Indonesia HPC Grid and Its Connectivity

-site report-

Indonesia

@ATCF6, 21 Nov 2022

BRIN
BADAN RISET
DAN INOVASI NASIONAL

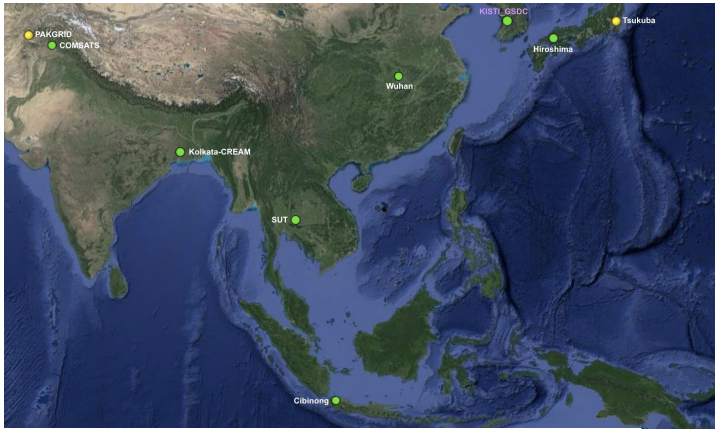
andria - syam

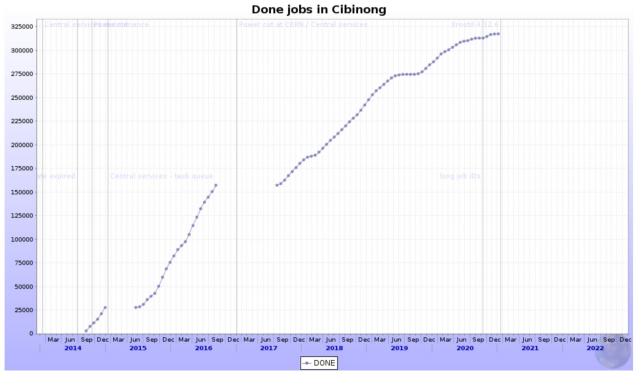
BRIN - National Research and Innovation Agency

- The sole national research agency of Indonesia
- Fused from several research agencies in Indonesia:
  - Indonesian Institute of Sciences - LIPI
  - Agency for the Assessment and Application of Technology - BPPT
  - National Institute of Aeronautics and Space - LAPAN
  - National Nuclear Energy Agency of Indonesia - BATAN
  - Eijkman Institute for Molecular Biology
  - Research divisions from various Ministries

HPC LIPI

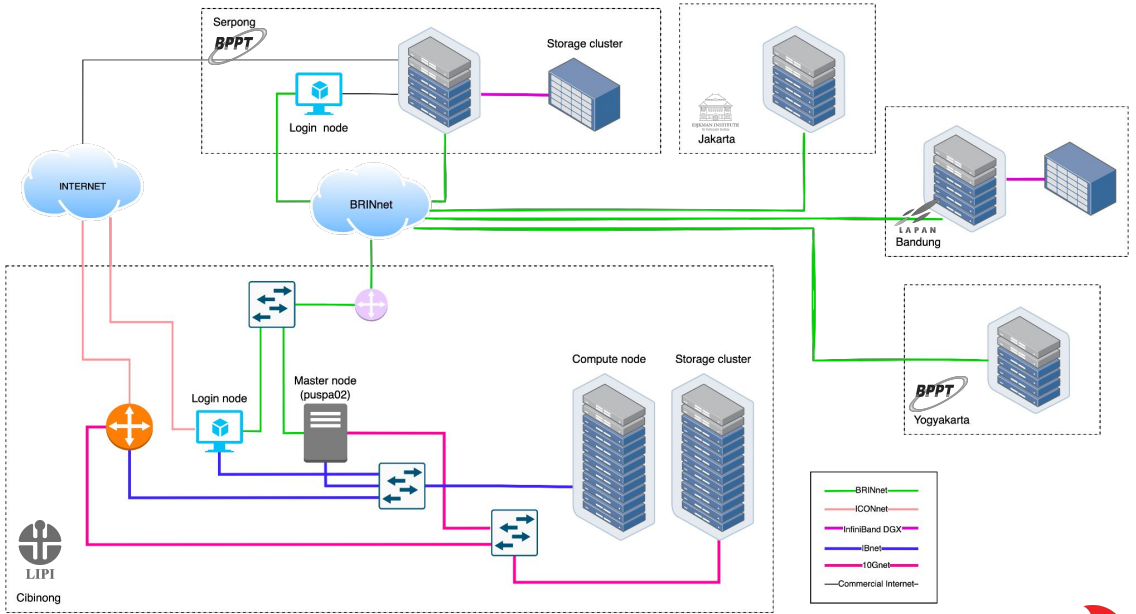
- (2014-2020)
  Cibinong Site used to serve ALICE grid
  (SL/CentOS - PBS - CREAM)
- (2019)
  A small short lived cluster Cibinong-2
  served ALICE grid with HTCondor-CE
  using SIMPLE Framework
  (Puppet - Docker - HTCondor)
- (2018-2019)
  Used to be connected to IdREN





BRIN Resources

- Agency integration means:
  - More resources available
  - Demands varieties
    - Physics
    - Microbiology
    - Machine Learning
    - ...
  - Different batch systems
    - OpenPBS
    - SLURM
    - HTCondor
    - AltairPBS (?)
  - User integration
  - Network integration



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HPC BRIN (in the last 2 years)

- Infrastructure and network consolidation
- Learning and discussing, how to manage those infrastructures

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Current BRIN's HPC Infrastructures

- Cibinong 1 : out of date
- Cibinong 2 : 40 nodes, Open PBS, MPI and Python (TensorFlow)
- Cibinong 3 : 20 nodes, Hadoop, Mongo, Storage
- Serpong 1 : 1 node DGX A100 (8 GPU MIG), SLURM, Docker, Jupyter
- Serpong 2 : 2 node (special purpose - Machine Learning), to be integrated
- Jakarta 1 : 5 nodes (special purpose), to be integrated
- Bandung 1 : ? nodes (special purpose - Atmospheric), to be integrated
- Yogyakarta 1 : x nodes (special purpose), to be integrated

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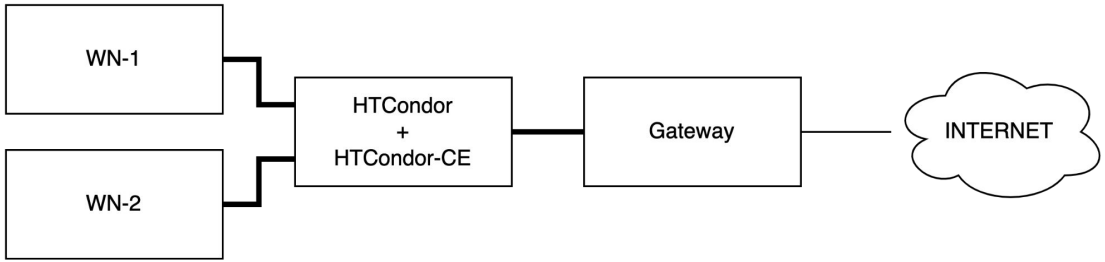
Initial Cibinong Cluster for ALICE grid

- 4 node cluster
- PoC for ALICE grid integration



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HPC BRIN next year

- Move to new data center
- A new 50 nodes cluster (Cibinong 4)
  - some of those will be pledged as BRIN-ALICE grid
- BRIN clusters integration
- New network infrastructure (possibly new ISP), IdREN integration

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Suggestions are welcome

- Is there any best practices for integrating distributed geolocated production HPC infrastructures as one collective HPC cluster?
  - User integration
  - Network integration
  - Resource integration
  - Job integration
- What is the best practice for integrating batch systems?
  Is there any batch system that could serve different purposes (from parallel MPI jobs, machine learning with TensorFlow, to Jupyter notebooks with docker)?
- How to trace and count users' resource usages? Is there any recommendation for cluster resource accounting application?

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Rejoining ALICE-grid

- Is there any practical guide to deploy and integrate our cluster to the ALICE grid?
  :)

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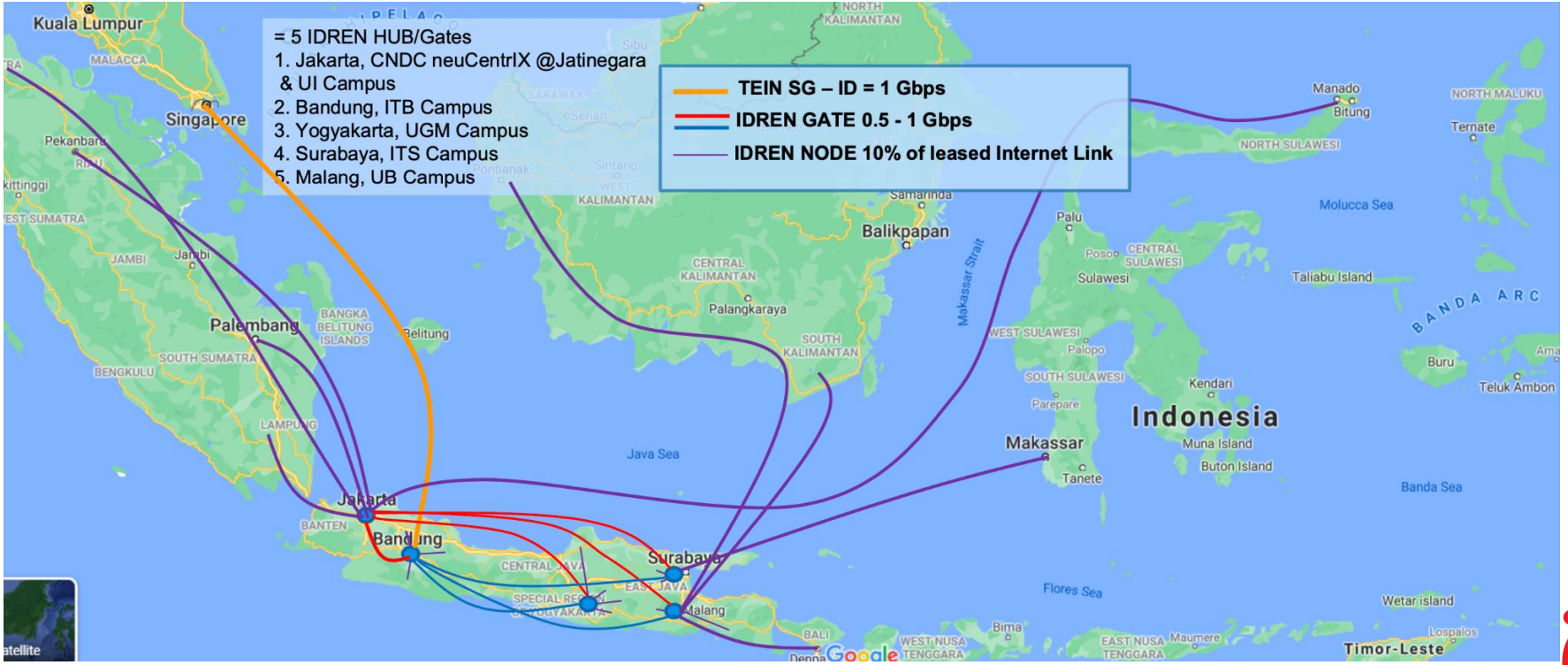
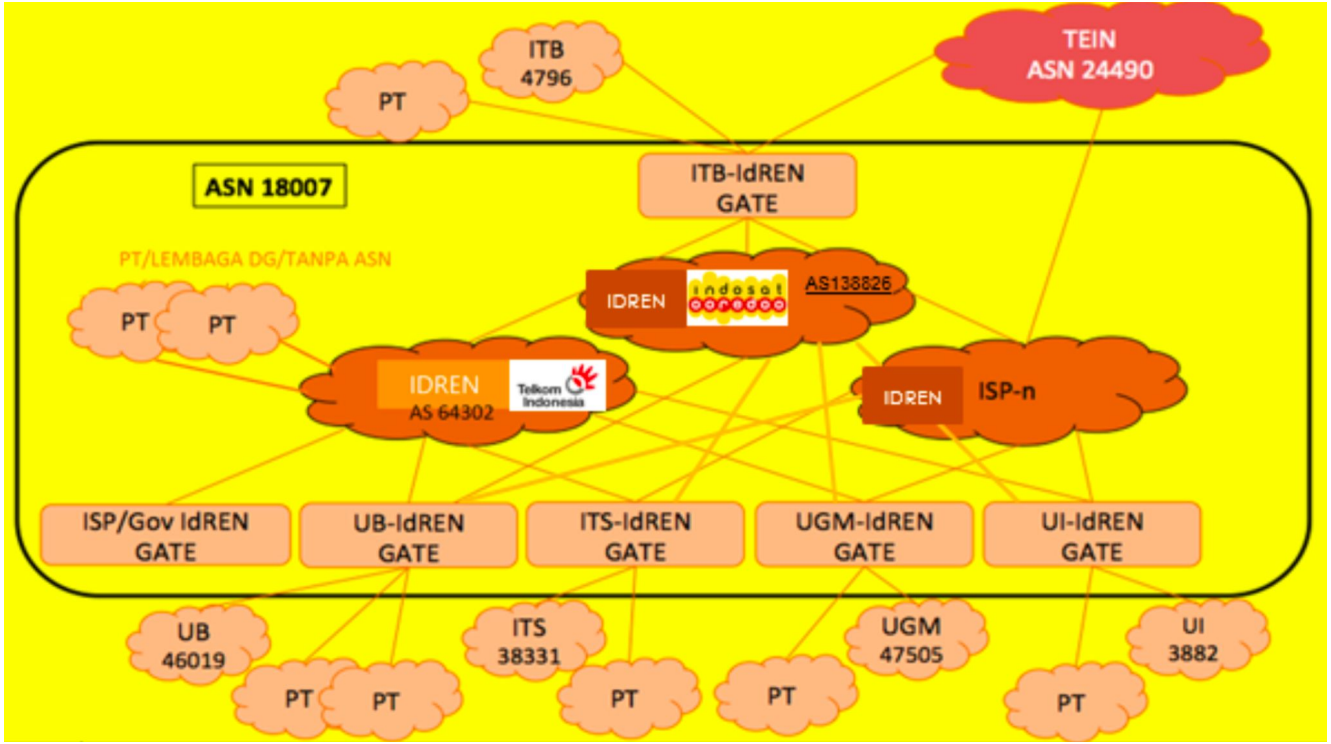
IdREN - Existing External connectivity



IdREN - National connectivity



9 ISPs:

- TELKOM
- INDOSAT
- MORATEL
- ICON+
- LINTASARTA
- LINKNET
- PGASCOM
- CBN
- SDI

Upcoming 100Gbps connection from ARENA-PAC

Existing TEIN SG-ID
1 Gbps

Upcoming connection
from ARENA-PAC

= 5 IDREN HUB/Gates
1. Jakarta, UI Campus
2. Bandung, ITB Campus
3. Yogyakarta, UGM Campus
4. Surabaya, ITS Campus
5. Malang, UB Campus

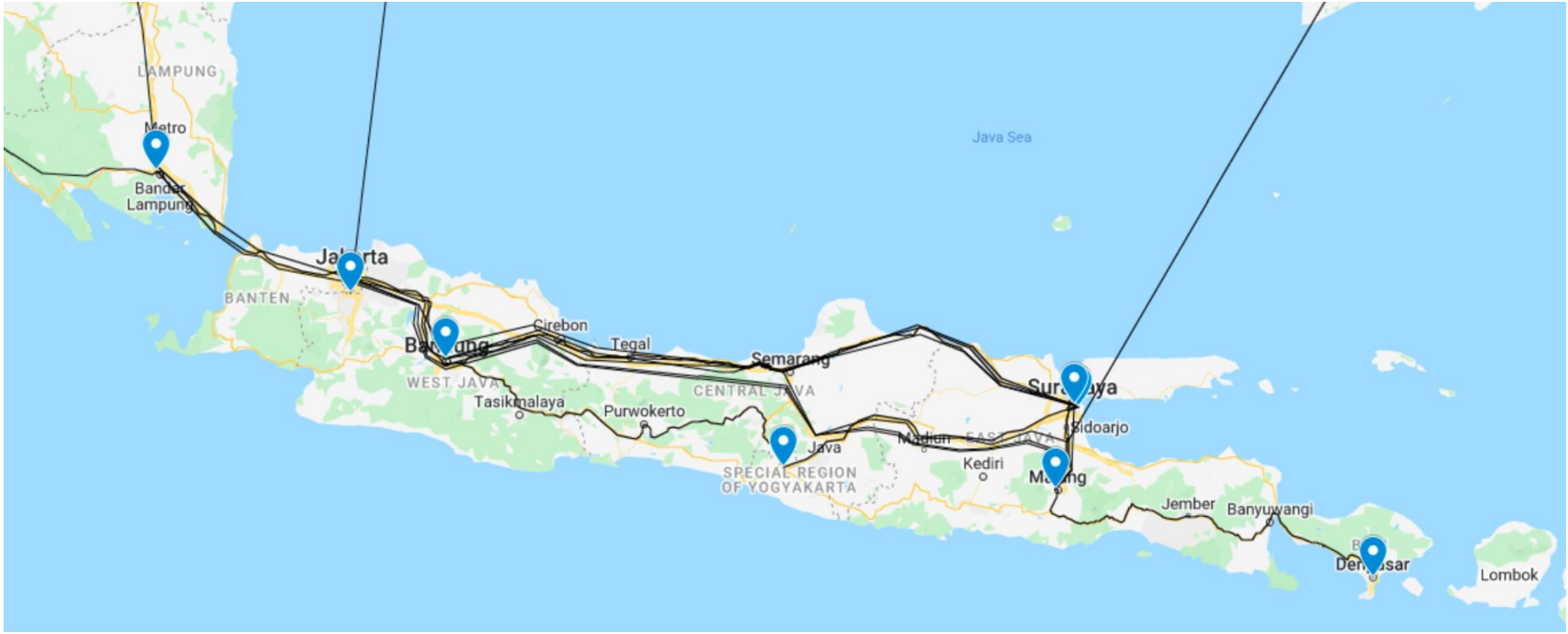
Jakarta
Bandung
Yogyakarta
Surabaya
Malang
MALAYSIA

Measure distances on the map using the ruler icon

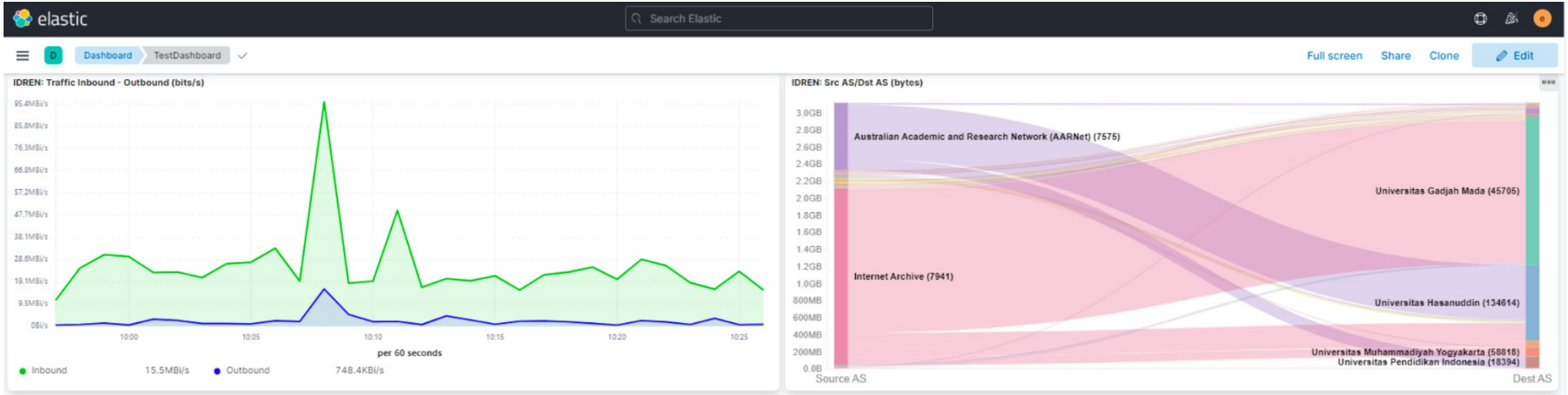
ESCAP ECOWAS TeleGeography

IdREN

Planned IdREN Backbone (Java - Bali)



IdREN - Traffic



IDREN: Top AS Source - Table

Top Source AS	Bytes	Packets	Flow Records
Internet Archive (7941)	1.9GB	1,386,519	386
Australian Academic and Research Network (AARNet) (7575)	755.2MB	1,234,693	1,409
SUNET SUNET Swedish University Network (1653)	754MB	534,387	360
Network for Education and Research in Oregon (NERO) (3701)	675.2MB	473,148	98
Tufts University (13326)	175.2MB	143,070	39
SURFnet bv (1103)	167.4MB	151,735	1,972
Universitas Negeri Yogyakarta (55674)	165.8MB	130,910	1,988
Lembaga Pengembangan Teknologi Informasi dan Komunikasi (63500)	163.5MB	171,626	12,322
RIKEN(Physical and Chemical Research Institute) (18128)	139.5MB	102,326	13
National Aeronautics and Space Administration (1848)	105.4MB	77,740	162
	Sum: 5GB	Sum: 4,406,1...	

IDREN: Top AS Destination - Table

Top Destination AS	Bytes	Packets	Flow Records
Universitas Gadjah Mada (45705)	2GB	1,609,979	9,436
Universitas Hasanuddin (134614)	1.6GB	1,636,403	1,763
Universitas Jember (132678)	845.2MB	635,295	1,358
Universitas Muhammadiyah Yogyakarta (58818)	321.5MB	249,430	1,844
Universitas Negeri Medan (58824)	241.6MB	204,158	1,348
Universitas Brawijaya (46019)	212.5MB	279,871	14,070
Universitas Pendidikan Indonesia (18394)	159.1MB	482,920	4,173
Universitas Islam Negeri Sunan Kalijaga Yogyakarta (55695)	124MB	145,508	2,785
Universitas Lambung Mangkurat (58475)	77MB	56,319	1,171
Universitas Sebelas Maret (55684)	59.2MB	68,620	4,832
	Sum: 5.6GB	Sum: 5,368,5...	

IdREN - Services

- IdREN Academy - https://academy.idren.id/
- EduROAM - https://eduroam.id/
- StasiunBelajar
- Online Shared Machine

- BRIN Grid => Indonesia Grid

Issues

- Sustainability
  - No long term contact with ISP
  - Universities can switch from one ISP to another
- Connectivity
  - Needs for inter-island connection
  - ISPs' investment