

# Indonesian ALICE-Grid and Its Connectivity

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Indonesian Institute of Sciences (ALICE Grid@LIPI)

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Bangkok, 2018.11.20



# ALICE-Grid@LIPI

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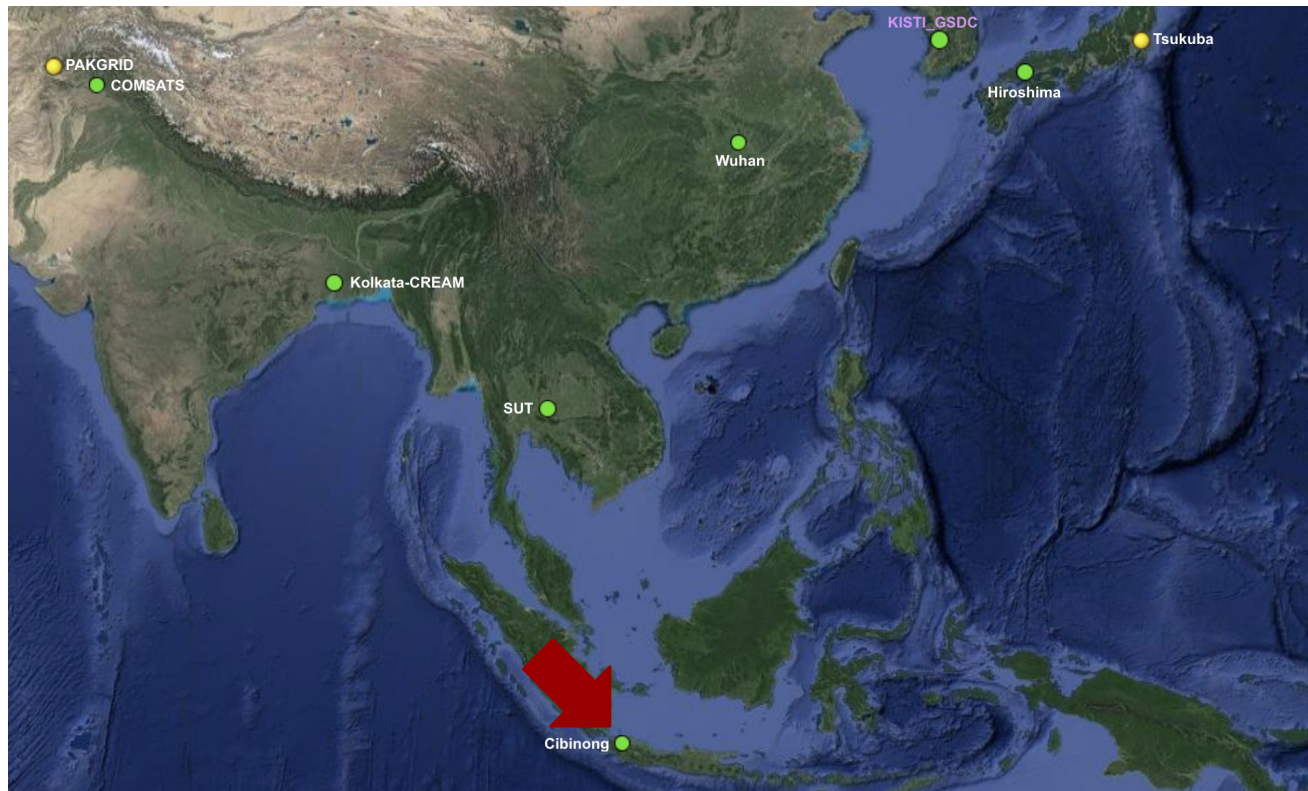
States - Problems - Progress - Future Directions

# LIPI - Indonesian Institute of Sciences

- Largest and oldest research institution in Indonesia
- Multidisciplinary researches



# LPI Resources

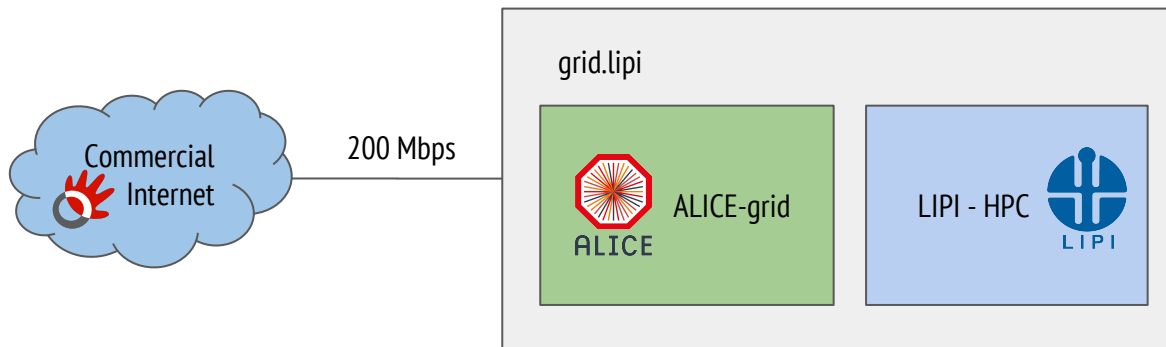


# LIPI Resources ver.1

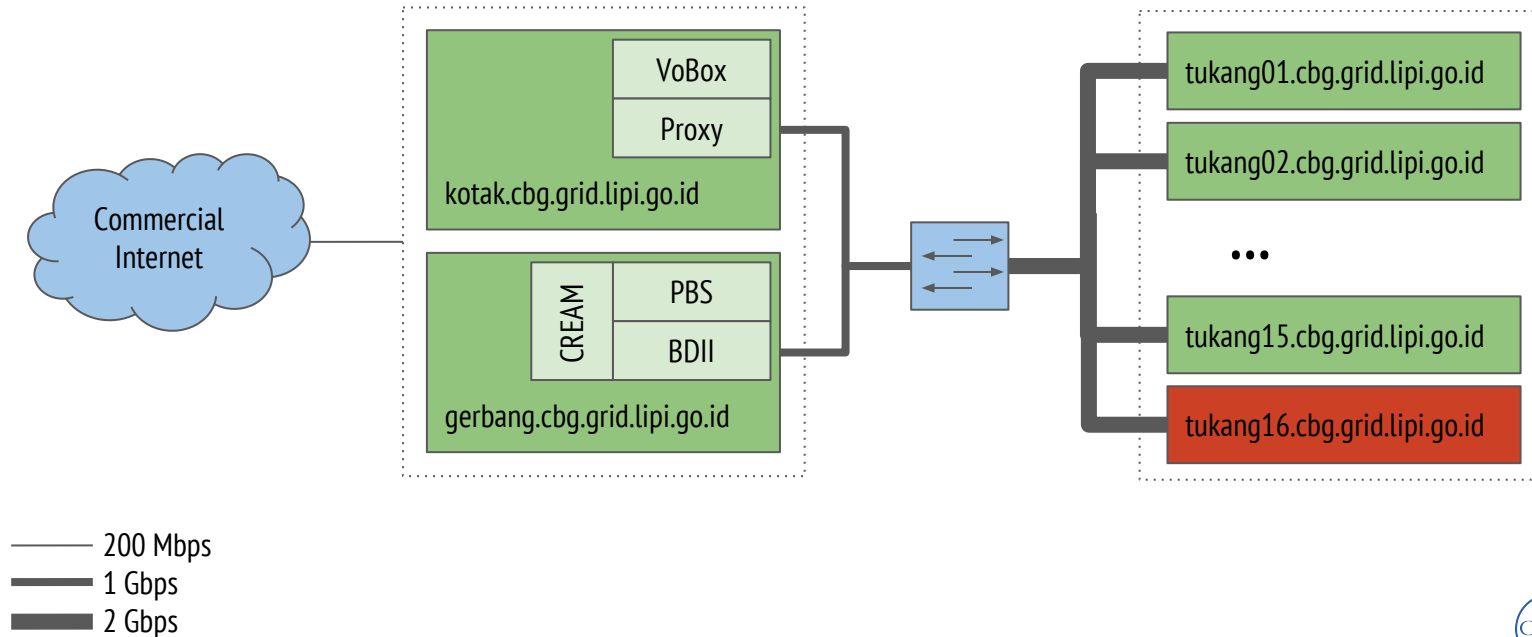
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- Managed by Research Center for Informatics
- 14 node
  - 8 core Intel Xeon E5-2609 2.4 GHz
  - 8 GB RAM
  - 175 GB /scratch
  - 10 GB CVMFS
  - CentOS 6.9
- 2 Gbps Local connection || 200 Mbps International connection
- 120 job slots
- From 2014

# LIPI Resources



# LIPI Resources ver.1



# Problems

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- Power outages (3 times)
- A “Black hole” worker node



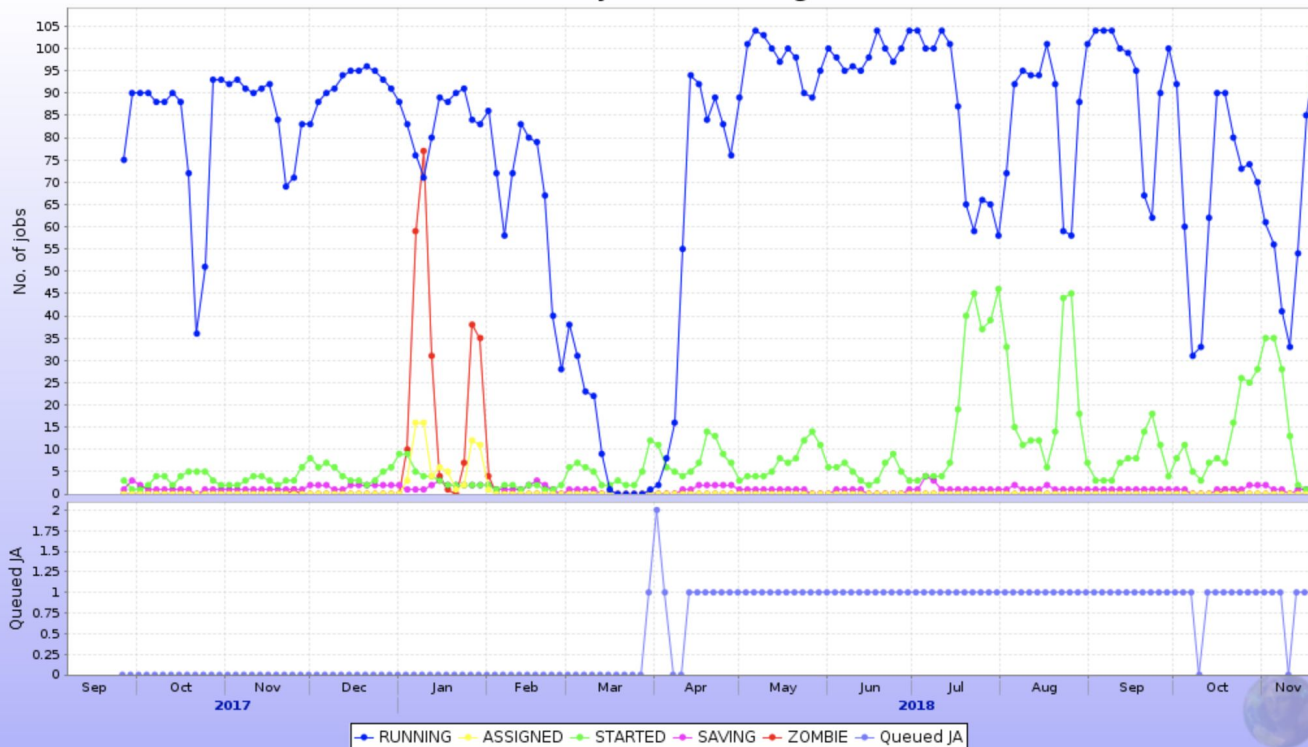
# Reports

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- Alice-LIPI grid v.1 can serve more than 95% uptime in 2018.
- New infrastructure (Alice-LIPI grid v.2) will be installed (installation is currently on progress) with combined Lightweight WLCG framework (on Docker) + VMs
  - Thanks to Maarten and his team.

# Activities

Active jobs in Cibinong



Active jobs in Cibinong

	Series	Last value	Min	Avg	Max
1.	RUNNING	97	0	76.61	188
2.	ASSIGNED	0	0	0.52	740
3.	STARTED	1	0	8.5	168
4.	SAVING	1	0	1.115	59
5.	ZOMBIE	0	0	1.818	1400
Total		99		88.56	

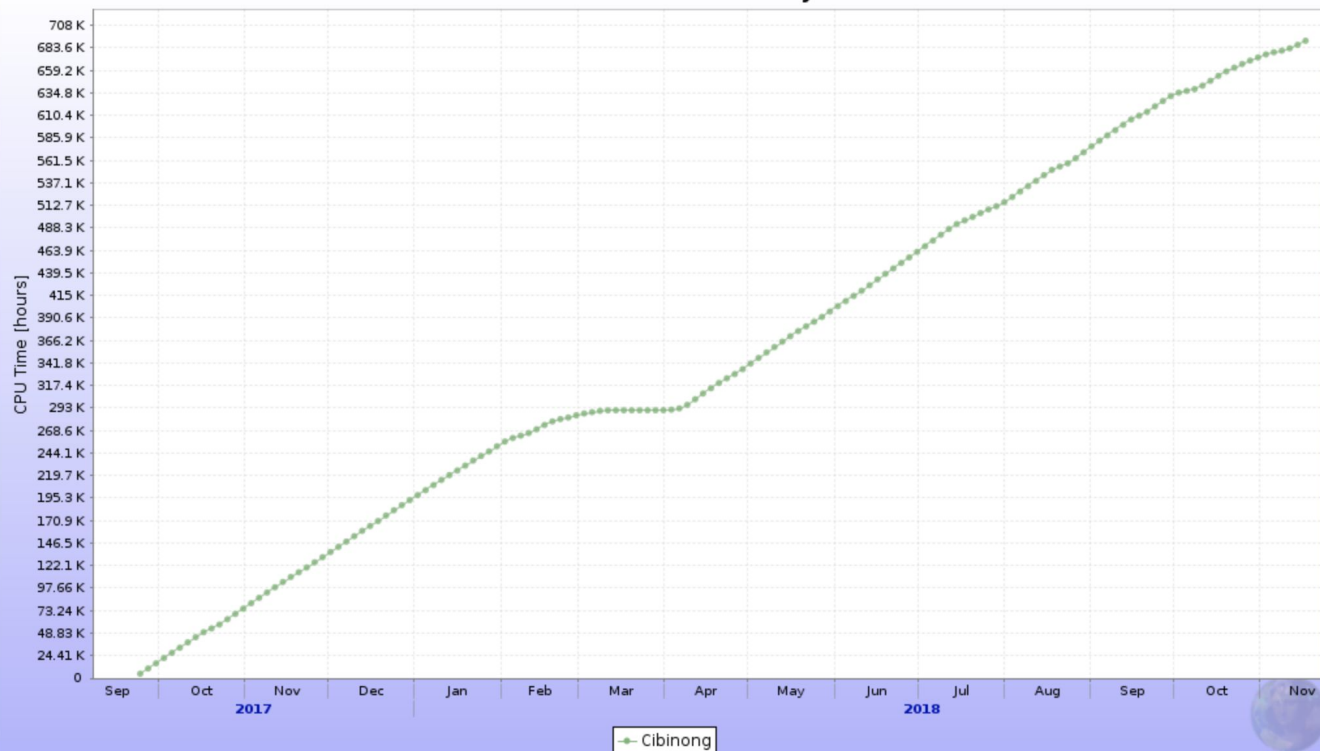
Queued JA

	Series	Last value	Min	Avg	Max
1.	Queued JA	1	0	0.541	5
Total		1		0.541	

# Activities

[KSI2K conversion table](#)

Total CPU time for ALICE jobs

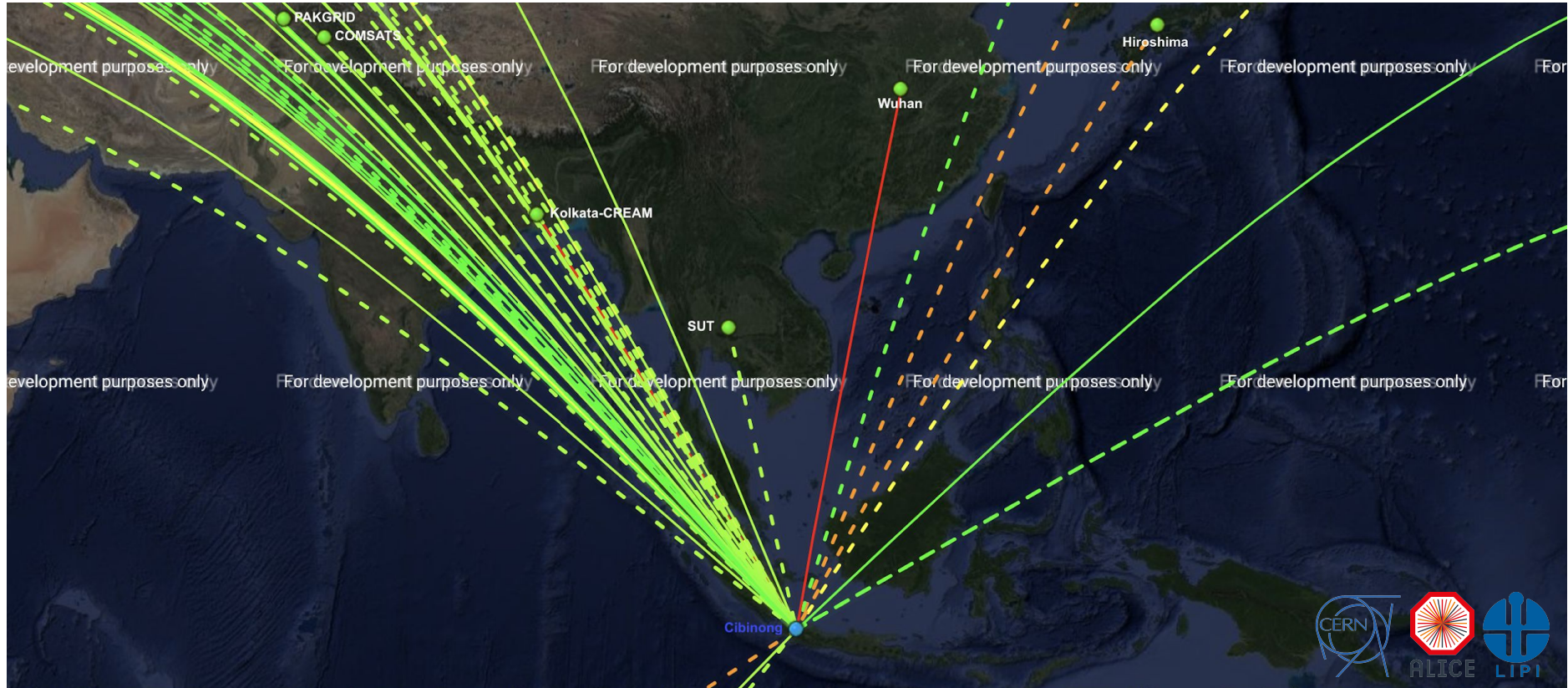


Total CPU time for ALICE jobs

	Series	Last value	Min	Avg	Max
1.	SUM	961 M	6.604 M	501.6 M	961 M
2.	Cibinong	691.3 K	4.8 K	355.5 K	691.3 K
Total		961.7 M		502 M	



# Network Connections



# Network Connections

IN from

No.	ID	Site	When	Speed (Mbps)	Hops	RTT (ms)	Streams
1.	2985437	Regulus	13 Nov 2017 19:25	142.61	17	191.25	1
2.	2827876	GRIF_IRFU_ARC	03 May 2017 00:16	117.45	17	212.21	1
3.	2960183	Cagliari	17 Oct 2017 15:33	109.06	9	290.75	1
4.	3044897	Trujillo	28 Feb 2018 04:22	83.89	23	318.43	1
5.	2829064	BITP_ARC	04 May 2017 06:44	67.11	12	224.13	1
6.	2827115	ICYB	02 May 2017 04:40	67.11	13	241.07	1
7.	3264445	CBPF	11 Nov 2018 05:03	50.33	25	369.88	1
8.	2746964	CERN_OFFMESOS	29 Jan 2017 07:45	50.33	28	383.99	1
9.	3266030	GRIF_IPNO	yesterday 23:21	50.33	7	170.27	1
10.	3264701	ISS	11 Nov 2018 11:52	41.95	15	302.93	1
11.	2791486	ORNL_Titan	24 Mar 2017 20:01	41.95			1
12.	3265143	SUT	11 Nov 2018 23:25	41.95	16	55.85	1
13.	3077413	Athens	09 Apr 2018 20:15	33.56	20	354.69	1
14.	3262274	COMSATS	08 Nov 2018 15:28	33.56	17	123.82	1
15.	3265951	GSI	yesterday 21:04	33.56			1
16.	3264570	LUNARC	11 Nov 2018 08:18	33.56	23	272.65	1
17.	3262510	PAKGRID	08 Nov 2018 21:31	33.56	19	120.15	1
18.	3264921	PNPI	11 Nov 2018 17:41	33.56	8	237.30	1
19.	3264292	Trieste	11 Nov 2018 00:46	33.56	16	286.88	1
20.	3264118	Birmingham	10 Nov 2018 20:00	25.17			1

OUT to

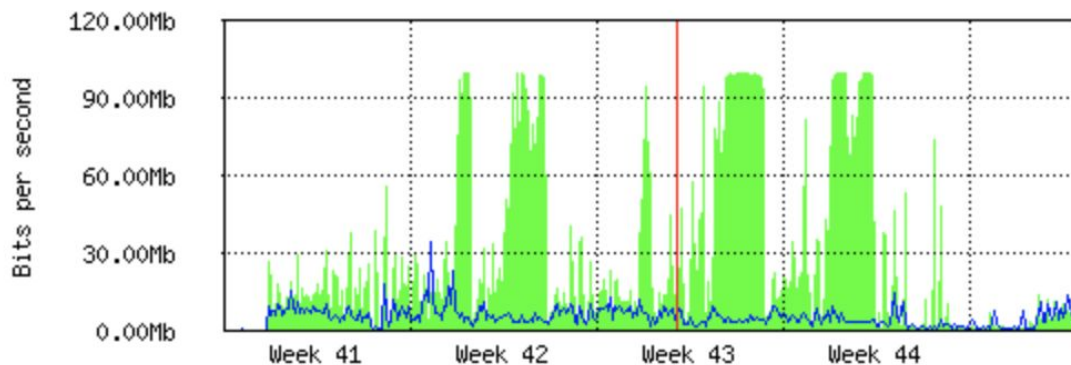
No.	ID	Site	When	Speed (Mbps)	Hops	RTT (ms)	Streams
1.	2958873	Cagliari	16 Oct 2017 05:56	100.67	31	290.08	1
2.	3264879	SUT	11 Nov 2018 16:31	92.28	17	56.50	1
3.	3262029	Hiroshima	08 Nov 2018 09:12	83.89	18	222.92	1
4.	3262190	IPNL	08 Nov 2018 13:19	75.50	9	174.80	1
5.	3261178	Tsukuba	07 Nov 2018 11:23	67.11	16	198.58	1
6.	3266342	GRIF_IPNO	today 07:57	58.72			1
7.	3265658	Oxford	yesterday 12:55	58.72	9	287.21	1
8.	3264969	Poznan	11 Nov 2018 18:55	58.72			1
9.	3264984	WUT	11 Nov 2018 19:18	58.72	15	197.03	1
10.	2827167	BITP_ARC	02 May 2017 06:00	50.33	11	238.63	1
11.	3264508	CCIN2P3	11 Nov 2018 06:43	50.33	27	175.72	1
12.	3261994	COMSATS	08 Nov 2018 08:18	50.33	16	118.87	1
13.	2339765	CSC	18 Nov 2015 14:02	50.33	17	327.67	1
14.	3065918	ISMA	24 Mar 2018 08:38	50.33	20	361.44	1
15.	3265546	ISS_LCG	yesterday 09:53	50.33			1
16.	3265202	JINR	yesterday 00:56	50.33	9	229.29	1
17.	3264555	SARA	11 Nov 2018 07:56	50.33			1
18.	3263721	TriGrid_Catania	10 Nov 2018 08:34	50.33	31	285.99	1
19.	3044773	Trujillo	28 Feb 2018 01:06	50.33			1
20.	3264530	UIB	11 Nov 2018 07:17	50.33			1





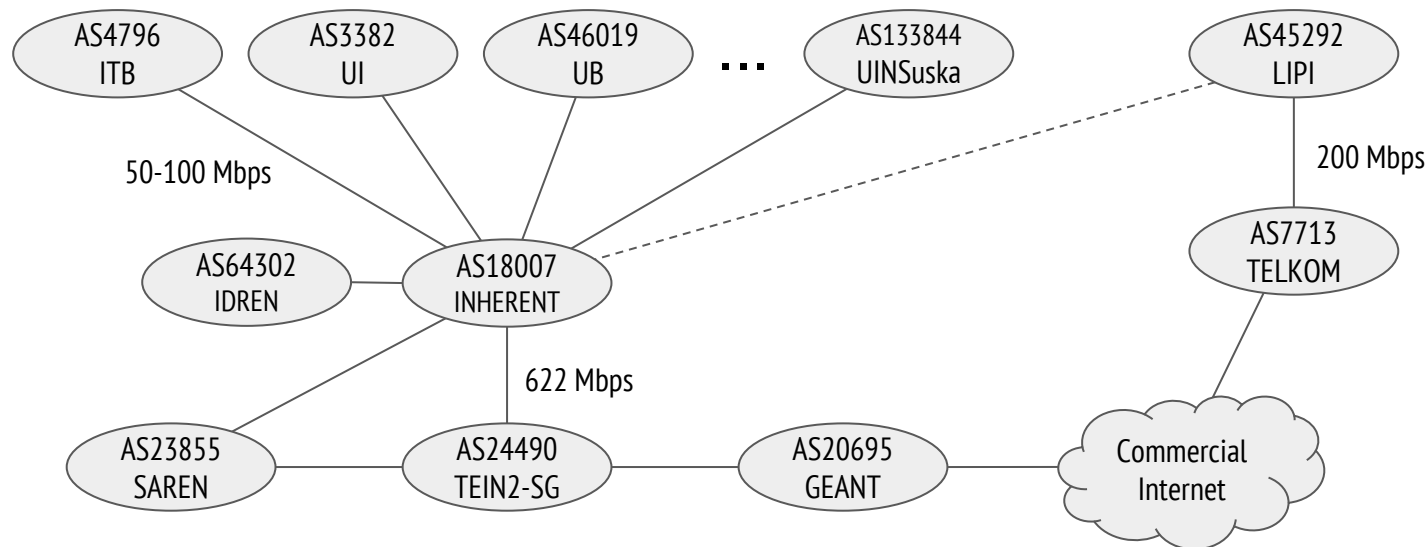
# Network Utilization

"Monthly" Graph (2 Hour Average)



Max **In**: 100.12Mb (100.1%); Average **In**: 29.47Mb (29.4%); Current **In**: 3.48Mb (3.4%);  
Max **Out**: 34.22Mb (34.2%); Average **Out**: 4.57Mb (4.5%); Current **Out**: 2.36Mb (2.3%);

# Network Integration - IdREN



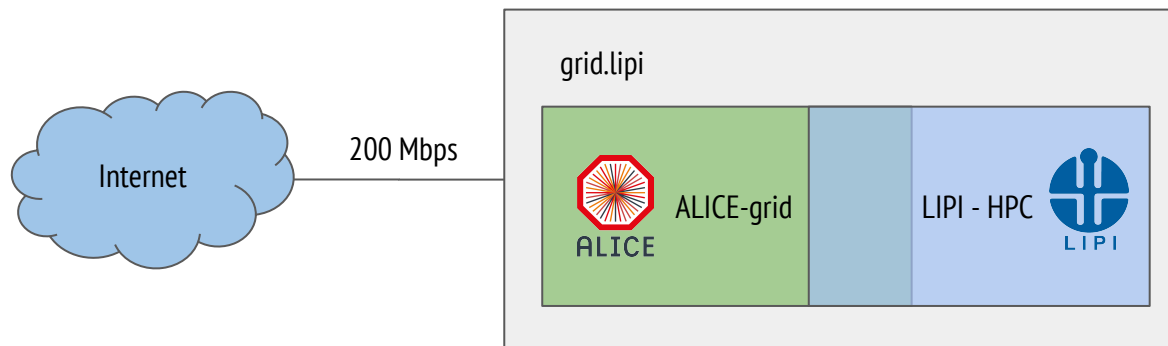
# LIPi Resources ver.2

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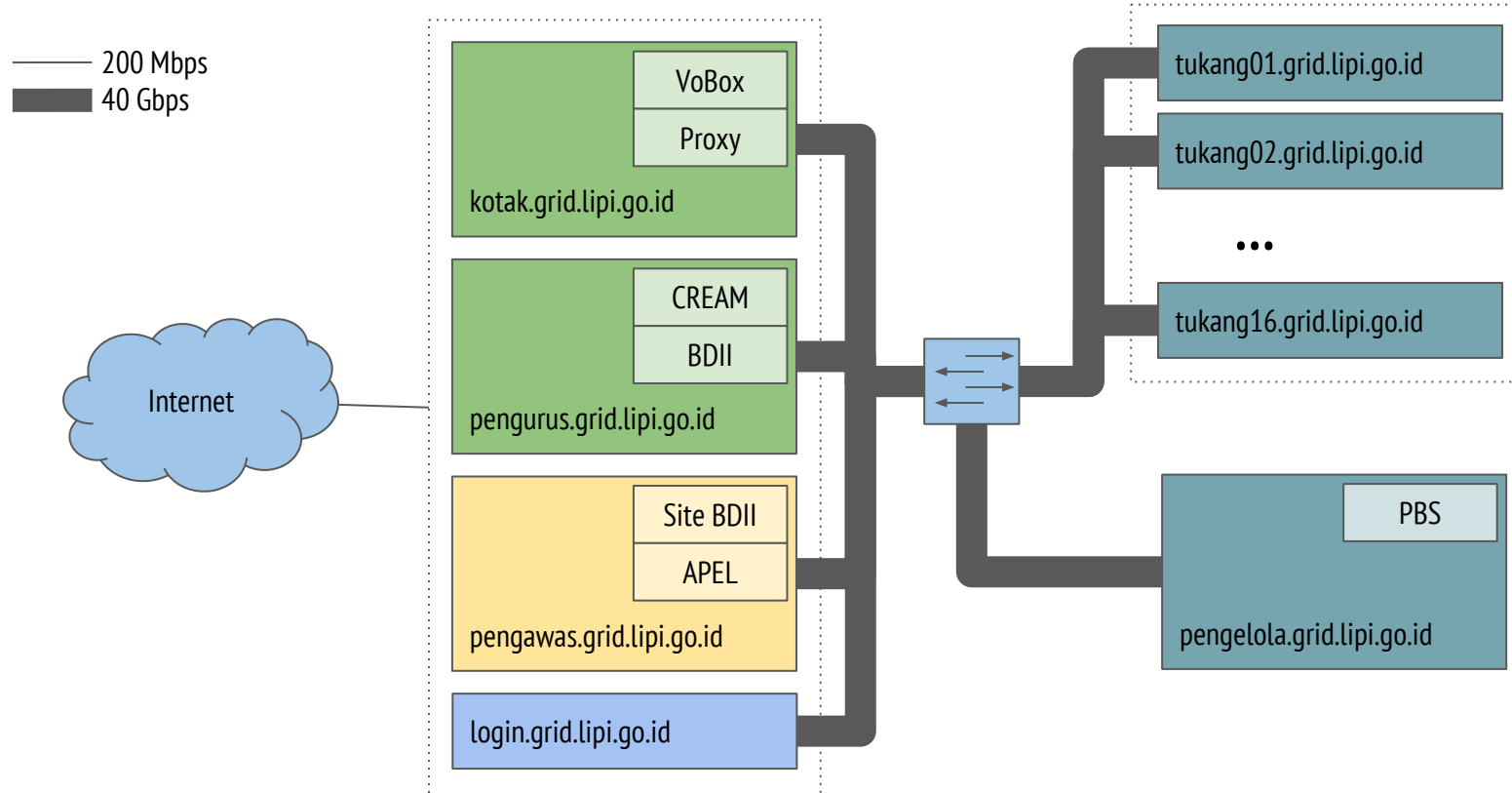
- Managed by Research Center for Informatics
- 16 node
  - 28 core Intel(R) Xeon(R) CPU E5-2695 v4 @ 2.10GHz
  - 88 GB RAM + 150 GB swap
  - 300 GB /scratch
  - 20 GB CVMFS
  - CentOS 7.5
  - Docker 18.06.1-ce
- 10 Gbps Local connection || 200 Mbps International connection
- ~300 job slots (but will share with local usage)



# LIPI Resources



# LIPI Resources ver.2



# What can we do next?

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- Reconnect with IdREN network
- Deploy the new ALICE-LIPI Grid on the new infrastructure
- Officially sign ATCF Letter of Agreement
- Officially join WLCG as Tier-2
- Contribute more to the community



# States - Problems - Progress - Future Directions

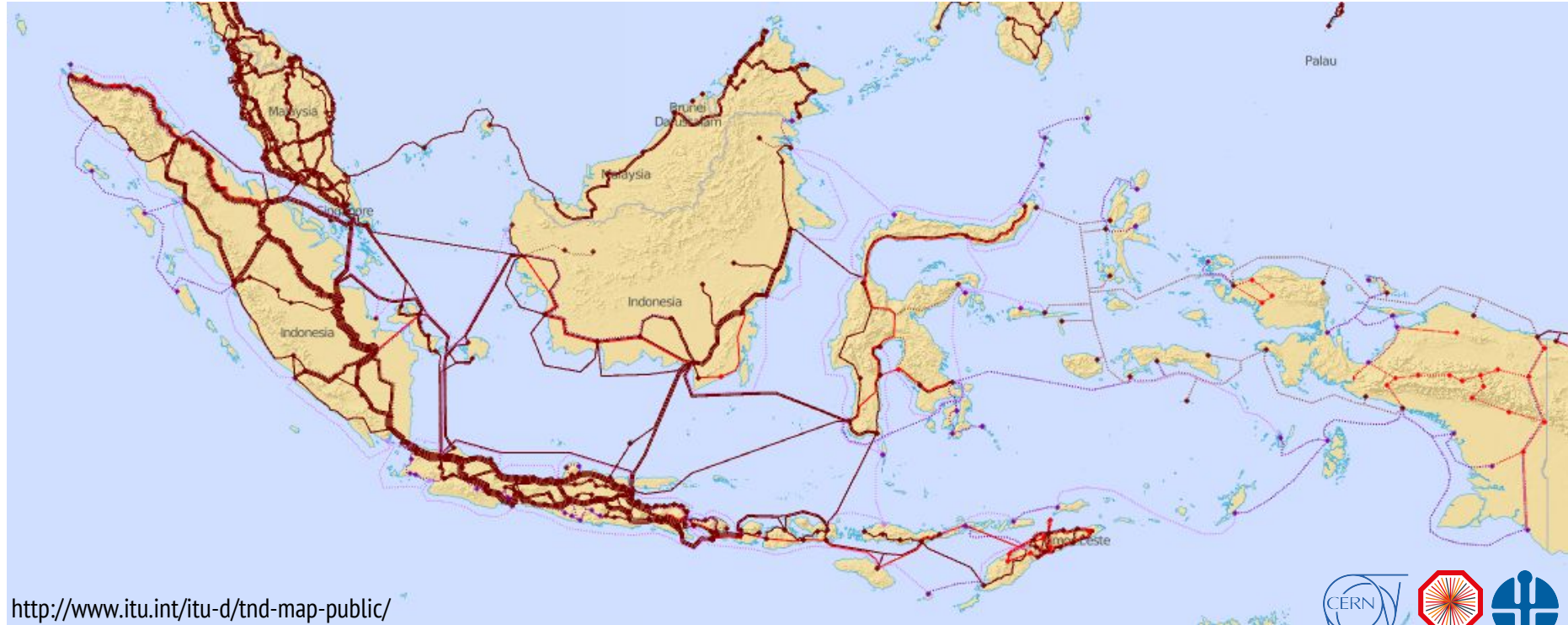
\*taken from Basuki Suhardiman (ITB/IdREN/INHERENT) and Ahmad Basuki (UB/IdREN)  
APAN46, August 2018

# IdREN

- Indonesian Research and Education Network
- Just started in 2015 to revive National REN (INHERENT)
- Supported by Ministry of Research, Technology, and Higher Education, Asi@connect with connection provided by Telkom Indonesia and Indosat



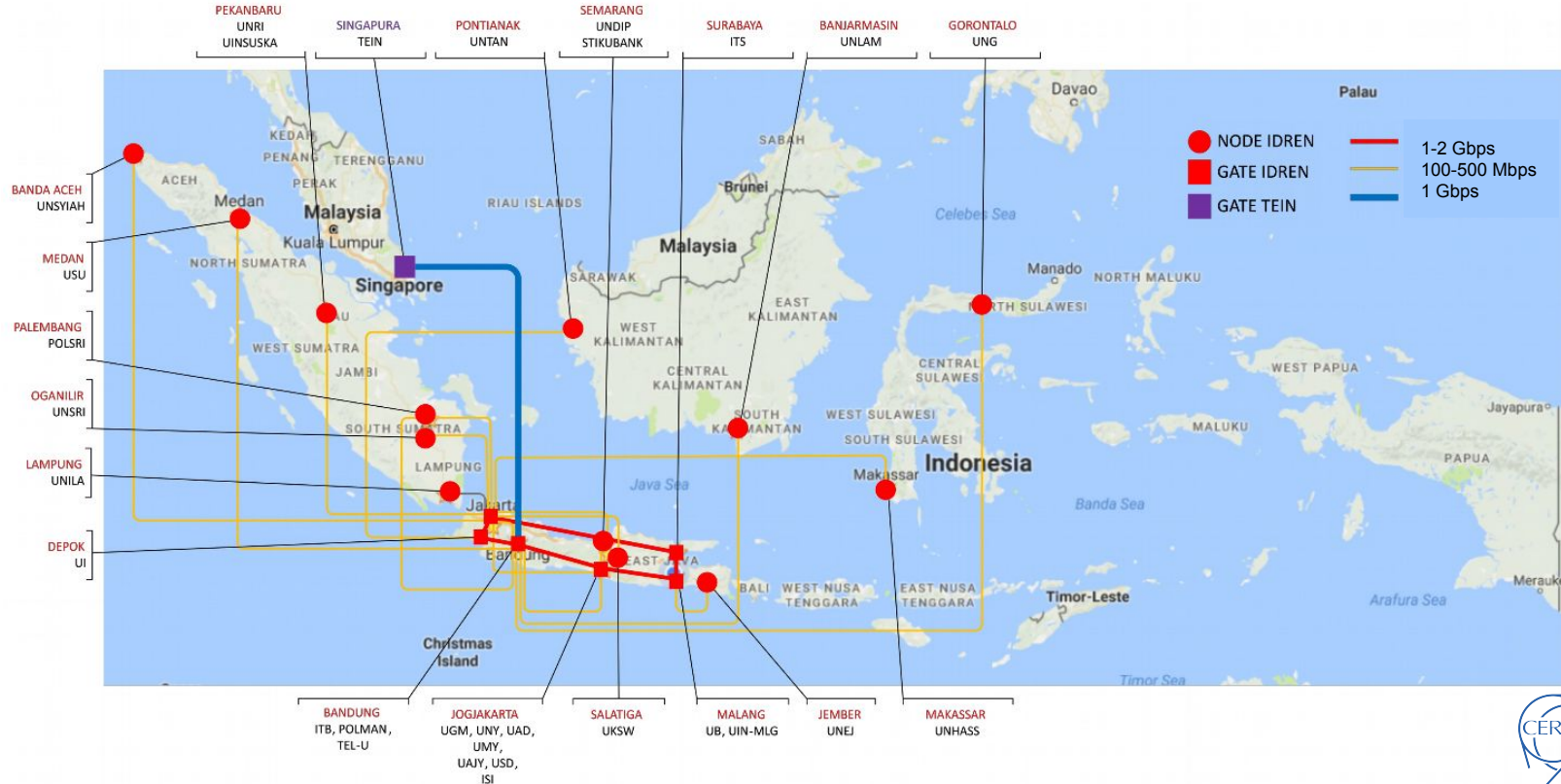
# Network Connectivity (Fiber Optic Links)



# Network Realization

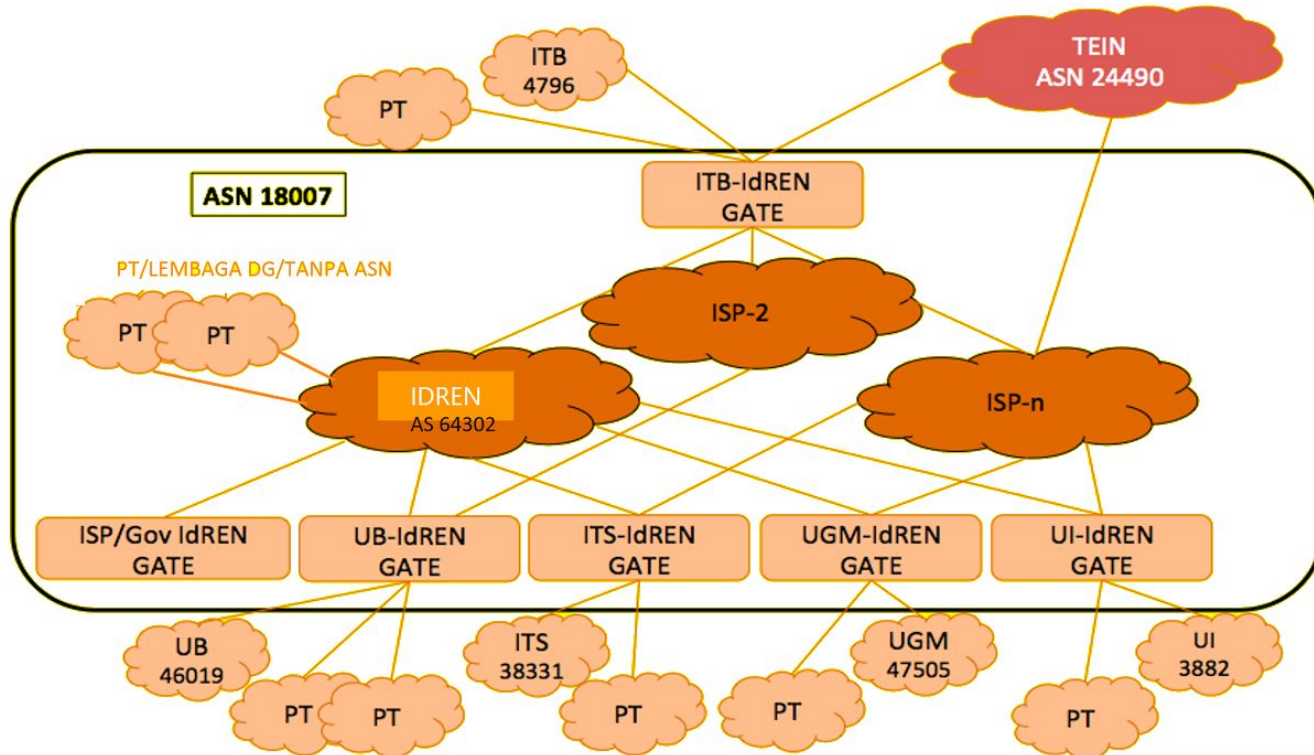
Gate	#Node	#ASN	#w/o ASN
01-IDREN	62	47	20
ITB-IDREN	2	2	0
ITS-IDREN	2	2	0
UB-IDREN	3	3	0
UGM-IDREN	2	2	0
UI-IDREN	1	1	0
<b>Total</b>	<b>72</b>	<b>57</b>	<b>20</b>

# Network Distribution

























# Implementation of AS64302 (IDREN) (2017)

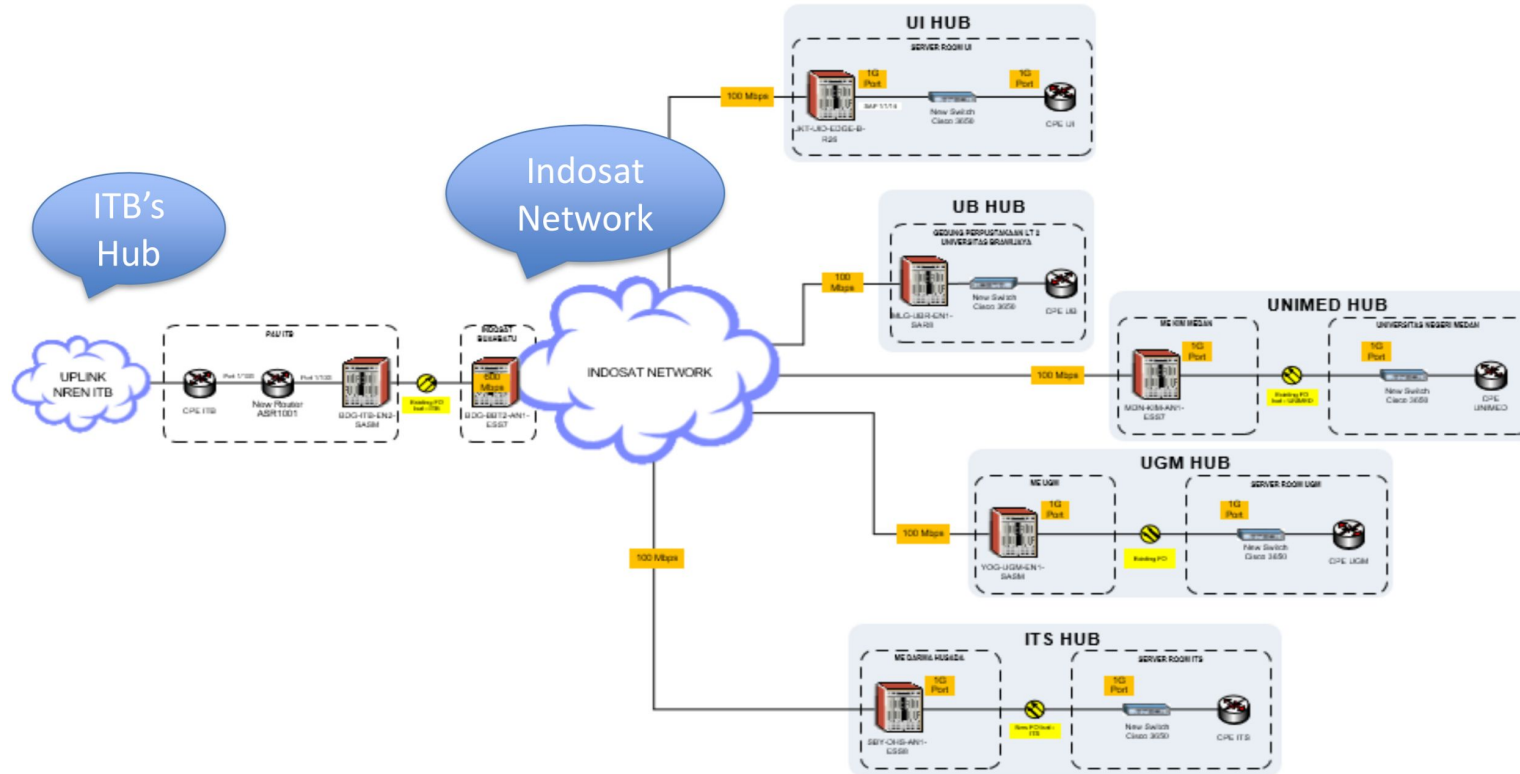


# Network Connectivity

Rank	Description		IPv6	Peer
1	INDONESIA RESEARCH AND EDUCATION NETWORK		X	<a href="#">AS64302</a>
2	Trans-Eurasia Information Network (TEIN2) - SG		X	<a href="#">AS24490</a>
3	Singapore Advanced Research and Education Network			<a href="#">AS23855</a>
4	Institut Teknologi Nasional			<a href="#">AS136871</a>
5	University of Indonesia		X	<a href="#">AS3382</a>
6	Institute of Technology Bandung		X	<a href="#">AS4796</a>

Rank	Description		IPv6	Peer
1	INHERENT		X	<a href="#">AS18007</a>
2	Universitas Negeri Yogyakarta		X	<a href="#">AS55674</a>
3	Bogor Agricultural University			<a href="#">AS17553</a>
4	UNIVERSITAS RIAU			<a href="#">AS56254</a>
5	Institut Seni Indonesia Surakarta			<a href="#">AS136866</a>
6	Universitas Malikussaleh			<a href="#">AS137299</a>
40	PPTIK - UNIVERSITAS GADJAH MADA		X	<a href="#">AS45705</a>
41	Universitas Brawijaya		X	<a href="#">AS46019</a>
42	Universitas Diponegoro		X	<a href="#">AS46049</a>
43	Universitas Sumatera Utara			<a href="#">AS55697</a>
44	Kantor Sistem Informasi Universitas Atma Jaya Yogyakarta		X	<a href="#">AS55680</a>
45	PetraNet, Surabaya, Indonesia			<a href="#">AS45304</a>
46	Universitas Tanjungpura			<a href="#">AS55687</a>
47	Universitas Airlangga			<a href="#">AS38142</a>

# Proposed Implementation (sept.2018)



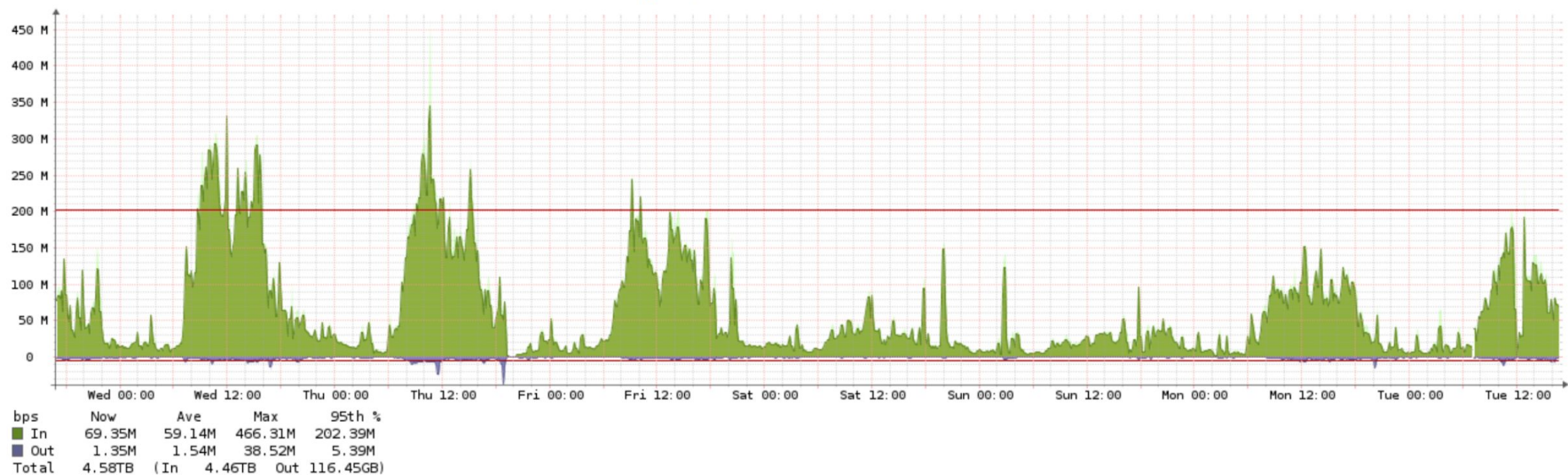
# Bandwidth Utilization (after 1 Gbps upgrade)

From 2018-07-31 16:45

To 2018-08-07 16:45

Update

[Hide Legend](#) | [Show Previous](#) | [Show RRD Command](#)



# Traffic Flow on TEIN4 Router

AS number	Chart	Hosts	Alerts	Name	Seen Since	Breakdown	Throughput	Traffic▼
4796		1635		<a href="#">Institute of Technology Bandung</a>	1 day, 7 h, 21 min, 55 sec	<a href="#">Rcvd</a>	17.54 Mbit/s	331.53 GB
7941		32		<a href="#">Internet Archive</a>	1 day, 7 h, 21 min, 53 sec	<a href="#">Sent</a>	12.13 Mbit/s	78.97 GB
2907		55		<a href="#">Research Organization of Information and Systems, National Institute of Informatics</a>	1 day, 7 h, 21 min, 54 sec	<a href="#">Sent</a>	63.99 bit/s	59.11 GB
786		859		<a href="#">Jisc Services Limited</a>	1 day, 7 h, 21 min, 56 sec	<a href="#">Sent</a>	198.33 kbit/s	54.03 GB
8068		34		<a href="#">Microsoft Corporation</a>	4 h, 21 min, 25 sec	<a href="#">Sent</a>	4.9 Mbit/s	46.27 GB
680		99		<a href="#">Verein zur Foerderung eines Deutschen Forschungsnetzes e.V.</a>	1 day, 7 h, 21 min, 55 sec	<a href="#">Sent</a>	447.9 bit/s	40.13 GB
46049		153		<a href="#">Universitas Diponegoro</a>	4 h, 21 min, 25 sec	<a href="#">Rcvd</a>	351 kbit/s	27.08 GB
1653		14		<a href="#">SUNET SUNET Swedish University Network</a>	1 day, 7 h, 21 min, 51 sec	<a href="#">Sent</a>	3.74 Mbit/s	21.03 GB
17055		7		<a href="#">University of Utah</a>	4 h, 26 min, 22 sec	<a href="#">Sent</a>	16.84 Mbit/s	19.97 GB
9821		17		<a href="#">Department of Science and Technology</a>	1 day, 7 h, 21 min, 57 sec	<a href="#">Sent</a>	243.15 bit/s	14.58 GB
3382		1933		<a href="#">University of Indonesia</a>	4 h, 21 min, 25 sec	<a href="#">Rcvd</a>	26.65 kbit/s	13.84 GB
1103		68		<a href="#">SURFnet bv</a>	1 day, 7 h, 21 min, 56 sec	<a href="#">Sent</a>	716.64 bit/s	12.91 GB

Status on 07.08.2018

# Applications

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- Telemedicine
- Eduroam
- SDN application initiates
- (WLCG - ALICE)

# Issues

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- Network Sustainability
  - New Business model for NREN
  - Limited support from government
  - How to integrate two ISP (competitor)
- Local Exchange with ISP
  - University subscribes another ISP
  - University acts as Local Exchange
  - Commodity traffic vs. REN traffic

# Next Plans

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- 2019
  - Asi@Connect bandwidth capacity upgrade (... – 10 Gbps)
  - Peering with SOE (Singapore Open Exchange)
  - Gorex initiative
    - Link Between Manado (North Sulawesi) – Jakarta (Jawa)



# Discussions

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Thank you

ขอบพระคุณ



# Opportunity

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- GOREX (Guam Research & Education eXchange)
- Initiated by Prof. Jun Murai to IdREN/INHERENT as backup link for Indonesian NREN
- The Link from Guam to Manado has been connected by TELKOM
- Still Discussed how we used the Network

