EOS
COSTA RICA

Technical Roadmap
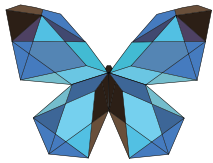
This document is intended as a open discussion with the **EOS community** and we encourage suggestions. Please let us know how we can better leverage the resources in Costa Rica to support EOS. **We want your feedback!**

The dawn of the EOS mainnet will require a great deal of coordination in order to run as smoothly as possible. Our initial priority will be providing redundant, high performance infrastructure located in Costa Rica. once our block producing cluster is operational in Costa Rica we will deploy full nodes in throughout central america in to provide the EOS ecosystem with low latency access in the region.

Initial **Setup**

We feel it is most beneficial to the network to maintain full control of all our hardware. Our proposed block producer configuration is 100% bare metal servers located entirely within Costa Rica.his will add to the network's resiliency by contributing technological, geographical and political diversity as no single point of our infrastructure relies on any third party cloud infrastructure. Everything from our .CR domain, DNS, IP addresses and servers will be 100% Costa Rican.

The current hardware characteristics for our primary and secondary block producers are:

- 4 x CPU 24 cores (48 threads) @ 1.87GHz
- 512 GB RAM
- 8 TB SSD Storage
- 100 MBps uplink

We will also launch an additional non-producing node as part of our initial setup to support our primary producer and respond in a timely manner to requests coming from users in our region.

Scaling **Plan**

We want to ensure that EOS scales as smoothly as possible and so improving our hardware is our main priority to handle a large number of transactions and have redundant equipment ready to go at a moments notice. We envision the following scaling plan for hardware:

Deploy two identical, primary and secondary, block producers with the following specifications:

- HP DL360 Gen 10 server.
- 2 x CPU 28 cores (56 Cores & 112 threads) @ 2.50 GHz
- 1.5TB DDR4–2666mhz RAM Memory
- 8TB in Raid 6 configuration
- 10GB/25GB PCI fibre network card
- 1GBs uplink

Full **Nodes**

In addition to hosting files, block producers will be expected to run API nodes that are able to query the blockchain database state on behalf of applications. These services make it vital for applications to get the information they need without having to run and maintain their own scalable hosting services.
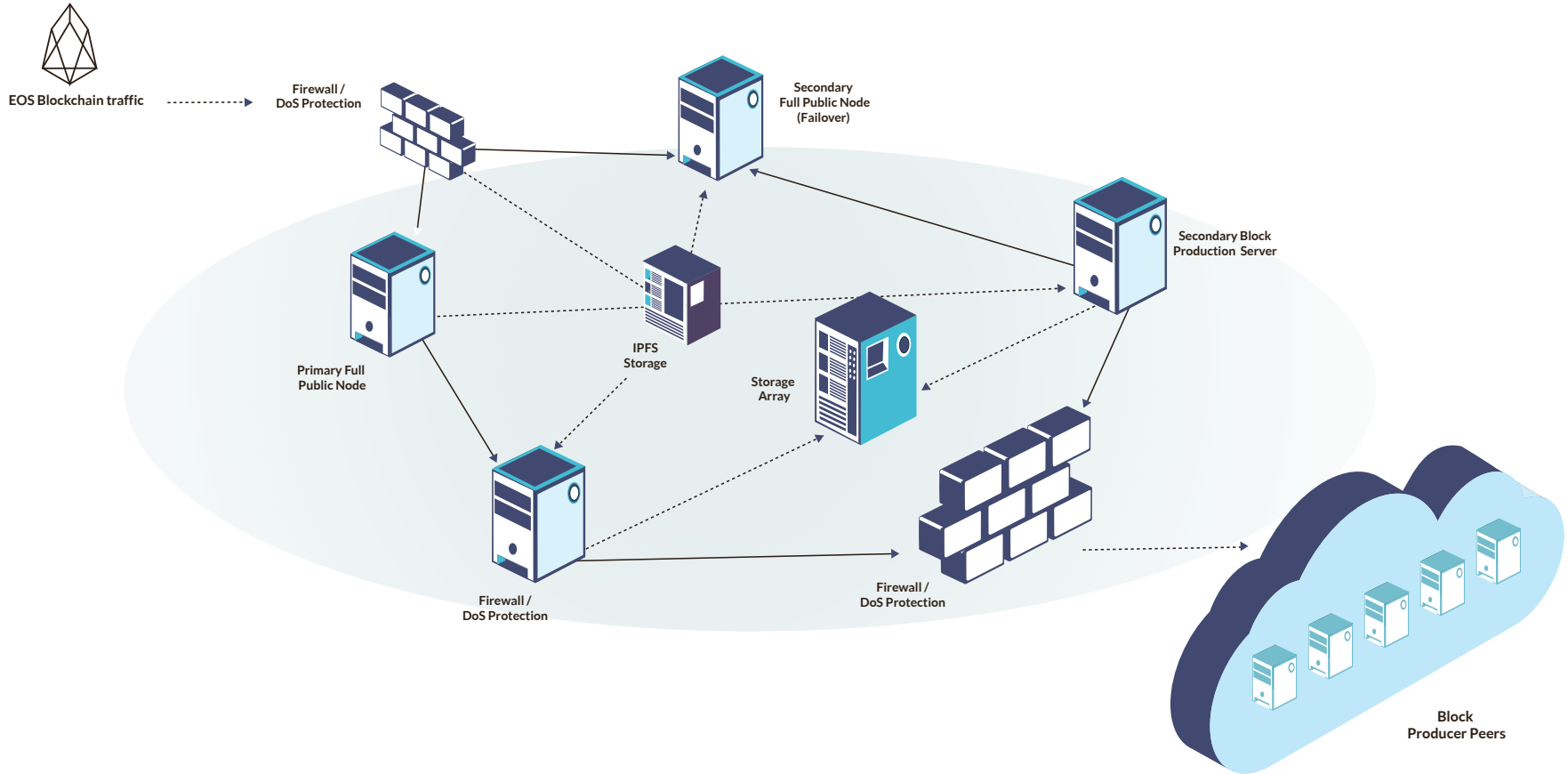
EOS Costa Rica will simultaneously launch two additional EOS nodes along with an IPFS storage array in Costa Rica. Once the Costa Rica server cluster is operational we will continue with the deployment of full nodes to serve the demand of Dapps in Panama, El Salvador, Guatemala, Honduras and Nicaragua, in that chronological order.

We believe block producers are incentivized to run full nodes in their regions, non-producing nodes can greatly help to reduce the load on block producing nodes by handling additional tasks that developers need such as:

The current hardware characteristics for our primary and secondary block producers are:

- API nodes
- Seed Nodes
- Testnet nodes
- Database indexes
- Query services
- Storage
- Hosting

Mexico

Jamaica

2
Guatemala
Full Node

3
El Salvador
Full Node

4
Honduras
Full Node

5
Nicaragua
Full Node

Costa Rica
Block Producer

1
Panamá
Full Node

Colombia

EOS Costa Rica **Infrastructure Diagram**

EOS Blockchain traffic

Firewall /
DoS Protection

Primary Full
Public Node

IPFS
Storage

Secondary
Full Public Node
(Failover)

Secondary Block
Production Server

Storage
Array

Firewall /
DoS Protection

Firewall /
DoS Protection

Block
Producer Peers

Technical Roadmap

Firewall

EOS Costa Rica will configure secure connections to prevent attackers from scanning the entire network topology looking for nodes to shut down. We will need to plan, communicate and work closely together with other Block Producers to ensure the network is secure and efficient.

Our block producers will not allow any incoming connections. This ensures our block producers stay hidden from the internet whilst still syncing up to the blockchain and producing blocks.

DNS

Our DNS will be hosted through one of the largest authoritative DNS networks in the world. The network has an average of a few milliseconds query speed with highly reliable service. We will run all hostnames under the Costa Rican TLD using our domain eosio.cr.

DoS

We will implement a DoS mitigation service along with Web Application Firewall (WAF), using a reverse DNS solution for all our hostnames.

Failover Protocol

We will design and implement equipment, configurations, and scripts that immediately switch block producers in case of an outage or for server maintenance.

Processes

We will define and publish official procedures for the following areas concerning a block producers responsibilities. In an effort to make the network constantly more resilient, these processes will be updated regularly as we learn from our experiences and those of other block producers. We will also will encourage feedback from the community to optimize our processes to best defend the interest of EOS token holders.

The current hardware characteristics for our primary and secondary block producers are:

- **Infrastructure Availability & Application Monitoring**

   We monitor all systems, devices, traffic and applications 24/7. We currently use PRTG network monitor to oversee and record our systems. Sensors are configured for the following metrics.

   - **Response times**
   - **Request inspection**
   - **Transactional throughput**
   - **TCP / HTTP checks**
   - **Pings / Latency**

- **Alerting / Reporting**

   We will document and provide visibility to our monitoring strategies. Additionally we will create a web portal for anyone to check our real time status of our infrastructure.

- **Regarding pageability we will establish pagerduty, escalation**

   procedures and get an on call schedule setup. All EOS Costa Rica staff will be alerted of any outages, incidents or support requests via Email, SMS, and internal messaging service.

- **Incident Management**

   We will develop and publish a procedure describing the steps we will take to deal with any incidents and/or outages.

EOS
COSTA RICA

Changes in Capacity

We will establish processes detailing how we will deal with

changes in hardware as we scale RAM, Storage, CPU

Security Monitoring

Intrusion

Vulnerabilities

Traffic patterns

Risks

Log Management Procedures

Log Consolidation

Debugging

Development

Forensics

Third Party Annual audits

Security

Infrastructure

Processes

Audit results will be shared with the EOS token holders

Technical Roadmap

Future **Technological Initiatives**

We encourage a culture where technologists can be enthusiastic about learning and experimenting. We plan on providing an environment that fosters innovation and present the following ideas for future technical undertakings from Costa Rica.

Hosting Services
In addition to hosting files, our block producers will be running API nodes that are able to query the blockchain database state on behalf of applications. These APIs will likely be a combination of GraphQL and custom Web Assembly based queries. This is vital for applications to get the information they need without having to run and maintain their own scalable hosting services.

Testnet Nodes
We will maintain testnet nodes to use for testing internal software, procedures, and staff training. These nodes will also be available for the community to use.

High Availability Alternatives
We plan on testing and comparing different infrastructure approaches including cloud computing to benchmark performance and optimize our production infrastructure. We will test load balancers, Web Application Firewalls, DDoS mitigation strategies, and software alternatives such as docker with the goal of discovering the best way to fulfill our vision of establishing EOS high availability clusters in each Central American nation.

Custom Application Infrastructure
We are aware that there are limits to what kind of applications can be built using the general purpose infrastructure provided by block producers. Some applications may require server-side rendering or custom database indexes maintained by custom micro-services which may require custom server infrastructure hosted by the application developer or other parties. Developers of these applications can benefit from the same scalable architecture used by our block producers to deploy their own customized API and Query Services. This will help developers rapidly bring scalable application infrastructure to market.

EOS

COSTA RICA