Greek Research and Technology Network

Advanced IT services for the
Life Sciences research community

Panayiotis Tsanakas, Chairman & CEO
ELIXIR-GR open kickoff event
18/5/2018

@ education

@ research

grnet
Networking Research and Education

@ health

@ culture

GRNET

- State-owned company (SA) under GSRT established in 1998
- Provide advanced e-infrastructures/services to the Greek academic and research institutions:
  - National and international connectivity
  - Infrastructures/services (network, computing, storage) to the community
- Promotion and dissemination of ICT in the academic community

Greek Research and Technology Network

Our vision is the development of Research and Education in our country along with the equal involvement of our communities in the Pan European society of Knowledge.

31.234 Active vm's

213 connected members

261 points of presence

2.563 servers

The role of GRNET

- Develops and administers integrated electronic infrastructure (e-infrastructures)

- Operates, in 24/7 operational basis, horizontal infrastructure and electronic services for the whole of educational and research community (infrastructure services)

- Creates open communities of knowledge about technologies (community building)

- Supports massive actions for spreading of ICT in education community

- Advises and supports the State in advanced ICT topics (network, computational and storage infrastructure)

Infrastructure and Services

Infrastructure

- Nationwide Optical Network Ultra High Speed
- Computer Data Centers
- Computational and Storage infrastructure
- Supercomputing Platforms
- Interconnection Provider GRIX
- Interface with international Internet / GEANT
- Backbone network for the School Network
- Fiber optic connections to 31 hospitals, wifi access

Services

- Cloud Computing (Okeanos)
- PITHOS (Storage Service)
- University Books (EUDOXUS)
- Academic Identity Card
- Faculty Elections
- ePresence / Teleconference
- Web Casting - Live streaming scientific & cultural events
- Hospital Services – imaging backup service, eduroam/edugain access to publications

GRNET: Advanced computational and storage services for the research and higher education community

- Computers, Networks and Storage for all:
  - Universities, Research Centers, Institutes, Laboratories, Classes, Students, Researchers
- Ability to provision full computer operating system and network in seconds (Virtual machines, containers)
- Development of Information Systems at minimum time, dynamic allocation in real time
- Online file storage and syncing (Pithos+ Service)
- Transitioning to full openstack support, CEPH, swift, manila storage

GRNET in numbers

- Connects all universities, research centers, academic organizations
- Dark fiber backbone (Nx10 Gbps) + Access 1 || 10 Gbps /institution
- International connectivity through GEANT network multiple 10 Gbps
- Operates the Greek Internet Exchange (GRIX) node (as *trusted third party*) – peering all Greek ISPs and SPs up to multiple 10Gbps (*open, neutral*)
- HPC: 444 TFlops HPC Tier–1 centre/ fat + GPU nodes, PRACE
- Public Cloud (~okeanos - over 400,000 virtual machines spawned)
- VPS VM provisioning (>400 VMs) Storage Services
- 4 DataCenters (EKT, Ypepth-Marousi, Louros Arta, Heraklio Crete)
  - hosting: 84 racks, 1200+ servers, n*10s thousands Virtual Machines, 9 PB of raw disk storage and 5PB tape

Network connectivity offering to

151
Institutions

50
Cities

340
PoPs

Democritus University of Thrace: **8**

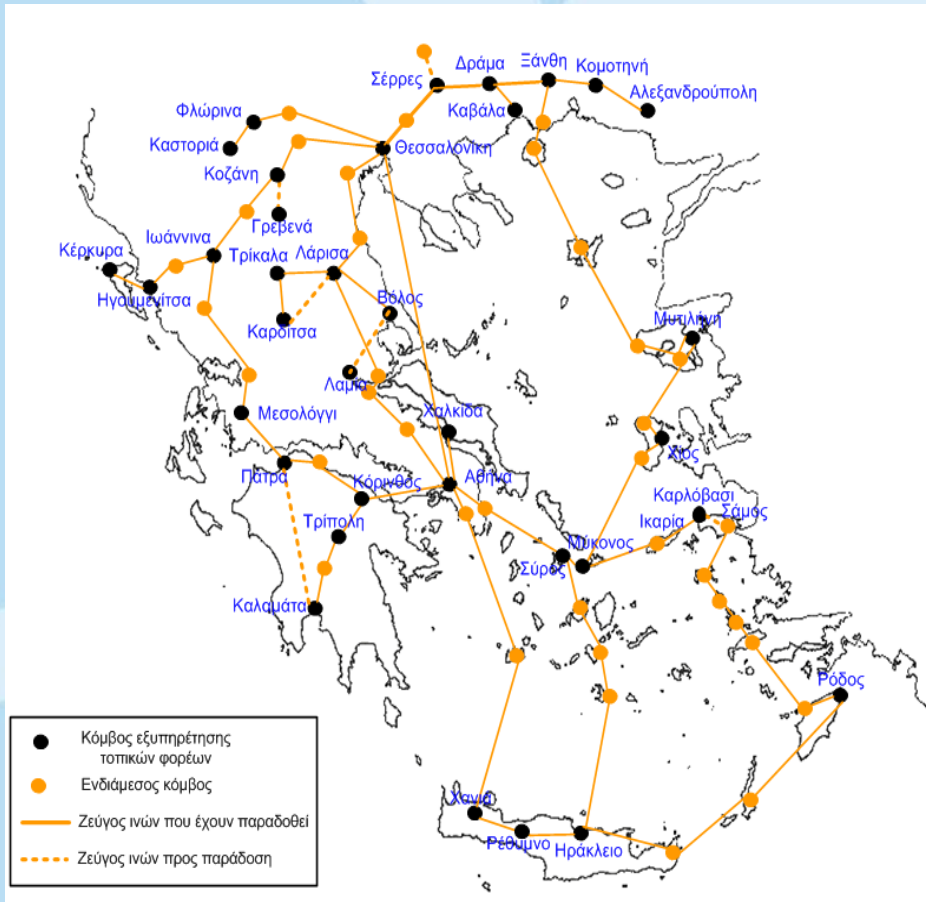Aegean University: **7**

University of Thessaly: **10**

Aristotle University of Thessaloniki: **6**

Panellenic School Network: **82**

- Connectivity needs
  - To the internet
    - protected
  - Between Institution sites
  - To other R&E Institutions in
    - Greece
    - Europe
    - worldwide
  - To GRNET datacenters

GRNET FIBER FOOTPRINT

- 35 PoPs
- 9000km fibers (IRU)
  - ➤ MANs Attiki & Thessaloniki
  - ➤ DF loops 33 cities
- Single-mode fiber pair
- 15-years IRUs
- Availability >> 99%

GRNET cloud services
okeanos, pithos+, e-Science, GREEN DC

~okeanos is our IaaS Service.

With ~okeanos you are one click away from your own Virtual Machines and Virtual Networks.

National Supercomputer Infrastructure
HPC **(High-Performance Computing Services)** **ARIS**

HPC services to the Greek R&E community

ViMa
Virtual Machines

GRNET ViMa service aims to provide to the Greek education and academic community access to shared computing and network resources that can be used for production services.

key role in major European Funded projects

GN4-2 – GÉANT
http://www.geant.org

GN4-2 - Accelerating research, driving innovation and enriching education

Infrastructure as a Service (IaaS)
https://clouds.geant.org/

Through a unique pan-European collaboration, GÉANT and 36 NRENs around Europe offer Higher Education and Research Institutions a range of attractive Infrastructure as a Service (IaAS) cloud computing solutions, tailor-made, and priced, for academia.
Watch a short video: **https://youtu.be/wujP8WFKXlo**

OPENMINTED
http://openminted.eu

OpenMinTeD brings together, content providers and scientific communities, text mining and infrastructure builders, legal experts, data and computing centres, industrial players, and SMEs

PRACE
www.prace-project.eu

PRACE (Partnership for Advanced Computing in Europe) is to enable high impact scientific discovery and engineering research and development across all disciplines to enhance European competitiveness for the benefit of society, strengthen the European users of HPC

The challenge:

Support RIs: Research Infrastructures

- scientific research that can respond to societal needs

- To maximize return on investment scientists & researchers must have access to modern and appropriate infrastructure

The challenge:

Support RIs: Research Infrastructures

- RIs are key enablers to advance frontier knowledge
  - must support the4th industrial revolution (fusion of technology)
  - be state-of-the-art and pre-competitive
- Need to bridge skills gap and develop critical skills
- NREN services: automated - orchestrated provisioning

Towards ELIXIR-GR Compute platform

ELIXIR-GR - cloud infrastructure

- ELIXIR-GR : distributed cloud infrastructure in central GRNET datacenter(s) and partner's sites

- Main compute and storage to be procured and installed in GRNET datacenters,

- …connected to existing/future local partners' infrastructures

- Over dedicated optical fiber / wavelength specially designed to offer secure access

Estimated size of the infrastructure

- 50 servers, 1500 cores, (mix of Thin, Fat, GPU nodes - some with 1TB dedicated RAM)

- Large storage
  - 750 TB disk
  - 1PB tape library.

- Software defined storage (including cold storage)

- Detailed requirements' gathering
- Public procurement procedures
- Ordering and installation of equipment
- Operations center
  - configuration management,
  - service center,
  - help desk
- for the duration of the project - onwards

Indicative List of Infrastructures and Services for Life Sciences research and the Health sector

Hospitals get connected on the GRNET fiber optics network, 1/10Gbps

Secure and fast processing of medical and research data

wi-fi
Remote access service in all hospitals

Fast access to all hospital services for staff and customers

New Data Center for the Health Sector

Effective, fast, secure storage and retrieval of medical data

Central Electronic Management Services for the National Blood Donors Registry

Managing the registry and issuing volunteer donor IDs through modern, credible and friendly procedures for blood donors, donation services and blood centers in the country.

Harmoni

High-Performance Archiving and Retrieval of Medical On-line Imaging Data.
Effective and flexible management of large amounts of imaging data, enabling hospitals to manage the long-term storage and retrieval of the large amount of imaging data effectively, providing a centralized repository, based on the DICOM standard (Digital Imaging and Communication in Medicine).

Central Staff Directory Service-DELOS for Hospitals

GRNET "Delos" Authentication and Authorization Infrastructure enables cross-institutional services by providing federated authentication and authorization among participating organizations.

DIADOSIS

Inter-loan online library. Is an electronic system which provides access to all research and medical publication papers via the DELOS- Authentication & Authorization Infrastructure service, to all hospital staff

eduroam

eduroam (education roaming) is the secure, world-wide roaming access service developed for the international research and education community. It allows students, researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions by simply opening their laptop.

GRNET plans in life Sciences

- GRNET currently upgrades its optical/IP network to SDN/NFV for automated – orchestrated on demand resource provisioning.

- New infrastructure will service all life science research facilities with dedicated network connectivity over GRNET's 10.000Km owned optical network.

- Connectivity to EU nodes over GEANT dark fiber guaranteed.

GRNET plans in life Sciences (cnt'd)

- active role in AARC2: implementing federated AAI service
  - according to the agreement under discussion for the Life Science AAI
  - in collaboration with the AARC2,GEANT,EOSCHub.

- Promotes trust mechanisms and adoption of federated Life Science AAI, and FAIR, open access concetpts.

- Develops orchestration and automation systems for simplifying the description, demand and supply of compound network-compute-storage services for LS.

Greek Research and Technology Network

www.grnet.gr

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GRNET SA

GRNET EDET