Keio University
1858
CALAMVS
GLADIO
FORTIOR

Digital Connectivity and Low Earth Orbit Satellite Constellations: Opportunities for Asia and the Pacific

A SATELLITE & INTERNET PROJECT
FOR RESEARCH AND EDUCATION IN ASIA-PACIFIC

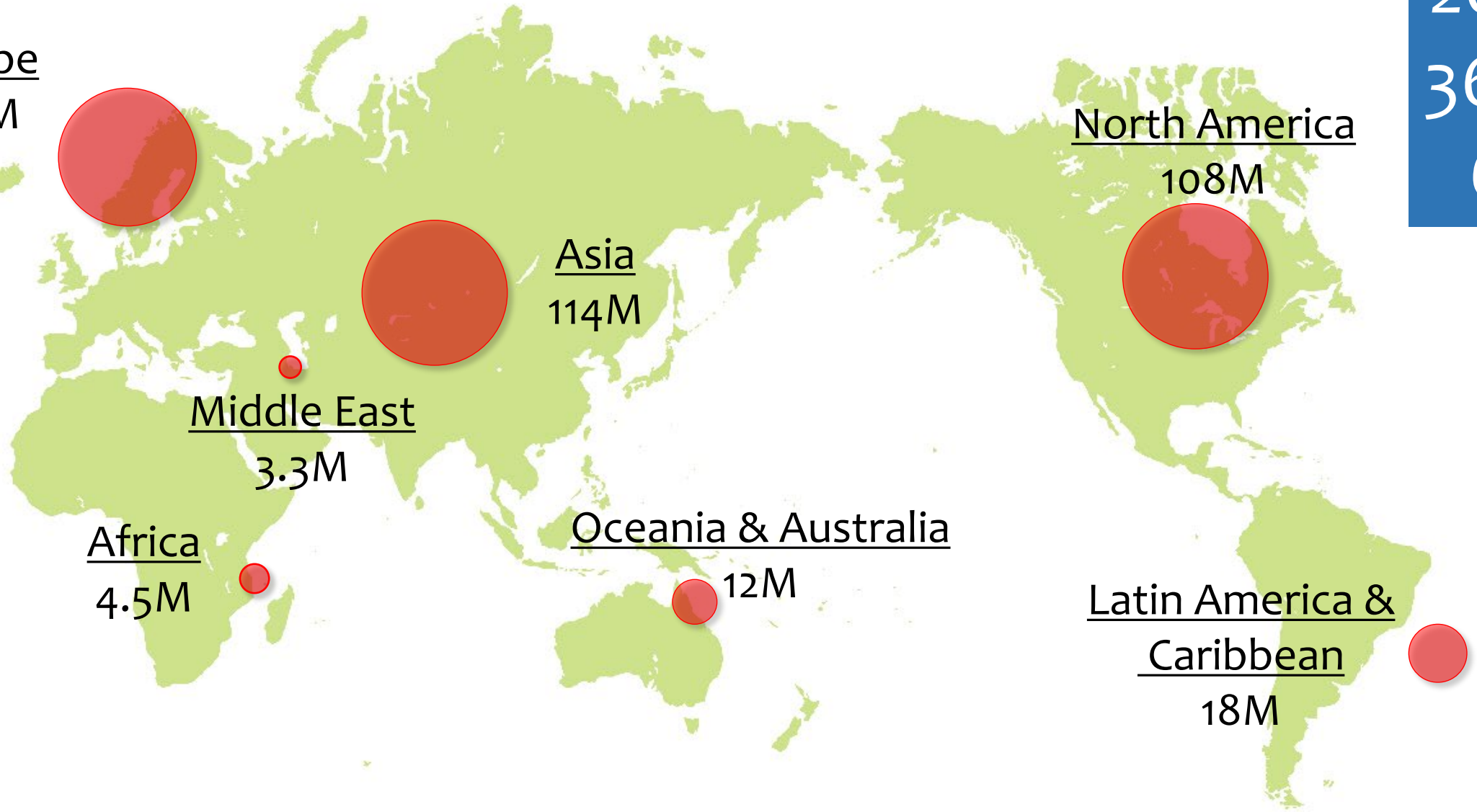
28th April 2021

Jun Murai
Keio University
WIDE Project

Internet Impact of Satellite Internet

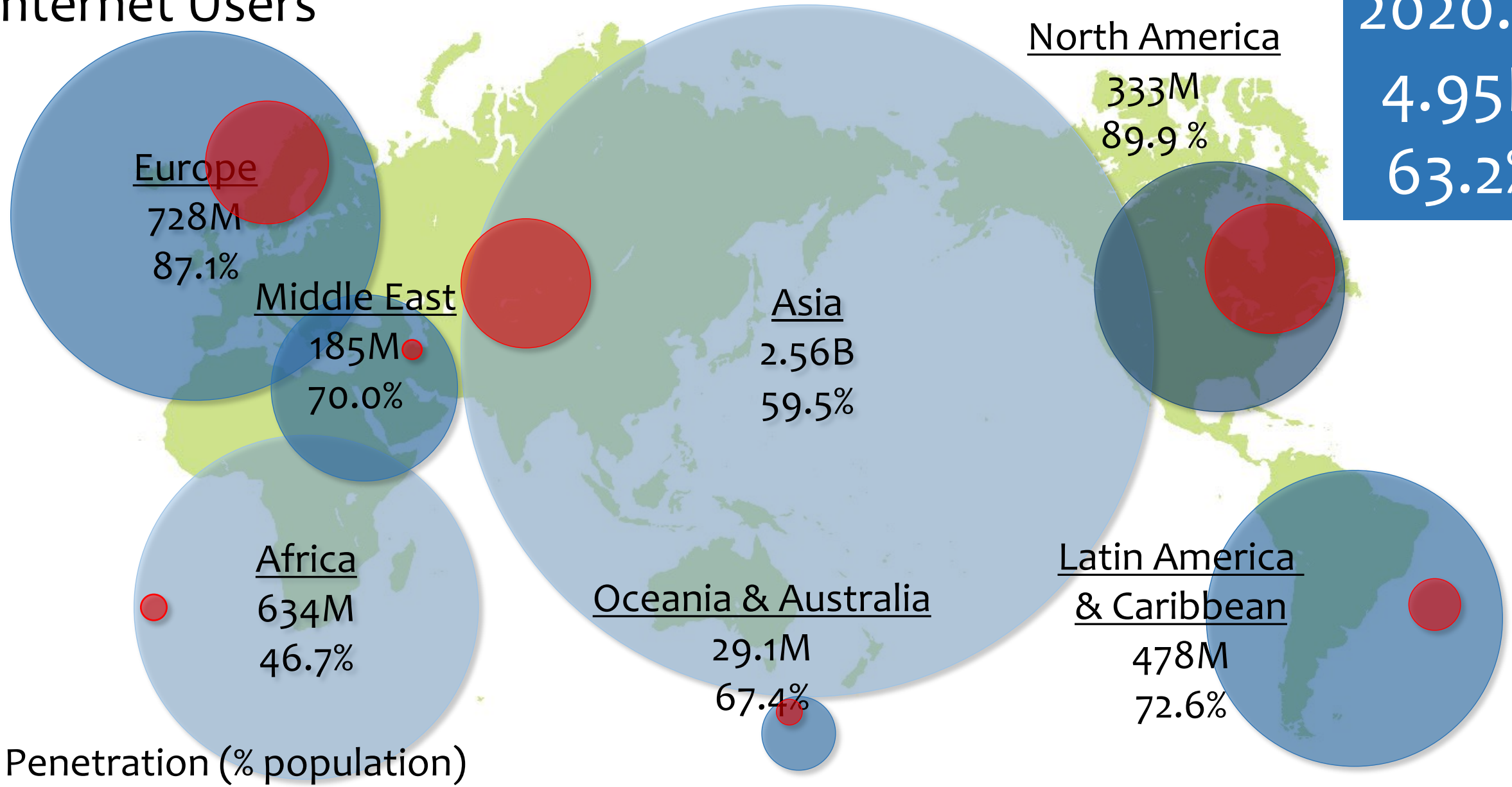
Internet Users

2000
361M
6%



Internet World Stat: http://www.internetworldstats.com

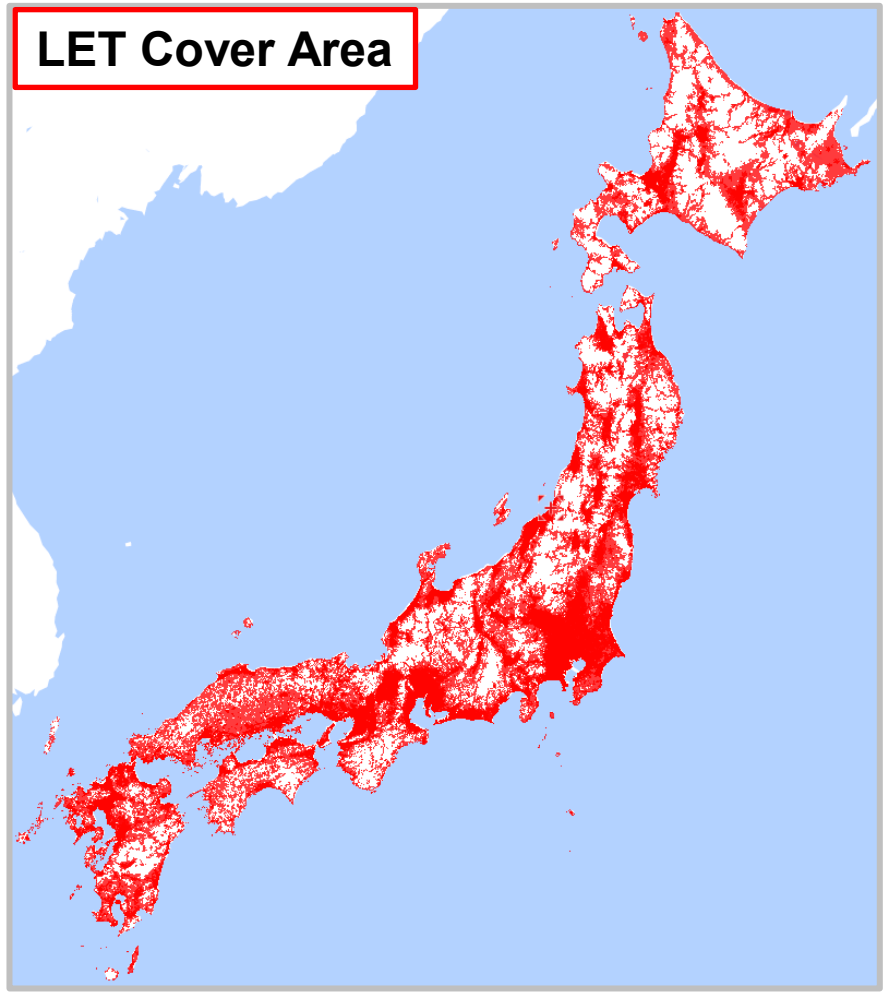
Internet Users



Internet World Stat: http://www.internetworldstats.com
Internet Users as of Dec 31, 2020

Even LTE Residence Coverage is 99+%,

LTE Geographic Coverage is Low as 60%



- **LTE Geographic Covorage**
  - **60%**
- **Limit of Terrestrial Networks**
  - **Business Continuity**
  - **IoT and Drone requiement**

Three Areas for NTN

Non-Terrestrial Network

Satellite Internet Project in Asia Pacific

* EDUCATION *
Educational Programs for Global Issues

* APPLICATION *
Lecture Sharing Platform

* COMMUNITY *
Sharing Experience and Ideas

* OPERATION *
Network Operation and Training

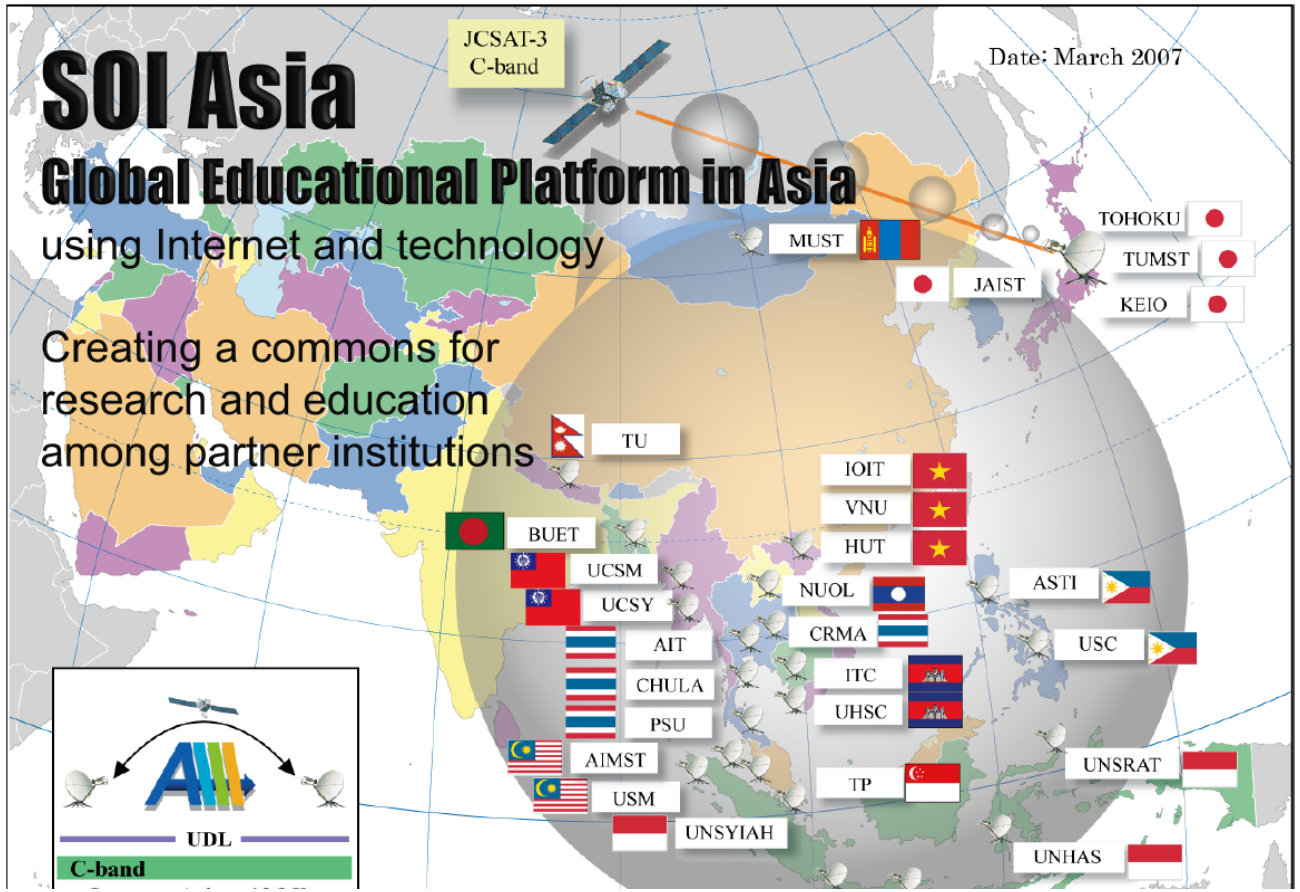
* NETWORK *
Network Development

AI^3 Achievement Highlights

- With NAIST as the hub, showed the feasibility of internet links on Ku-band from 1996
- With Keio SFC as the hub, connected 26 partners using unidirectional link routing with IPv6 and Multicast on C-band from 2000
- Deployed C-band VSAT network for disaster recovery at Syiah Kuala University in Indonesia after 2014 earthquake and tsunami

SOI Asia Achievement Highlights

- Consortium with 26 partners in 11 countries from 2001 with the spirit of cooperation and mutual respect
- Program Development for human resource in Asia in various fields, including information technology, security, marine technologies, environmental issues, cultural understandings, disaster management, and entrepreneurship
- Collaborating with AI^3 in IT HRD programs and research of internet in Asia
- Conducted Evidence Based Approach programs with 9 universities in 7 countries in 2012-2017



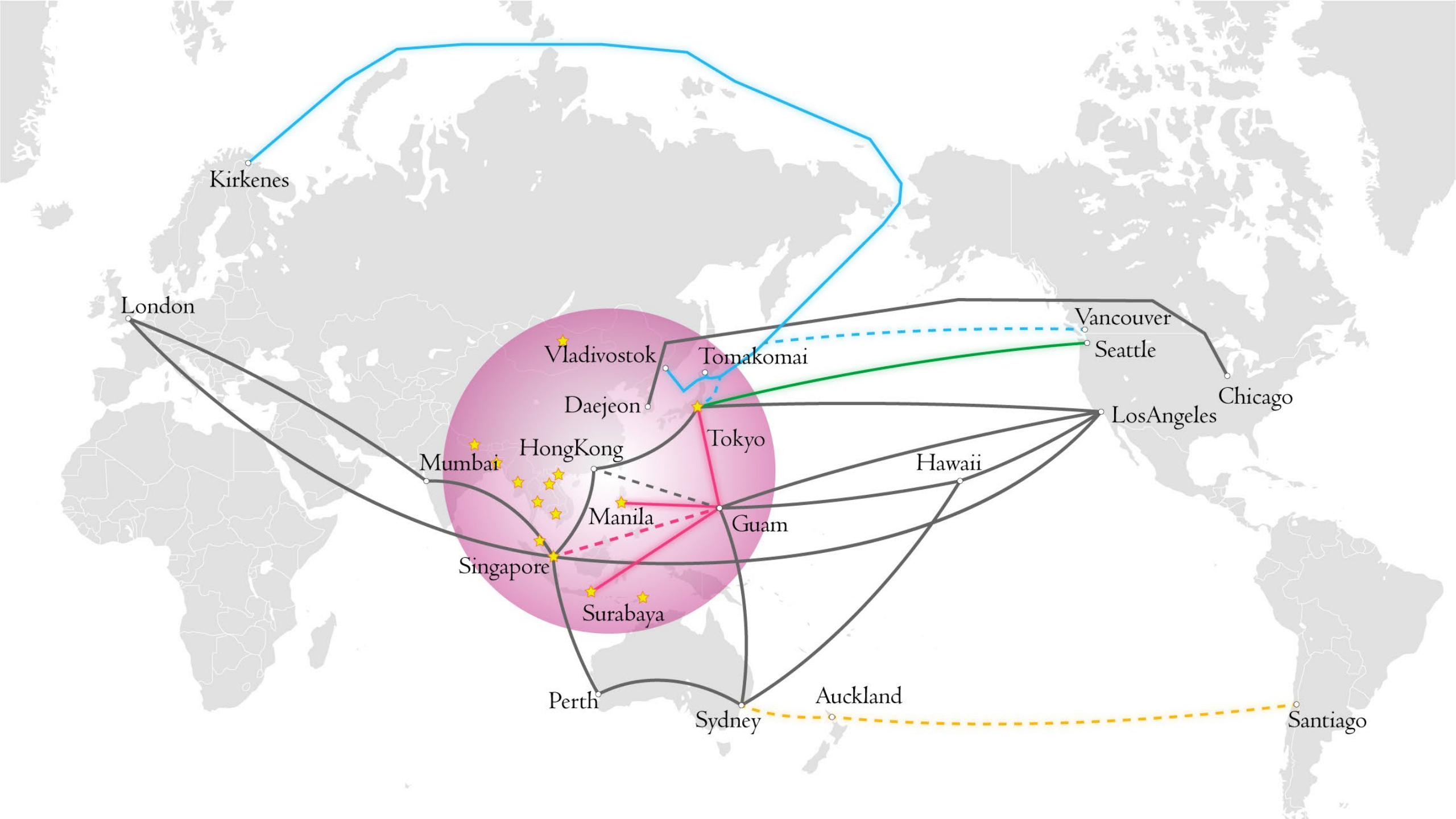
SOI Asia Achievement Highlights: EBA

- 2012 – 2017
- Partners: 9 Univs. in 7 countries
- Fieldworks and seminars:
  - 30 fieldworks in Asia
  - 31 seminars
- Internship
  - 109 virtual
  - 43 onsite
  - 12 job-offers for interns
- Participants: 561 students
- Certificates issued: 1,077

ARENA-PAC

Arterial Research and Educational Network in Asia-PACific

- New Program founded in 2020
- To fund submarine cables in Asia-Pacific for collaboration with global research network community
- Operated by WIDE Project (WIDE/AI3/SOIASIA) with APNIC
- Starting with Tokyo-Guam 100G and other cables
- Full collaboration with existing REN in the region such as NSF, Internet2, TEIN, APAN and so on.
- Finance based on APIDT (Asia Pacific Internet Development Trust)


Kirkenes
London
Vladivostok
Tomakomai
Vancouver
Seattle
Chicago
Daejeon
LosAngeles
Tokyo
HongKong
Mumbai
Hawaii
Manila
Guam
Singapore
Surabaya
Perth
Sydney
Auckland
Santiago

2021-2025: an APNIC Foundation Project

Towards a global, open, stable and secure Internet that is affordable and accessible to the entire Asia Pacific community.

The Internet is now an essential fact of life, providing employment, livelihood, health, education, access to government services, and much more for billions of people.

In the Asia Pacific, billions of people remain unconnected, and billions more have only limited, slow and unreliable access to the Internet. A 'digital divide' exists not only between the 'connected' and the 'unconnected', but between those who enjoy dependable, fast, secure services and those who do not, with serious implications on achieve sustainable social and economic development in the region.

With reliable, affordable access to a quality Internet, billions of people can be healthier, better educated, and more productive members of society.

The growth and development of the Internet across the Asia Pacific is at a critical juncture: we have the opportunity now to boost investment in building capacity (both people and infrastructure) to foster an open, stable and secure Internet, accessible to all.

In the Asia Pacific

4.3 billion people (55% of total global population)

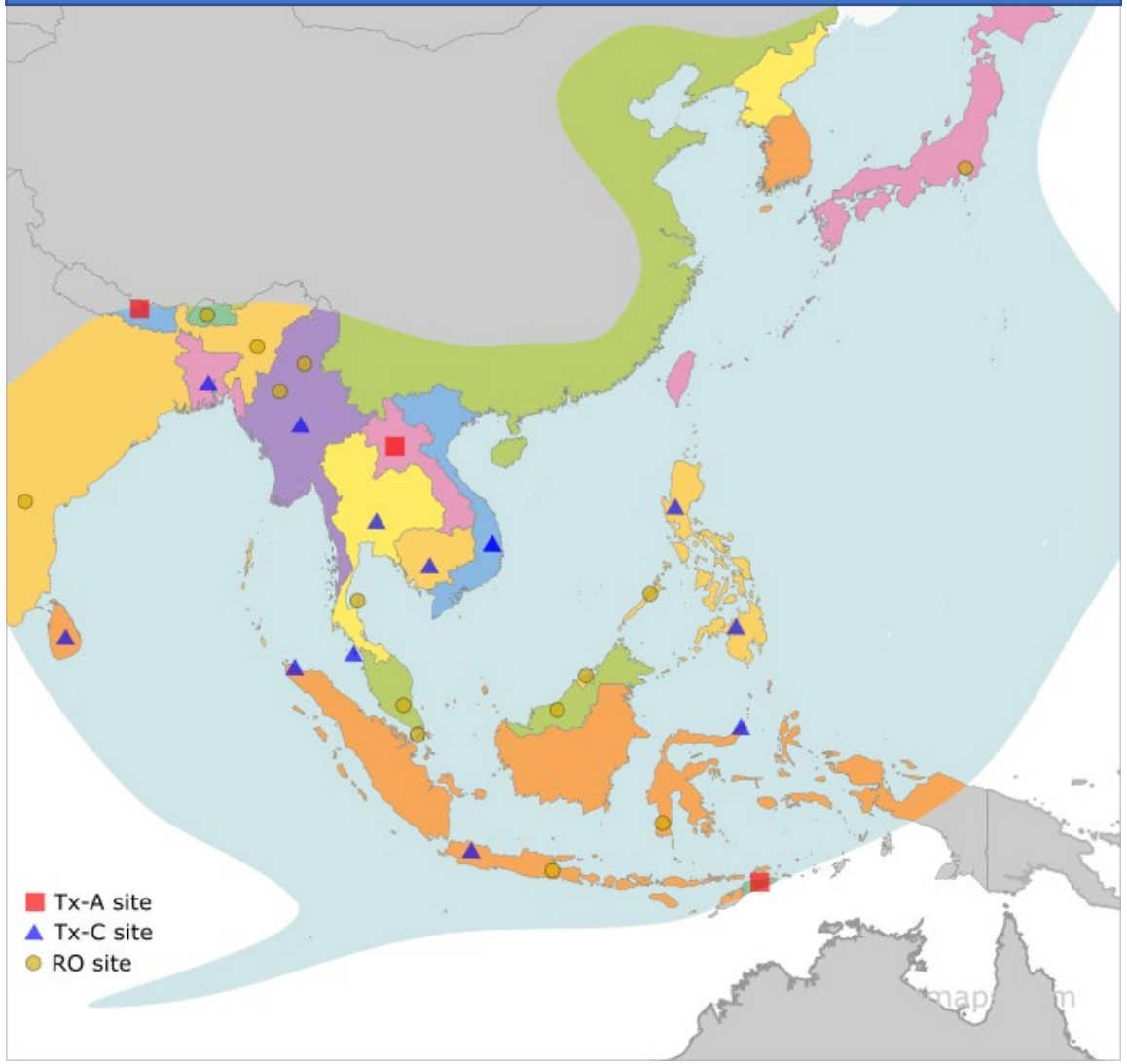
1.5 billion only have limited, slow or unreliable access to the internet

2.03 billion do not have access to the Internet

SARENA-PAC Plan 2021 – 2025

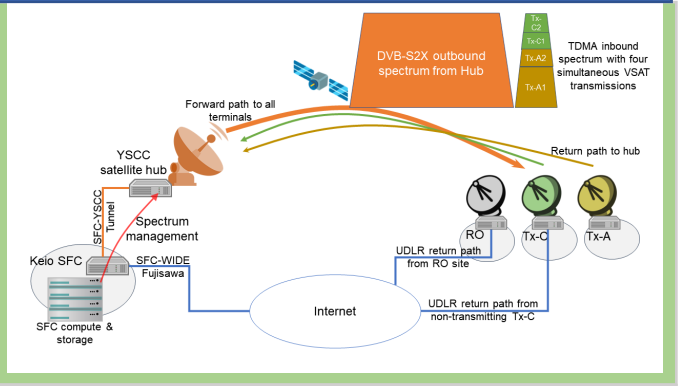
Satellite and Aero Research and Educational Network for ASIA-PACIFIC

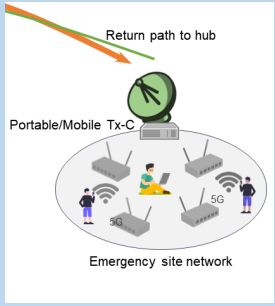
I. Satellite Internet infrastructure



II. Research

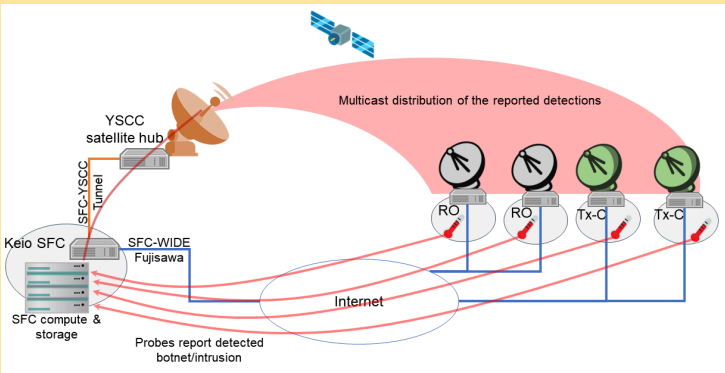
A. Developing a satellite internet as **Internet inclusion** and **alternative internet** in the region



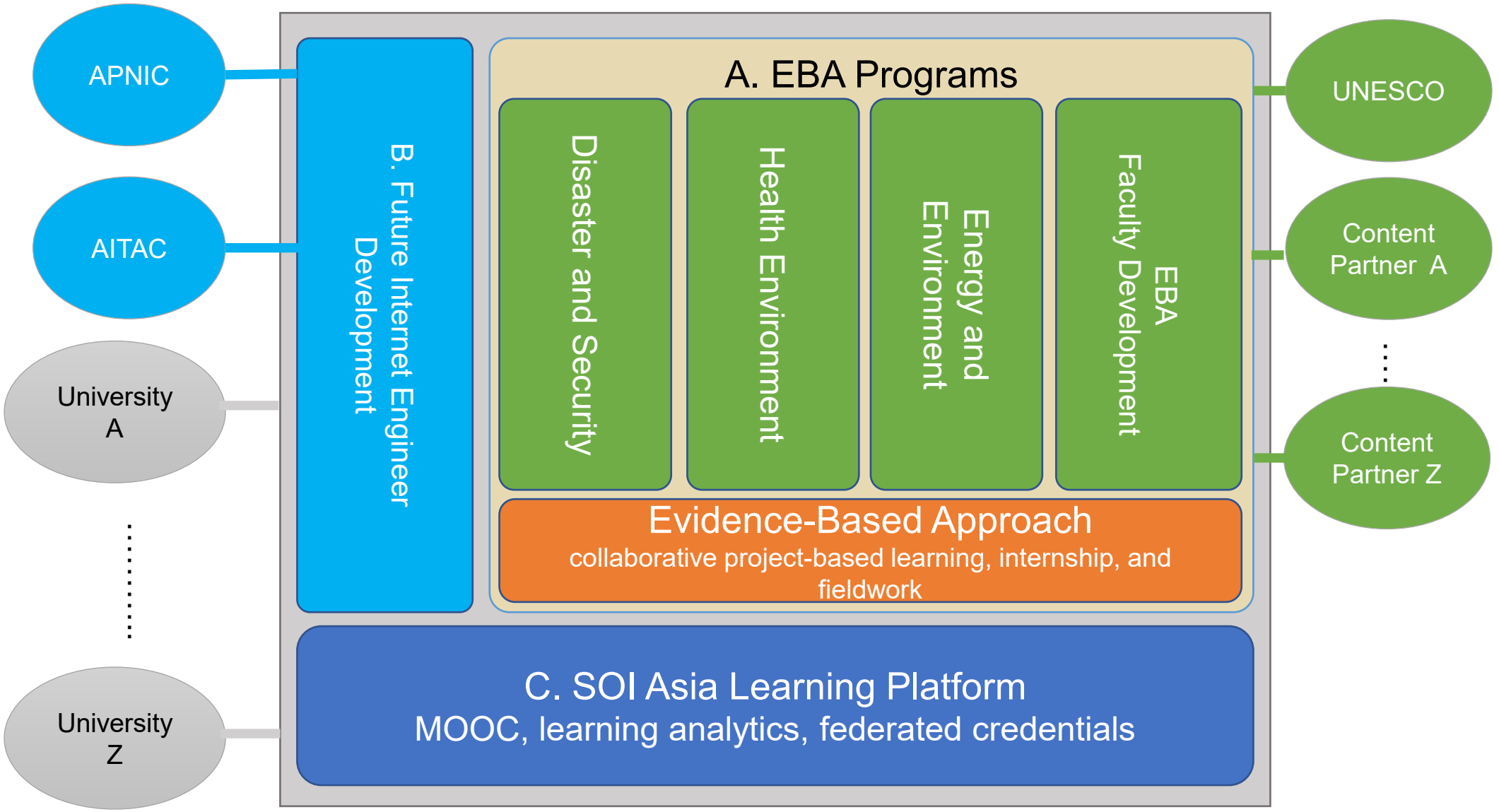


B. Developing an **emergency-ready** network

C. Research and education network **infrastructure research and development** and collaborations



SOI Asia Capacity Building Framework



Summary

1. **APNIC Foundation funding SOI-ASIA/AI3 for five years**
2. **Satelite overlay Interenet Architecture researches as AI3**
    1. Sarena-PAC design
    GEOs, LEOs and HAPS
    2. Disaster Recovery Internet
    3. Internet Inclusion
3. **SOI-ASIA for university collaboration as “EBA”**
    1. Disaster Recovery
    2. Health
    3. Environment