Infrastructure Builders Program

1. Context

Dear community,

It has been three months since our report and it is time for another quarterly report to keep the community informed about the progress of IBP. In this report, we will provide an overview of the progress made in the last three months, including the latest developments in network expansion, performance optimization and tool development. We hope that you find this update informative and insightful as we continue our journey to strengthen the ecosystem.

In the previous report, we highlighted the successful launch of the Infrastructure Builders Program (IBP), the onboarding of new members, and the establishment of key infrastructure services.

As a brief recap, administrative curators have reviewed documentation submitted by members for assessment, including incorporation documents, websites, resumes, and colocation facility locations. The first quarter saw 7 initial members join the program, deploying GeoDNS and Anycast-based RPC services, as well as boot nodes. These members also launched several services, including Boot Nodes for Westend, Kusama, and Polkadot, and full archive RPC nodes for these networks. Additionally, they joined GeoDNS and Anycast pools and developed essential tools, scripts, and services for efficient deployment and monitoring of other members.

2. Services

IBP members collaborated to deploy GeoDNS and Anycast-based RPC services, as well as boot nodes. They are actively involved in the ongoing maintenance, administration, and operation of these services to ensure the highest level of network availability.

Based on the proposed metrics, members are operating the following services, successfully meeting the individual member service criteria:

- Operate 3 Boot Nodes (1 each) for Westend, Kusama, Polkadot and have them included in the node source code. IBP members are operating a total of 21 boot nodes at the moment. Following members launched the service:
    - Stake.plus
    - Helikon
    - Amforc

    - Metaspan
    - Gatotech
    - Turboflakes
    - Dwellir

- Operate 2x full archive RPC nodes for Polkadot, Kusama, and Westend. IBP members are operating a total of 14 RPC nodes at the moment. Following members launched the service:

    - Stake.Plus
    - Helikon
    - Amforc
    - Gatotech
    - Turboflakes
    - Metaspan
    - Dwellir

- Members are required to join at least 2x GeoDNS pools and 2x Anycast pools. Following members launched the service:

    - Stake.Plus - GeoDNS (dotters.network)
    - Gatotech - GeoDNS (ibp.network)
    - Helikon - AnyCast (Pending)
    - Amforc - AnyCast (Pending)

- The following RPC services are already operational and included into the polkadot.js:

    - IBP-GeoDNS1 - operational on Polkadot, Kusama, Westend, Westmint, Collectives (Westend), Bridgehub (Kusama), Encointer, Statemine, Collectives (Polkadot), and Statemint
    - IBP-GeoDNS2 - operational on Polkadot, Kusama, Westend, Westmint, Collectives (Westend), Bridgehub (Kusama), Encointer, Statemine, Collectives (Polkadot), and Statemint

3. Tools

Beside these services, members are developing the tools and scripts necessary to efficiently deploy and monitor IBP services:

- IBP Website https://ibp.network

    - Main website design and design integration with Monitor and Wiki

    - Progress and updates to the website
        - Main website design developed by Thomas from Stake.plus.
        - Integration of the design with the Monitor and Wiki are nearing completion with an estimated 60 hours maximum to complete these tasks.

- IBP Monitor https://monitor.dotters.network/ - Github
    - Decentralized health checker used to monitor and report on events that occur on the IBP network.
    - Progress and updates to the monitor
        - Kukabi developed the status page for the monitor.
        - Turboflakes introduced a framework for an alerts-engine worker. The aim is to inspect each healthCheck and raise alerts to matrix/element if needed.
    - Additional monitors now running at:
        - https://ibp-monitor.helikon.io [new]
        - https://monitor.dotters.network [new]
        - https://ibp-monitor.metaspan.io
    - Detailed list of changes:
        - Upgrades to module dependencies
        - Refactor codebase to be more modular
        - Refactor docker containers
        - Introduce sequelize database migrations - a list of structural and data changes, allowing an empty database to be populated with seed structure and reference data
        - Refactor the API layer
        - Introduce .env files in root and docker
        - Amend the data format for healthcheck to include memberId at root
        - Implement ‘prettier’ to aid with development standards
        - Improvements in libp2p config for monitors to share healthCheck results

- GeoDNS Manager (Source Code) - A tool written in golang designed to determine the nearest site for each country globally and automatically manage country -> member assignments. The tool also allows rapid response if a member goes offline to remove that member from service offering.
- IBP Wiki https://wiki.ibp.network/ and https://wiki.dotters.network/
    - All the knowledge that has been gathered from the collective experience of the members of the Infrastructure Builders' Programme.

    - After due research was finalized about the most suitable platform to host the documentation of the Infrastructure Builders' Programme, The decision taken was to self-host the wiki pages in both subdomains (i.e. ibp.network and dotters.network) from a single source of code (Github repository here) based on docusaurus' React templates.
    - To cater for the different audiences which are expected to visit the wiki pages, it has been also decided to divide the documentation in five (5x) interrelated chapters:
        - For general visitors, a "What is IBP" chapter relating to the biggest features of the IBP and how it benefits the networks' community.
        - For network and project teams, a "Consuming IBP" chapter where they can easily find the instructions on how to connect to the IPB endpoints and consume the services offered by the programme.
        - For curators, auditors, and critics, among others, an "Auditing IBP" will allow them to consult, in one convenient place, the information proving the activities and achievements of the programme.
        - For candidates, a "Joining IBP" chapter with information about the reasons why it is worthwhile to join the programme and general guidance in the process from application to acceptance.
        - For new and old members alike, a "Serving IBP" will provide detailed instructions on how to design, deploy and maintain their infrastructure as part of the IBP community.
    - Some basic information has started to populate the above chapters, for example, in "Serving the IBP", the stack that includes Proxmox + Ceph + Ubuntu + HAproxy will be the the first to go out of the press, and alternative solutions like WMware, vSAN, NGINX, and the like will be added once an IBP member with the relevant experience shares the details with the team.

- IBP node metrics monitors

    - The deployed nodes are utilizing Prometheus for monitoring server status and metrics, allowing members to effectively track performance and address any potential issues in a timely manner.IBP GitHub repo https://github.com/orgs/ibp-network/repositories

4. Budget

The budget for the program operates on a monthly basis, with members being postpaid at the end of each month for the services they provide. Please find all the child bounties linked below for your reference.

- 01/2023 Child Bounties

- 02/2023 Child Bounties
- 03/2023 Child Bounties
- 04/2023 Child Bounties

5. Network Expansion

The program has successfully integrated new members from various regions, contributing to a more diverse and resilient network infrastructure.

The initial plan involved project member Crifferent.de deploying the infrastructure in the Czech Republic, Europe by the mutually agreed deadline of 1st May. Regrettably, Sik was unable to deploy the infrastructure in Europe by the agreed deadline and withdrew from the program. We would like to express our gratitude for Crifferent.de contributions and wish him the best in his future endeavors.

IBP team conducted a thorough location analysis to determine the most suitable course of action. After careful consideration, it was decided that relocating the newly freed infrastructure location from Europe to India would be advantageous for the project. This decision was based on the potential to further improve service coverage and decrease service latency for our users in this region. We are pleased that a new applicant has applied in deploying the infrastructure at the new location in India.

Administrative curators have reviewed and accepted the new IBP applications:

- Dwellir - Africa location with Lagos, Nigeria datacenter
- Rotko Networks - East Asia, Thailand location (service under deployment)
- Polkadotters - Oceania location, in progress of finding and establishing deal with the datacenter
- Lucky Friday - North America, US, Arizona (service under deployment)
- Radium Block - Asia, India (service under deployment)

IBP has expanded to 11 out of the 12 planned locations with all existing applicants accounted for. The proposed member geographical distribution status is as follows:

- **Europe: 3 -** Amforc - Switzerland, Metaspan - UK, Turboflakes - Portugal
- **North America: 2 -** Stake.plus - US, Virginia, Lucky Friday - US, Arizona (service under deployment)
- **Central America: 1 -** Gatotech - Costa Rica
- **South America: 1 -**
- **Asia: 2 -** Rotko Networks - Thailand (service under deployment), Radium Block - India (service under deployment)

- **Middle East: 1 -** Helikon - Turkey
- **Oceania: 1 -** Polkadotters - Oceania, (service under deployment, not finalized Datacenter location)
- **Africa: 1 -** Dwellir - Nigeria

With the 11 members onboard we have 1 more locations available. Please apply to the IBP f you wish to provide professional membership services in the following region:

- **South America** - preferably Argentina, Chile or Brazil

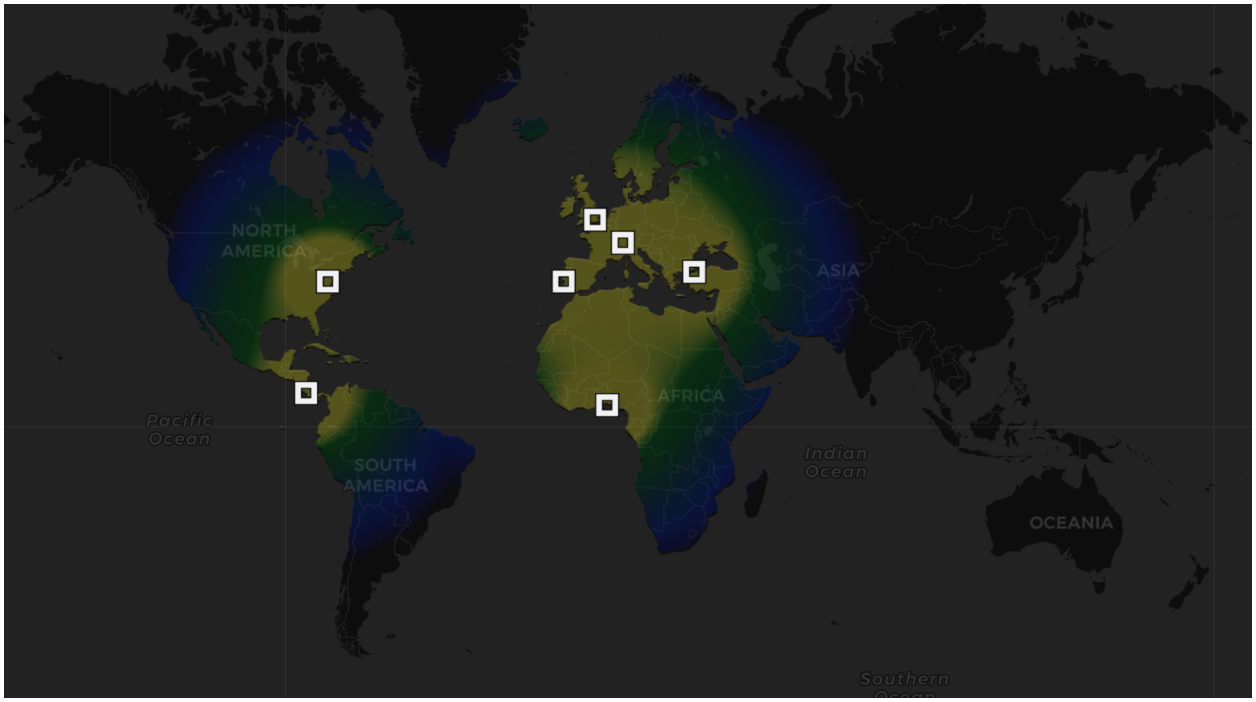
Applications are open now and you can submit your application on the following form.

As the underlying software is completed we will be able to expand the program by taking on Hobbyist Members. If your region is full, you can apply now and wait in queue for a slot to become available in your region. If you wish to become a Hobbyist Member, it will take us some time to prepare the network and for us to figure out exactly how we should handle on-boarding these members.

6. Geographical distribution of services

The program's objective is to provide the best quality of service irrespective of where in the world the users are located. Thus, the priorities are equally divided on geo-diversity of the program operators and the ability to self-repair the services in case of problems, also called resilience.

The following map shows the IBP level of service and global coverage. The color chart represents the latency ranges for users experiences with yellow displaying the areas with expected response time below 50ms.



7. Service performance and monitoring

The Infrastructure Builders Program (IBP) aims to provide optimal service with a latency below 50ms to ensure a seamless user experience when interacting with blockchain technology. To achieve this goal, it is essential to have a globally distributed network of server locations, minimizing the physical distance that data must travel between endpoints. To address this challenge and significantly reduce latency, our project within the IBP focuses on implementing a global endpoint delivery network.

IBP is progressing well and is currently in the phase of developing a monitoring system. This system will actively monitor the usage of infrastructure services to ensure optimal performance and reliability.

7.1. Service availability and health checks

Our monitoring system, currently under development, aims to effectively monitor the health checks of the services and measure latency to service providers. This advanced monitoring solution will work continuously to guarantee the seamless operation of deployed endpoints, handling any deviations with minimal disruption.

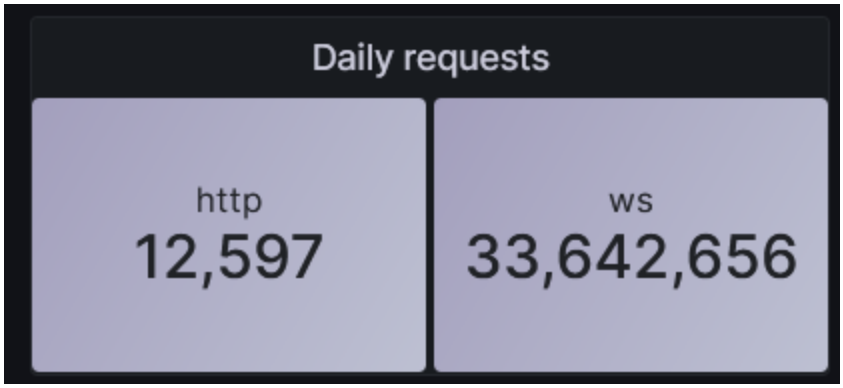
7.2. Service usage

To ensure optimal performance and reliability for the IBP RPC endpoints, we are developing monitoring tools using Prometheus and Grafana. These solutions enable real-time tracking of usage and performance metrics, offering valuable insights for service optimization and user experience improvement.

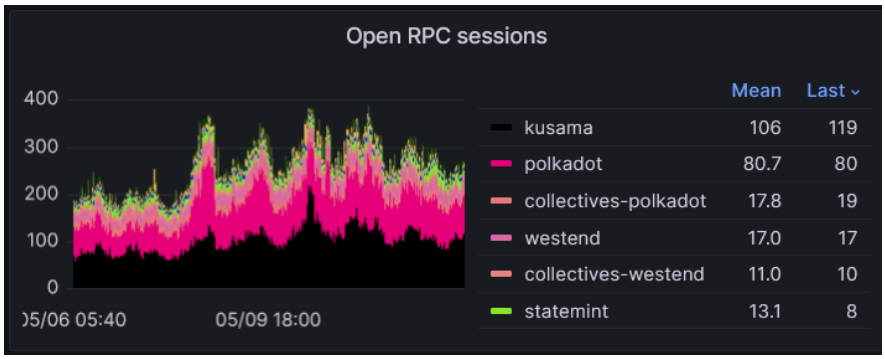
Prometheus collects essential metrics from the IBP RPC endpoints, while Grafana creates interactive dashboards to display the collected data. This combination allows continuous monitoring and optimization of our services.

In order to reduce costs we began utilizing the “--relay-chain-rpc-urls” flag on system chain nodes and pointing it toward our relay chain nodes. While this did have the intended effect of reducing bandwidth and cpu usage on these nodes by ~80%, it also created a lot of rpc activity against our relay nodes inflating the overall metrics. We’re working to determine a way to separate the metrics so we can get a more accurate representation of real usage. Additionally, this method of statistical collection is temporary and will eventually be integrated into the monitoring software.

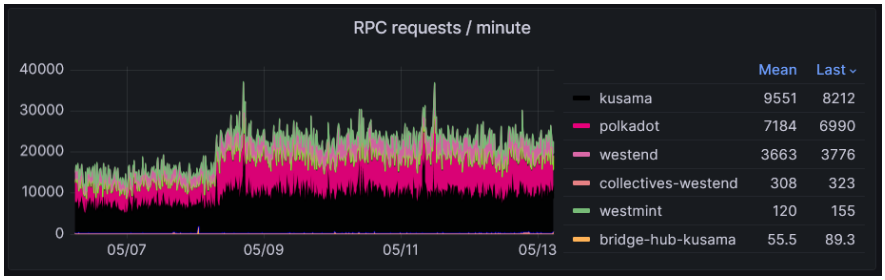
- Average Daily RPC Queries: 30M



- Open RPC Sessions over the last 7 days



- RPC Requests per minute over the last 7 days



7.3. SLA and outages

In the previous quarter, we successfully maintained the highest level of SLA, with no observed service outages, ensuring consistent and reliable performance for our clients.

7.4. Maintenance and upgrades

To maintain high-quality services, we have implemented a weekly maintenance schedule for the Infrastructure Builders Program. During the maintenance window, the member responsible for maintenance is temporarily excluded from the services to prevent any outages or reduced performance. This approach allows us to execute necessary upgrades and updates without disrupting end-users' experiences.

All upgrades and maintenance tasks were completed on time, ensuring no disruption to the services provided.

7.5. Service summary

The following metrics, although not currently available, have been defined and will be accessible upon the completion of our monitor development process:

1. Total Responses: The cumulative number of API responses served over a specified period.
2. Data Egress: The total amount of data transmitted from the service to clients during a specified period.
3. Daily Response Volume: The highest number of responses served within a single 24-hour period for each network.
4. Rolling 7-day Average: The average number of daily responses served over a rolling 7-day period.
5. Network-specific API Responses: The number of API responses served for each individual network during a specified period.
6. Cumulative Network API Responses: The all-time total number of API responses served for each network since a specific starting date.

7. Uptime Percentage: The proportion of time that services are available and operational, expressed as a percentage over a specified period (e.g., 90 days).

8. Communication

IBP program presents a major effort to further decentralize the core infrastructure and we welcome the community to come forward and share any concerns or give us feedback on the program. The best place to reach the program is on Element - IBP Public chat room or reply to the polkassembly post.

We would definitely like to hear from the existing providers who may consider switching from existing grants to the IBP. IBP Applications are open and you can apply with the following form.