

Belle II Update

LHCOPN-LHCONE meeting #54

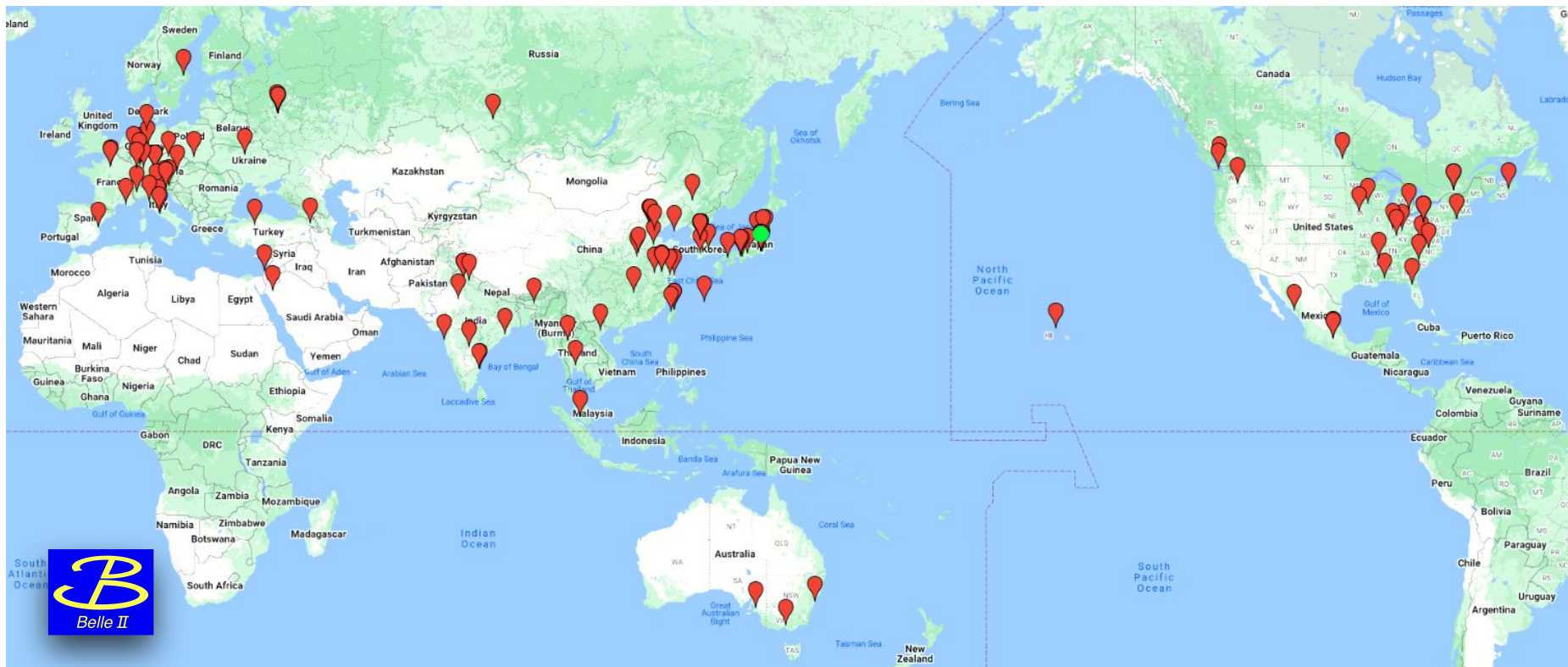
Manchester (UK)

Dr. Silvio Pardi

18 March 2025

The Belle II Experiment

Around 1200 members, 131 institutions, 28 countries

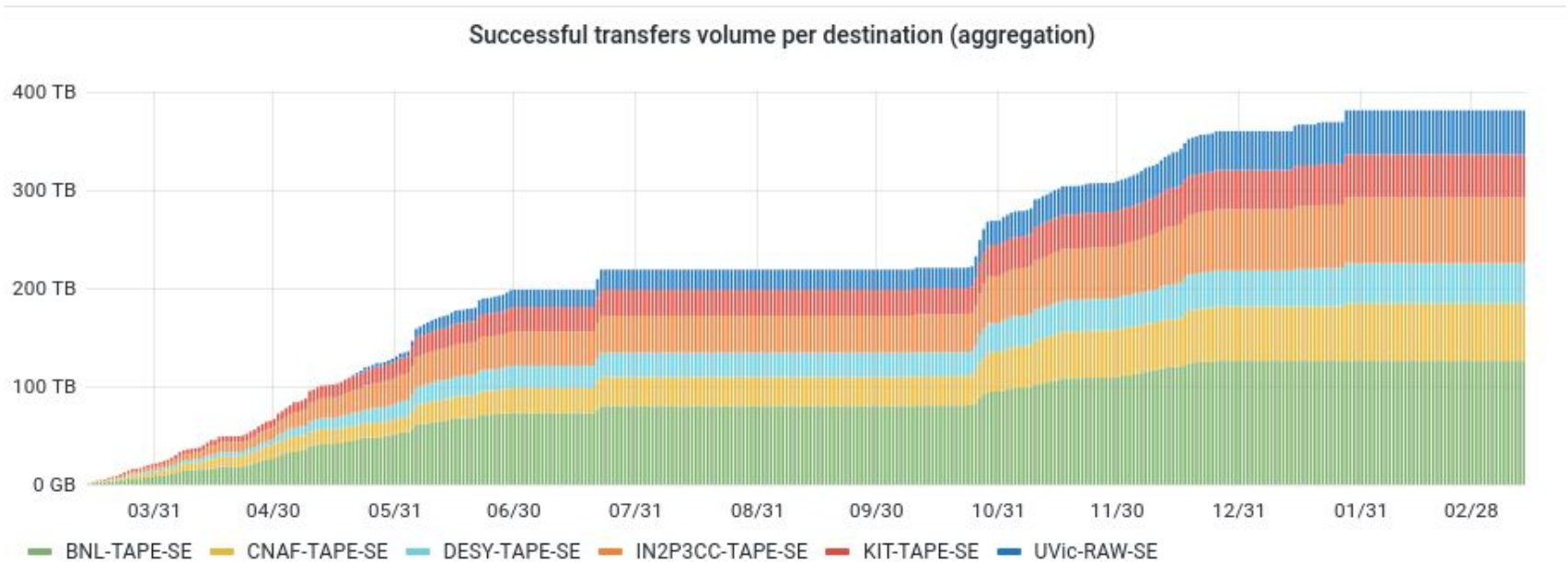


Belle II Status

Data taking started in 2019.

Currently in Shutdown.

Next run period will be 2025 starting October or November



Belle II distributed resources - site report 2024

- 58 sites
- 35 sites providing pledged resources
- 32 GRID Storages
- 5 Tape systems

TYPE	Resource provided	Pledged for 2024 JFY
CPU Pledge	512,6 kHS06/kHS23*	520kHS06
CPU Opport.	412.6 kHS06/kHS23	
DISK	21.292 PB	25 PB
TAPE	12.929 PB	9.520 PB

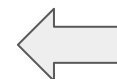
NEW CHALLENGES FOR SITES

- Token Based Authentication
- Update the Operative system (RHEL9/Almalinux9)
- Network Operation (IPv6, Link update, Jumbo Frame)

For Production: 34.9 kjobslots pledged + 36 kJobslot opportunistic

*Including local resources used eg. calibration

TYPE	Resource provided
CPU	36,7 kHS06/HS23
DISK	1.685 PB



Specific Resource for calibration

New Site Report 2025 in Preparation

KEKCC Renewal 2024

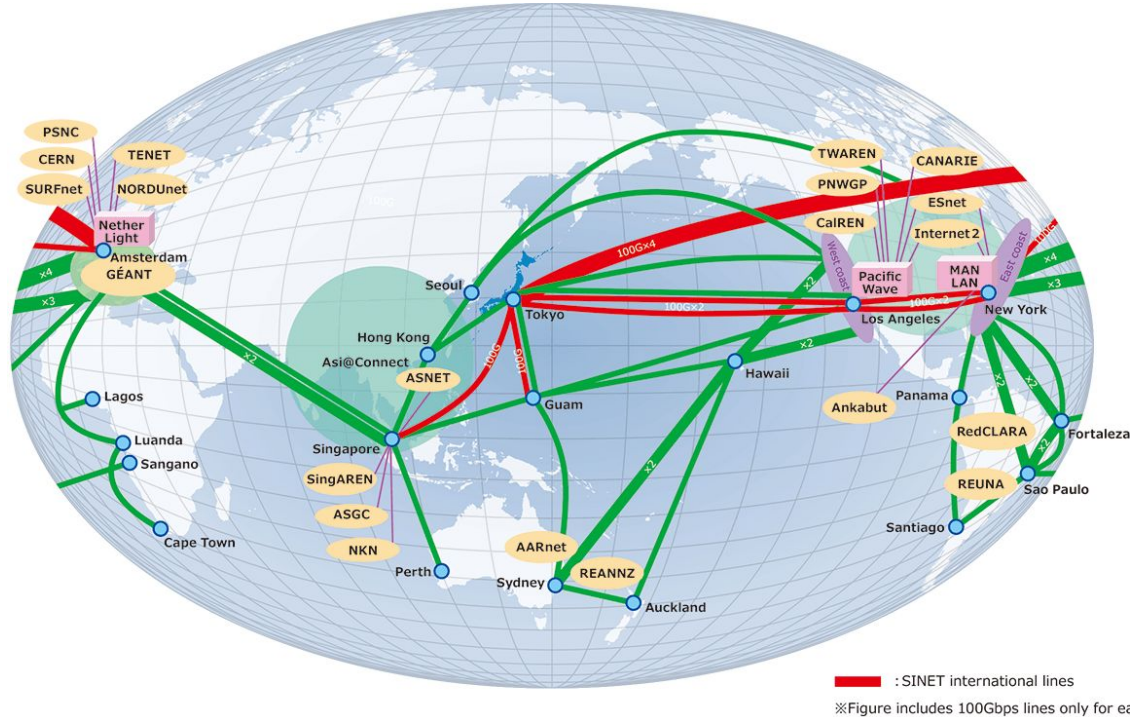
KEKCC has been renewed. The whole infrastructure has been moved over a new hardware.

Network Connection

- Upgrade from LAG of 2x40G to single 100G
- 20G Internet

Connection Japan vs EU/USA

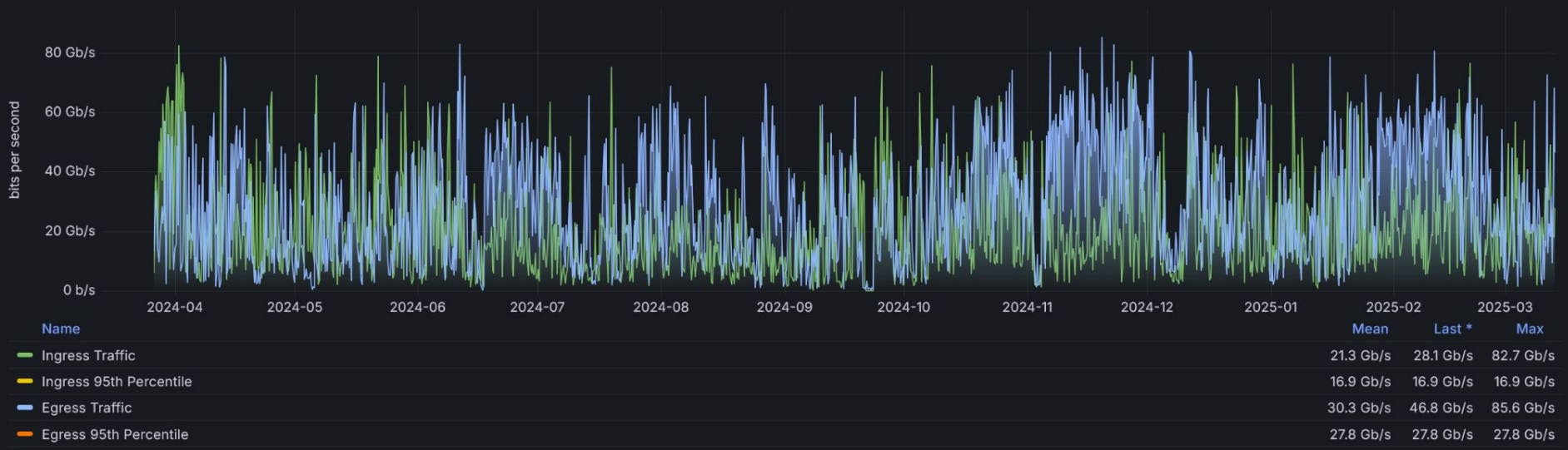
https://www.sinet.ad.jp/en/news_en/sinet6-upgraded-japan-amsterdam-lines-to-400gbps-april-1-2024



L3VPN Monitoring - LHCONE Peering NL-SINET

<https://public-brian.geant.org/d/KpTnkJR4k/sinet?orgId=5&from=now-1y&to=now>

rt1.ams.nl - traffic - ae20.200 - SRV_L3VPN RE_INTERCONNECT SINET #NL-SINET-LHCONE \$GS-00840 | ASN2907 |



IPv6 in Belle II

A milestone has been open on our internal ticketing system to keep track of IPv6 deployment in our infrastructure.

In Belle II infrastructure we have already some site with WNs in dual stack and at now no issue has been observed, however a full IPv6 compliance of our infrastructure vs IPv6-only resources must be demonstrate.

As for the Central Services of Belle II IPv6 is going to be assessed.

- Tested FTS servers at BNL and KEK that accept jobs from an IPv6 only client.
- Rucio configured in dual stack
- DIRAC at KEK already in dual stack

IPv6 Implementation for SE as of June 2024

IPv6 Implementation Status	# Storages	Percentage of Storage Elements (total 32 Storages)
Dual stack enabled	25	78%
IPv4 only	3	9%
IPv6 implementation planned	2	6%
IPv6 can be implemented if needed	2	6%

In 2023 the percentage of storage elements in dual stack was 43%

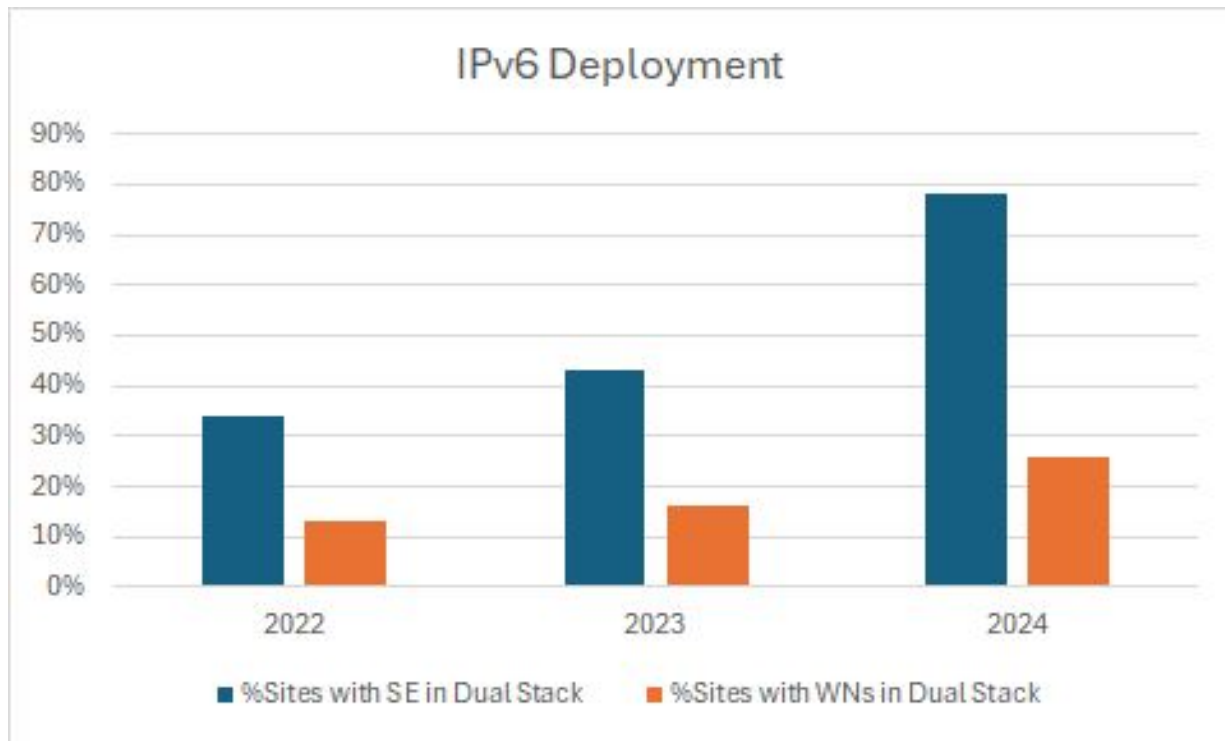
IPv6 Implementation on WNs as of June 2024

IPv6 Implementation Status	Percentage of sites which deployed dual stack WNs
dual stack enabled	26%
IPv4 only	57%
IPv6 implementation planned	13%
IPv6 can be implemented if needed	4%

In 2023 the percentage of of sites which deployed dual stack WNs was 16%

IPv6 Deployment vs years

We expect that the percentage of SE and WNs in dual stack reported in 2025 will increase.



HTCondor Cluster IPv6 Only Testbed

Testbed in Napoli.

Creation of an IPv6 Only HTCondor cluster

- HTCondor-CE
- Condor Central Manager
- 1 Worker Node
- 1 Squid server

The Site will be used to test the various central services from the computing resources point of view.

MultiONE

Belle II site Connected to LHCONE

<https://twiki.cern.ch/twiki/bin/view/LHCONE/MultiOneBGPcommunities>

The activity requires a work site side and NREN side.

Currently, 13 of the 24 Belle II sites connected to LHCONE are seen to publishing BGP communities.

In october 2024 we seen BGP Communities published by 5 sites.

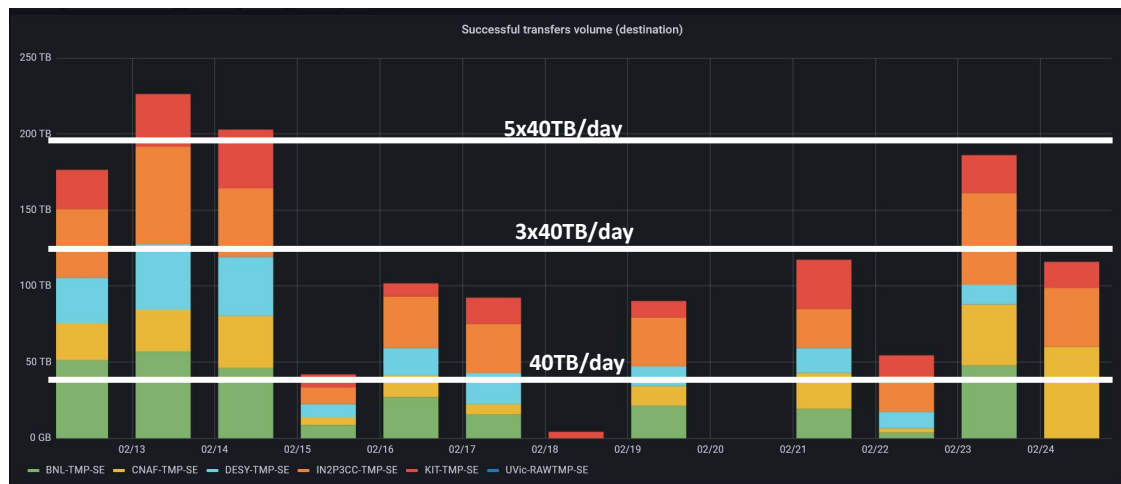
# Belle II Sites	RC Site	BGP Communities
1	IN2P3-CC	ALICE, ATLAS, BelleII, CMS, DUNE, ILC, JUNO, LHCb, NOvA, Pierre, XENON
1	INFN-T1	ALICE, ATLAS, BelleII, CMS, DUNE, JUNO, LHCb, Pierre, XENON
2	FZK-LCG2	ALICE, ATLAS, BelleII, CMS, LHCb
1	praguelcg2	ALICE, ATLAS, DUNE, NOvA, BelleII, Pierre
1	DESY-HH	ATLAS, BelleII, CMS
1	INFN-NAPOLI-ATLAS	ATLAS, BelleII, CMS, LHCb, Pierre, perfSONAR
1	BNL-ATLAS	ATLAS, BelleII, DUNE
2	ARNES	ATLAS, BelleII, LHCONE, Pierre, perfSONAR
1	IN2P3-IRES	perfSONAR, BelleII, ILC
2	CA-UVic-Cloud	ATLAS, BelleII, NOvA

N.B. Network Prefix are kept from CRIC. To doublecheck that belle II resources are configured on the proper subnet.

Joint Belle II/Hyper-K in the next WLCG Data Challenge

Belle II successfully participated the WLCG DC24, exercising the network connections among KEK and the RAW Data Centers.

In the context of JENNIFER3 Project (Japan and Europe Network for Neutrino and Intensity Frontier Experimental Research) we are organizing a **joint Data Challenge with Hyper-K experiment**, based in Japan trying to run in the same time window of the next WLCG DC. (in dependence of the project timeline)



Results of Belle II DC24 reported at CHEP24

<https://indico.cern.ch/event/1338689/contributions/6010887/>

Thank you

MultiONE Monitor

To monitor the deployment of the Belle II BGP community on Belle II sites connected to LHCONE, a script has been set up to query the LHCONE Looking Glass (<https://lhcone-lg.cern.ch/>) for the IPv4 and IPv6 networks of these sites.

The script uses the lhcone.json file, which contains all LHCONE prefixes, to check the networks (<https://twiki.cern.ch/twiki/bin/view/LHCONE/WebHome>)

The prefixes are then looked up using the site names registered in CRIC.

<https://baltig.infn.it/spardi/multione-check/-/blob/main/communities.sh>

MultiONE Monitor

```
06/10/2024 18:20.12 /home/mobaxterm/LHCONE ./communities.sh INFN-NAPOLI-ATLAS 4
CHECK COMMUNITIES OF 90.147.67.0/24
Communities: 137:5 137:6 20965:155 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 target:137:5
Communities: 137:5 137:6 2603:2112 20965:155 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 target:137:5 target:2603:434300001 target:20965:111
Communities: 137:5 137:6 57484:137 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 target:137:5
Communities: 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 64805:13 ✓

06/10/2024 18:20.19 /home/mobaxterm/LHCONE ./communities.sh INFN-NAPOLI-ATLAS 6
CHECK COMMUNITIES OF 2001:760:422a:137::/64
Communities: 137:5 137:6 20965:155 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 target:137:5
Communities: 137:5 137:6 2603:2112 20965:155 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 target:137:5 target:2603:434300001 target:20965:111
Communities: 137:5 137:6 57484:137 61339:2 61339:3 61339:4 61339:6 61339:11 61339:60001 target:137:5
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```