

# Native Implementation of Ephemery Testnet on Besu & Teku Client Pairs

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# What is Ephemerality?





# What is Ephemery?

- A testnet that rolls back to genesis after a set period
- Focused on short-term and heavy testing use cases
- Solves common testnet problems:
  - Insufficient testnet funds
  - Inactive validators
  - State bloat
  - Issues faced by long-running testnets

# Project Overview



# Project Overview

## Goal

Provide native support for Ephemery on Besu and Teku client pairs

## Why

- Improve user adoption
- Simplify node running process
- Create a seamless user experience
- Enable automatic genesis updates and resets

# Status Report

# Status Report

## Initial Status

Pre-Implementation:

- Native support limited to:
  - Geth
  - Reth
  - Lighthouse
  - Lodestar

Setup Process:

- Required manual downloading of genesis files
- Complex configuration process
- No centralized tracking of implementation work



# Besu EL Implementation Changes

- Added EphemeryGenesisUpdater class for dynamic genesis updates.
- Updates made to key files: `NetworkName.java`, `BesuCommandTest`, `NetworkDeprecationMessageTest`, `EphemeryGenesisUpdaterTest`, `ephemeral.json`, `changelog.md`
- Genesis file (`ephemery.json`) includes custom params like `ethHash`, `discovery`, and `bootnodes`.
- Documentation updated for commands to run Ephemery.



# Teku CL Implementation Changes

- Genesis data uses SSZ format; loaded dynamically via genesis state URL.
- EphemeryNetwork class manages genesis updates and slot validations and EphemeryNetworkTest.
- Key updates in Eth2NetworkConfiguration, ephemery.yaml, DatabaseNetwork, and EphemerySlotValidationService.
- Documentation expanded for user commands on Ephemery.



# Differences in Ephemery Implementation Between EL/Besu and CL/Teku

## EL/Besu Client

- Genesis config updates are programmatically managed with JSON format.
- Added custom parameters: ethHash, discovery, and bootnodes.
- Straightforward to update chainId and timestamp.

## CL/Teku Client

- Genesis data is in SSZ format, making it harder to modify.
- Programmatically update genesis config file (ephemery.yml) and depositChainId, depositNetworkId, and minGenesisTime
- Instead of hardcoding, the updated SSZ is loaded via a genesis state URL.
- Pre-set checkpoint sync URL simplifies user setup on Ephemery.
- **Genesis Reset:** Implemented in Teku; pending completion for Besu.





**Completed implementation work  
on both Teku and Besu clients**

# Completed implementation work on both Teku and Besu clients

- ✓ Initial Research and Planning
- ✓ Ephemery genesis function development for both clients
- ✓ Simple network flags: `besu --network ephemery` `teku --network ephemery`
- ✓ Genesis reset function on Teku
- ✓ Documentation updates
- ✓ Implementation status documentation
- ✓ Testing and Refinement



# Progress Summary

**Total Merged PRs**

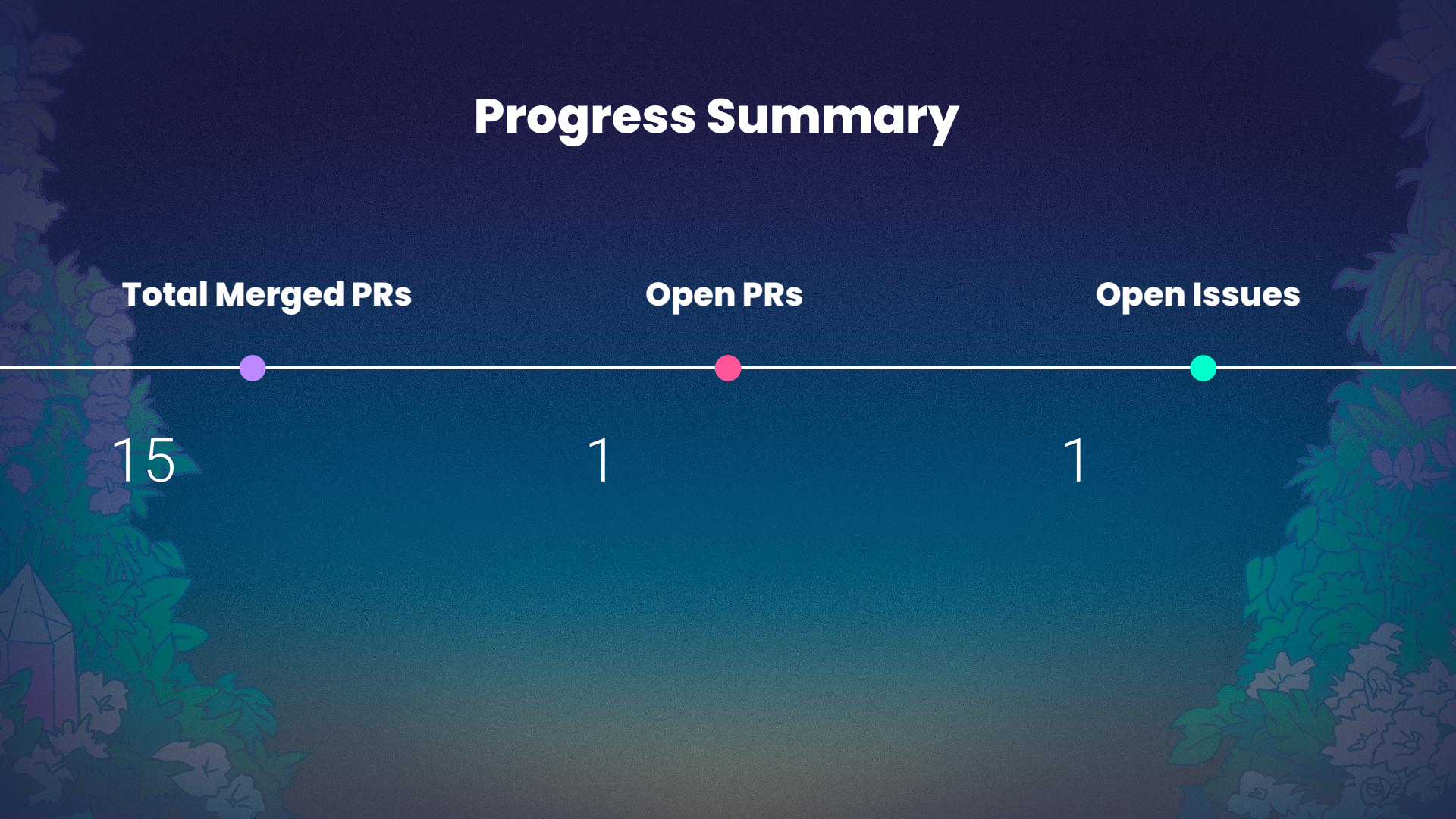
15

**Open PRs**

1

**Open Issues**

1



# Ongoing Work in Progress



# Ongoing Work in Progress

- Genesis reset function on Besu
- Ephemery website redesign
- Tutorial walkthrough creation

# Challenges Faced



# Challenges Faced

- Initial scope definition difficulties
- Complex client architecture navigation
- Limited documentation on existing implementations
- Test environment setup complexity





# **Future Development**



# Future Development

- Complete Besu Genesis reset implementation
- Implement Teku validator client onSlot processing
- Expand native support to other client pairs
- Become a validator



# Key Takeaways



# Key Takeaways

- Deep dive into Ethereum Protocol
- Experience with client implementation
- Java skills enhancement
- Test-driven development
- EIP implementation experience

# Mentors

## Special Thanks to:

- Paul Harris (Teku team)
- Sally Macfarlane (Besu team)
- pk910 and Mario Havel (Ephemery team)
- Holly (Past fellow)
- EPF Community
- Josh Davis



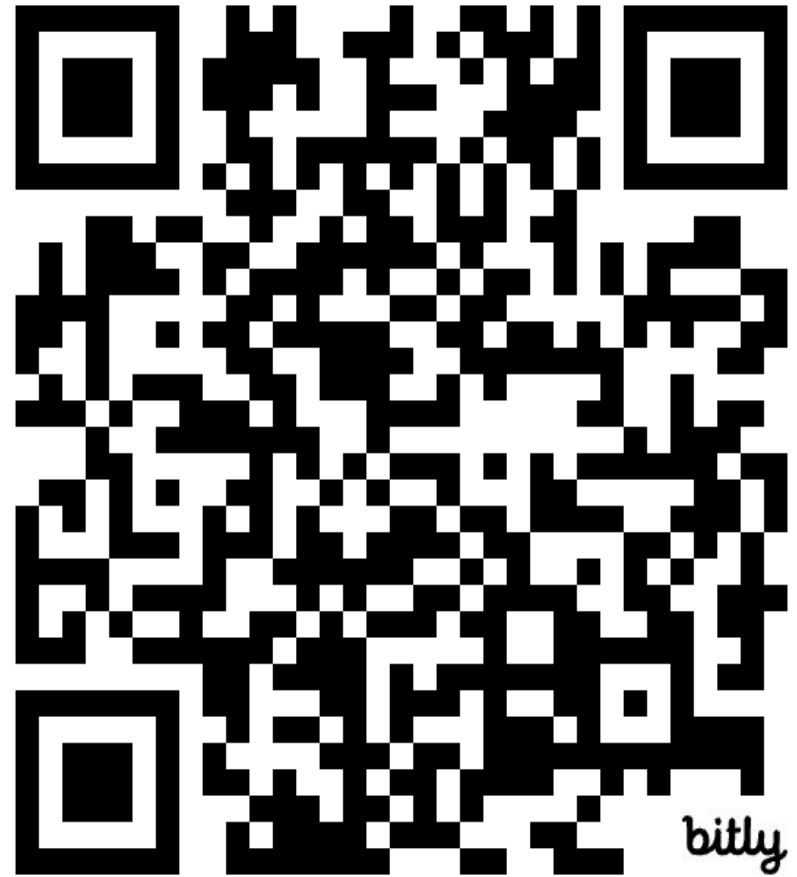
# How to Contribute to Ephemery

# How to Contribute

- Run a node, especially client which is not tested yet
- Add validators, monitor attestations, proposed blocks, slashing issues
- Use your wallet, find out how it behaves after the reset, how it handles different network ID from same RPC
- Deploy dapps, try your favorite developer tooling
- Run infrastructure, explorers, etc
- Reach out with your own ideas for testing



# Ephemery Incentivization Program



## EL Client Implementation Status

Client	Genesis Function Status	Genesis Reset Status	Contributor(s)	Notes
<a href="#">Besu</a>	<a href="#">Merged into main</a>	<a href="#">In-progress</a>	<a href="#">@gconnect</a>	<ul style="list-style-type: none"><li>- <input checked="" type="checkbox"/> Native support without extra arguments completed.</li><li>- <input checked="" type="checkbox"/> Genesis function implemented</li><li>- <input type="checkbox"/> Genesis Reset Implementation</li><li>- <input type="checkbox"/> Update Besu documentation</li><li>- <a href="#">Detail note</a></li></ul>
<a href="#">Geth</a>	Completed	In-progress	<a href="#">@atkinsonholly</a>	- <a href="#">Detail update</a>
<a href="#">Reth</a>	Completed	In-progress	<a href="#">@T-ess</a>	- <a href="#">Detail update</a>
<a href="#">Nethermind</a>	Not Started		-	-
<a href="#">Erigon</a>	Not Started		-	-
<a href="#">EthereumJS</a>	Not Started		-	-



## CL Client Implementation Status

Client	Genesis Function Status	Genesis Reset	Contributor(s)	Notes
<a href="#">Teku</a>	<a href="#">Completed &amp; Merged in Main repo</a>	<a href="#">In-progress</a>	<a href="#">@gconnect</a>	<ul style="list-style-type: none"><li>- <input checked="" type="checkbox"/> Native support without extra arguments merged.</li><li>- <input checked="" type="checkbox"/> Genesis function implemented</li><li>- [ ] Genesis Reset Implementation in progress</li><li>- [ ] Update documentation</li><li>- <a href="#">Detail note</a></li></ul>
<a href="#">Lodestar</a>	Completed	In-progress	<a href="#">@atkinsonholly</a>	<ul style="list-style-type: none"><li>- <a href="#">Github Discussion</a></li><li>- <a href="#">Development update</a></li></ul>
<a href="#">Lighthouse</a>	Completed	In-progress	<a href="#">@T-ess</a>	<ul style="list-style-type: none"><li>- <a href="#">Detail update</a></li></ul>
<a href="#">Nimbus</a>	Not Started		-	-
<a href="#">Prysm</a>	Not Started		-	-
<a href="#">Grandine</a>	Not Started	-		-

# Resources

- Ephemery Website: [ephemery.dev](https://ephemery.dev)
- Project Documentation: [GitHub](#)
- Implementation Status: [Client Implementation Table](#)
- Ephemery Matrix Community



# Thank you!

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