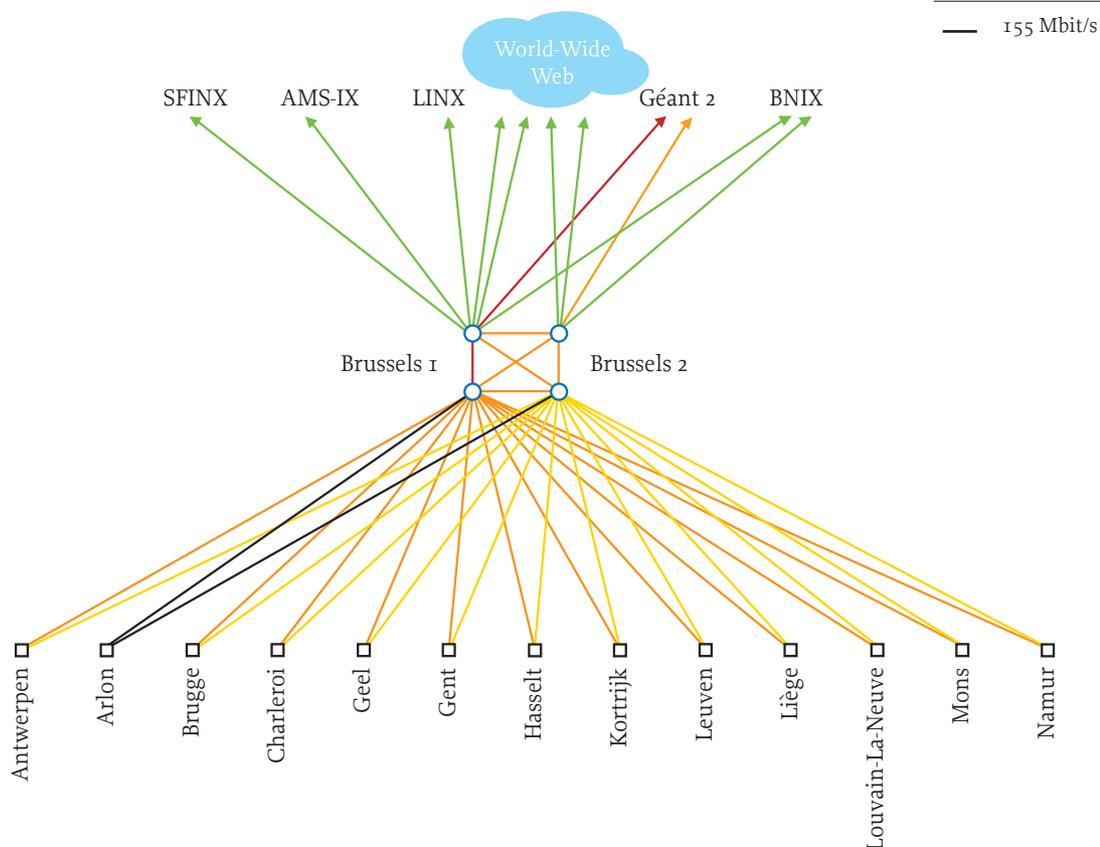


## Access capacity development, in Gbit/s



## The BELNET network

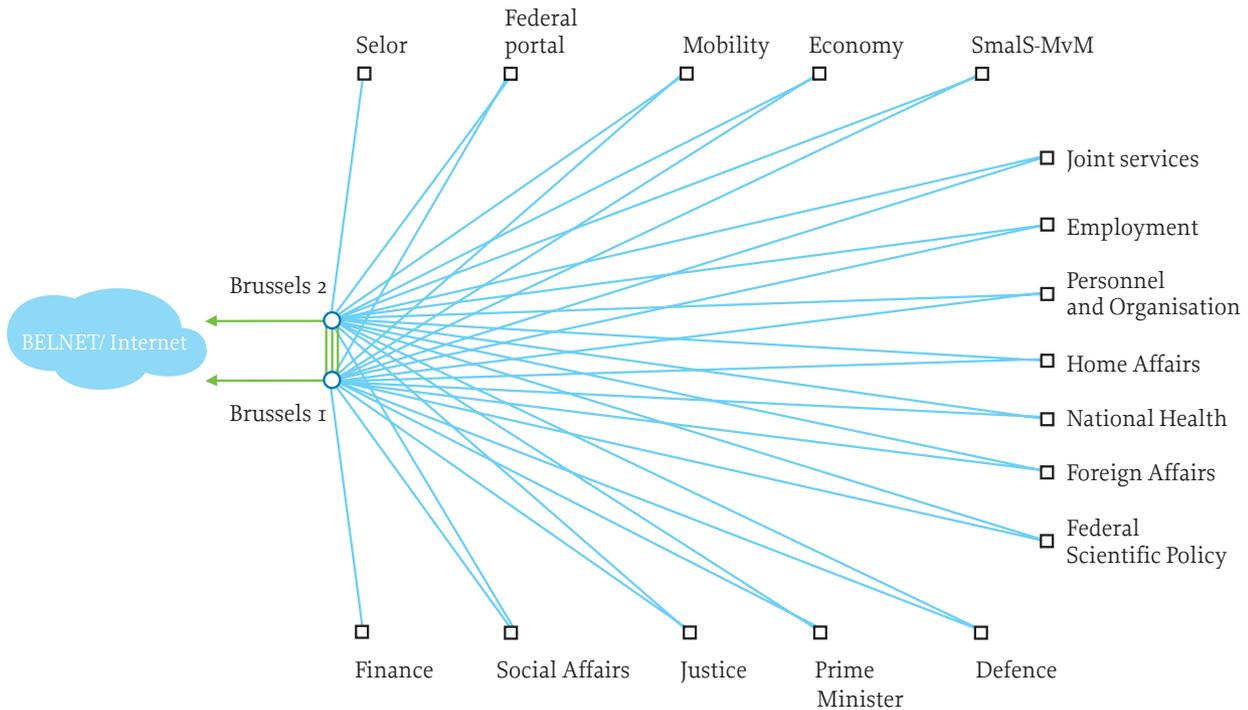
The BELNET network comprises two star-shaped structures, centralised in Brussels. The core of the network is the departure point for 2.5 Gbit/s data transmission lines which lead to 15 national PoPs (Points of Presence), two of which are in Brussels. Maximum availability of the network is assured by its double, fully redundant set-up.



Thanks to BELNET, new technologies are able to gain a foothold in Belgium.

## The FedMAN network

FedMAN (Federal Metropolitan Area Network) allows government agencies to communicate with one another via FedNAPs (FedMAN Network Access Points). Each FedNAP has redundant Fast Ethernet connections of 100 Mbit/s to the central routers of the two FedMAN core sites. These routers are interconnected via three separate fibre optic circuits, thus increasing the reliability of the network. The central routers offer internet access via the BELNET network.

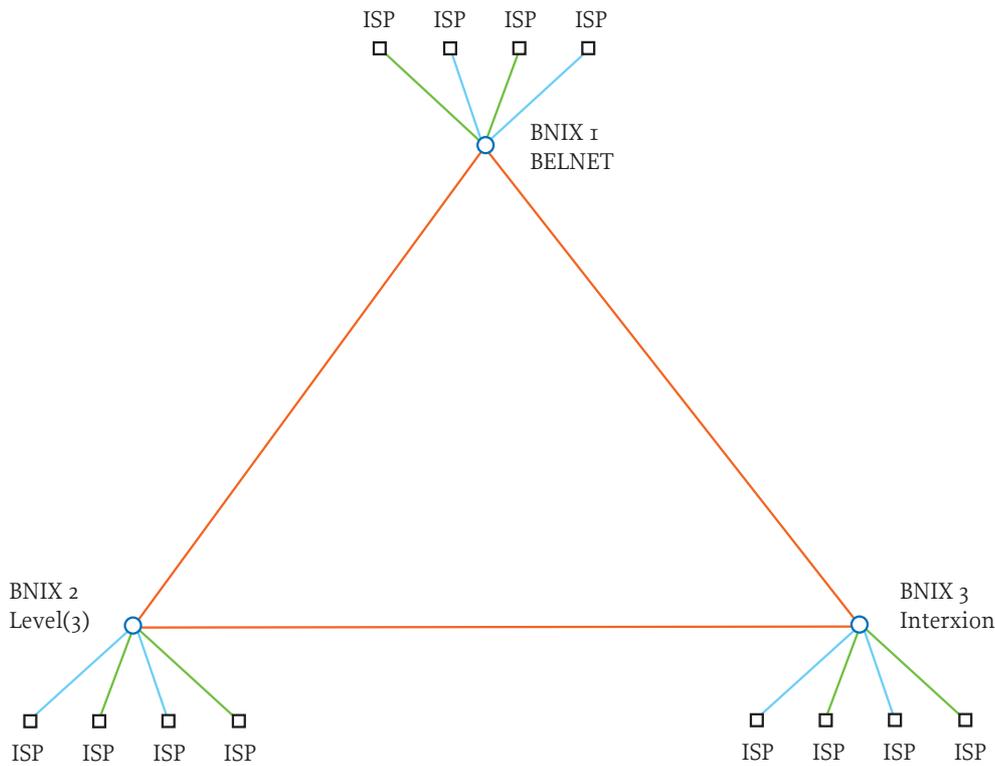


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## The BNIX network

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The BNIX (Belgian National Internet eXchange) is constructed around three powerful switches situated in three locations in the Brussels region. These switches are connected to one another via three fibre optic pairs with a capacity of 10 Gbit/s. ISPs can connect directly to BNIX via Fast Ethernet or a Gigabit-Ethernet connection. IPv4, IPv6 and multicast connections are possible.



**New technologies** BELNET accelerates the knowledge and information society by offering scientists technologies that they cannot find elsewhere. For example, we have made grid computing a possibility in Belgium.

**Grid computing** brings geographically dispersed computers together in a single network, so that one virtual supercomputer is created with huge computing and storage capacity. This technology enables new scientific applications and leads to new insights, in areas such as high energy physics, astrophysics, hydrology, medical conceptualisation and mathematics.

BELNET is also a precursor in the field of **IPv6**, the new standard for transporting data packets over the internet. We are providing the means allowing end-users already to start experimenting and working with this new protocol, thus enabling them to acquire experience and prepare for the future.

Another advanced technology that BELNET offers is **multicast**. With multicast, large quantities of data can be sent to various recipients simultaneously. This technology is a response catering for the need to exchange multimedia information. An example of where multicast is useful is in the context of real-time video-streaming.

**Practical services** BELNET provides a wide range of practical services in response to the requirements of its network-connected organisations.

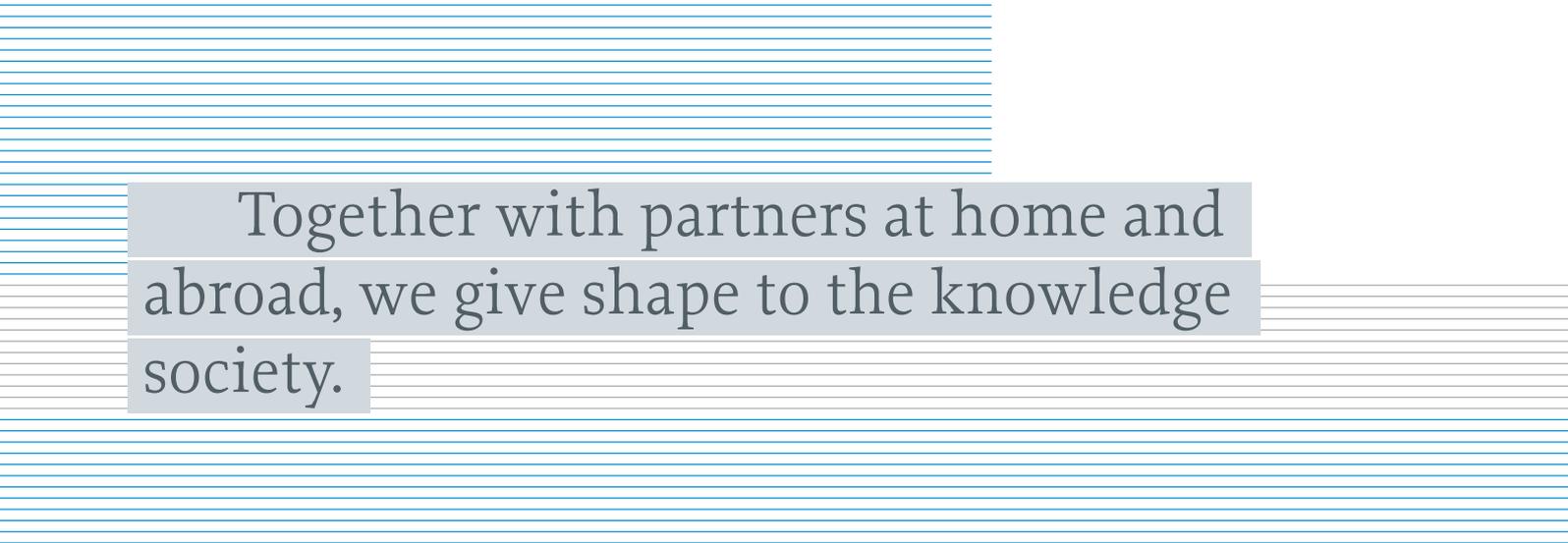
For instance, BELNET arranges the **registration of .be and .eu domain names**. The presence of a DNS .be-name server and a global DNS root server in BELNET's server farm bears witness to the national and international reputation that BELNET enjoys in this regard.

We also facilitate cheaper access to **software** for researchers and teaching staff. First, we offer a large range of free software via our own ftp server. And, second, via our network, we provide access to commercial software at special rates.

When the results of a customer-satisfaction survey showed us that security is one of the greatest current concerns of the organisations connected to us, BELNET set up a **CERT** (Computer Emergency Response Team). The CERT, which is unique in the country, provides the most up-to-date information on computer and network security.

For network-connected organisations with a need for **video-conferencing** with more than two parties, BELNET has two Multipoint Control Units (MCUs) available.

In addition, with the **Virtual Leased Line** (VLL) service, we also offer a cheap and simple alternative to expensive leased lines. In the context of associations of universities and colleges, such connections are of particular relevance.



Together with partners at home and abroad, we give shape to the knowledge society.





“We stay in permanent contact with all the organisations that are connected to BELNET. Our main job is to identify their needs and pass the relevant information to the right people at BELNET.”

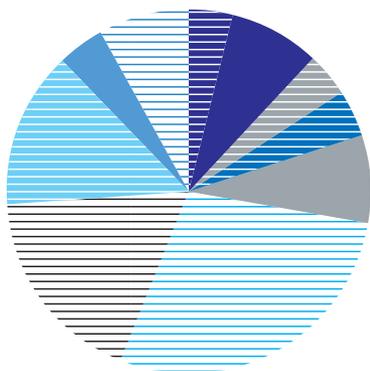
Customer Relations Officers

Laetitia Lagneau and Koen Schelkens

**Our people** The business culture of BELNET has undergone a sea change in recent years. Previously, we mainly provided the organisations connected to us with network access; nowadays we focus much more heavily on service provision, support and communication. We cater for our network-connected organisations' needs in a direct, proactive manner.

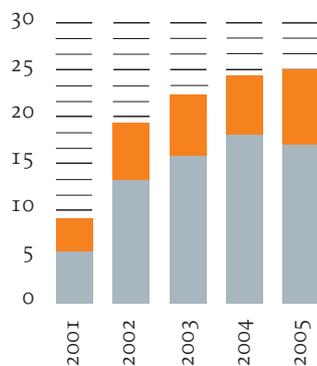
**Personnel** Expansion of our Communication section by one staff member forms part of our new, customer-oriented approach. The Administration section has remained relatively stable. The technical section lost 4 of its 17 staff in 2005. BELNET has advertised the posts as vacant but the statutory requirements linked to the status of an autonomously managed federal service make it particularly difficult to hire qualified staff at this time. Since the Copernicus reform, BELNET has only been able to offer fixed-term contracts with pay based on minimum scales. This is unsuited in current economic circumstances to attracting highly qualified ICT specialists. The shortage of staff is temporarily being made up for by engaging external consultants and the use of secondment. With the aim of finding a structural solution, a start was made in 2005 on looking into possible alternatives to the current legal status.

### The average number of full-time equivalents, spread over the various departments



	Communication	1
	CERT	2
	Logistics	1
	Legal department	1
	Customer relations	2
	Network department	7
	Servers, services and ICT	4,5
	Administration and finance	3,5
	BEgrid	1
	Management	2
<b>Total</b>		<b>25</b>

### Changes in BELNET workforce numbers, in terms of full-time equivalents



Women  
 Men



## Board

### Chairperson

Monnik Desmeth, adviser-general for Scientific Affairs, FPS Scientific Policy <sup>1</sup>

### Deputy Chairperson

Pierre Bruyère, BELNET director <sup>2</sup>

### Voting members

Marc Acheroy, professor at the Royal Military College <sup>3</sup>

Fabrice Carton, vice-counsellor for Scientific Affairs, FPS Scientific Policy <sup>4</sup>

Paul Lagasse, professor at the University of Ghent

Henri Malcorps, director of the Royal Meteorological Institute <sup>5</sup>

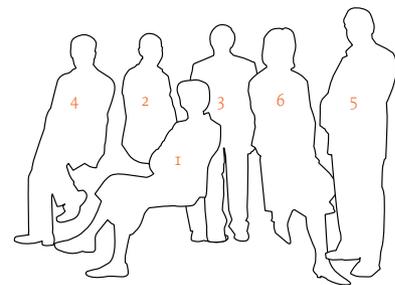
### Members with a consultative voice

Guy Snykers, general inspector Finance

Marianne Jacques, BELNET accountant

### Secretary

Nathalie Pinsart, BELNET administration and finance coordinator <sup>6</sup>



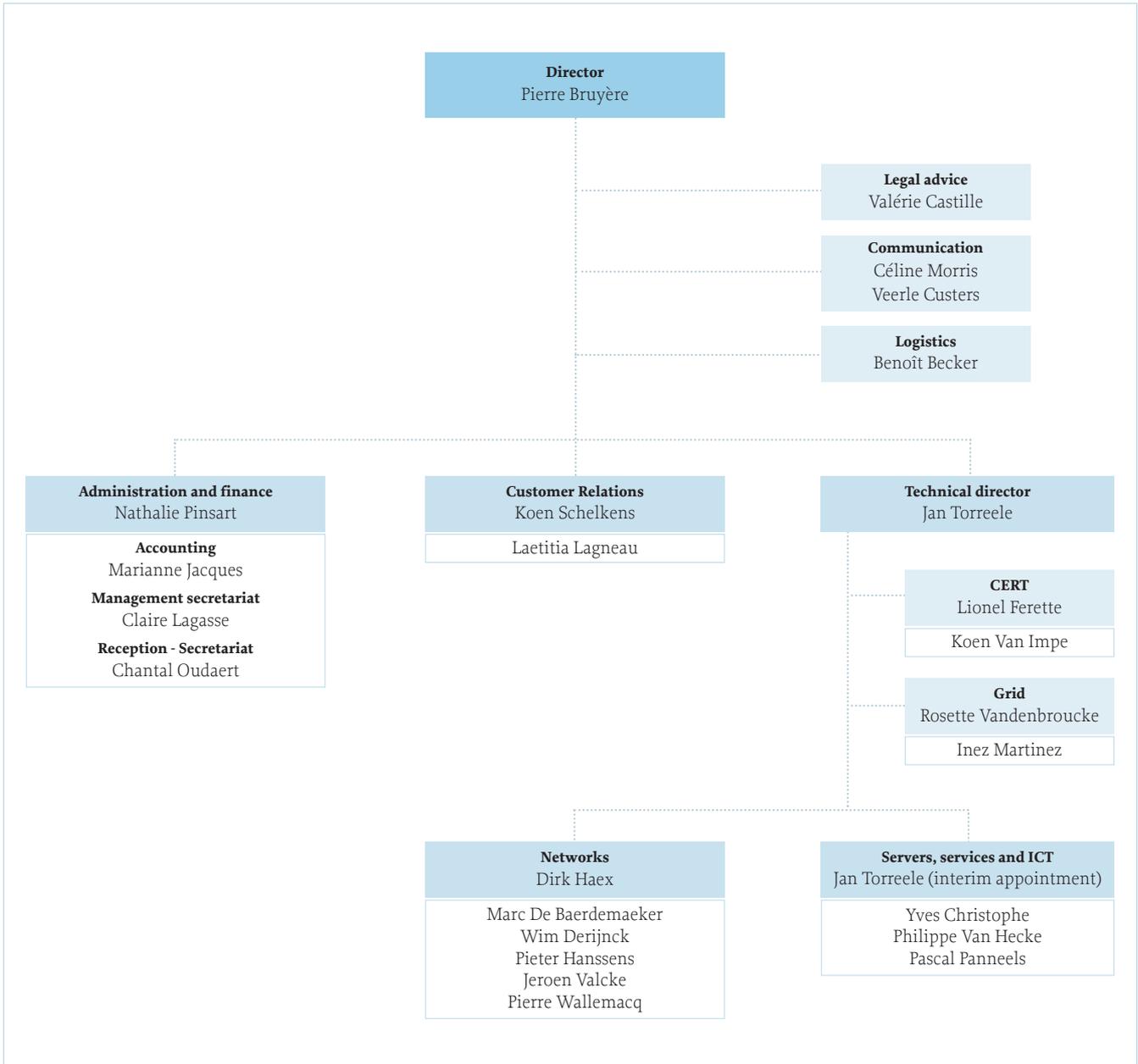
**Board** BELNET's management organ is its director and board.

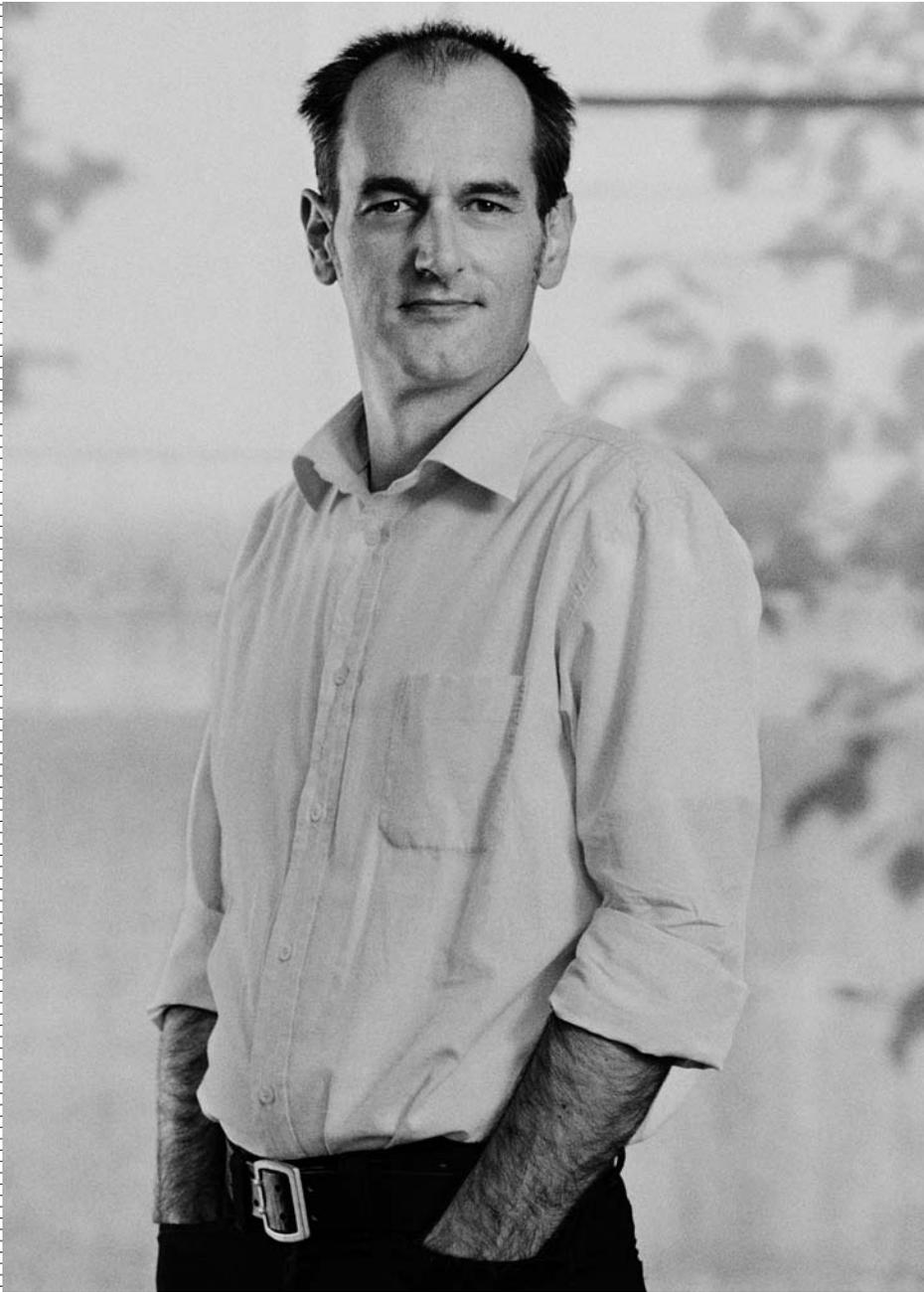
The board's tasks include approving the outline programme, the budget, the investment programme, the accounts, rates, public procurement assignments and the hiring of staff.

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**The BELNET organisational chart, year-end 2005**

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Jan Torrele, Technical Director

**Partners** BELNET works in partnership with organisations at home and abroad in order to give shape to the knowledge society.

The **Belgian universities** provide space to accommodate the BELNET network apparatus and govern access to these premises. The management of this apparatus is under BELNET's control.

BELNET has set up a number of projects with the **Flemish Community**, including financial support provided for connecting and improving network access for all Flemish colleges. We are also working together with the Flemish Community on the successful development of our grid infrastructure.

BELNET has a 15-year cooperation arrangement running with **SOFICO** (Société wallonne de financement complémentaire des infrastructures). In the context of this cooperation, BELNET offers higher education establishments in the Walloon Region very advantageous, high-value network access.

BELNET cooperates in the **Géant2** project, the international network that links together European research networks. This network is half financed by the European Commission and half by the national research networks themselves.

The FedMAN network has been developed on behalf of the **FedICT** (the Federal Government Department for Information and Communications Technology). In 2005, it was agreed that 2006 should see a start to implementing the second generation of this network.

BELNET is part of **Terena**, the European association of research networks, which concentrates on exchanges of information. Terena examines issues such as mobility and security.

BELNET is a founding member of the **ISP Association Belgium**, and Jan Torrele, the technical director of Belnet, represents ISPA on the strategic committee of **DNS Belgium**.







“We used BELNET at the Liège University Hospital for live transmission of a neurosurgical operation during ImagéSanté, ‘The International Health Film Festival’. More than 2,000 people connected to the network during the three-hour intervention in order to watch the broadcast. We are looking to repeat this experience and extend it to other disciplines.”

Dr Philippe Kolh, MD, PhD, FAHA, FESC  
Cardiovascular Surgery Department  
Liège University Hospital

**Finance** Expenditure, excluding the provision for future expenses and an addition to the Reserve Fund, fell by 10.2% compared to 2004. It amounted to 8,135,000 euros in 2005 against 9,064,000 euros in 2004. This reduction is a consequence of the drop in leased line charges. The fall was passed on in our own charges, which immediately explains why the total amount of invoiced charges was down in 2005.

**Notes** To improve follow-up of income and expenditure and the efficiency of resource administration, a start has been made on analytical bookkeeping. Amongst other things, this new accounting system will help us to keep track of the indirect costs of the various activities in a standardised manner. The new accounting also facilitates better budgetary management of each department.

Investments (585,000 euros) mainly relate to the procurement of computer equipment for the development and maintenance of the BELNET networks.

On the advice of the auditor and at the request of the board of management, a full inventory of moveable assets has been prepared. The bookkeeping has been brought into line with the values in the physical inventory and, with a view to showing a greater degree of detail, has been subdivided into new accounts. A number of assets that were no longer physically used still had to be removed from the accounting. They represent a net sum of 62,000 euros.

To improve follow-up of income and expenditure and the efficiency of resource administration, a start has been made on analytical bookkeeping.

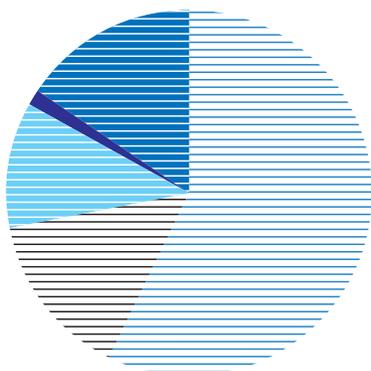
## 1. Balance sheet, in euros

<b>ASSETS</b>	<b>YEAR 2004</b>	<b>YEAR 2005</b>
Tangible fixed assets	2,746,537	1,509,532
External receivables due in no more than one year, not subject to accounting system	20,387	60,422
Short-term external receivables due in no more than one year, subject to accounting system	133,815	15,643
Share certificates and treasury certificates	6,943,000	9,443,000
Bank and giro accounts - cash in hand and stamps	3,729,214	4,683,283
Matured securities for collection and internal financial deposits	0	0
Transitory account	1,765,409	1,569,948
<b>Total assets</b>	<b>15,338,362</b>	<b>17,281,828</b>
<b>LIABILITIES</b>	<b>YEAR 2004</b>	<b>YEAR 2005</b>
Net assets or equity or net liabilities	11,713,755	14,233,970
Provisions for risks and losses	2,468,263	322,947
Short-term external debts due in no more than one year, not subject to accounting system	842,057	228,166
External debts due in no more than one year, subject to accounting system	138,799	31,586
Transitory account	175,488	2,465,159
<b>Total liabilities</b>	<b>15,338,362</b>	<b>17,281,828</b>

## 2. Profit and loss account, in euros

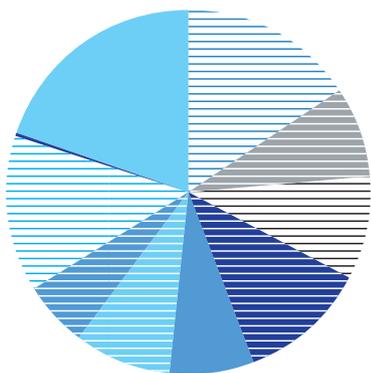
<b>EXPENDITURE</b>	<b>YEAR 2004</b>	<b>YEAR 2005</b>
Other use of consumption goods and external services	6,789,566	6,364,412
Tax on real estate and various levies	0	0
Direct and indirect staff salaries	1,116,528	1,121,436
Economic depreciation on accommodation expenses, intangible fixed assets and tangible fixed assets	1,918,122	1,766,370
Income (expenditure) other than social security contributions brought forward	57,865	56,410
Capital losses on existing assets and liabilities	2,385	65,487
Additions to reserve fund	0	25,258
Additions to provisions for future risks and charges	0	0
General accounting result	1,261,002	2,494,957
<b>Total expenditure</b>	<b>11,145,468</b>	<b>11,894,330</b>
<b>INCOME</b>	<b>YEAR 2004</b>	<b>YEAR 2005</b>
Services invoiced	1,988,776	1,464,396
Interest and other financial income	179,518	205,778
Capital gains on existing assets and liabilities	27,068	93,820
Income brought forward other than taxes and social security allowances	7,875,365	7,985,020
Deductions from provisions for future risks and charges	1,074,741	2,145,316
<b>Total income</b>	<b>11,145,468</b>	<b>11,894,330</b>

Excerpts from the budgetary accounts: income in 2005, in thousands of euros



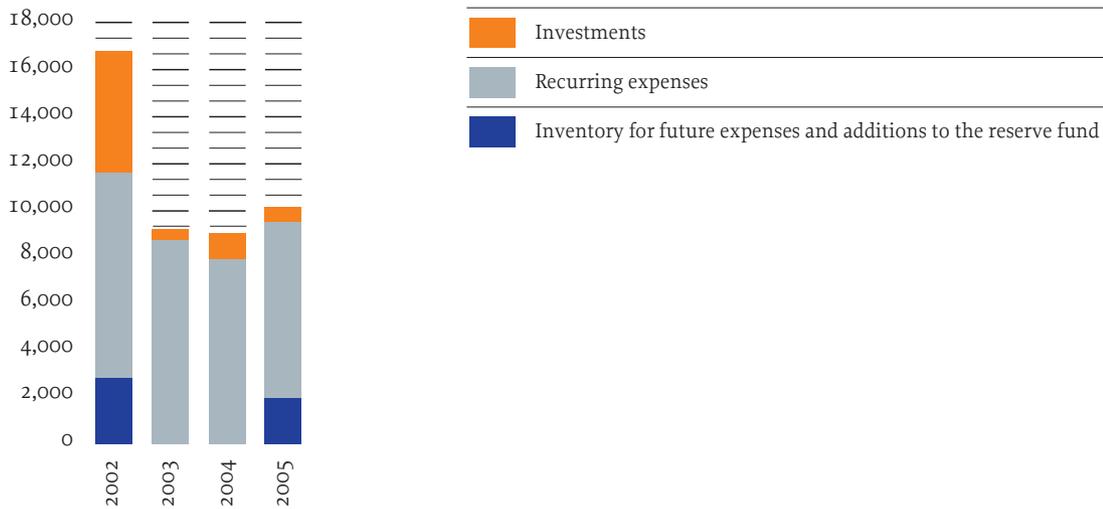
Grants	7,985	57.47%
FedMAN-project	2,015	14.5%
Invoiced services	1,543	11.11%
Interest	206	1.48%
Receivables on inventory	2,146	15.44%
<b>Total</b>	<b>13,895</b>	<b>100%</b>

Excerpts from the budgetary accounts: expenditure in 2005, in thousands of euros

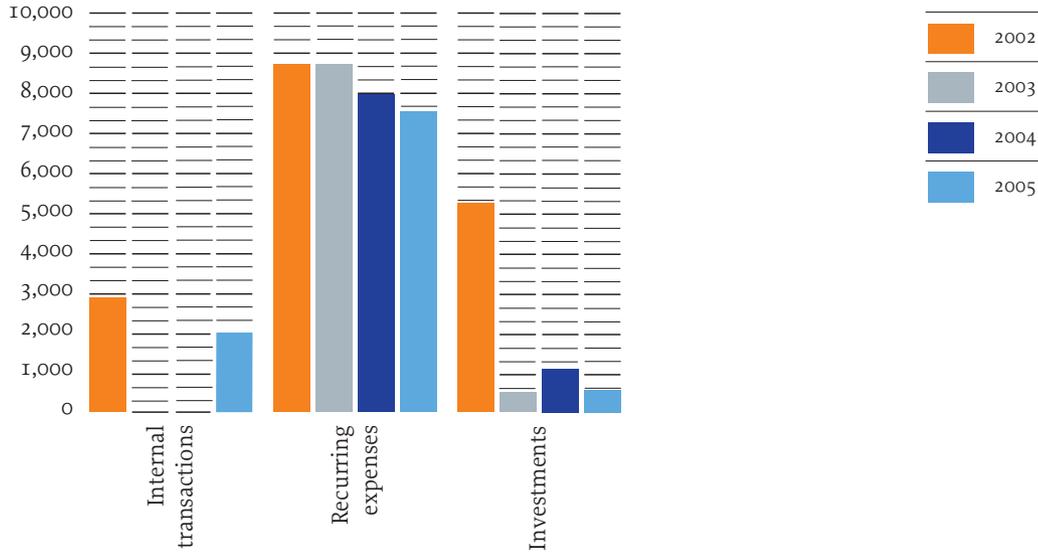


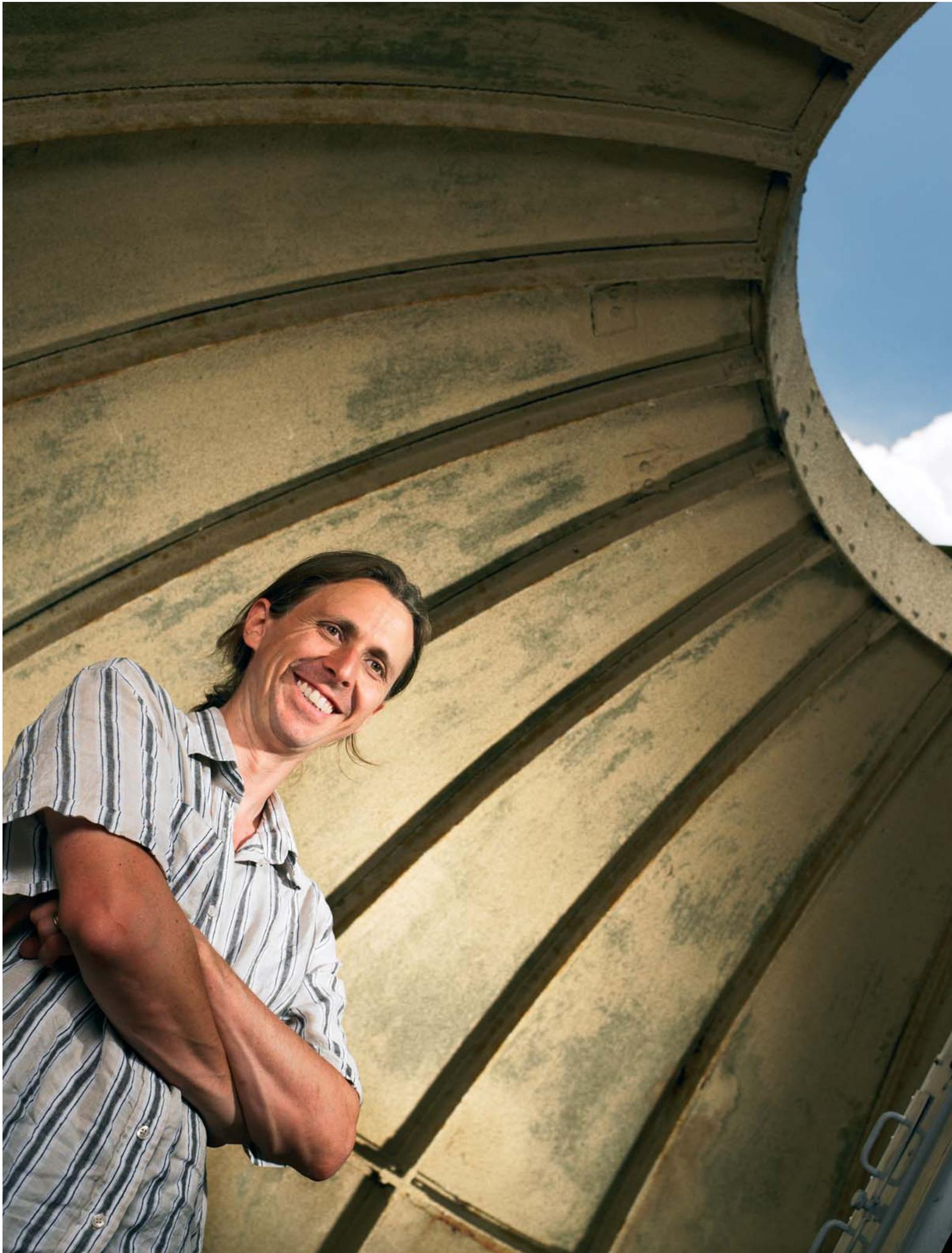
National lines	1,592	15.67%
European lines	820	8.07%
Commercial internet	937	9.22%
Maintenance of network apparatus and services	1,159	11.41%
Overheads	750	7.38%
Salaries	886	8.72%
Other investments	585	5.76%
FedMAN project	1,406	13.84%
Addition to the reserve fund	25	0.25%
Inventory for future expenses	2,000	19.68%
<b>Total</b>	<b>10,160</b>	<b>100%</b>

## Summary of expenditure in recent years, in thousands of euros



## Proportion of various expenditure items, per annum, in thousands of euros







“The Observatory conducts scientific research into the sun, offers scientific services and produces forecasts of space weather. For both incoming and outgoing data traffic, we need a lot of bandwidth. Eighty stations spread across the world send data on the status of the sun. The Solar Influences Data analysis Center (SIDC) hourly downloads tens of satellite images from NASA via BELNET. We even make images and info available on our own web site. For the Observatory, the continuity of the connection, which BELNET guarantees us, is very important. It is essential that we can reach the data collected worldwide at the SIDC every day.”

David Berghmans

Group Leader, Solar Influences Data analysis Center (SIDC).

Royal Observatory of Belgium

## Conclusion

In 2005, BELNET embarked on a new way. We are evolving into a customer-oriented organisation with a great deal of attention to support, service and communication. We want as much as possible to respond to the needs of our target group. In future, this will without a doubt lead to the introduction of many new, advanced technologies. We have already at this stage achieved a great deal in this regard, together with our staff, partners, network-connected organisations and end-users. Grid computing, multicast, VLL and IPv6 are just a few examples.

The shift from technology to services means that BELNET has a need for more staff. For the further development of our organisation, we need ICT specialists who are able to produce innovative work. A change in status enabling us to attract highly qualified personnel is therefore a priority. An improved, more apt status will further reinforce the position of our organisation and help us efficiently and effectively achieve our objectives.

The findings of our internal strategic 'think-tank' form the guiding line for the coming years. We will in future further align ourselves with the needs of the organisations connected to us and the development of innovative services and applications. We also want to further strengthen our position and optimise our organisation.

To all our employees, partners and network-connected organisations that have already made a contribution and will continue to do so into the future we extend a sincere 'thank you'.

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## Glossary

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### bandwidth

The capacity or bandwidth of a data connection, measured in Hertz (analog networks) or bits per second (digital). Bandwidth designates the amount of data that can be transferred within a given time.

### BEgrid

The BELNET grid initiative. Further info on [www.begrid.be](http://www.begrid.be).

### bit

Abbreviation for 'binary digit' (or the binary numbers 0 and 1). Basic unit used by computer systems, usually combined in a succession of bits. Eight bits constitute a byte.

### BNIX

The Belgian internet exchange (Belgian National Internet eXchange). A central exchange where internet service providers active on the Belgian market exchange data traffic with one another. The term IX is used internationally in most internet exchange abbreviations.

### byte

A succession of eight bits.

### CERT

Abbreviation of Computer Emergency Response Team. A centre for preventing and resolving problems in connection with computer security by means of permanent controls and international information exchange and cooperation.

### Distributed Denial of Service (DDoS)

A DDoS attack is an attack on a server. It entails such a large number of connection requests being created that the server crashes or is temporarily unable to offer its services. The attack generally involves the deployment of computers in various locations across the world, which may or may not be centrally controlled.

### FedMAN

An acronym for Federal Metropolitan Area Network. A Belgian computer network constructed by BELNET on behalf of FedICT, which connects the Federal offices in Brussels with one another and with the internet.

### FTP

File Transfer Protocol, a protocol for exchanging files over the internet.

### Géant2

The second generation of the pan-European research network, created out of cooperation amongst 30 national research networks and the European Commission. Further info on [www.geant2.net](http://www.geant2.net).

### Grid computing

An innovative technology in full development, based on computers linked worldwide for joint processing of large quantities of data. BEgrid is the BELNET grid initiative for stimulating grid computing in Belgium.

### IP

Internet Protocol, the standard for transporting data over the internet in accordance with a series of established communication rules.

### IP address

A unique identification number for a computer system within a network. Within an isolated, internal network, use of IP addresses is virtually unrestricted. However, if one wants to connect computer systems with the internet, registered IP addresses are needed to avoid duplication with other computer systems so that transmitted data reaches the right computer (see also IPv6).

### IPv6

Internet Protocol version 6, the newest generation of the Internet Protocol and the successor to IPv4. IPv6 allows inter alia a large increase in the number of IP addresses, which computer systems need in order to connect directly with the internet.

### ISP

Internet Service Provider or supplier of internet services.

### Multicast

A technology by which a data stream is simultaneously sent to several recipients, suited for transmitting images and sound.

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## Glossary

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### phishing

Phishing is a criminal practice by which individuals are defrauded by means of a copy of a trusted web site. The visitor is under the impression that the copy is authentic and unsuspectingly provides certain confidential information such as his credit card number.

### PoP

Point of Presence, access point to a network, the geographical location where connection to a main network is possible. A PoP is usually shared by tens or hundreds of users.

### query

In informatics, a query is an assignment sent to a database. The term is also used to specify the search criteria that are entered into a search engine.

### Service Level Agreement (SLA)

An agreement between two parties setting out the quality requirements that a service has to satisfy.

### spam

Spam is undesired electronic mail. It frequently concerns advertising distributed on a large scale.

### streaming

A technology for transmitting data uniformly and without interruption. Streaming enables an incoming multimedia file to be opened even before it has been fully transmitted.

### VLL

With Virtual Leased Lines, geographically dispersed local computer networks can be linked to each other in a virtual private network (VPN).

### VPN

Virtual Private Network, a part of a public network - often called a tunnel - for protected communication between two or more end points.



BELNET supplies higher education institutions, research establishments, public authorities and other public organisations with fast network access and relevant services. More than half a million people use our network infrastructure every day. We stimulate the development of new technologies such as grid computing, IPv6 and multicast. BELNET's role also includes the management of FedMAN, the network that links together Federal departments, and of BNIX, the Belgian internet providers' exchange.

## BELNET

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**BELNET**

**Activity Report**

**2005**

**Activities,  
projects and  
services**

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Activity Report 2005  
Activities, projects and services



## Introduction

This report provides a summary of our principal activities in 2005. These activities form part and parcel of BELNET's four major objectives:

1. to provide **telecom services** that fulfil our customer's needs;
2. to develop **advanced technologies** that promote research and, more generally, stimulate the development of the knowledge society;
3. **to strengthen** and consolidate **our own position**, so that BELNET is a reliable and stable partner for all parties with which it cooperates;
4. **to optimise the organisation** to make full use of all its resources.



# Day-to-day activities

# Day-to-day activities

## Management

The day-to-day management is in the hands of Pierre Bruyère, the general director of BELNET. The technical activities are carried out under the leadership of technical director Jan Torreele. Furthermore, each department of BELNET is headed up by a coordinator.

## Customer Relations

Customer Relations is responsible for not-for-profit accountmanagement and coordinates customer administration for the 155 organisations connected to BELNET and the 50 organisations connected to BNIX. The department is first and foremost the listening ear of BELNET for these organisations and end-users. In order to achieve optimum alignment of our service palette and the needs of the target group, Customer Relations regularly conducts satisfaction and needs analyses. By way of visits and daily e-mail and telephone contact, the department endeavours to provide rapid answers to the questions and needs of customers and prospects. Using an integrated customer approach, Customer Relations ensures that all important information and all questions from customers and users quickly reach the relevant people at BELNET.

Customer Relations maintains the partnerships with organisations that represent large groups of customers, such as regional government departments responsible for higher education and research and the umbrella organisations within the scientific and educational sectors. Finally, Customer Relations contributes to development of the service offering and direct communication with network-connected organisations.

## Communication

The communication department is a support department that falls under the direct leadership of the BELNET director. The department is responsible for external and internal communication. Its tasks include maintaining contact with the press, taking care of BELNET documentation – both online and offline – and organising workshops and seminars such as our annual User Day. The communication department also develops information campaigns. It regularly organises activities for our own workforce: team-building, workshops, seminars, etc.

## Legal activities

The legal department is responsible inter alia for analysing and drawing up contracts with suppliers and network-connected organisations. The department also lends assistance in the acceptance and execution of government procurement contracts. A large part of its time is taken up with closely following up and assisting the external study for reforming BELNET's legal status. The legal department is an active member of the Workgroup Legal within ISPA. In this connection, it works together with the other competent authorities in Belgium on topics such as privacy, data retention and spamming.

## Administration and finance

The Administration and Finance department is in charge of general financial management, bookkeeping and government procurement contracts, personnel policy, the secretariat and reception.

## Logistical activities

The logistics department is responsible inter alia for the management of stocks, office infrastructure and office equipment. The department also provides services in relation to seminars and other activities. It also looks after the management of PoPs (Points of Presence) and BELNET's computer rooms.

## Technical activities

A large portion of the activities of BELNET are of a technical nature. They concern the development, promotion and support of network access, new technologies and practical services. The technical activities fall within four major domains:

### 1. Networks

The networks department of BELNET administers, controls and maintains three networks: the **BELNET network**, the **FedMAN network** and the **BNIX network**. Research into and the implementation of new, potentially interesting network technologies and services also form part of the core tasks of BELNET's networks department. The department is represented in a variety of international workgroups and task forces, including the Géant workgroups and Terena Task Force. The BELNET network engineers take regular training courses so as to be able to carry out all of these activities in professional manner.

The three networks that BELNET administers are permanently (24/7) monitored by the NOC (Network Operations Center) of BELNET, which contributes to enabling the level of network access to be laid down contractually in a strict Service Level Agreement (SLA), which provides for penalties if the pre-determined level is not achieved. The SLA provisions relate inter alia to the maximum downtime of the network and the quality of the connections. To date, BELNET has not had to pay out any compensation whatsoever, which illustrates the quality of the infrastructure.

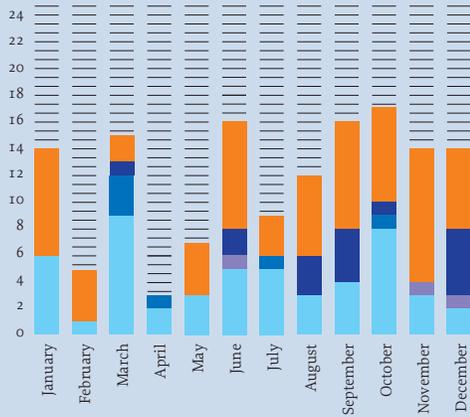
Via its helpdesk in the NOC, the BELNET network department provides support to network administrators. This support encompasses both the provision of information and help in the installation of network connections or tests. The NOC gives network-connected organisations extensive information on their total network traffic over the BELNET network and traffic over other research networks. This helps in the timely detection and resolution of overloads, network attacks and other problems.

### 2. Servers, services and ICT

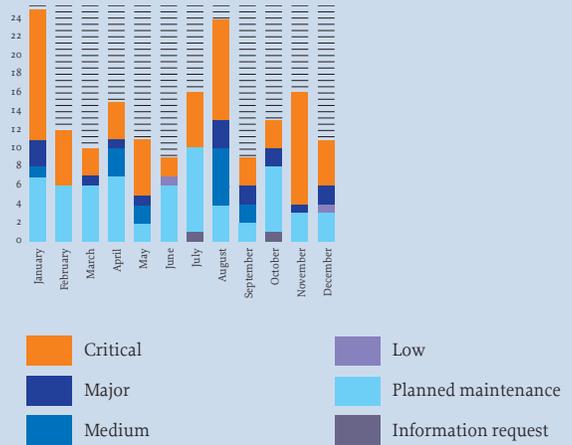
This department is responsible for the development, implementation and operation of the BELNET services. The departments range of tasks includes day-to-day administration and monitoring of the services, and also research into and evaluation of new or innovative applications. The internal ICT of BELNET is also taken care of by this department.

## The BELNET Network

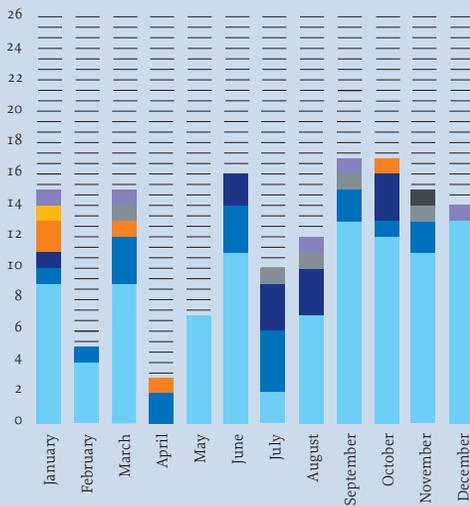
### NUMBER OF INCIDENTS AND PRIORITIES IN 2005



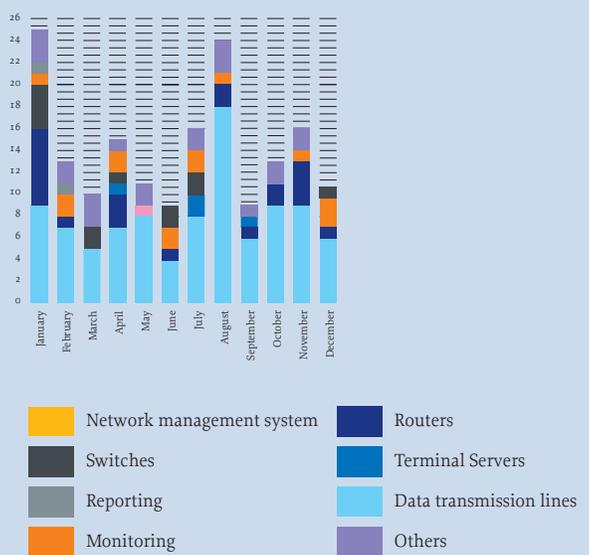
### IN 2004



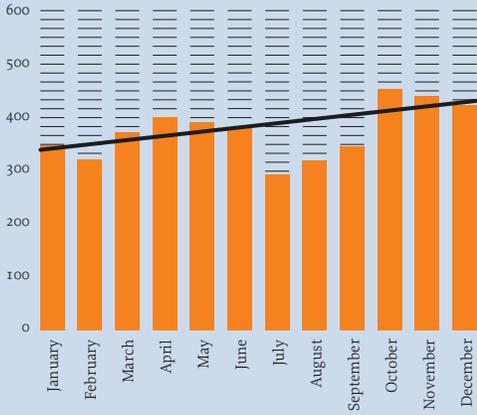
### INCIDENTS PER TYPE, PER MONTH IN 2005



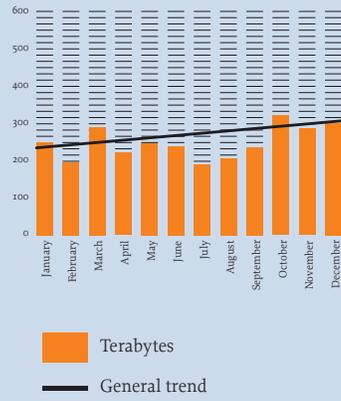
### IN 2004



## TOTAL NETWORK VOLUME, IN 2005 PER MONTH

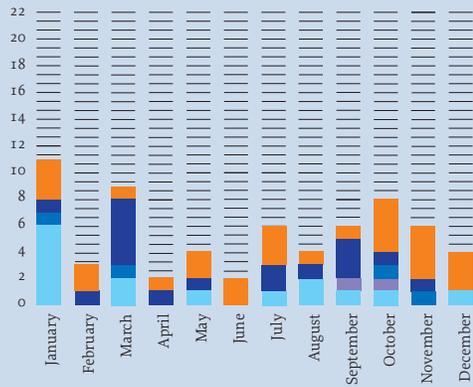


## IN 2004 PER MONTH

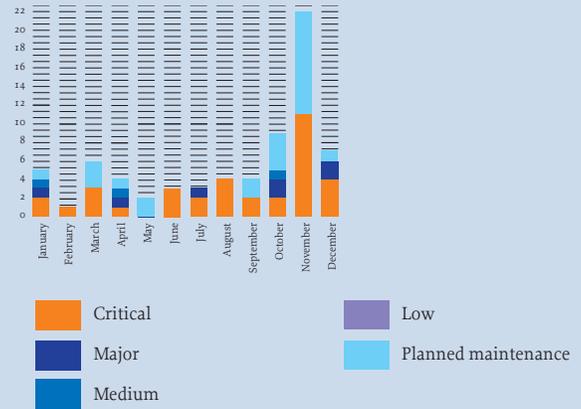


## The FEDMAN network

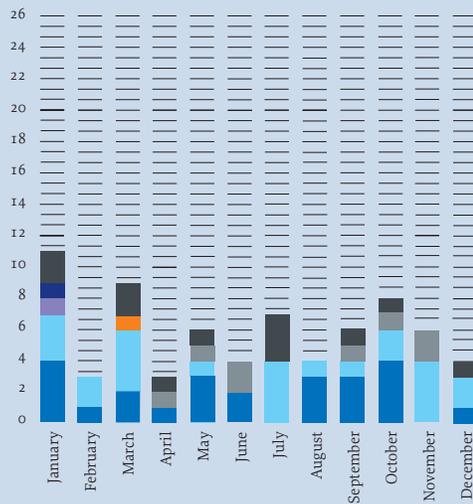
### NUMBER OF INCIDENTS AND PRIORITIES IN 2005



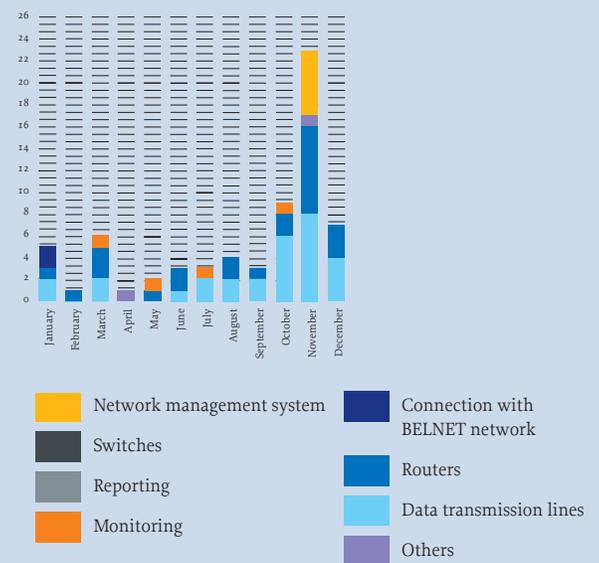
### IN 2004



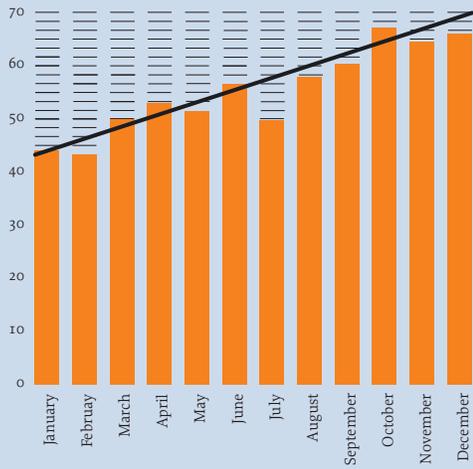
### INCIDENTS PER TYPE, PER MONTH IN 2005



### IN 2004



## TOTAL NETWORK VOLUME, IN 2005 PER MONTH



## IN 2004



Terabytes  
General trend

## The BNIX network

### NUMBER OF BNIX CONNECTIONS

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### **3. Grid computing**

The Grid computing department coordinates the BEgrid project. This project is run in conjunction with a number of network-connected organisations (7 in 2005). It encompasses the construction and operation of a grid infrastructure with ancillary services for the use of Belgian researchers. BELNET ensures a number of requisite grid services (resource broker, user interface, etc.), so that small institutions can also connect to BEgrid. In 2005, BEgrid expanded to a stable infrastructure with some 300 computing elements and a storage capacity of 3 terabytes. BEgrid is affiliated to EGEE (Enabling Grids for E-Science in Europe), a project in the 6th framework programme of the European Commission that is aimed at the development of an international grid and, inter alia, establishes connections with grid infrastructures in the USA, Japan, Korea and China. A bilateral agreement has also been reached with the Dutch grid project. Users in Belgium and the Netherlands can now set up virtual organisations and work transparently with the grid infrastructures of both countries.

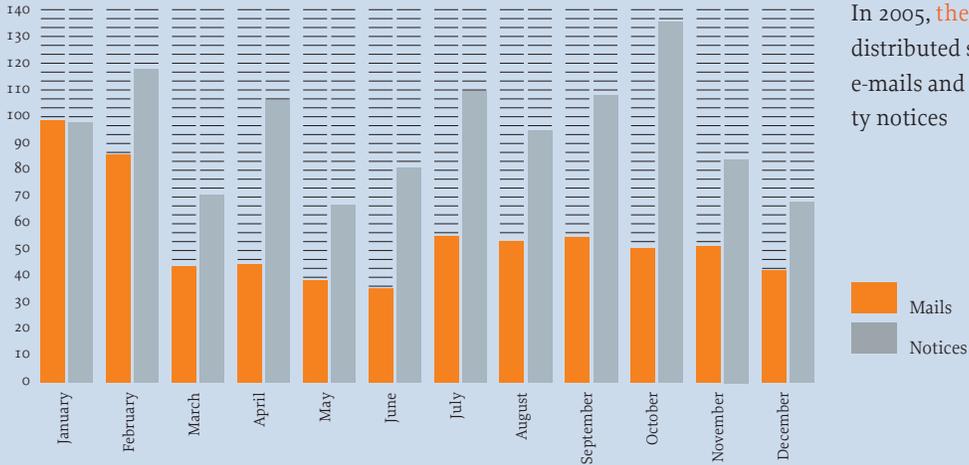
Via its Grid computing department, BELNET is the Certificate Authority (CA) for BEgrid and signs all user and machine certificates needed for use of the Belgian grid infrastructure. These certificates are valid internationally thanks to the cooperation with EUgridPMA. The Grid computing department is also responsible for communication with grid end-users, participating grid authorities and international grid initiatives. The department manages the content of the BEgrid website, follows up on infrastructure functioning, organises BEgrid management meetings and follows up on the resultant activities. The department also organises the annual BEgrid seminar.

### **4. BELNET CERT**

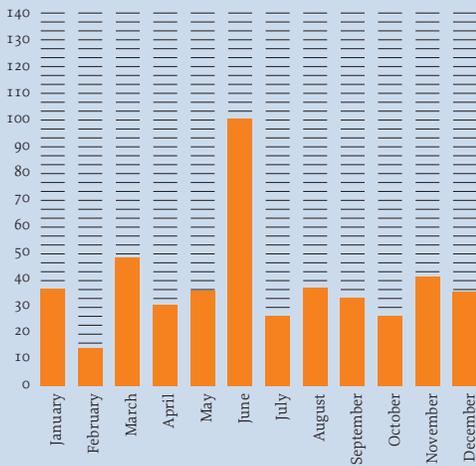
The BELNET CERT has been operational since 1 July 2004. It distributes information on security questions via its website, issues a newsletter and sends out mailings with security warnings or notifications. In 2005 a total of 662 warning e-mails were sent out and 1,140 security notices formulated. Some 469 incidents were reported. BELNET CERT is accredited at European level, meaning it can efficiently cooperate with the other European CERTs. The CERT department supports the organisations connected to BELNET in respect of security matters. The organisations are informed about security issues that concern systems in their networks. The department also follows up complaints from network-connected organisations about other networks and offers assistance where this appears to be necessary. The CERT department also issues regular 'best practices', takes part in European task forces and permanently improves the tracking of hacker activities.

## CERT

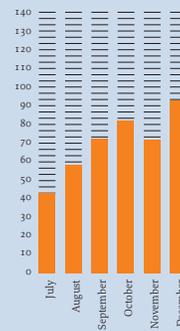
### WARNING E-MAILS AND SECURITY NOTICES IN 2005, PER MONTH



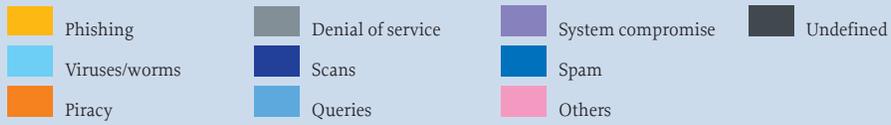
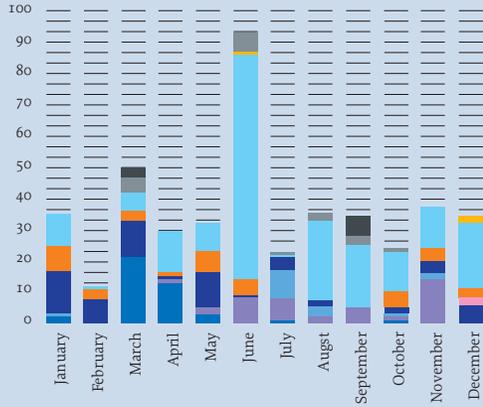
### NUMBER OF INCIDENTS IN 2005, PER MONTH



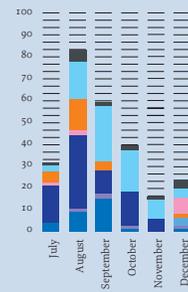
### IN 2004

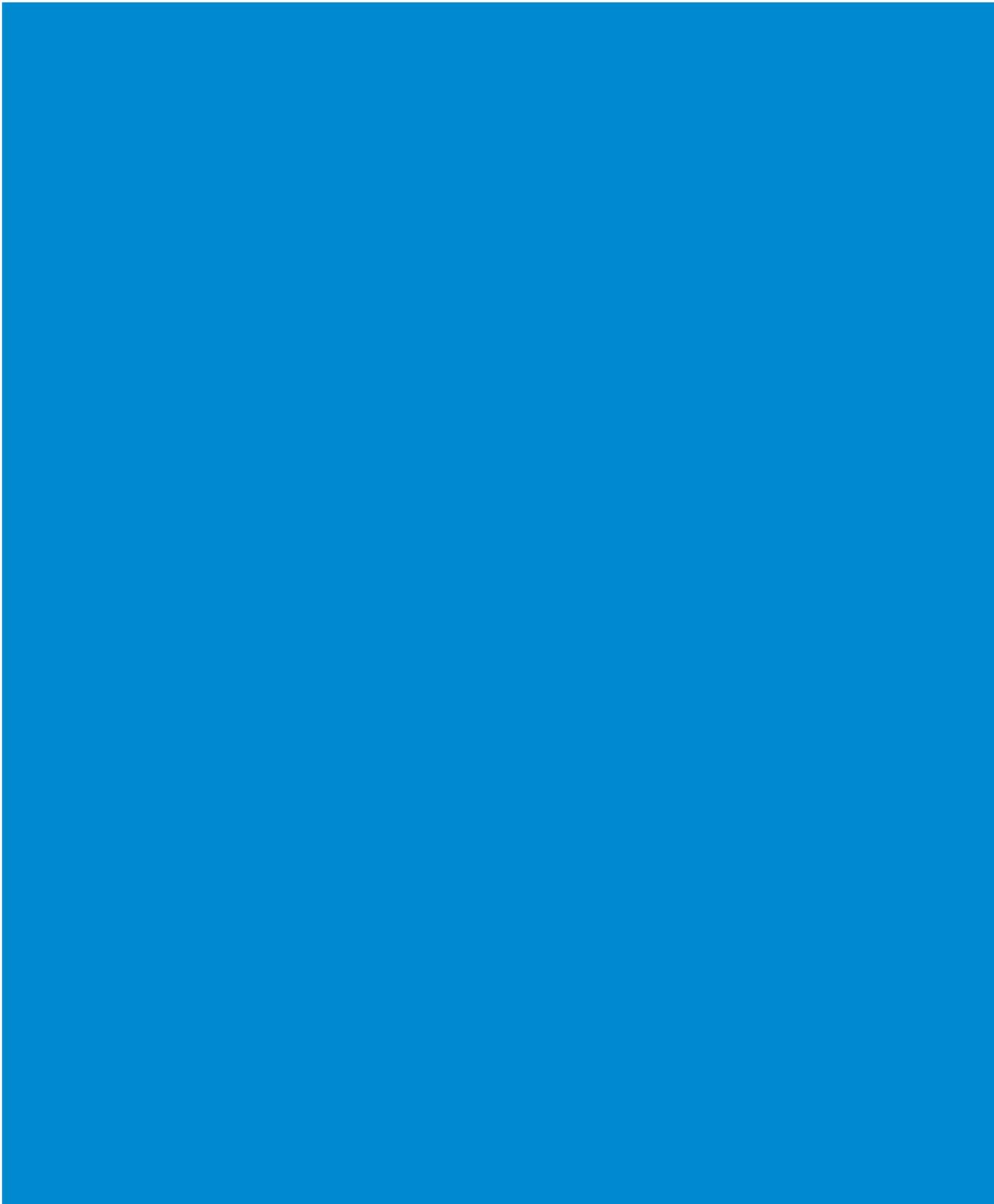


## TYPES OF INCIDENTS IN 2005, PER MONTH



## IN 2004





# New projects

# New projects

## Techno-economic broadband study

In conjunction with the Interdisciplinary Institute for BroadBand Technology (IBBT), BELNET carried out a large-scale study of the BELNET network in 2005. This strategic study, on which 10 people worked over a period of 6 months, focused on the econo-financial and technological aspects of the BELNET network infrastructure. The study shows the course that should be set for the longer-term development of the BELNET network.

### Fibre optic network under own management

The study concluded that BELNET should optimally replace its current network lines, which are on short-term lease, with its own fibre optic connections, equipped with its own optical apparatus. Fibre optic allows the use of various light wavelengths, enabling several simultaneous connections with very high data transmission speed (10+ Gbit/s). A fibre optic network under BELNET's own management would seem to be the best solution for meeting the growing need for transmission speed, flexibility and security. By acquiring its own fibre optic lines, whether by purchase or long-term lease, BELNET is able to offer virtually unlimited bandwidth and the cost of extra bandwidth is minimal. In the start-up phase, the investment is significant, but the entire project can be turned around over a period of 8 years.

### European trend

Géant2, the pan-European research network, meanwhile uses its own fibre optic connection. A BELNET fibre optic network under its own management is a perfect match in this European context. One of its benefits is that it will enable international private connections with very high capacity between users in the research and education sector. The network gives users the possibility of generating enormous data streams, say in the context of scientific experiments. BELNET is currently examining the possibilities of commissioning its first fibre optic connections in 2007.

## Géant2

Géant2 was introduced in June 2005 as the second generation of the international network linking together the European research networks: it is 50% financed by the European Commission. Géant2 is a computer network to which thirty national research and education networks are linked across Europe. In Belgium, 155 institutions make use of this pan-European research and education network.

### BELNET and Géant2

The link between the BELNET and Géant2 networks has a capacity of 10 Gbit/s. BELNET contributed to the funding of Géant2 and is actively working on developing the network, including by participating in the various work groups for expansion of the services on the network (e.g. performance measurement & management work groups).

### For scientific cooperation at a European level

The users of Géant2 cooperate in a variety of scientific fields such as elementary particle physics, astronomy, biology and meteorology. By using the high-technology Géant2 network, they are able to exchange research data, results and analyses securely and at lightning speed.

### Largest network ever

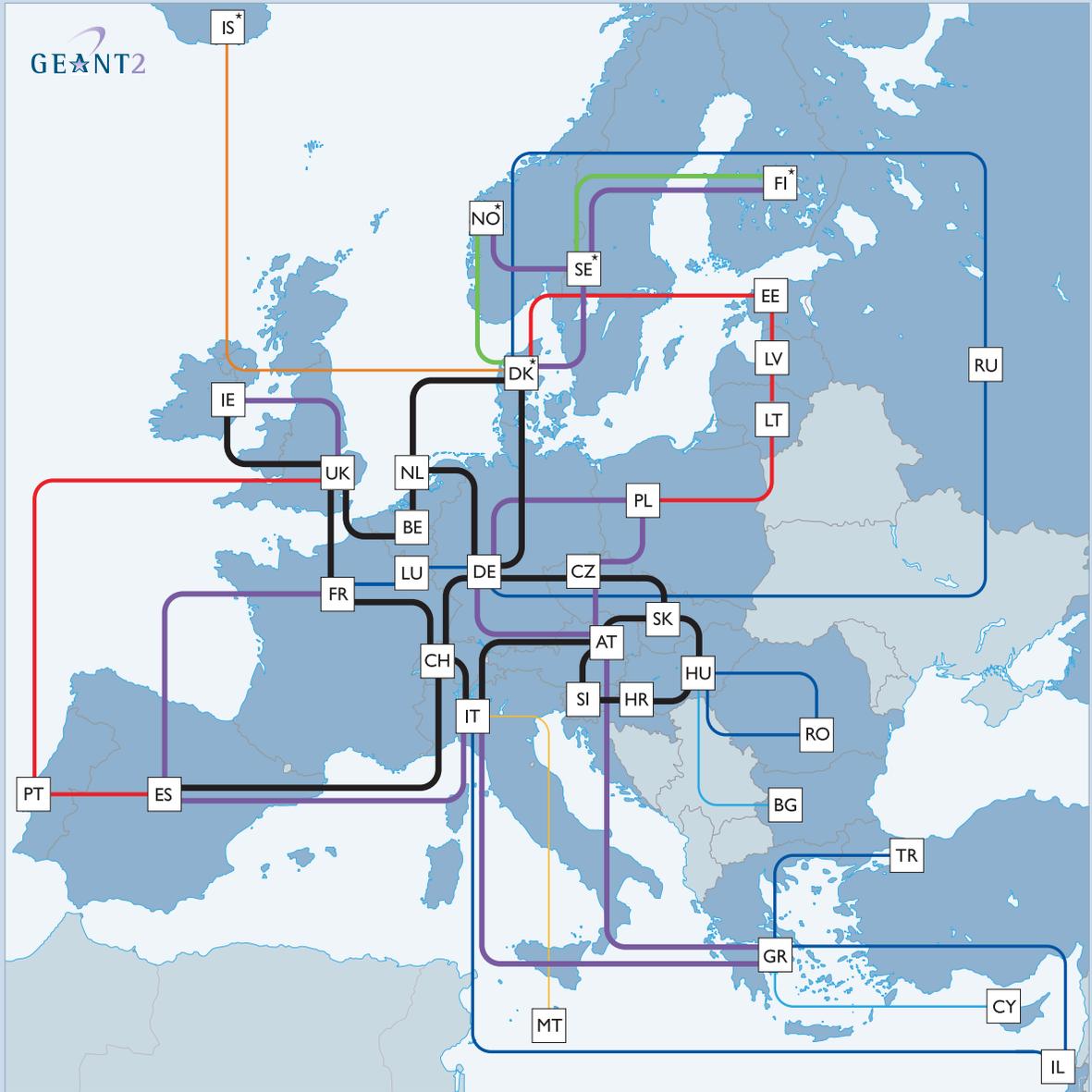
Géant2 is the largest network ever for promoting European research and education. The Géant2 network stretches to 50,000 kilometres. 12,000 kilometres of that is made up of fibre optic cable. Géant2 is further linked with research and education networks in the United States, Latin America, the Middle East, North Africa, Asia and the Southern Pacific area. The intercontinental part results in international cooperation outside the borders of Europe. Further information on [www.geant2.net](http://www.geant2.net).

## The Géant2 network

The Géant2 network links 30 national research and education networks with each other.

The core of the network comprises multiple wavelengths of 10 Gbit/s. These are for the most part created using fibre optic connections.

—	Fibre optic
—	10 Gbit/s
—	5 Gbit/s
—	2,5 Gbit/s
—	622 Mbit/s
—	310 Mbit/s
—	155 Mbit/s
—	34 Mbit/s



## Colleges project

In 2005, BELNET negotiated with the Walloon Region and the Flemish Community to considerably improve internet access for colleges and at the same time reduce the cost price. Included in this are the French-language colleges in the Brussels Region that do not yet have a high-speed connection, which should get a cheap, powerful network solution. BELNET is at this time examining the best way of bringing this to fruition.

### The academisation of colleges at lightning speed

Connection improvement contributes to and accelerates the academisation of college education as advocated by the Bologna guidelines. This academisation entails expanding research tasks and more intensive cooperation with universities. Thanks to the greater network capacity, colleges can set to work with multimedia applications, video-conferencing, computer telephony, electronic learning (e-learning) and grid computing, amongst others. The colleges are linked at high speed to each other and with the universities, and also with international research networks such as Europe's Géant2 and America's Internet2.

### Not only fast, but also much cheaper

At present, colleges wanting fast access to the BELNET network must themselves arrange a link to a connection point (PoP) at the nearest university. For this, colleges generally use a leased line from a telecom operator. But leased lines are expensive. The agreement with the Walloon Region and the Flemish Community will render such expensive solutions unnecessary. BELNET will directly link each college to its network using a fibre optic connection.

## FedMAN II

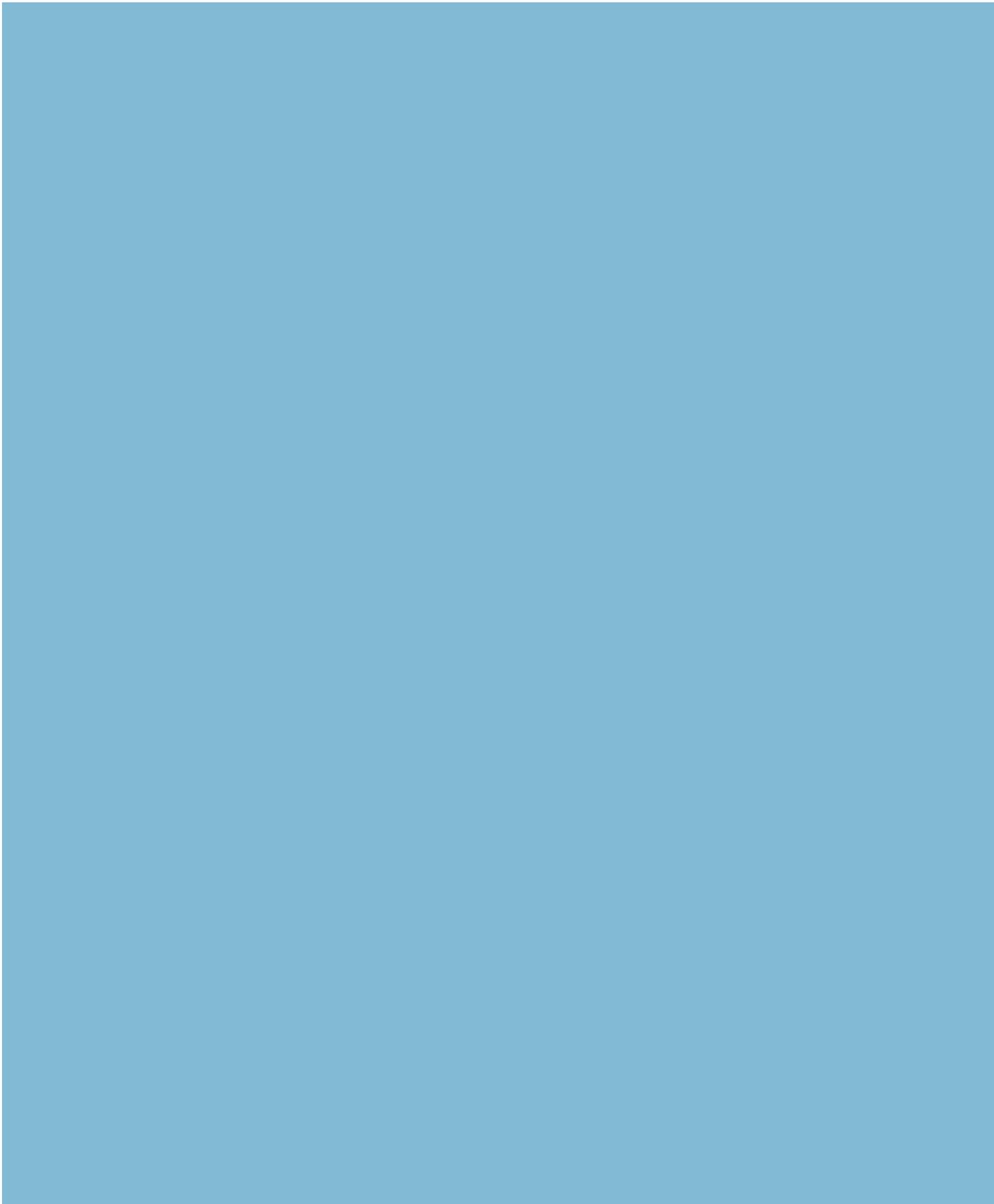
Data traffic via FedMAN continues to rise, partly as a result of the increased number of applications. For this reason, an agreement was signed with FedICT in 2005 on the second generation of the FedMAN network. The task of designing and developing the new network has been accorded to BELNET on the basis of its extensive experience with fast, secure computer networks, including FedMAN I. FedMAN II will connect 80,000 people at 24 sites.

### More capacity for a better service

FedMAN connects government offices with one another, the public, e-government applications and the internet. FedMAN II enables a faster, simpler, cheaper exchange of data. The service will also further improve the government's service provision with the new network. FedMAN II offers each federal government department a connection of 1 Gbit/s, without any limitation on volume. This capacity is ten times greater than with FedMAN I. FedMAN II thus offers a whole range of new possibilities.

### More secure and cheaper

All the essential components of FedMAN are installed at two different sites, which mitigates the risk of a network crash in the case of disaster. By integrating the latest network technology, multiprotocol label switching (MPLS), within the computer network, government offices that are connected to the system save on costs. Many of them currently lease fixed lines for secure data exchange. With FedMAN II, fully protected connections are possible (virtual private networks (VPN)). VPNs render the expensive leased lines unnecessary. Data exchanged over a VPN cannot be accessed by any other party than the addressees.



# New services

# New services

## .eu registration

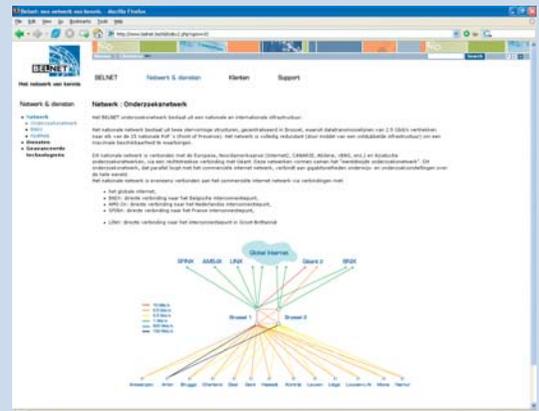
BeBot, the old online domain registration service for registering .be domain names, no longer fulfilled users' requirements. Thus, in 2005, a new system was developed for registering both .be domains and .eu domains. The system came on line in November 2005. By the end of 2005 it was administering around 1,850 .be domain names and 400 .eu domain names.

## BEgrid web services

In the context of BEgrid, BELNET has introduced a number of new web services, including a web server and a Certificate Authority (CA). These services used to be provided on an ad hoc basis on various BELNET servers. In 2005, the decision was taken to standardise all BEgrid services and accommodate them on a single server. The BEgrid web site is being redesigned and moved, as is the existing CA service. BEgrid users are also being provided with a Wiki service.

## BELNET web sites

During the course of 2005, the most important BELNET web sites, i.e. [www.belnet.be](http://www.belnet.be) and [support.belnet.be](http://support.belnet.be), were revamped. The design and navigation structure have been altered, and all the texts checked and brought up to date. We have also introduced a new content management system, with which we can more quickly and easily keep the web sites up to date.



In 2005, the BELNET web sites were thoroughly updated and made more user-friendly.



BELNET offers support via the internet. The support web site is exclusively reserved for BELNET customers.

## CERT workshops

One way in which BELNET helps its customers increase security is by providing information. In 2005, we made a start on doing this by way of CERT training sessions. There were two sessions, one in September and one in October. The CERT workshop, held over two days, dealt with all important facets of CERT and security. The participants learned more about the organisational, technical, legal and operational aspects of CERT. The programme was based on the Transits training given by Terena, our European partner.

## BEgrid seminar

In 2005, the second BEgrid seminar was organised. Researchers from various scientific disciplines explained how they deploy BEgrid in their work. For BELNET, the seminar is an opportunity to exchange opinions with end-users. With an attendance of over 100, the auditorium had a full complement.

## IPv6 tunnels

For some years already, BELNET has been supporting IPv6, the successor to the current protocol, IPv4. Since 2005, users connected to an IPv4 network have been able to get to know the new protocol and experiment with it by way of an IPv6 tunnel. This service is offered on a server that forms part of sixx.net ([www.sixx.net](http://www.sixx.net)). The service is available free of charge to all BELNET end-users.

## Jabber

2005 saw BELNET commission an Instant Messaging service, based on the Jabber Protocol, the open standard for instant messaging ([www.jabber.org](http://www.jabber.org)). It is configured so that not only users within the Jabber network can communicate but also users on other networks like Microsoft Messenger, Yahoo Chat, AOL and ICQ. The connection with the Jabber server can be extra-secured and can be reached via both IPv4 and IPv6. Following registration, the service is available to all BELNET users on <http://jabber.belnet.be>.

## User Day 2005

BELNET endeavours to maintain proximity to its network-connected organisations and end-users. For this purpose, we organise an annual BELNET User Day. During the User Day, we provide information on network technologies and services, offer people the chance to establish contact with one another and try to gain feedback on our own work. The theme for the 2005 BELNET User Day was 'Next Generation Networks'. Over 180 people took part.

## Video-conferencing

In 2005, BELNET set up a special video-conferencing service for its end-users. This service enables high-value video-conferences with a number of participants (up to 20). The service comprises 2 components: an ad hoc service accessible to all BELNET users and a reservation service with support. The ad hoc service can be used at a moment's notice but does not offer support or guarantees as to service availability. The reservation service allows users to arrange a video-conference ahead of time with guaranteed resource

availability. Support is also provided as part of the service. In either case, the video-conference is held via an online connection on BELNET's video-conferencing system. The BELNET system coordinates the various video-conferencing streams.

### Virtual Leased Line (VLL)

With Virtual Leased Lines, geographically dispersed local computer networks can be linked together in a virtual private network (VPN) by which we offer our customers a cheap alternative to classic leased lines. In the second half of 2005, a pilot version was tested. Since 1 January 2006, VVL has been available to all our customers. In particular, such connections are of great importance to universities and colleges that are grouped in associations. They enable them to communicate and exchange data quickly and cheaply.

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