# Turkish National Grid enabled HPC Infrastructure TRUBA
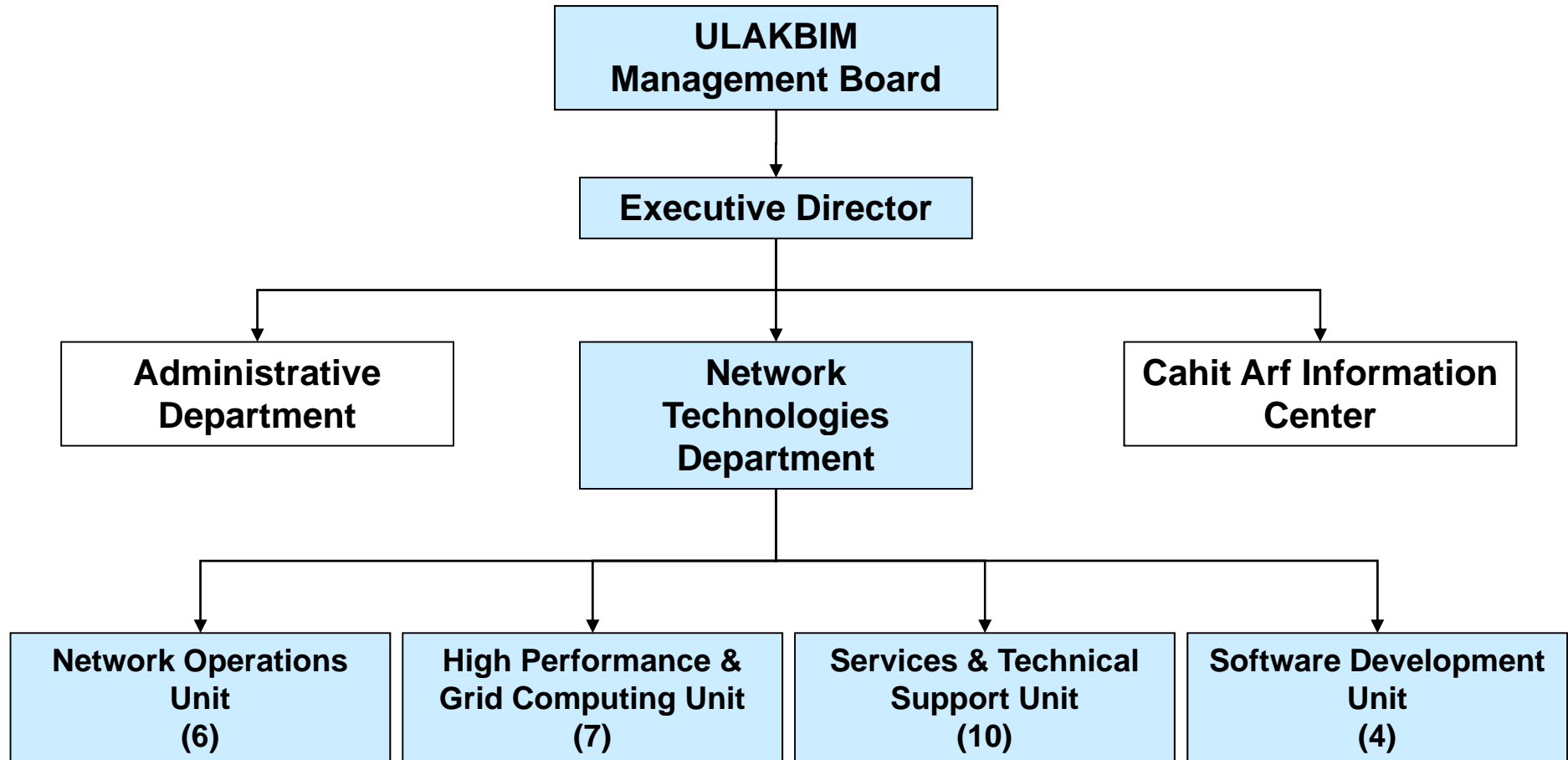
Milli Kütüphane
07/07/2011 – Ankara

# ULAKBIM

- Founded in 1996

- R&D institute of TUBITAK (The Scientific and Technological council of Turkey

  - The institute has no commercial targets, nor is it aligned with profit-making
  - Semi-independent government organization
  - Funding is entirely from government
  - Serving research and education community

# ULAKBIM Organization

## Organization and Staffing

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                    ┌─────────────────────┐
                    │      ULAKBIM        │
                    │  Management Board   │
                    └─────────────────────┘
                              │
                    ┌─────────────────────┐
                    │ Executive Director  │
                    └─────────────────────┘
                              │
        ┌─────────────────────┼─────────────────────┐
┌──────────────────┐ ┌──────────────────┐ ┌──────────────────┐
│  Administrative  │ │     Network      │ │ Cahit Arf        │
│   Department     │ │  Technologies    │ │ Information      │
│                  │ │   Department     │ │ Center           │
└──────────────────┘ └──────────────────┘ └──────────────────┘
                              │
        ┌───────────────┬─────┴─────┬───────────────┐
┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│   Network    │ │High Performance│ │ Services &  │ │ Software     │
│  Operations  │ │ & Grid        │ │ Technical    │ │ Development  │
│    Unit      │ │ Computing Unit│ │ Support Unit │ │ Unit         │
│    (6)       │ │    (7)        │ │    (10)      │ │   (4)        │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
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# ULAKBİM

- **ULAKBIM Management**
  - Management Board members are nominated by TUBITAK Presidency and appointed by Scientific Board of TUBITAK.
  - Management Board of ULAKBIM consists of 7 members (Executive Director of ULAKBIM plus 6 members appointed by Scientific Board of TUBITAK)
  - Executive Director is nominated by TUBITAK and appointed by Scientific Board of TUBITAK
  - Deputy Directors are nominated by Executive Director and appointed by President of TUBITAK.

- **Includes 3 departments:**

  - **Administrative Department**

  - **Cahit Arf Information Center Department**
    - Provides nationwide information and document delivery services in order to meet the information requirements of universities, public and industrial sectors.

# Network Technologies Department

- operates National Academic Network – ULAKNET

- coordinates NGI (National Grid Initiative) and operates TRUBA (Turkish e-Science e-Infrstaructure)

- carries out security needs of ULAKNET backbone via ULAK-CSIRT (Computer Security Incident Response Team)

- coordinates nationwide IPv6 protocol transition with collaboration with Telecommunication Authority Office of Ministry of Transportation

- participates in research and development studies on network and information technologies

# ULAKNET 2011

**158 Universities & Research Institutions**
**~ 870 Connections    ~ 100.000 Researchers    ~ 2.500.000 Students**
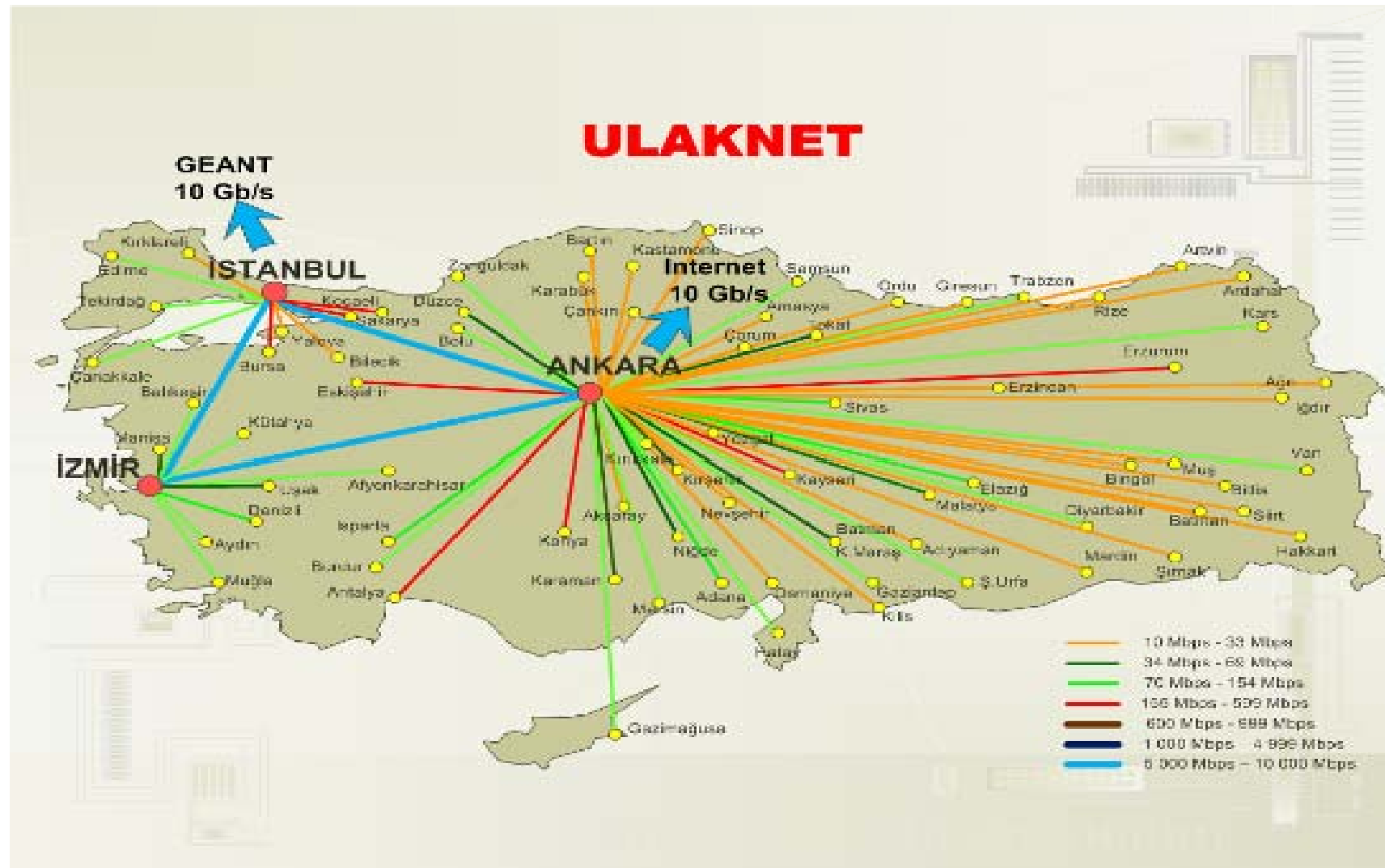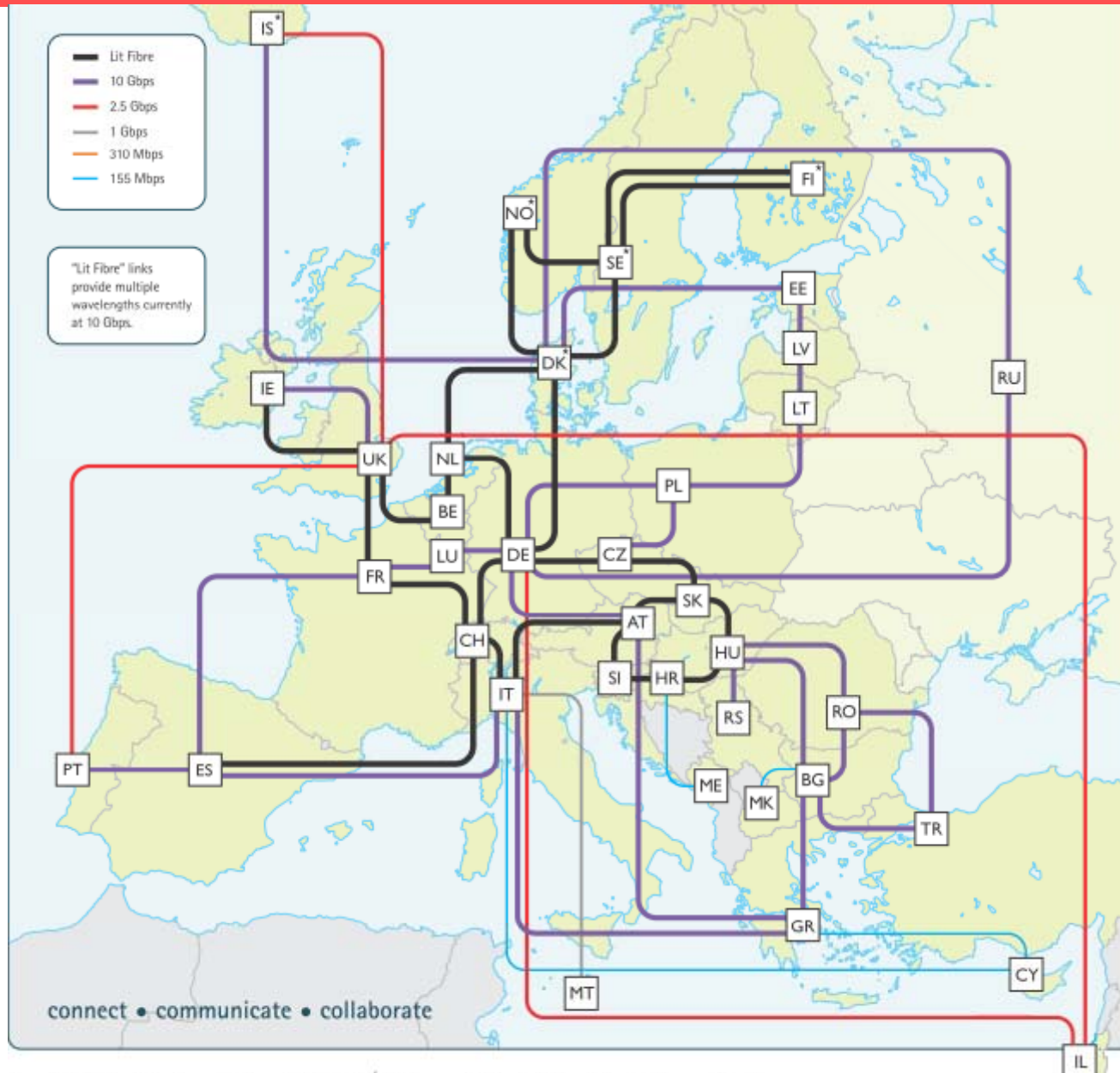
# ULAKNET Services

**Network Operations Center (NOC)**
- Operating a huge network (+850 connection, 7x24 service)

**Network Statistics**
- Netflow, MRTG, NAGIOS, Weather map

**Basic Network services**
- Mirror+hosting, Root DNS, FTP, Proxy, Content Provider,Mailing lists, Blogs

**Advanced Network Services**
- Multicast
- eduroam (fully integrated with European eduroam Federation)
- Quality of Service
- VoIP – national academic voice network telephone numberring
- Ulak-CSIRT: Computer Security Incident Response Team for NREN
  - accredited by Trusted Introducer, European CSIRT Directory (first in Turkey)

**Storage Services**
- National Seismic data from hundreds of sensors of different national institutes related with earthquake
- TIER-2 Center for ATLAS and CMS experiments of CERN (Unique in the region)
- Distance Education data of various institutes

**Training Services**
- Grid and Parallel Computing
- VoIP,
- IPv4 and IPv6 Routing, IPv4 and IPv6 Security,
- 802.1x based authentication and system administration

**Grid and HPC services through TRUBA e-infrastructure**

# ULAKBİM in FPx's

**FP6 & FP5 Projects (9 Projects)**

- **EUMEDCONNECT**
- **GEANT2**
- **EGEE-II** , • **EGEE-III**
- **EUMEDGrid**
- **SEE-GRID,** • **SEE-GRID-2,** • **SEE-GRID-SCI**
- **BSI: Black Sea Interconnection**

**Ongoing FP7 Projects (7 Projects)**

- **SEERA-EI: SouthEast European Research Area for e-Infrastructure**
- **GEANT3**
- **EuMed-Support**
- **EGI-InSPIRE European Grid Initiative**
- **e-IRGSP3 e-Infrastructure Reflection Group Support Project**
- **HP-SEE High Performance in South Eastern European**
- **PRACE-2IP**

# International Organizations

- **TERENA** (Trans-European Research and Education Networking Association)

- **EGI.eu** (European Grid Infrastructure)

- **RIPE NCC** (Reseaux IP Europens Network Coordination Center)

- **CEENet** (Central and Eastern European Networking Association)

- **TI** (TRUSTED INTRODUCER)

- **e-IRG** (e-Infrastructure Reflection Group)

# National Projects

- 20M Euro annual ULAKNET Connectivity Costs (Ministry of Finance) (1996→ 201X)
  - New National Lightpath Project
    xWDM and/or Ethernet based fiber optic access (own or leased)

- **New National Academic Network Infrastructure (ULAKNET2)**
  - **funded by State Planning Organization (2009-2011)**
  - **10 Gbps triangle backbone in 2011 between Istanbul-Ankara-Izmir**

- **Development of National Union Catalog Software for hundreds of libraries**
  - **Supported and funded by Ministry of Culture and Tourism (2009-10)**

- **Design of National IPv6 Infrastructure and Transition to IPv6 Protocol**
  - **Supported by Ministry of Transportation**
  - **Funded by Turkish Research Area Budget (2009-2011)**

- **Turkish National Grid enabled HPC Infrastructure project (TRUBA)**
  - **funded by State Planning Organization (2009-2013)**
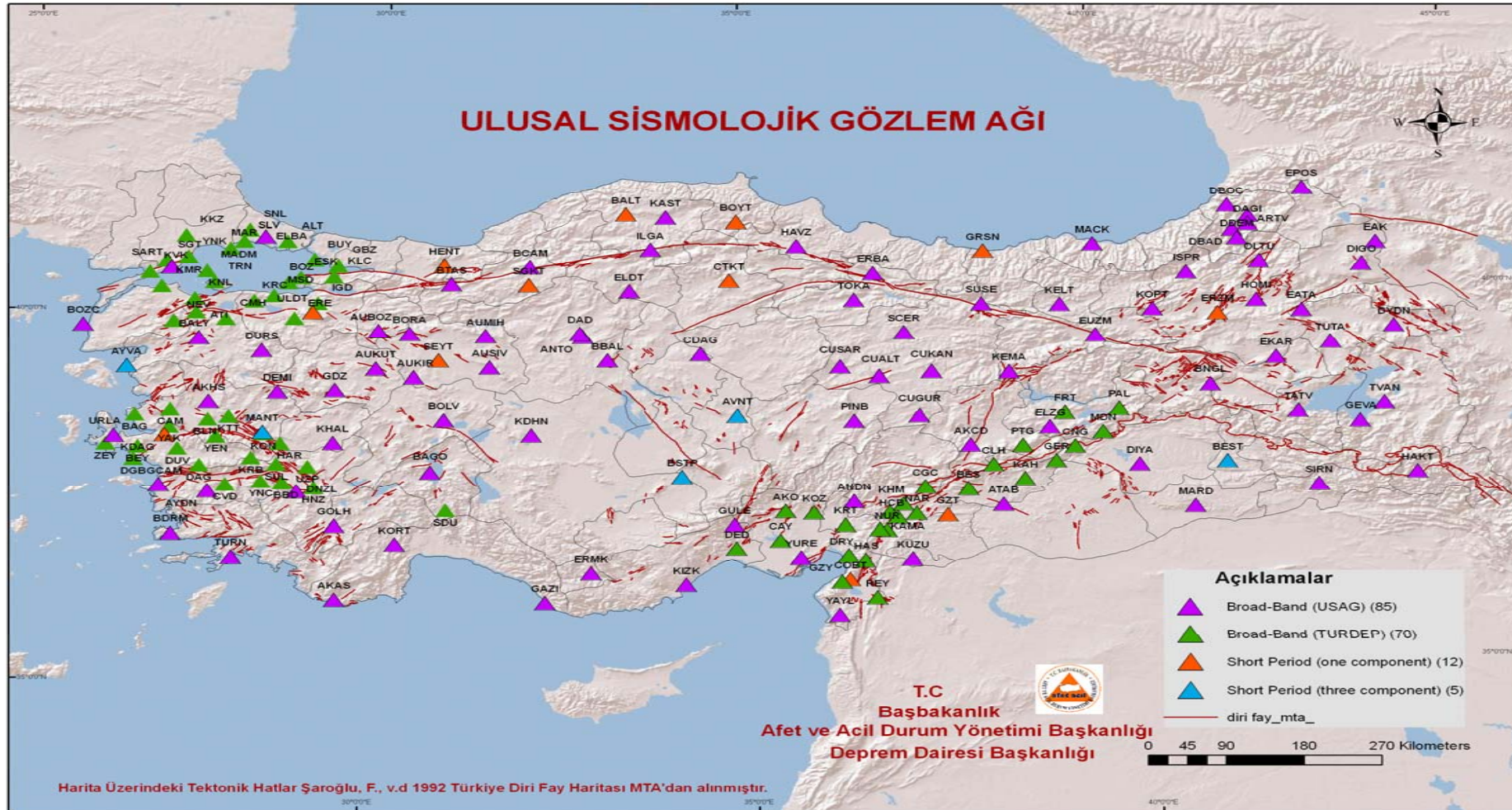
**Supported by State Planning Organization (2011-2013)**
**Real time and offline data collection from 3 major institutes and 9 regional university based seismic network**
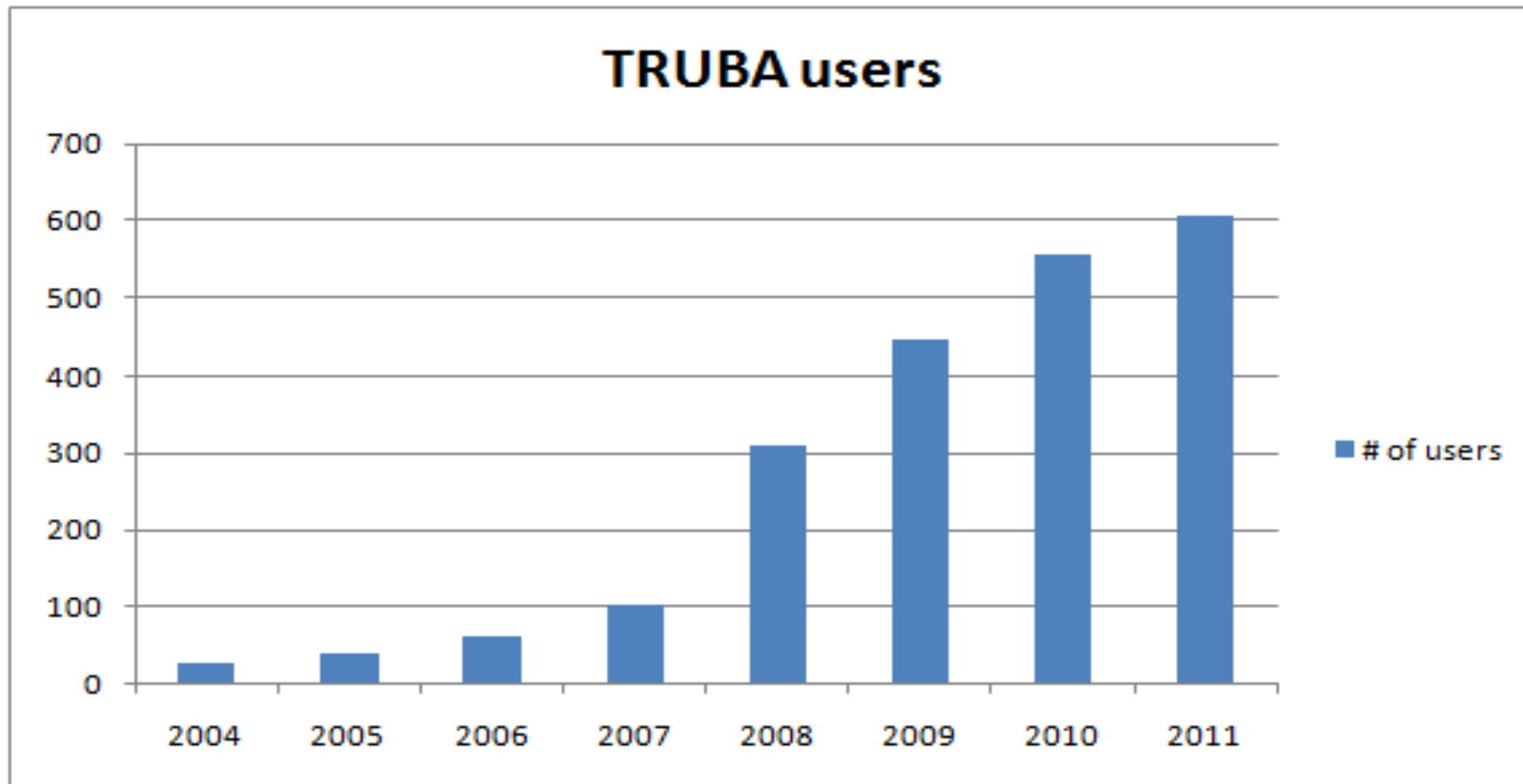
# TRUBA (Turkish e-Science e-Infrastructure)
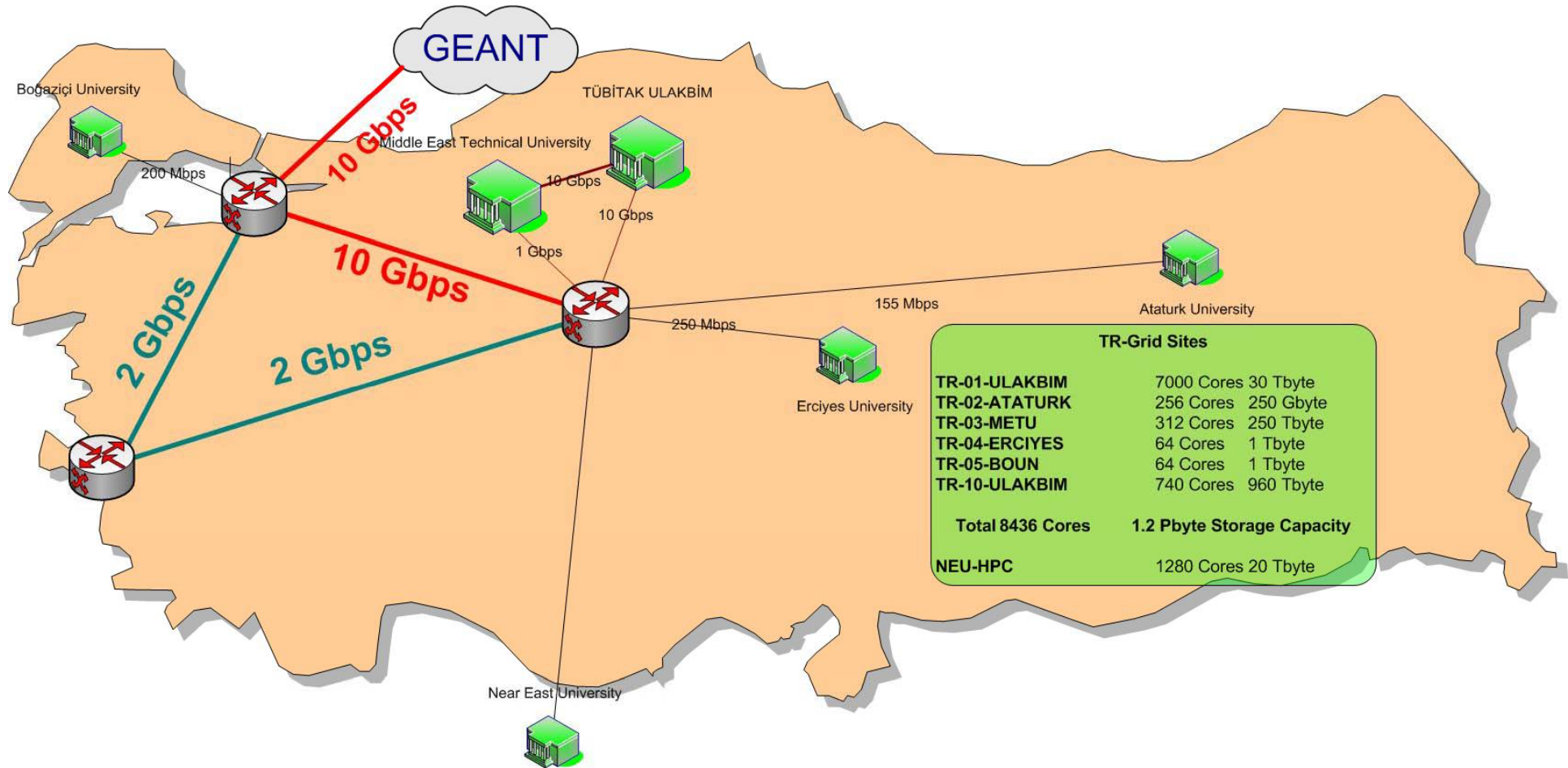
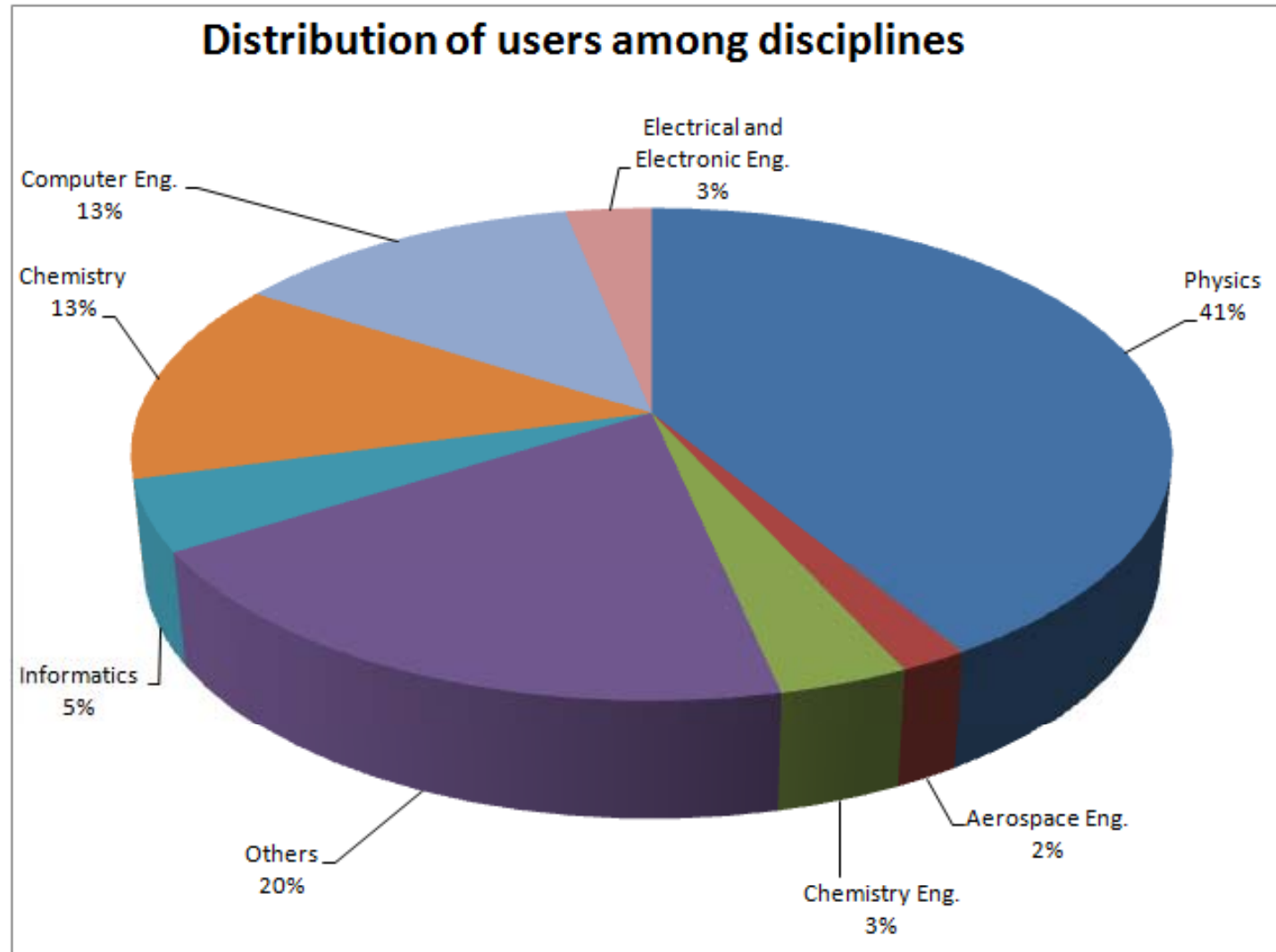**5 million euro support from State Planning Organization (2006-2010)**

**+10M during (2011-2015)**

# TRUBA Users

- **605 users**
- **34 different disciplines**
- **55 different institutes/universities**



**TRUBA users**

Distribution of users among disciplines

- Electrical and Electronic Eng. 3%
- Physics 41%
- Computer Eng. 13%
- Chemistry 13%
- Informatics 5%
- Others 20%
- Chemistry Eng. 3%
- Aerospace Eng. 2%

# TRUBA Strenghtening Activities 2011

- New 1MWatt datacenter with ability to support High Density installations (ready for operation)

- HPC cluster upgrade from 40 Tflops to 100 Tflops (Q4)

- Lustre DFS upgrade from 640 Tbyte to 1.2 Pbyte

- Dark fiber or high capacity WAN links to beneficiary institutes

# Conclusion

- **ULAKNET and TRUBA are both leading infrastructures in their geographical region.**

- **ULAKBIM also identifies critical areas to improve and fully supports these areas with TRUBA infrastructure.**

- **TRUBA is a unique collaborative infrastructure that brings together universities, public agencies and industry.**