Concept Proposal:

Lebanese National Research and Education Network

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HE Minister's office – Lebanon, 06.08.2011

Purpose of the Meeting

- Generic overview of some key technical and operational requirements for developing NREN

- Intended to show the importance and current trends of NRENs in order to help in making the right choices

- Understanding your requirements and needs to identify the next steps to be taken for establishing Lebanese NREN

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Outline

- Research and Education Networking: ASREN Perspective

  - Need for dedicated connectivity for R&E

  - ASREN historical background and operations

- NREN Model

  - Connectivity

  - Organization and ownership

  - General activities

- Developing Lebanese NREN

  - Technical requirements

  - Operational and skill requirements

  - Funding requirements

  - Service portfolio

- Funding sources

Research and Education Networking

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Research and education networks

- National Research and Education Networks(NRENs) dedicated networks connecting universities and research centers at the national level

  Examples: Algeria (ARN), Egypt (EUN/ENSTINET, Jordan (JUNET), Morocco (MARWAN), Qatar (Qatar FN), Syria (HIAST), Tunisia (MRST), U.A.E. (ANKABUT), Palestinian Terr. (PadI2), Saudi Arabia (SREN-KAUST), Lebanon (NCSR)

- Regional Research and Education Networks (RRENs) are Dedicated networks which connect NRENs

  Examples: EU GEANT, Latin America CLARA, Asian Pacific APAN, US Internet2, Canada CANARI, South Africa UbuntuNet Alliance, etc..

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Status of NRENs on the world map

NREN STATUS
- Working
- Initiative
- Planned
- No NREN or not known

Source: *TERENA Compendium of National Research and Education Networks In Europe 2010*

Why dedicated networks ?

- Fast and efficient state-of-the-art network, services, tools and applications to boost productivity

- Minimize costs and leverage economies of scale by using available research, academic and technical resources

- Growing demand for high-performance computing and eScience initiatives

- Common culture of R&E community, collaborative research

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Historical background

- EUMEDCONNECT, 2004 --> [1], [2], [3?]

- PAN Arab Network, 2005

- Rome Declaration 2006 - CAMREN

- NAP, the Network Access Points 2007

- ASREN, 2010

  - EUMED - Brussels, March 30

  - League of Arab States – Cairo, December 8

- ASREN GmbH - Dusseldorf, June 2011

  - Abu-Ghazaleh & Consulting GmbH

  - Jordan University Network

  - Moroccan CNRST

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ASREN network

- To connect all Universities, Educational Institutions, and Research Centers in the Arab World to each other, to the Mediterranean, Europe, North America, and the rest of the world through a high speed R&E network, towards a new era of science"

The drivers

- More and more MED/Arab R&E networks emerged in recent years

- A series of new cables in the region were laid (e.g. JADI), so become more economical to connect NRENs in the region and to the world

- MED/Arab e-Infrastructure to evolve in the region as an R&E Communication link between East and West.

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Current status of ASREN network

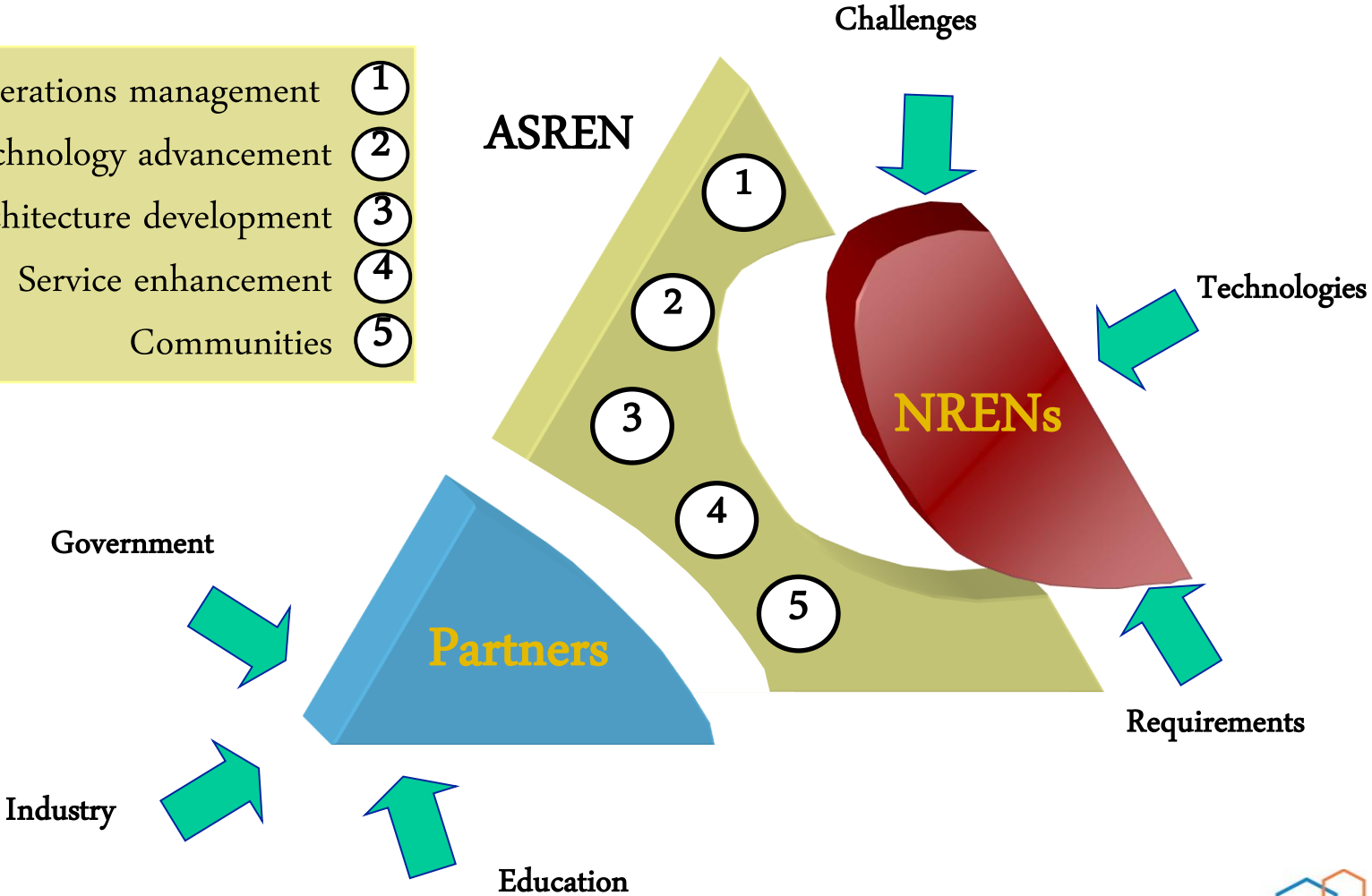Builds on the existing EUMEDCONNECT network which connects some Arab Mediterranean countries to Europe
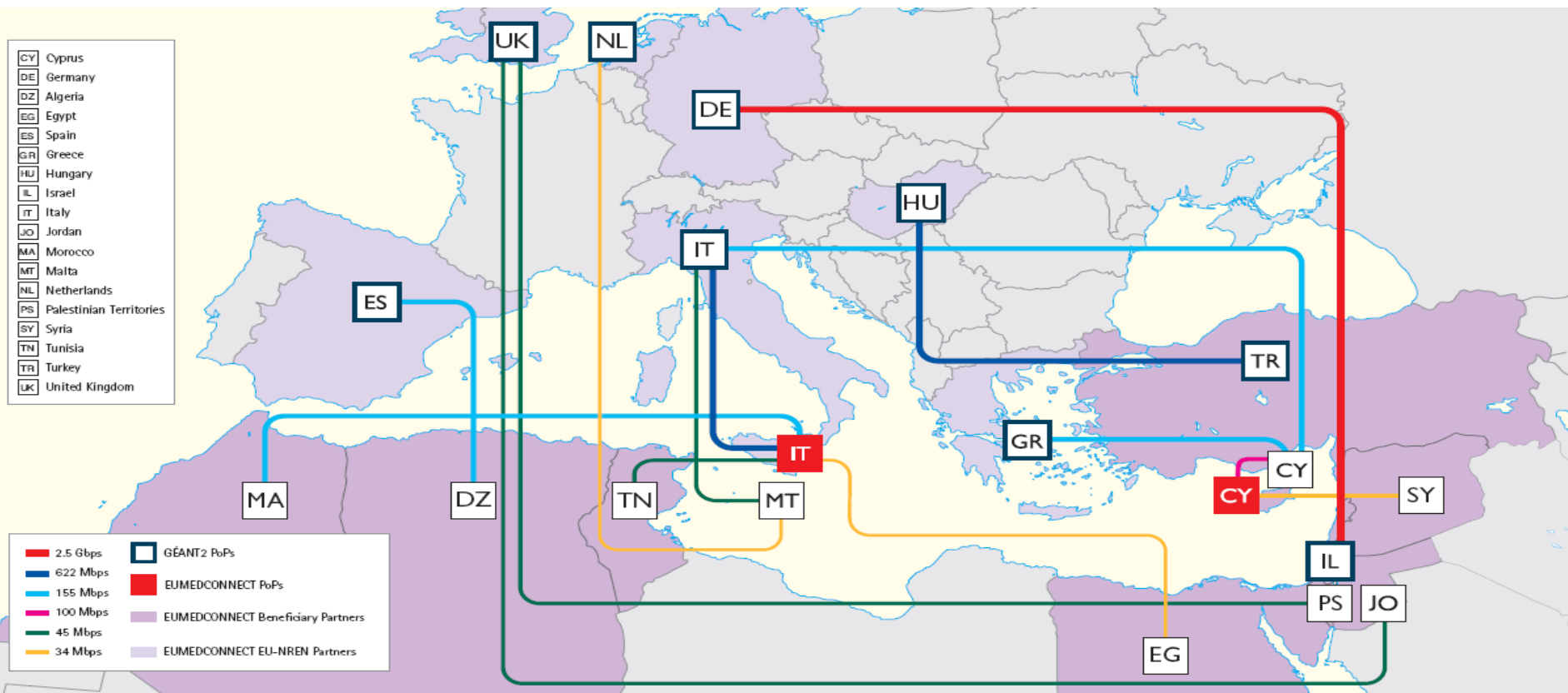
External connectivity
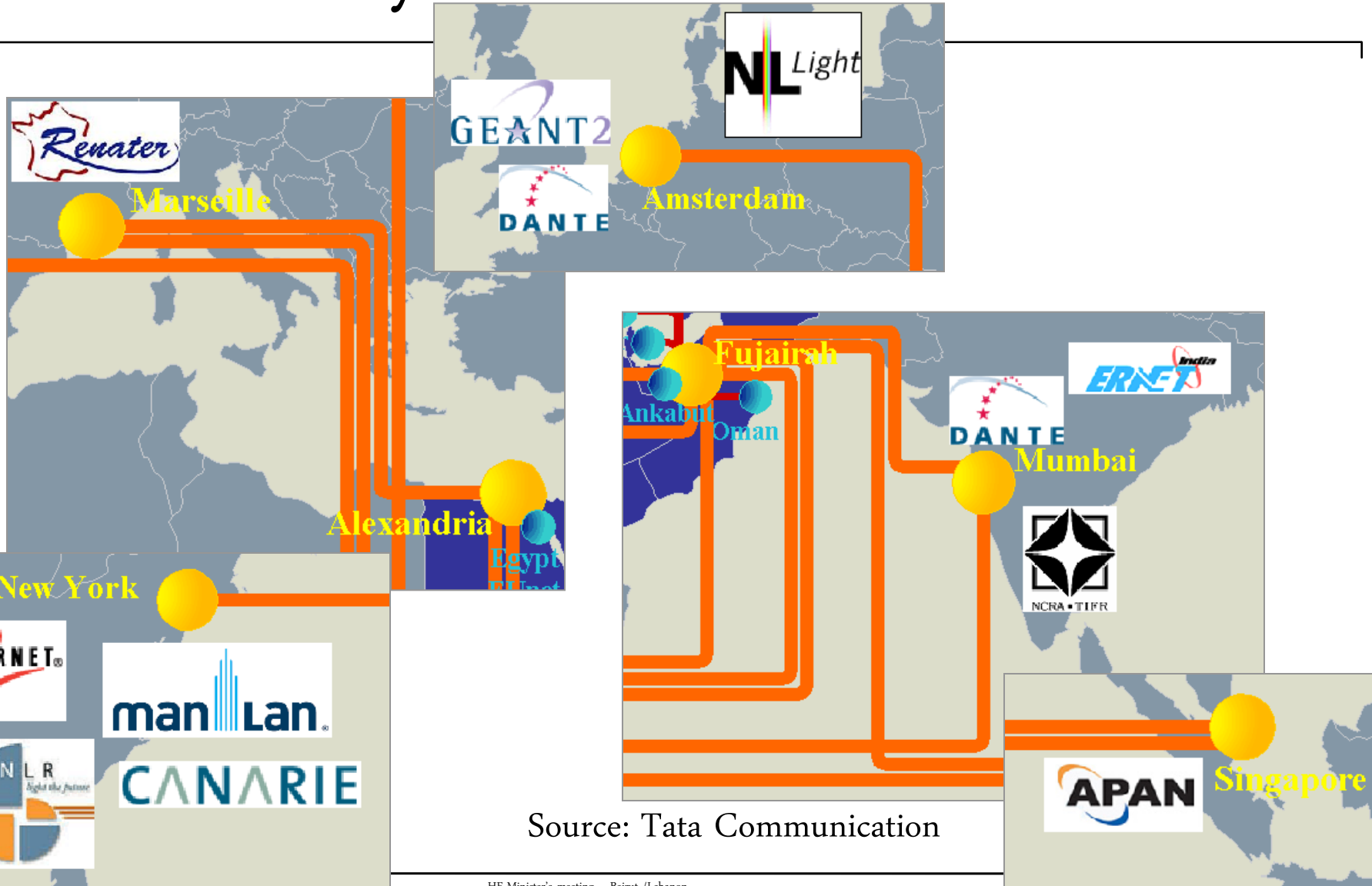
Source: Tata Communication

Eco-system model
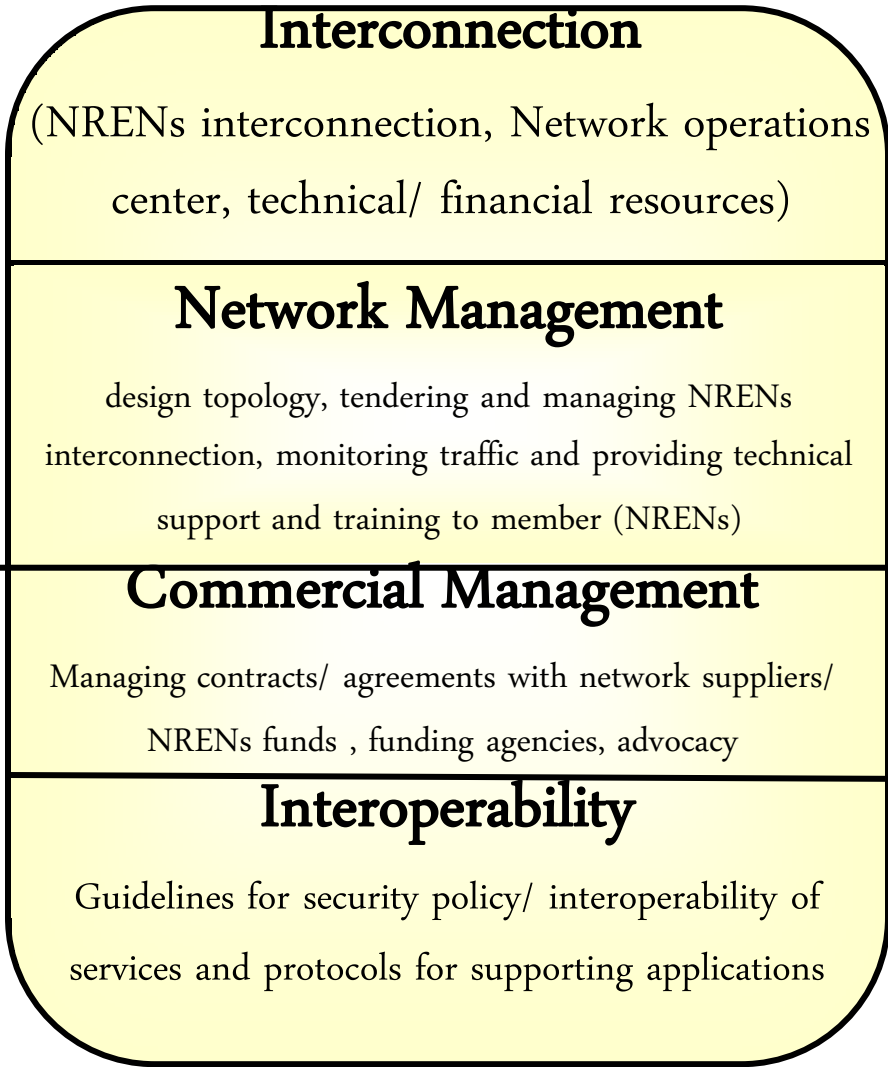
Operations management ①
Technology advancement ②
Architecture development ③
Service enhancement ④
Communities ⑤

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Challenges

Technologies

NRENs

Requirements

Partners

Government

Industry

Education

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Operations and functions

Interconnection

(NRENs interconnection, Network operations center, technical/ financial resources)

Network Management

design topology, tendering and managing NRENs interconnection, monitoring traffic and providing technical support and training to member (NRENs)

Commercial Management

Managing contracts/ agreements with network suppliers/ NRENs funds , funding agencies, advocacy

Interoperability

Guidelines for security policy/ interoperability of services and protocols for supporting applications

Core Functions

Support Functions

Cloud computing, Content, eLearning resources, eLibrary, Research,

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NREN Model

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European NREN

- The European NREN model has been identified as "best practice" and was implemented in several countries, worldwide.

- It is based on a connectivity between Universities, Research Centers, and Educational Institutions with each represented and managed by its own Local Area Network – LAN

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European NREN (Cnt.)

- LANs connect at the national level through a high speed dedicated network, managed by an NREN organization

    - Dedicated fibre optic connections between institutes or

    - Leased capacity from telecommunications

- At the international level, connectivity between NRENs is provided by the regional network, i.e GEANT

- Some NRENs additionally have their own links to key destinations / Cross-Border Fibres, commissioned or operated by the NRENs

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Organization and ownership

NREN network management organization and ownership model:

- Consortium of Universities – Italy, Palestine

- Not-for-profit company – Greece, Jordan

- Government entity – Spain, Egypt

- National research authority – Morocco, Algeria, possibly Lebanon

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NREN General activities

- Unified connectivity to all research and education institutions to provide country-wide standard communication facilities and capabilities to faculty, researchers, students, and staff, leading to better sharing of resources, information, data, knowledge and expertise.

- Consolidated Internet services, with the NREN acting as an ISP to universities and research institutions. Available statistics in some countries have shown that savings can go upto 40% on access costs, while enabling common access policies and cofigurations at the national level.

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NREN General activities

- Connectivity to regional research networks, providing opportunities for joint research collaboration and online education initiatives.

- Access to content, common repositories, and library resources of all universities with a unified subscription to all journals and periodicals for all Universities and research centers.

- Video conferencing services, media streaming, IP telephony, access federations, and wireless roaming for the purpose of facilitating communications, exchanges of lectures, and coordination of meetings, training and conferences between all users in universities and institutes.

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NREN General activities

- Consolidated agreements with software vendors on behalf of all Universities for licencing, with savings reaching upto 50% in some cases.

- Common caching, filtering and anti-spam and anti-virus protection services provided by NRENs to all connected institutions.

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Developing Lebanese NREN

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Recent developments

- Lebanese Ministry of Telecom has launched the following projects:

    - 40 mi USD project for the deployment of 710 km telephone wire and 2,750 km fiber optics (Alcatel-Lucent), allowing 75% of internet users to get access to 15 Mbps

    - 6.3 mi USD bid to set up the Lebanon Optical Transport Network, (Ericsson) to extend the network to the entirety of Lebanese territories, and will provide the DWDM equipment to light up the domestic fiber

    - Ericsson/ Huawei to set up 3.5G (HSPDA) Mobile Network with Telcom operators

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Recent developments

- On the international infrastructure, the following cable systems exist:

  - IMEWE submarine cable made available to ISPs on July 6, 2011 – with direct link to France on a 40 Gbps capacity, of which only 10 Gbps is being used

  - CADMOS cable system between Lebanon and Cyprus, with 40 to 60 Gbps capacity invested with CYTA in Cyprus, of which only 5 Gbps is being used;

  - Berytar cable system between Lebanon and Syria and then Aletar between Syria and Egypt;

  - Terrestrial connectivity to Syria and subject to an agreement with STE, it can possibly connect to the JADI and RCN terrestrial cable systems that run to Turkey and Saudi Arabia and UAE

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Initial Setup

- Leased capacity to connect:

  - Lebanese University, St-Joseph University, American University of Beirut, ….. and the Lebanese Agricultural Research Institute

  - These universities already have fiber optic networks within their campuses and are most probably connected by fiber terrestrial cables to the MofT and its operating arm - Ogero;

  - On the existing copper infrastructure, the MofT and Ogero can still provide 45 Mbps connectivity

- Stakeholders to involve: CNRS, Universities, Ministry of HE, Ministry of Telcom, and Telecom operators

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Technical requirements

- LUN to establish a data center/ network operation center (NOC)

- NOC main function to operate, maintain, and manage the communication and information flow with the connected universities, connectivity providers, and upstream networks, mainly:

  - IP routing, caching and filtering, network security, video streaming, resource sharing and access, fault/ trouble ticketing, technical mailing list, web services and updates, etc.

- LUN needs to be licensed by the government
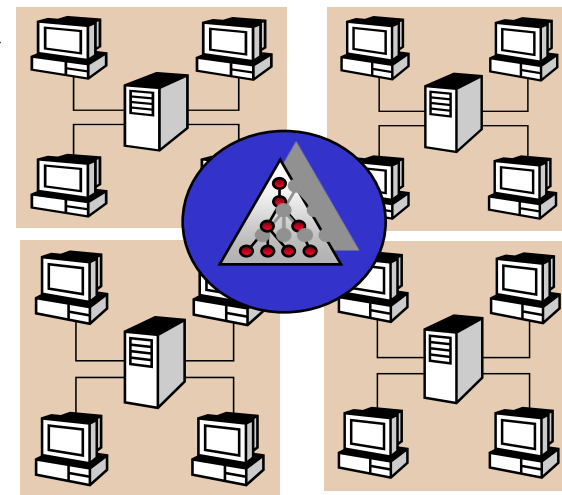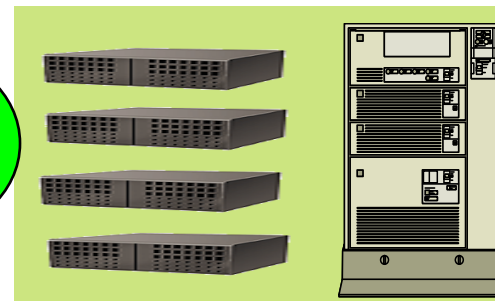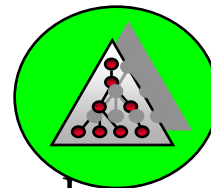
Operational and skill requirements

LAN and WAN Technology	Ethernet, ISDN, ATM, PDH and SONET/SDH
Internet Protocols	IPv4/ v6 packets, common link-layer, encapsulation schemes, IP addressing, ICMP, TCP, UDP
IP network monitoring	IP Network Monitoring - SNMP polling, MIBs and open source-tools like MRTG, Cricket, etc.
Internet services	DNS, FTP, telnet, e-mail (SMTP, POP, IMAP)
Routing protocols	Interior - OSPF and IS-IS, Exterior - BGPv4, Autonomous Systems
Multicasting	IGMP, PIM, multicast extensions to BGP, MSDP, SSM, common multicast-enabled applications
IPNetwork monitoring	Alarms, SNMP traps, syslog, Netflow statistics, network performance monitoring RIPE TTM boxes, AMPlets NLANI
Security	CERT, configuring and using IDS & Firewalls, security evaluation techniques, NATs, VPN technologies, etc, IP Quality of Service, IPv6, MPLS

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Service portfolio

1. Connectivity services
2. Security services
3. Authentication services
4. Hosting and content delivery services
5. Communication tools and conferencing
6. Computing resources
7. Dissemination

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Connectivity

- Basic IP-connectivity services

- Connections to LUN-backbone

- Carrier/telco -service between LUN and institute Bandwidth on demand

- End-to-End connectivity for end users groups: Access@home - for end users

- Wireless access (WLAN services: WIMAX- WIFI)

- VPN-services (Lightpaths, MPLS-VPNs, VPN- encryption & IP-tunnels)

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Connectivity

- DNS services, NTP-service

- IPv6 (enabled network, experiment & promotion)

- IP-Multicast (enabled network, experiment & promotion)

- Network Support services: Helpdesk, Monitoring, Performance, Detective tools, etc.

- IP & DNS Registration services: IP-address allocation, Domain name registration

- National Internet Exchange

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Security

- Anti-virus/ Anti- spam control

- Intrusion detection and prevention

- NETFLOW monitoring tool

- Vulnerability testing tool (Network & web services)

- Computer Security Incident/Emergency Response Team

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Authentication

- Authentication and authorization

- Identity management systems

- PKI certificate service

- Server Certificate Service

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Hosting and content delivery

- Webhosting /Hot standby

- Mail relay / back up services

- Disaster recovery

- Storage Area Network

- Netnews/Usenet server

- Academic/educational software distribution: frame agreements

- FTP & Mirroring services

- Hosting R&E services/applications

- Media storage and –streaming facilities

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Communication tools and conferencing

- Video conferencing tools/application

- VoIP / IP-Telephony

- Instant Messaging, and Mailing List services

- E-Mail gateway services

- Search Engines

Computing resources

- GRID computing

- Virtual Learning Environments

- Digital Repositories

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Dissemination

- Consultancy and advice

- Training: workshops, seminars

- Support &User Portals, user groups /forums/ blogs

- Newsletters, reports, user manuals

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Funding sources

- Membership fees from participating institutions

- Government funds

- Research and project funding through EC, UNDP, World bank, Foundations, etc.

- Donations

- Usage and consultancy service fees

Other sources

- Coordination between MofT and MofHE to provide competitive and affordable tariffs to the universities for high speed connectivity to the Internet and also to RRENs in Europe and the US (e.g. Internet2 POPs in the Netherlands and in MANLAN in NY; The tariffs for these last links are IPLC tariffs that are currently at 17,000 USD per E1 per Month for a Half-circuit only so connections at STM-16 and STM-64 as IPLCs will not be affordable with the existing tariffs; A special tariff and concession needs to be applied to the Universities and Research Centers

- EU Bilateral funding

- EUMEDCONNECT3 to start in Sept/Oct 2011 – Lebanon is eligible

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Invitation!

- ASREN Upcoming events:

  - e-AGE 2011 - Integrating Arab e-Infrastructure in a Global Environment December 12-14, 2011, Amman – Jordan:

    EUMEDCONNECT, Internet2, ASREN

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