

Proposals of the
Laboratory of Information Technologies
for the 7-year Programme of JINR's
Scientific Research and Development

I.V.Puzynin

2
0
0
3



2 0 0 9

In 2000 we began with

- Reorganization of the Laboratory of Computing Techniques and Automation (LCTA) into the Laboratory of Information Technologies (LIT)
- New laboratory structure
- Partially destroyed JINR LAN ATM backbone
- Low bandwidth of external channel (2 Mbps)

2

Now in 2002

0

- Really working new LIT structure

0

- Reliable Fast Ethernet JINR LAN backbone

3

- External channel 30 Mbps

- License for data transfer and telematic services

- LIT staff professional training



2

0

0

9

The main task:

- the development of computing and information resources of JINR
- provision of remote access to these resources and resources of other centers
- the creation of a unified administrative - information space of the Institute

2003



2009

2
0
0
3

- To meet the requirements of theoretical and experimental research conducted and planned at JINR and in the framework of international collaborations as well as the requirements of the effective managing of the Institute.

- To correspond to the global tendencies in the field of the development of the element base and information technologies.

- To be provided with financing from the JINR budget.



2 0 0 9

Development of information, computer and network (ICN) support of JINR's activities include:

1. JINR local area network (LAN).
2. External JINR's computer communication links.
3. Computing for scientific research.
4. Information support of scientific research and administrative activity.
5. Participation in the Russian and international projects on the development of distributed systems of information processing and storage.
6. Computer physics for theoretical and experimental research.

2003



2009

General lines should be construction of the JINR **Local Area Network** and organization of **external communication** links that should correspond to the latest technological advances. The high-speed backbone with effective security and data flow management system connected to high-speed communication links of the scientific computer network of the **new generation** will provide a way for creating at JINR a system of **distributed computations, data processing and data storage** that completely correspond to the global up-to-date tendencies in the area of information technologies.

2
0
0
3



2 0 0 9

1. Local Area Network (LAN)

Step-by-step build-up of the gigabit network, when the gigabit interfaces will equip only those clusters which do form a Gigabit path.

Network security

Network Management System.

2
0
0
3



2 0 0 9

JINR
Local
Area
Network
(LAN)

2
0
0
3

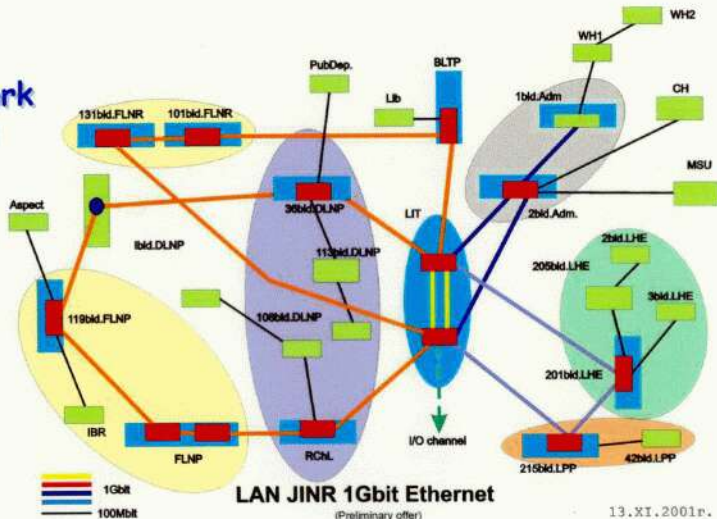
1-Gigabit Ethernet LAN Project

Technoserv	- CISCO 6509, 4908* eq.	~\$560 000
Jet Infosystems	- CISCO 6506* eq.	~\$1 000 000
	NORTEL eq.	~\$600 000
TOPSbi	- CISCO 4006 eq.	~\$570 000



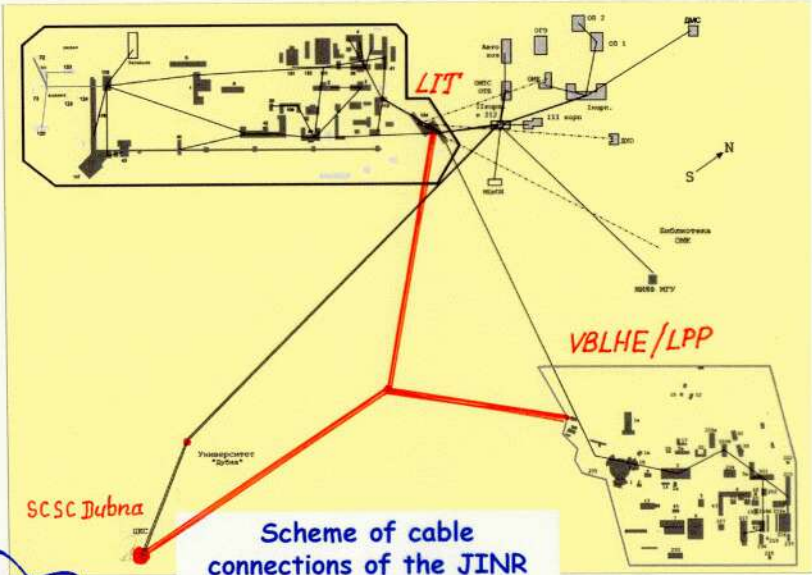
2 0 0 9

JINR Local Area Network (LAN)



13.XI.2001r.





Scheme of cable connections of the JINR computer network



2. External computer communication links of JINR.

Between Moscow and Dubna. Currently, JINR will lease 30 Mb/s with possibility of expanding the bandwidth up to 155 Mb/s

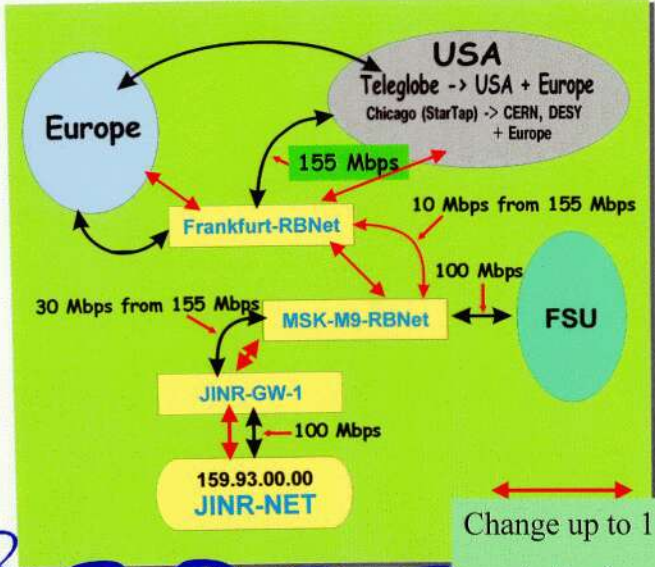
At present, in the framework of the project FASTNET the capacity of the international channel Moscow - Frankfurt is 155 Mb/s. In the channel there is a 10Mb/s granted bandwidth for the JINR network

2
0
0
3



2 0 0 9

2003



Change up to 1 Gbps
in the future



2009

1. Step-by-step increase of the throughput of the channel Dubna - Moscow from 30 Mb/s up to 1 Gb/s in 2002-2004.
2. Participation in the implementation of the interdepartmental programme "Creation of the national scientific computer network of a new generation in 2002-2006" that comprises:
 - increase of the granted capacity in the international channel Moscow - Frankfurt from 10 Mb/s up to 45 Mb/s in 2002-2004, with its subsequent increase up to 155 Mb/s;
 - connection of the Russian scientific network to the European high-speed backbone GEANT;
 - development of the networking infrastructure of Russian nuclear physics centres (at the level of 1 Gb/s) for integration of computing and information resources;
 - preliminary work on installing a segment of a new generation of the IPV6 protocol;
 - participation in the activities on creation of a GRID-segment in Russia and its inclusion in the European and global GRID infrastructure;
 - creation of a dedicated channel to CERN for the nuclear physics centres of Russia at the level of 34 Mb/s in 2002, 70 Mb/s in 2003, and 155 Mb/s in 2004.

2003



3. Maintenance of the BACKUP channel.

2 4. Participation in the development of the
0 networking infrastructure of the JINR Member-
0 State Institutes.

0 5. Equipping of 3-4 JINR halls for regular
3 videoconferencing.



2

0

0

9

2

3. Computing for scientific research

- Distributed computing

- Mass storage

- General-purpose program complexes

0

0

3



2

0

0

9

Hardware & Software Resources at JINR High Performance Computer Centre

SPP2000

8 CPU x 720 Mflops;
1 GB memory;
~70 GB disk space



ATL



ATL

D370/1-server



ATL-2640 tape library 10.56 TB
(3 DLT 4000 drives);
HP OmniBack v.2.55& OmniStorage v. 3.11

PC-cluster
20 CPU 800MHz
MYRINET
for MD



APE100



SUN CMS Cluster



NIS+cluster: 3 Sun Sparc stations;
24 GB disk space; Solaris 2.5.1;
Iris Explorer license server, LHC++

8 batch-nodes dual PIII-500 MHz, 512 MB RAM, 9 GB HD;
2 interactive PC 333 MHz, 128 MB RAM, 8 GB HD;
Server: dual PIII-600 MHz, 512 MB RAM; 170 GB RAID-5;
DLT-4700 tape library;
Linux Red Hat 6.1; cernlib 2000; ROOT 2.25.03;
LHC++; PBS; total perf. of PC-farm: 400 SI 95



Upgrade
+32 CPU 800MHz (+1.5 K Si95)
File server with 1 TB disk space

PC-farm
total performance ~ 2K SI95

Solving the LHC Computing Challenge



10 Thousand dual-CPU boxes

Hundreds of tape drives

Multi-Gigabit Ethernet switches

Farm Network

Real-time detector data

† Data Rate in Gbps

LAN-WAN Routers

Grid Interface

Data Network

10 Thousand disk units

Computing fabric at CERN (2006)

2003



2009

Activities on Creation of Grid-segment in Russia

Projects

- * EU DATAGRID (WP6, WP8)
- * INTAS - CERN 440
- * RCC-LHC Project
- * RFFI grant

Current status

- * installation of GLOBUS
- * creation GRIS and GIIS
- * CA (certification)
- * TESTBED1 (EU DATAGRID)
- * metadispatcher
- * development of monitoring tools
- * data management
- * mass generation of physical events and creation of distributed data base

Participants

Moscow region:

- * SINP MSU
- * RCC MSU
- * ITEP
- * JINR (Dubna)
- * IHEP (Protvino)
- * IAM
- * TC "Science and Society"
- * INR (Troitzk)
- * LPI

St. Peterburg region:

- * IHPC&DB
- * PNPI

2003



Information support of scientific research and administrative activity

1. The database systems development on the basis of Oracle 8i/9i, Objectivity/DB, MS SQL server, MYSQL.

2. Development of the WWW network at JINR.

3. Development of the JINR electronic library (JINR Library, Publishing Department, etc.).

4. Development of the systems of electronic document circulation.



2

0

0

9

Computer physics

for theoretical and experimental research

- Creation and development of methods for mathematical simulation of physics processes and analysis of data for theoretical and experimental research.
- Algorithmic and software support of computer simulation on the basis of new programming technologies with the use and optimization of computing systems of modern architecture and high-speed networks.

