# MYREN-X and SIFULAN Identity and Access Management

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# What is MYREN

- **Malaysian Research and Education Network (MYREN) is a DEDICATED PRIVATE NETWORK for research and education established in 2005.**

- **It is connected to other RENs to form the largest and most geographically diversed private network**

- **Its like a separate internet where each country has its own Network Operation Centre (NOC) working collaboratively**
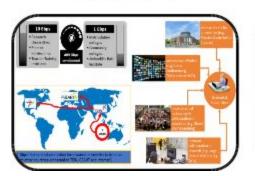
# Current Standing

- Ministry of Higher Education (MOHE) has given mandate to UiTM Holdings as the coordinator in creating a consortium to offer dark fibre to Institutions of Higher Education

- The project will **primarily provide dark fibre to all Institutions of Higher Education** to enable high-speed network to support current and future demands in Research and Education
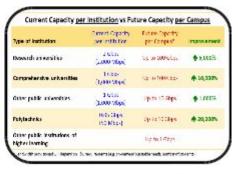
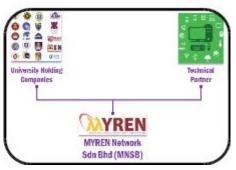- Codenamed MYREN-X

# MYREN-X Project Aspirations



Towards realising the 10 shift initiative



Better bandwidth overall



Reflecting tomorrow's realities



Creating shared opportunity

# Towards Realising MOHE's 10 Shift in HE Initiative

**Digital Content, Massive Open Online Courses (MOOC), Learning Analytics (Big Data), 21st century classroom**

**T E L E P R E S E N C E**

**Cyberinfrastructure, Network, Storage, Collaborative and Application Services**

**Science Data Access, Ranking, Nobel Laureate Research**



**Cyberinfrastructure is the GAME CHANGER**

# Better Bandwidth Overall

## Current Capacity <u>per Institution</u> vs Future Capacity <u>per Campus</u>

| Type of Institution | Current Capacity per Institution | Future Capacity per Campus* | Improvement |
|---|---|---|---|
| Research universities | 2 Gbps (2,000 Mbps) | Up to 100 Gbps | 5,000% |
| Comprehensive universities | 1 Gbps (1,000 Mbps) | Up to 100 Gbps | 10,000% |
| Other public universities | 1 Gbps (1,000 Mbps) | Up to 10 Gbps | 1,000% |
| Polytechnics | 0.05 Gbps (50 Mbps) | Up to 10 Gbps | 20,000% |
| Other public institutions of higher learning | | Up to 1 Gbps | |

* Bandwidth provisioned will depend on Research and Education requirements (e.g. on-demand burstable needs, number of students).

# Reflecting Tomorrow's Realities

**100 Gbps**

Research Universities Premier Polytechnics Teacher Training Institutes

**400 Gbps on-demand**

**1 Gbps**

Matriculation colleges Community colleges Aminuddin Baki Institute

More contents by universities (e.g. Massive Open Online Courses)

Increase use of video (e.g. Video Conferencing, Telepresence, VOD)

GÉANT

INTERNET 2

TEIN

1 Gbps

Increase use of technology & collaboration in education (e.g. Global Online Learning)

Students & Researchers

Increase collaboration in research (e.g. Large Hadron Collider, Big Data)

1 Gbps international connection for research universities to be at par with other countries connected to TEIN, GEANT and Internet2
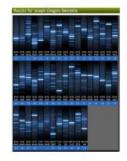
- As of MYREN3, average MYREN3 (Nov 2015)
  - average speed 0.08 Mbps/student (80 kbps)
  - cost per student per 1 Mbps is RM239.55 per month

- US Fed Communication Commission suggests minimum speed
  - for email and navigating government web, 0.5 Mbps
  - for interactive web and educational videos, 1 Mbps
  - for video conferencing, 1 Mbps

To close gap @ min speed of 1 Mbps per student = RM1.8b per year cost to acquire bandwidth from ISP!

# Examples of Research and Innovation Requirements
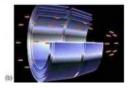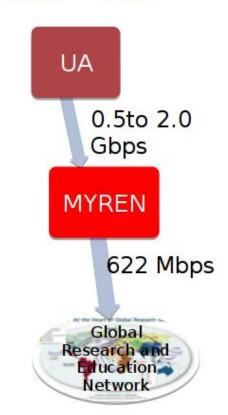

CERN Large Hadron Collider


DNA Sequencing


Square Kilometer Array Telescope



- Petabytes of raw data.
- Tier-2 connection to CERN for National Particle Physics Centre at UM.
- Collaboration for data and analysis for Genomics researchers at UM, UiTM, UPM and USM.
- Collaboration for data and analysis for Astronomy (UKM, UPM)
- *FRONTIERS OF KNOWLEDGE*
- National High Speed Innovation Platform for new devices innovation and testing.

## As-Is

UA

0.5to 2.0 Gbps

MYREN

622 Mbps

Global Research and Education Network

# Core Network Capacity of NRENs

- SUK JANET – for ac.uk and gov.uk – 2,000 Gbps
- Europe GEANT – 500 Gbps
- US Internet2 – multiple of 100 Gbps (max 800 Gbps)
- China CERNET2 – mix of multiple of 10 Gbps and 100 Gbps
- Australia AARNET – mix of 40 and multiple of 100 Gbps
- Canada CANARIE – multiple of 100 Gbps
- Korea KOREN – 160 Gbps
- Singapore SingAREN – 100 Gbps
- Japan SINET4/NII – 40 Gbps   (SINET5– 100 Gbps by 2017)
- Thailand ThaiREN/UniNet – 50 Gbps
- India NKN – multiple of 10 Gbps
- Malaysia MyREN3 – 10 Gbps (as Jan of 2016)
- Pakistan PERN2 – 10 Gbps
- Vietnam VinaREN – 1 Gbps
- Cambodia CamREN – 1 Gbps
- Philippines PregiNET  - 1 Gbps

- *TEIN4 (Trans-Eurasia Information Network) = 10 Gbps

- MYREN3 – Cost RM10 for 1 Mbps per month (roughly)
- To close gap to 100 Gbps for 2,000 km of fibers = RM1.2 b/yr
- For 4,000 km (to connect all Univ branches) = Rm2.4 b/year

- TOTAL cost to buy bandwidth for T&L and Research Networks
  = RM1.8b + RM2.4b = RM4.2b per year

- Singapore SingAREN – SGD4.80/Mbps

- Cost to lay cable (RM200k/km) = RM800mil one-off

- **RM4,200mil (buy bandwidth) vs RM800 (lay cable)**

- Cost to lease dark fibers = US internet2 roughly USD3/Mbps (not available in Malaysia, i.e. no ISP offers dark fibers

# Why Need Dark Fiber?

- Buying bandwidth is not the best practice of providing IT infrastructure for higher education and research community.

- The current gap is a stumbling block to achieve the envisioned shifts of higher education as the "healthy" and "lean" backbone of the enablers is not in place.

- The demand of globalized learning and innovation ecosystem will not be met as it will cause as economic pain to the education community if we continue buying bandwidth

- Accessibility to digital content will increase the network readiness index of the country.

- Cost analysis shows that dark fibre solution benefits the education community by providing value for money IT infrastructure and has been proven in many countries
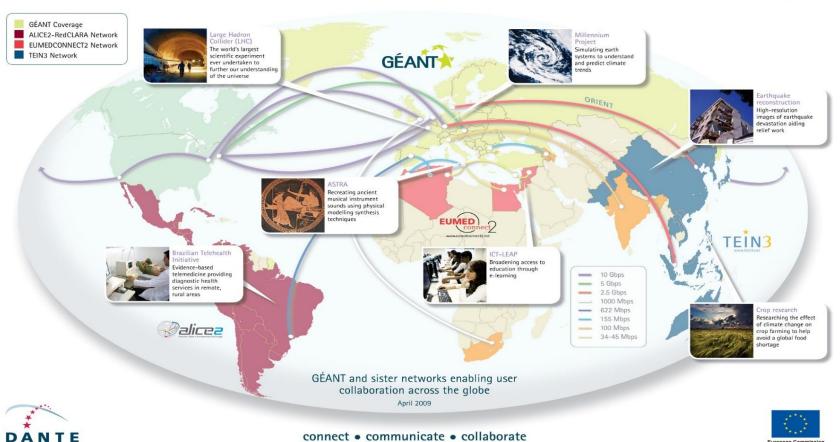
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# Global NRENs Connectivity



GÉANT — At the Heart of Global Research Networking

GÉANT and sister networks enabling user collaboration across the globe

April 2009

connect • communicate • collaborate

DANTE
www.dante.net

European Commission
Information Society
and Media

# MYREN-X Cloud Guiding Principles

- Focus on providing ICT services related to research and education computing and enterprise computing

- Delivery through a cloud computing platform modelled after Amazon Web Services and /or Microsoft's Azure Cloud

- Single, Agile Cloud Computing Platform that caters for Research, Education and Enterprise computing needs

- Leverages on Secure Identity Federation on Unified Lightweight Access Management (SIFULAN.id)

# Research Computing Services

- High Performance Computing (HPC)
  - Science and Engineering research
  - Animation Rendering
  - Big Data

- Virtual Servers (VMs) and Storage provisioning for researchers

- Virtual Workbench for various domain specific analyses

- eg. Research Clearing House (Storage)

# Education Computing Services

- Massive Open Online Courses (MOOC)

- Distance Learning and Life-Long Learning

- Curriculum Management

- Online tutors

# Communication and Collaboration Exchange (CXC) Services

- Corporate "Dropbox"

- Secure Documents Collaboration

- Video Conferencing

- Unified Communication
  - IP telephony
  - Corporate chat
  - Email

# Service Delivery Model

- Single Consolidated Infrastructure of Agile Cloud Platform using Opensource Technology from our collaborators (Japan, Australia, EU,...)

- Infrastructure optimization for all services

- Operation by back-to-back service and maintenance agreements with local OSS companies

- International corporate partners with proven products

# SIFULAN:
## Malaysia's Authentication and Authorization Infrastructure (AAI) Trust Framework

VIDEO

# Malaysian Identity Federation and Access Management (MyIFAM)

- In 2008, individuals were appointed as Registration Authority for Grid User Certificates issued by Academia Sinica Grid Computing Certification Authority (CA).

- In 2011 Malaysian Identity Federation and Access Management (MyIFAM) initiated preparation to become CA for Malaysia by joining APGrid PMA as member which later approved MyIFAM CA membership on 30 April 2012 and became Malaysia's Production CA

- Producing grid user as well as server certificates until today servicing research and education communities

# SIFULAN

- As a value-added service of MyIFAM expansion, it is natural progression to develop the trust framework for accessing resources and services that do not require highly secure environment (i.e maintain a comfortable level of assurance of at least user identity vetting; better than social identity (FBConnect, Google, etc))

- SIFULAN stands for Secure Identity Federation on Unified Lightweight Access maNagement

- Working together with GAKUNIN Japanese Academic Access Federation since 2014 to develop AAI for Malaysia.

- Running Pilot Production service with Partners from Czech Republic and GAKUNIN

DEMO

# SIFULAN Benefits

- Real identity vetting at every transaction

- Facilitating consortium for library resources subscription. Eg. by negotiating for better pricing

- Facilitating worldwide access for mobility of staffs and students; not bound by campus IP

- Easier account management without EZProxy drawbacks

- Possibility to link ORCID with SIFULAN identifier

# SIFULAN Challenges

- Various cloud services for both private community cloud (MYRENCLOUD) as well as public cloud services (Google, MS)

- Most IHLs do not have mature Directory Services (LDAP/AD)

- A long process of LDAPing all LDAPs

- Costs

# Concluding Remarks

- Being a late adopter is sometimes advantageous as we can learn from other countries on best of breeds

- By creating a trust framework, SIFULAN can promote greater and more secure e-Science collaboration activities

- Eventually build Federated Cloud Infrastructure to allow for HPC-On-Demand

- A long Journey Ahead and we always welcome all the help and collaboration

# Trust

No more anonymous access
by Sifulan Bin Sifulan