Post-Merge Testnets

a close look at the public Ethereum testnet infrastructure and how it ~~will change~~ changed significantly with the merge

Afri Schoedon

Head of Protocol, ChainSafe Systems

About me

ChainSafe

Head of Protocol Engineering
ChainSafe Systems, Berlin

ETHBERLIN

Core Organizer ETHBerlin
Department of Decentralization, Berlin

(EF/ESP Grants for EL/CL Testnets)

```
.---------.
|.-------.|
||> run  ||
||       ||
|'-------'|
_^_________^_
|Görli Testnet|
'-------------'
```

Launched Goerli Testnet w/ ChainSafe
ETHBerlin 2018 & GoerliCon 0, Berlin

parity ethereum

Release Manager “Parity Ethereum”
Parity Technologies, Berlin

https://github.com/q9f

What we'll cover today

Protocol History

Brief protocol history of Ethereum and an overview of the pre-merge testnets.

The Merge™

Implications of The Merge™ on the public testnet infrastructure; how does the new consensus affect the testnets?

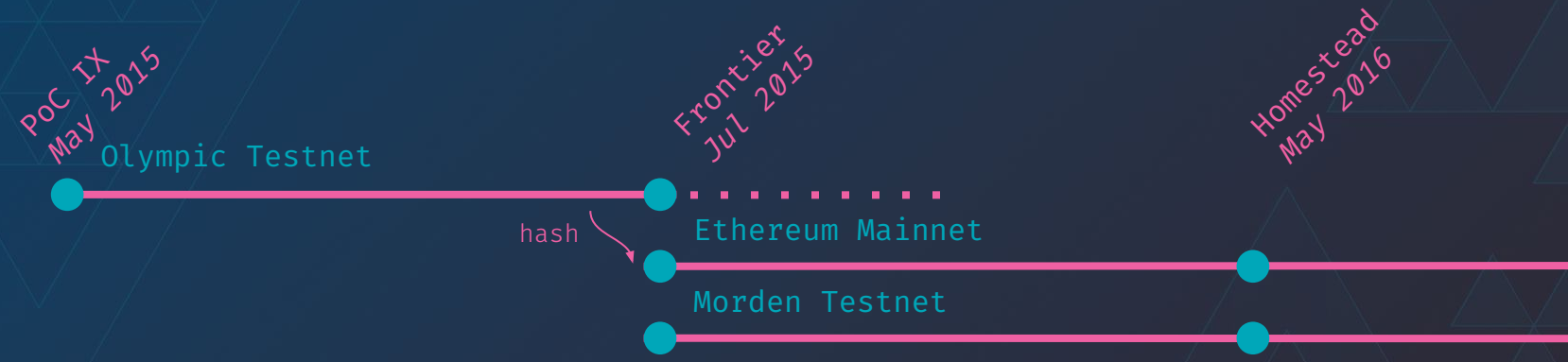
Testnet Selection

Quick guide to choose a post-merge testnet for your project.

Section 0

Brief Protocol History

Ethereum launched from a Testnet (2015)



Olympic Testnet:

- Ethereum Pre-Release
- Proof-of-Concept 09
- Proof-of-Work Ethash
- Network ID #0

https://github.com/ethereum/genesis_block_generator

Ethereum Mainnet:

- Ethereum Beta Release
- “Frontier 1.0”
- Proof-of-Work Ethash
- Network ID #1
- Genesis from Olympic block hash

Morden Testnet:

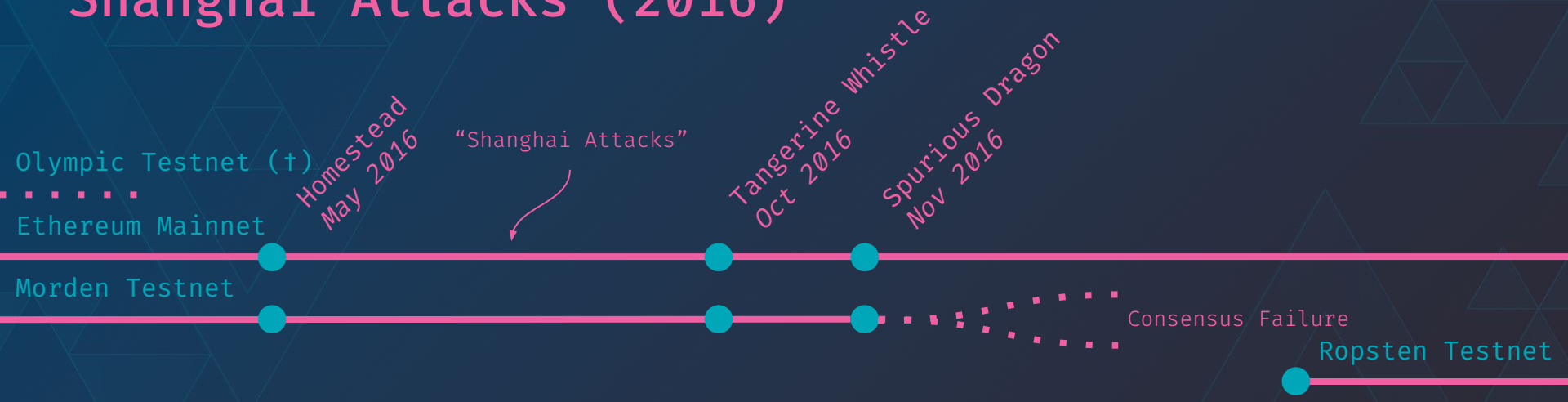
- Proof-of-Work Ethash
- Network ID #2
- Replaces Olympic
- Custom starting nonce for replay protection (2**20)

From Shanghai, with love

The “Shanghai Attacks” during DevCon 2 in Shanghai (2016) would have a lasting effect on the public Ethereum testnet infrastructure.

https://www.infoq.com/news/2016/09/Ethereum-DOS-Attack

Shanghai Attacks (2016)



Shanghai Attacks:

- Ethereum Mainnet DoS during DevCon 2
- Exploit EXTCODESIZE disk read time

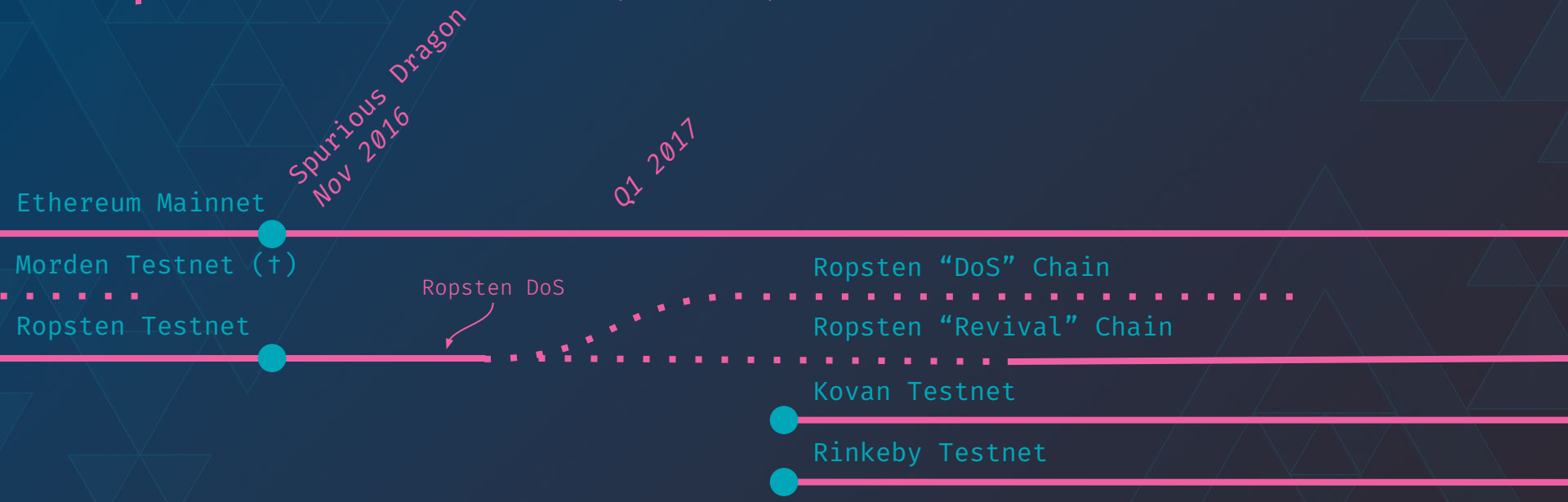
Morden Consensus:

- Chain split between Geth and Parity
- Morden specific (no issue for mainnet)

Ropsten Testnet:

- Proof-of-Work Ethash
- Network ID #3
- Replaces Morden
- Replay Protection (EIP 155 Chain ID #3)

Ropsten Revival? (2017)



Ropsten DoS:

- Repeated Testnet DoS
- Unusable for weeks

Kovan Testnet:

- Proof-of-Authority (Aura, Parity only)
- Network/Chain ID #69

Rinkeby Testnet:

- Proof-of-Authority (Clique, Geth only)
- Network/Chain ID #4

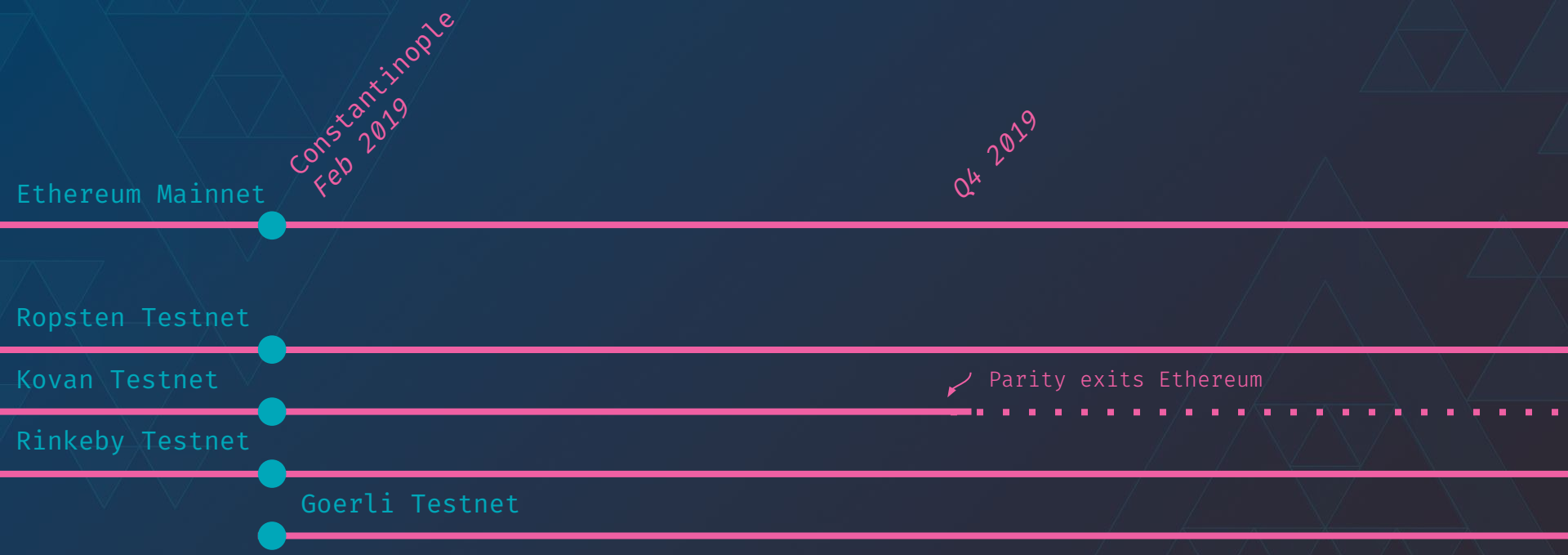
Goerli Testnet Idea

To give Ethereum a stable, public, cross-client testnet, two teams ideated the Goerli Testnet at ETHBerlin (2018), won a hackathon prize, and were immediately disqualified after.

ETHBERLIN
HACKATHON + WORKSHOPS + TALKS

https://medium.com/ethberlin/proof-of-transparency-ff31c4911462

Goerli to the Rescue (2019)



Goerli Testnet:

- Proof-of-Authority (Geth, Parity, Pantheon, Nethermind)
- Network/Chain ID #5

“Open Ethereum:”

- Uncertain future for Kovan/Aura

ethereum foundation blog

Categories Search Languages

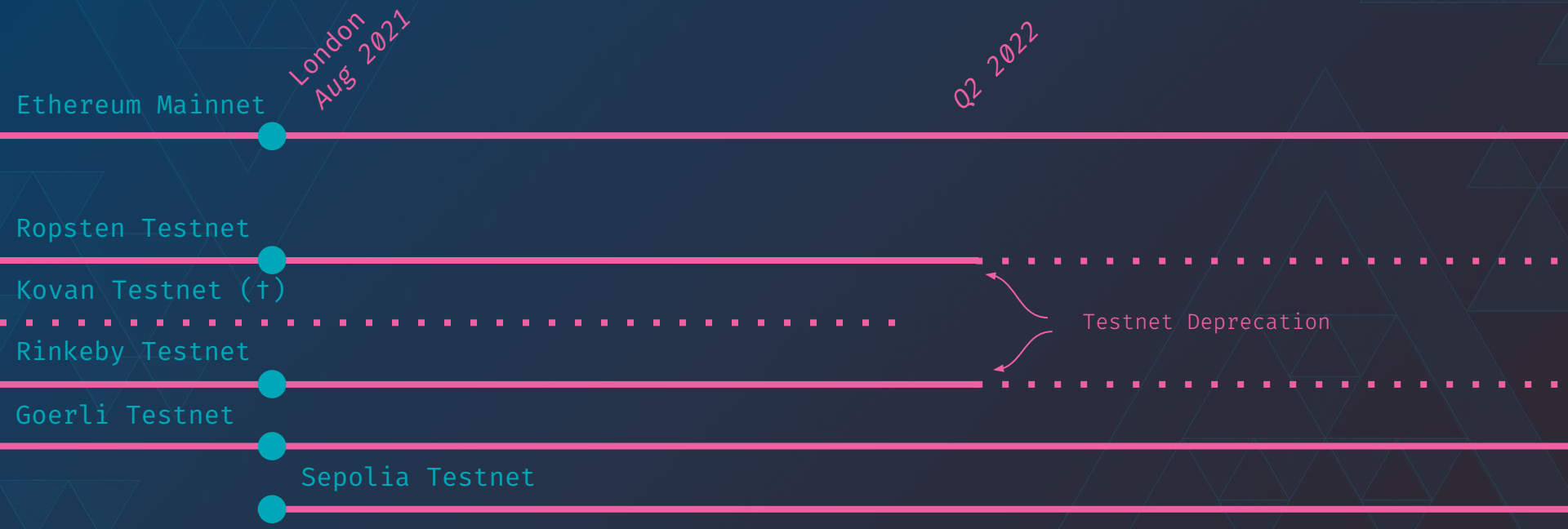
Ropsten, Rinkeby & Kiln Deprecation Announcement

Posted by Protocol Support Team on June 21, 2022

Research & Development

https://blog.ethereum.org/2022/06/21/testnet-deprecation

Pre-merge Testnet deprecation (2022)



Sepolia Testnet:
- Proof-of-Work, Network/Chain ID #11155111

Deprecation of:
- Ropsten & Rinkeby

Pre-Merge Testnets

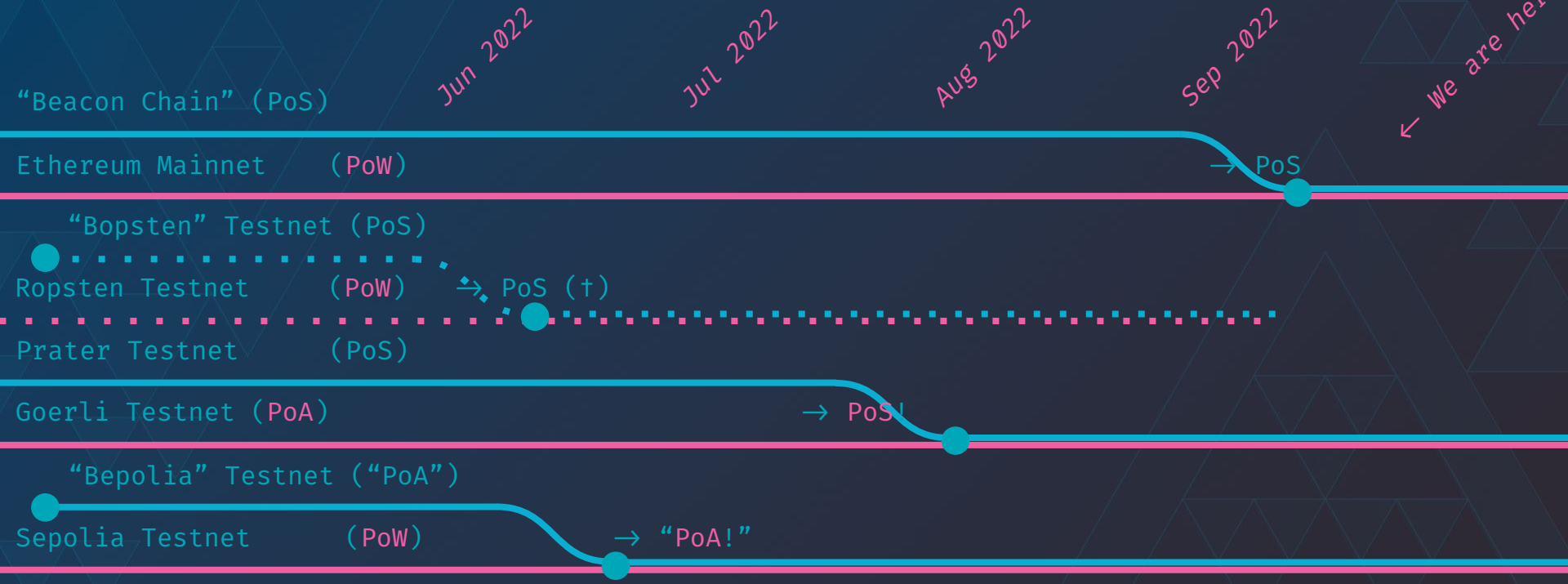
Extensive List (6)

- Morden (†)
- Ropsten
- Kovan (†)
- Rinkeby
- Goerli
- Sepolia

Section 1

Implications of The Merge™

The Merge™ (2022)



Implications of The Merge™

Consensus

- Proof-of-Work: permissionless
- Proof-of-Authority: permissioned
- Proof-of-Stake: permissionless (*)

Networks

- Mainnet: PoW → PoS, unchanged (*)
- Goerli: PoA → PoS, now *permissionless*
- Sepolia: PoW → “PoA,” now *permissioned*

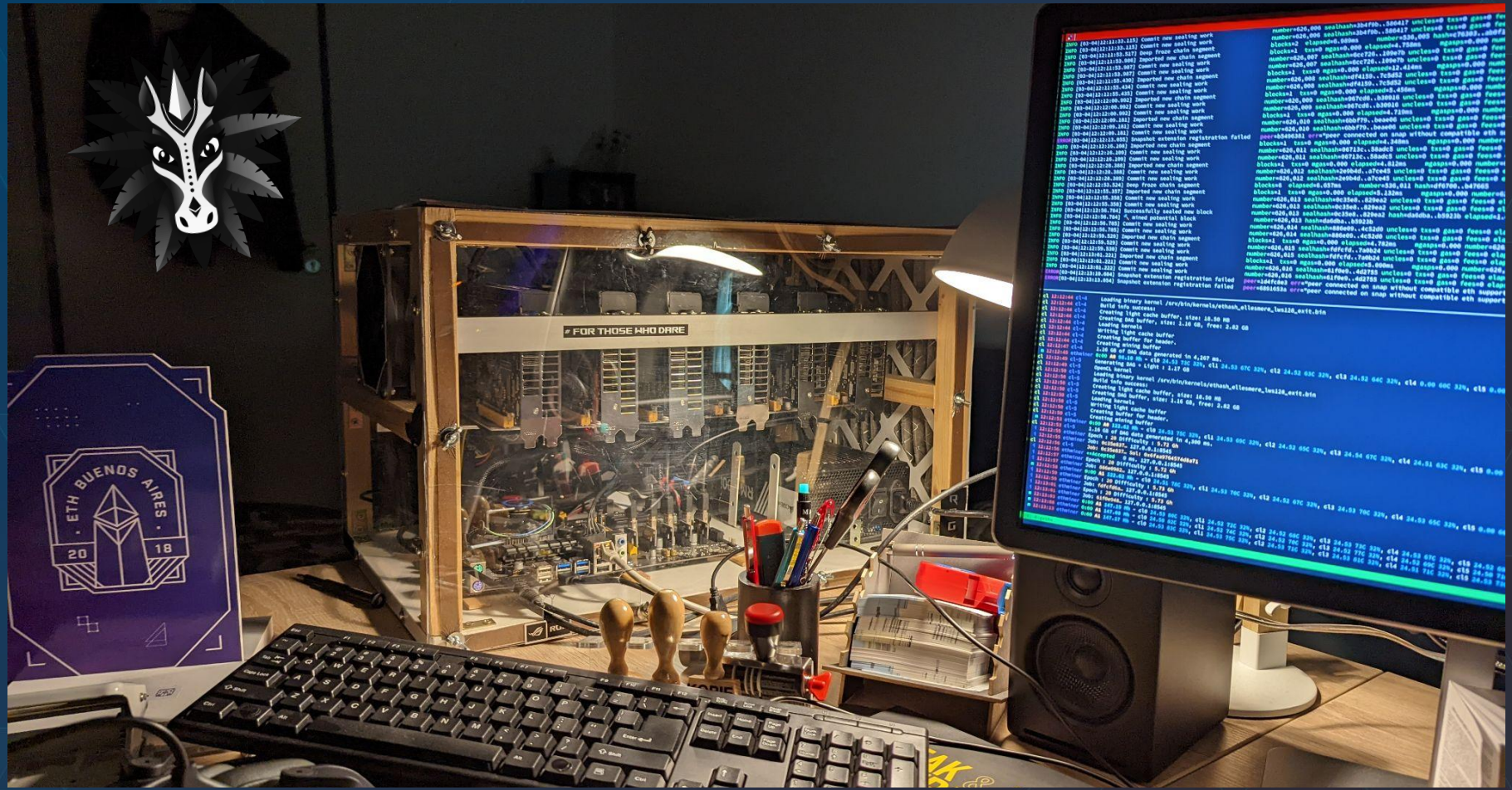
Goerli-Prater Merge

Pre-Merge

- Proof-of-Authority: Clique
- Predefined validator set (community)
- Access to consensus permissioned

Post-Merge

- Proof-of-Stake: Gasper / LMD GHOST
- Open validator set (given access to GoETH)
- Access to consensus permissionless



Mining through The Merge™ (here: Sepolia)

Sepolia-Bepolia Merge

Pre-Merge

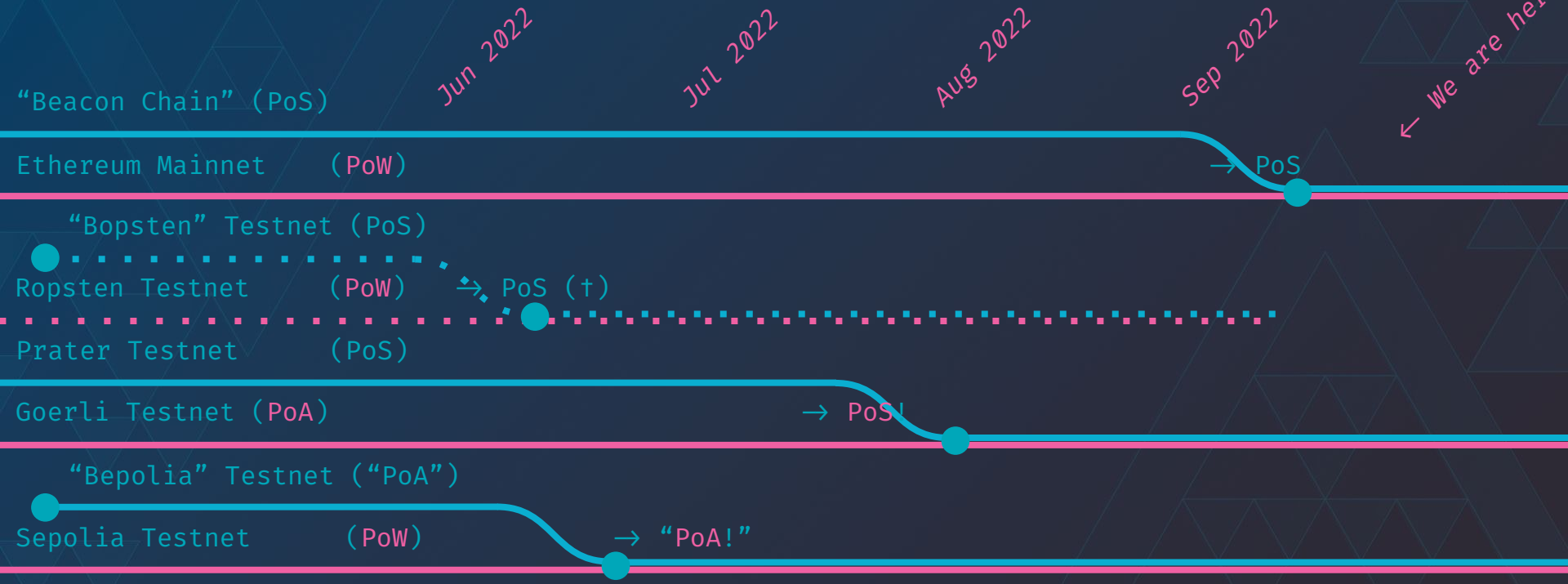
- Proof-of-Work: Ethash
- Nakamoto consensus (“one CPU, one vote”)
- Access to consensus permissionless

Post-Merge

- Proof-of-Authority: Gasper / LMD GHOST (*)
- Permissioned validator set through token
- Access to consensus permissioned

https://sepolia.etherscan.io/address/0x7f02c3e3c98b133055b8b348b2ac625669ed295d

The Merge™ (2022)



Extensive List (3)

- Ropsten (†)
- Goerli
- Sepolia

Post-Merge Testnets

Section 2

Testnet Selection Guide

Post-Merge Supported Testnets

Goerli

- Open validator set, stakers can test network upgrades
- Large state, useful for testing complex smart contract interactions
- Longer to sync and requires more storage to run a node

Sepolia

- Closed validator set, controlled by client & testing teams
- New testnet, less applications deployed than other testnets
- Fast to sync and running a node requires minimal disk space

https://blog.ethereum.org/2022/06/21/testnet-deprecation

Dos and Don’ts

Do use Goerli Testnet

- Most similar to mainnet
- Test your validators

Do use Sepolia Testnet

- Most stable
- Long-term guarantees
- Test your applications

Don’t use Ropsten

- Expect interruptions (†)

Don’t use Kovan

- Dependence on Parity (†)

Don’t use Rinkeby

- No protocol upgrades (†)

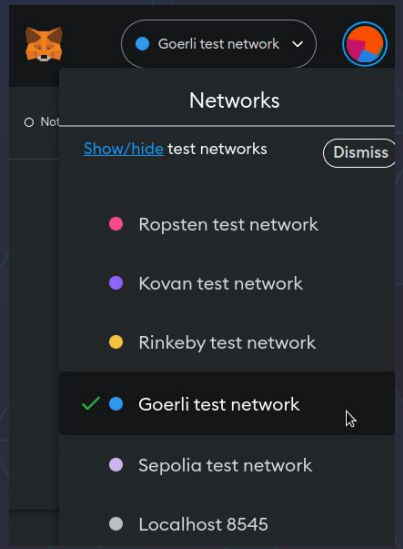
Caveats

Goerli Testnet

- Goerli Ether supply issues
  - Testnet-only protocol upgrade?
- Fairly old (in terms of testnet age)
  - More difficult to synchronize

Sepolia Testnet

- (lack of infrastructure)



Dos (simplified)

Goerli: Validators

Sepolia: Applications

Any Questions?

RUN GLR

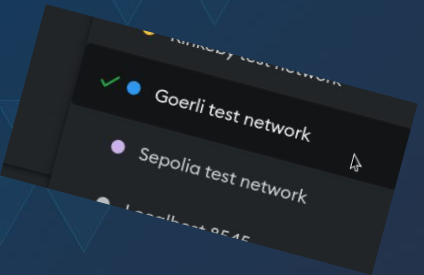
Do use Goerli Testnet

- Most similar to mainnet
- Test your validators

RUN SPL

Do use Sepolia Testnet

- Most stable
- Long-term guarantees
- Test your applications



Hit me up for free Testnet Ether !!

Testnet Workgroup? Anyone?

Thank you!

Afri Schoedon

Head of Protocol, ChainSafe Systems

afri@chainsafe.io

@q9f