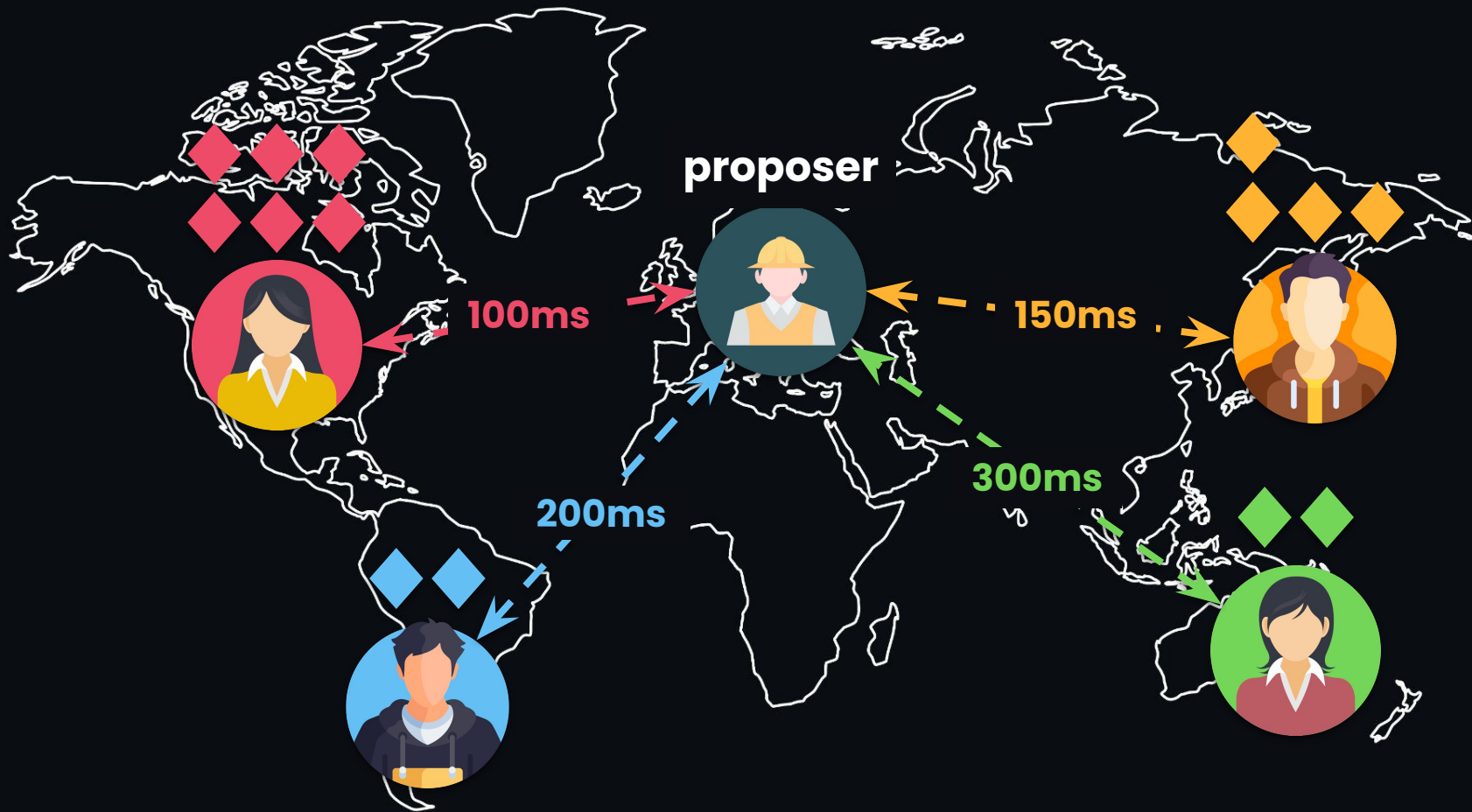


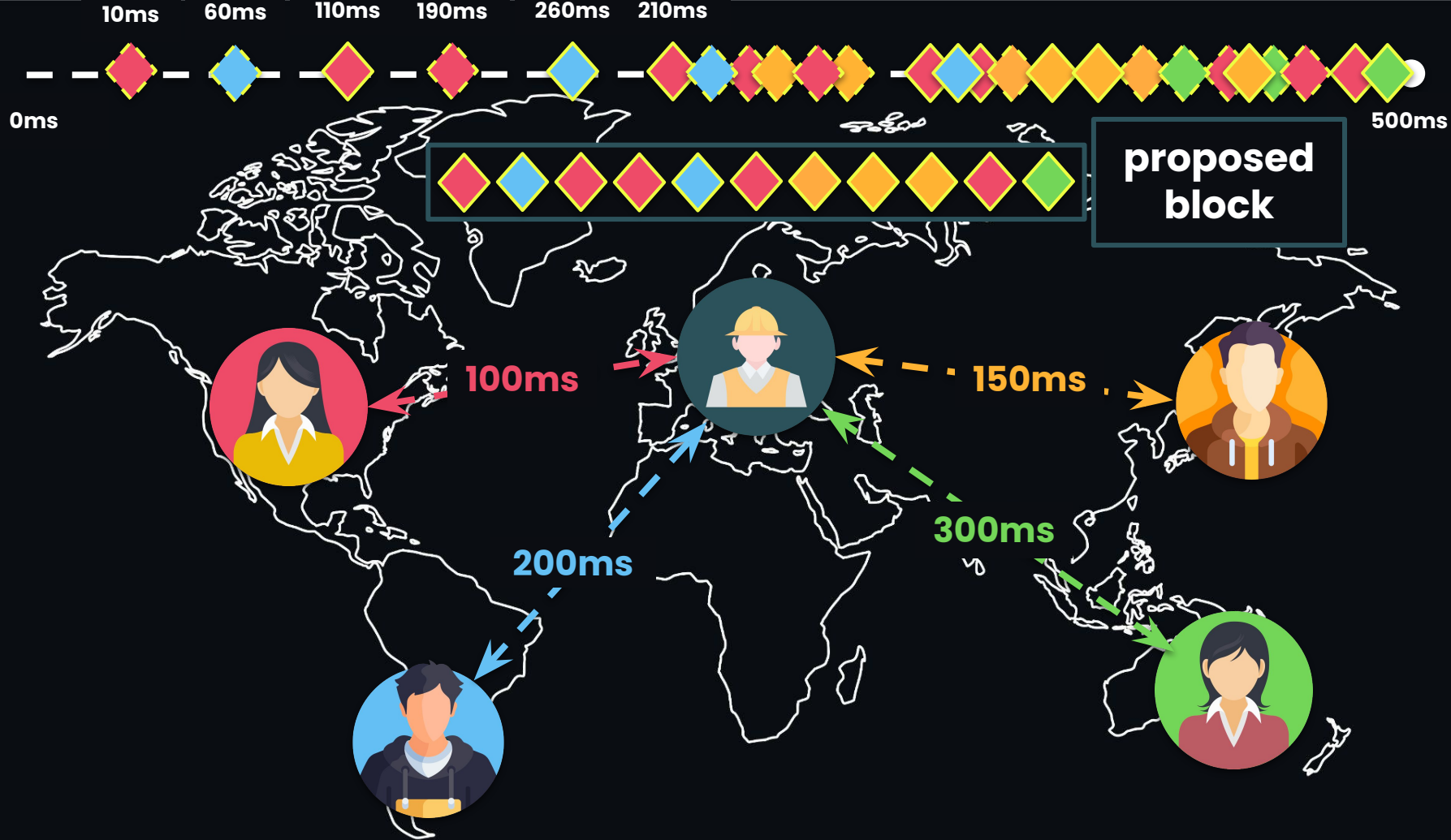
The Geography of Order Flow in Blockchains

DeTap 2026

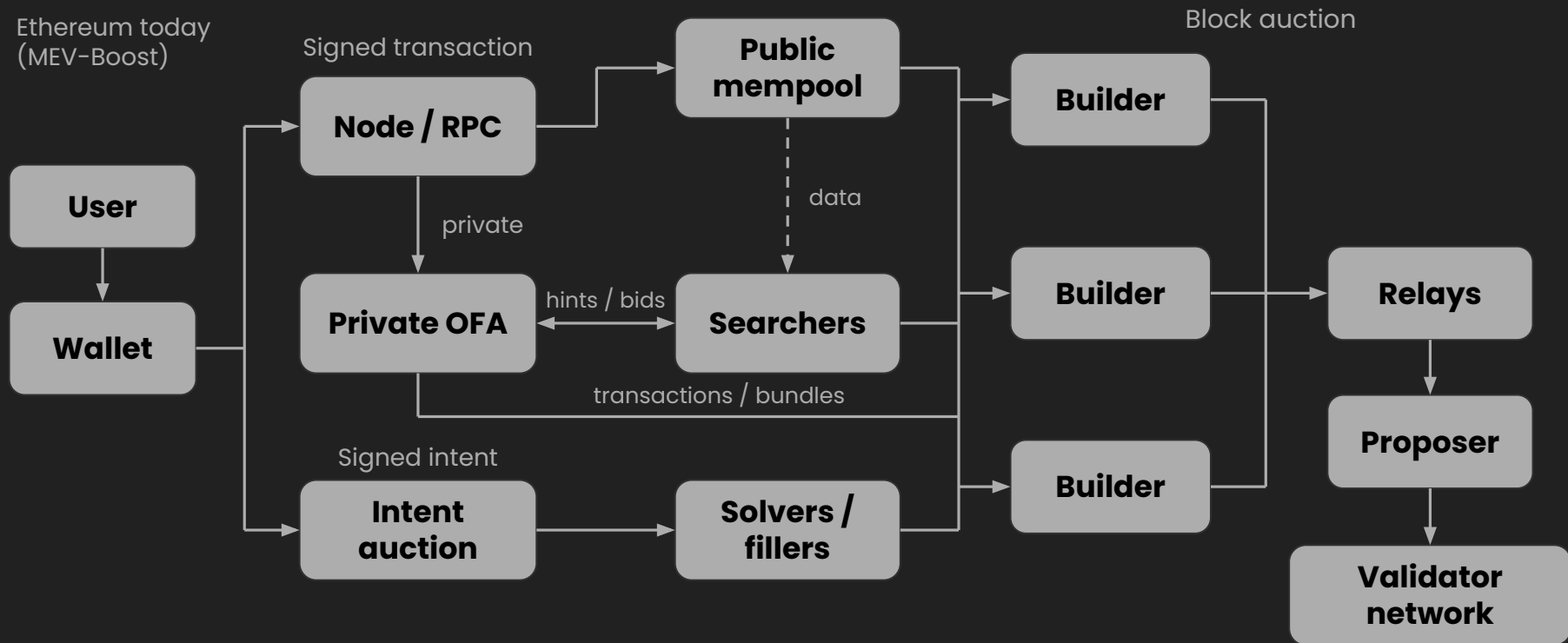
Burak Öz (Flashbots), Lioba Heimbach (Category Labs), Christoph Schlegel (Flashbots)

6 October, 2026



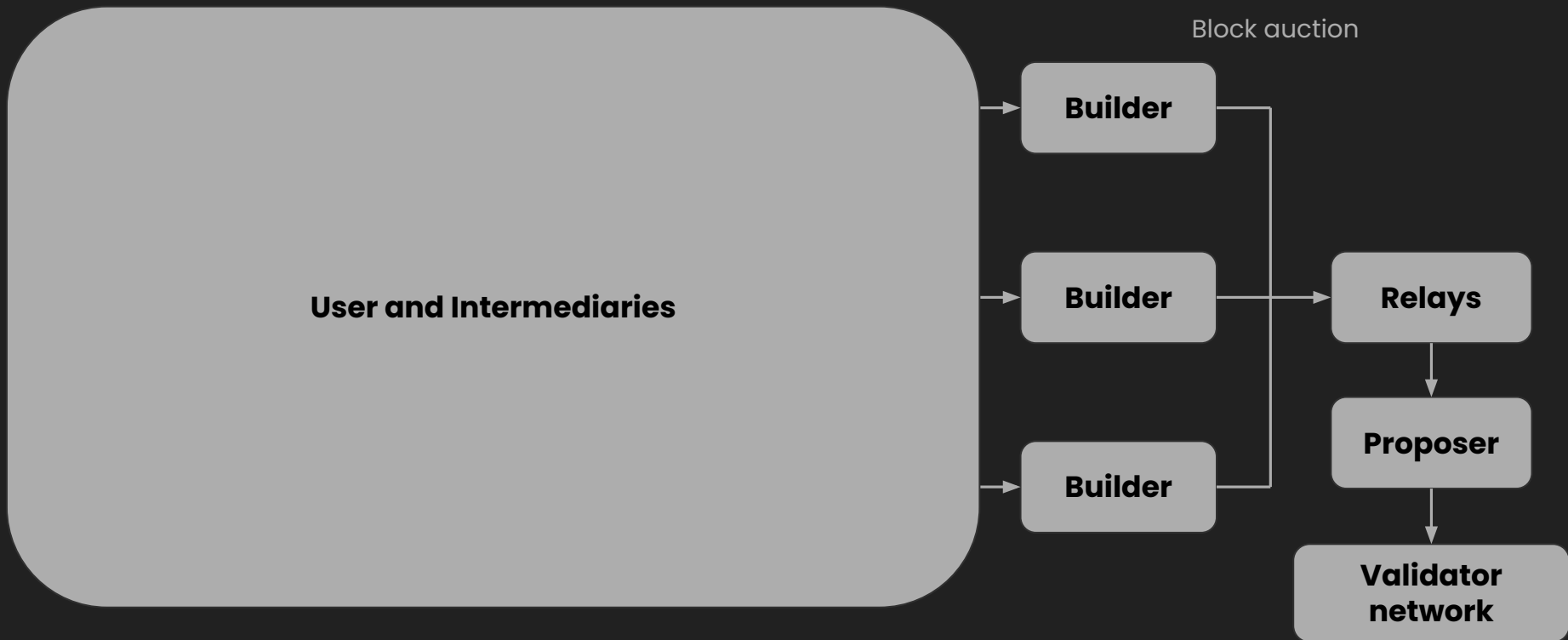


Journey of an Ethereum transaction

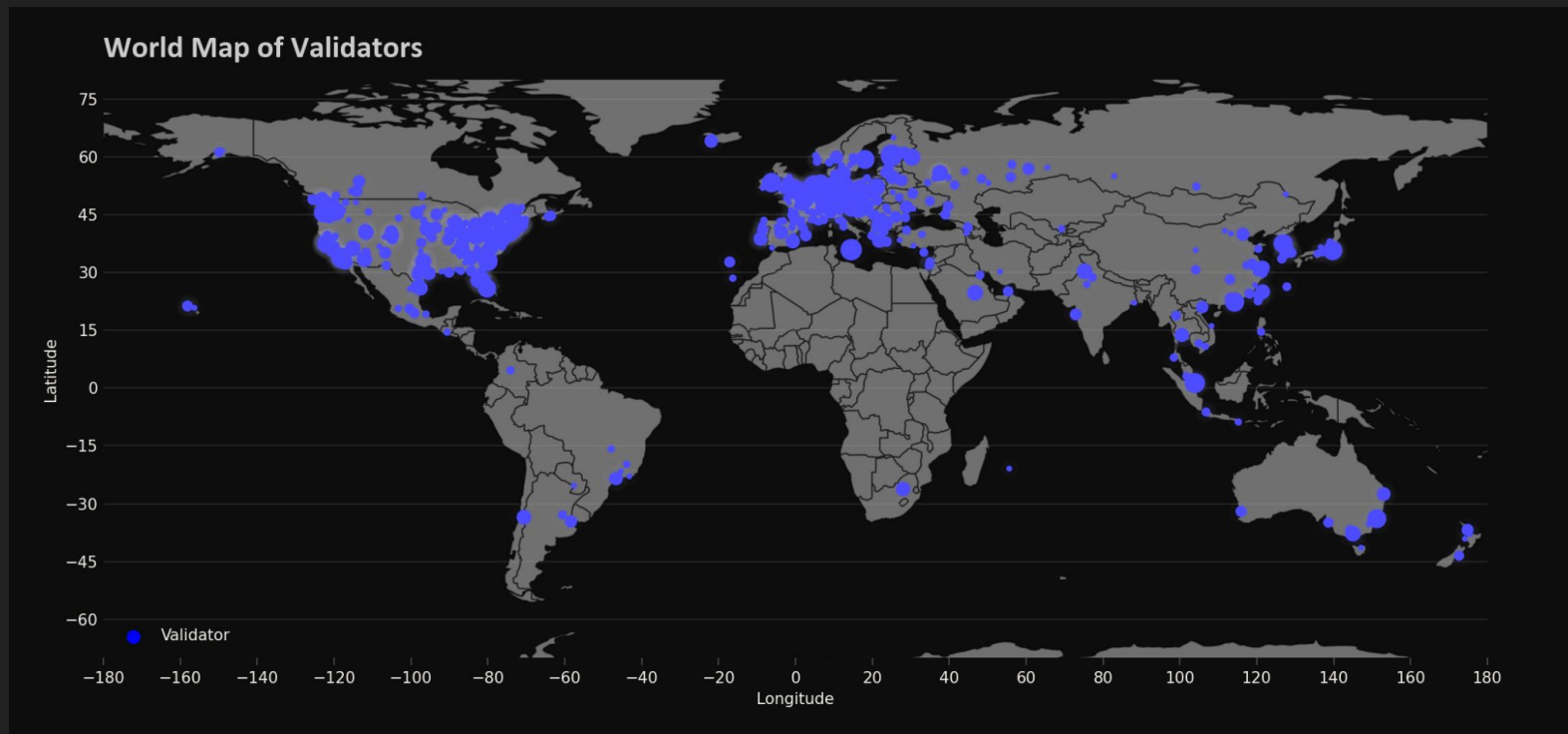


Distinct entry paths; shared block-building and consensus layers.

Simplified journey of an Ethereum transaction

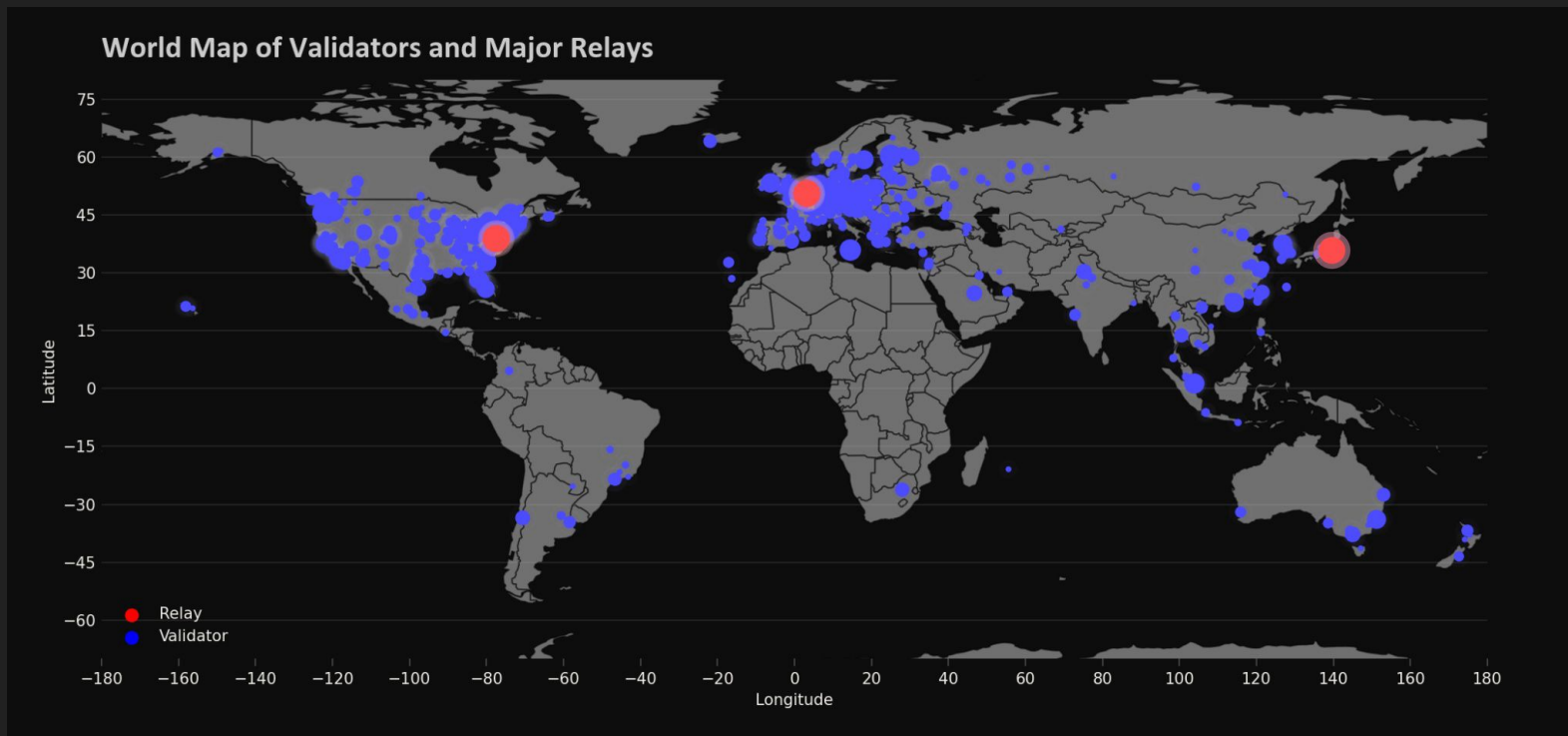


Validator distribution

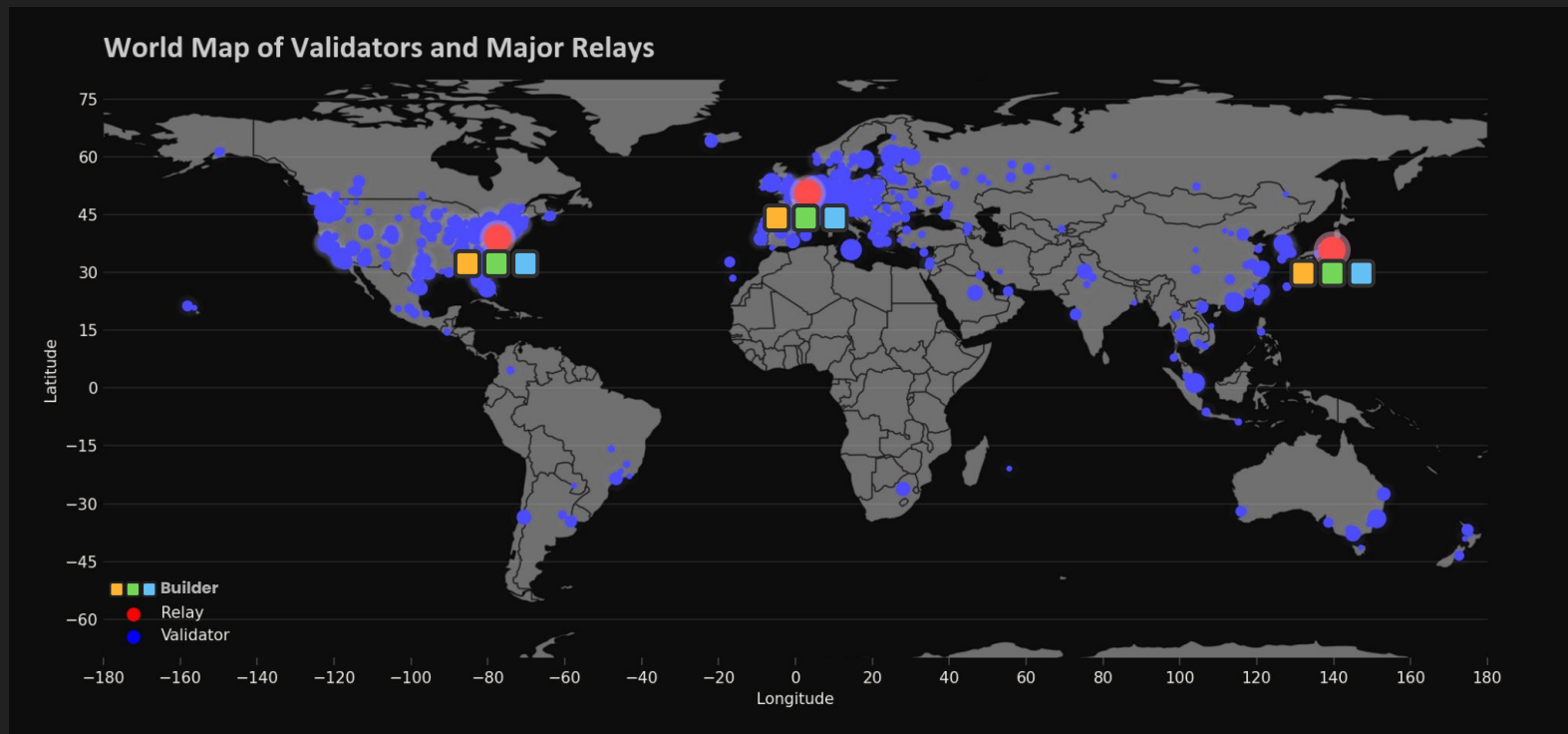


Validator data via Chainbound <> EF Robust Incentives Group

Relay distribution



Builder distribution



Why geographic decentralization?



Censorship resistance

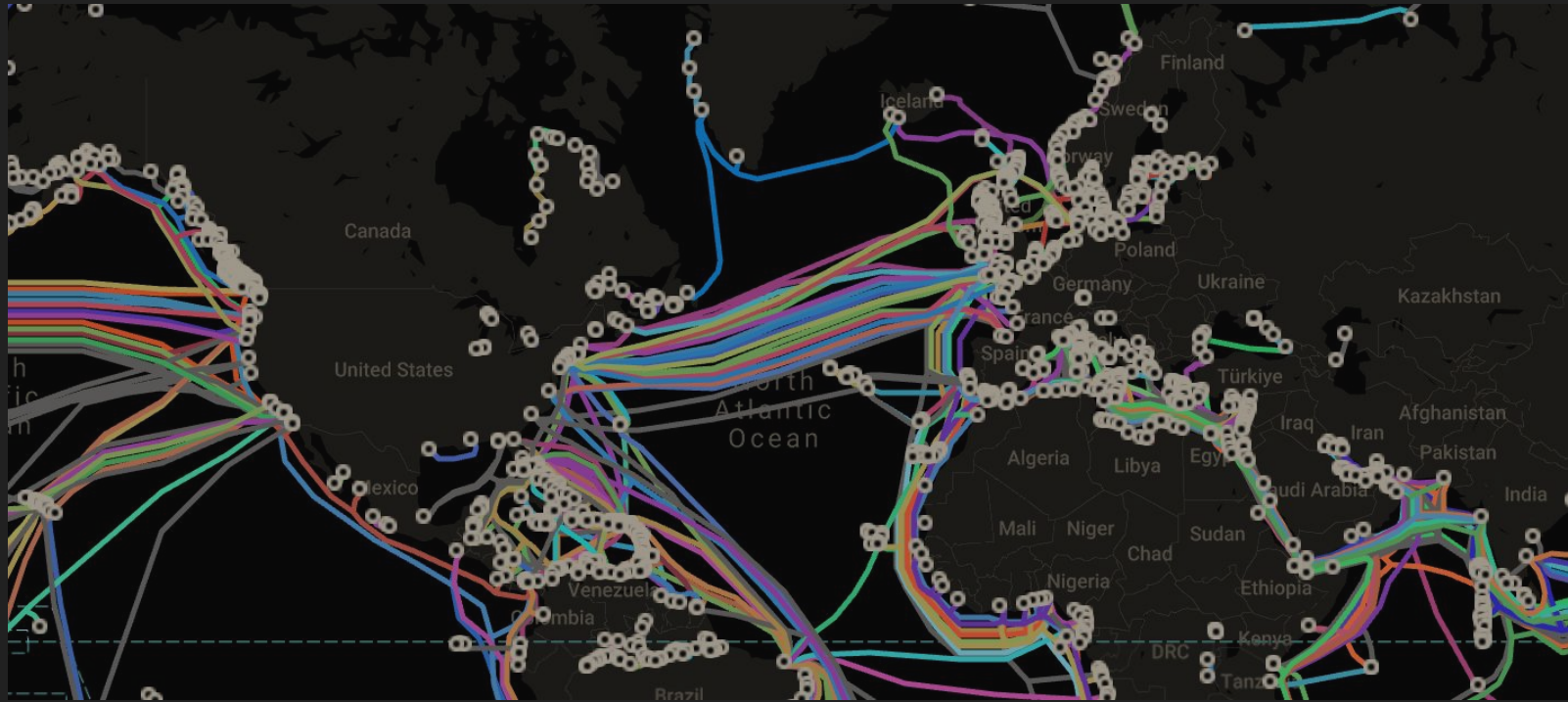
Laws and restrictions differ across jurisdictions. A geographically diverse validator set means no single jurisdiction can censor transactions.



Equal access

Time to inclusion and finality depends partly on a user's distance to the nearest proposer. With a fully distributed validator set, all users get the same experience.

Relays & Transatlantic corridor



Geography in traditional finance



Quincy Data Launches Transatlantic Signal Feeds

March 27, 2025 (Chicago)

Quincy Data, the global leader in market data technology, announces new Transatlantic Feeds distributing key CME data in London, Frankfurt, and Mumbai. This data service provides insights into large trade events for key CME futures instruments, ensuring market participants receive critical trading indicators with minimal delay. The Signal Feed latency from CME's Aurora, IL to the Slough-LD4 data center in the UK is 23.x milliseconds one-way, enabling the fastest possible price discovery.

**Wireless signal feeds: ~23 ms
Chicago–London (2025). How?**

Dispersed order-flow origin; concentrated execution infrastructure

Map: Sniper in Mahwah (2014), London–Frankfurt microwave routes. Cable example: Equinix (2015). Signal

locate
LSE in London



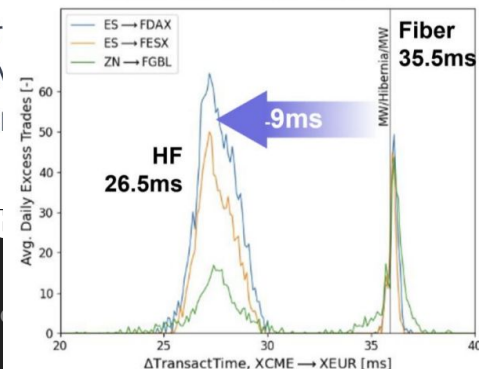
Stefan Schlamp • 1st
Head of Content Development & Management
2mo •

Having [#cmegroup](#) and [#eurex](#) [#marketdata](#) on Deutsche Börse's A7 Analytics Platform helps reveal the footprints of shortwave trading in the [#histogram](#) of reaction times between trades on [#cme](#) and [#eurex](#).

The lowest "classical" ([#microwave](#) + dedicated trans-Atlantic [#fiber](#)) latency is approximately 37 ms. The data, however, shows the shift towards shortwave radio (high-frequency, "HF") of [#hft](#) trading participants. This technology (at very low bandwidths) provides a 9 ms [#latency](#) advantage.

[Read more...](#)

XCME/XEUR Cross-Venue Reactions



Geography in traditional finance

Order flow. Retail investors, funds and firms route orders through brokers and dealers; execution can be far from the investor.

Futures and equities. Market makers and execution algorithms co-locate with matching engines: LSE in London; Eurex in Frankfurt.

Cross-market links. Microwave networks connect London and Frankfurt; Hibernia Express extends the latency race across the Atlantic.

Dealer markets. In corporate bonds and bespoke derivatives, low latency mainly serves dealer pricing and hedging.

Dispersed order-flow origin; concentrated execution infrastructure.

Intermediation and settlement

Aggregation. Brokers and dealers in TradFi; wallets/RPCs, OFAs and builders in Ethereum. Both aggregate dispersed user flow.

Co-location. In both systems, execution infrastructure benefits from proximity to information sources and trading endpoints.

Settlement. TradFi relies on financial institutions. Ethereum relies on a decentralized validator network to validate and finalize blocks.

Geography. Builders must reach the current proposer, and blocks must propagate across the validator network.

Decentralized settlement can coexist with concentrated intermediation.

Intermediation and settlement

	Traditional Finance	Ethereum
Aggregation	Brokers and dealers collect dispersed client orders	wallets/RPCs, OFAs and intent auctions; builders aggregate at block level
Execution	Exchange matching engines (CME Aurora, NJ equities)	Builders order transactions into candidate blocks
Latency race	Co-location plus fast link between venues	Builders co-locate with relays; CEX-DEX searchers need fast CEX feeds
Settlement	Institutions: clearing houses and depositories (e.g., NSCC, DTC)	Decentralized validator network validates and finalizes blocks
Where flow must reach	Fixed: the venue's data centre	Moving: the current proposer, which rotates every slot, via relays

Decentralized settlement can coexist with concentrated intermediation.

Today's validator set is concentrated

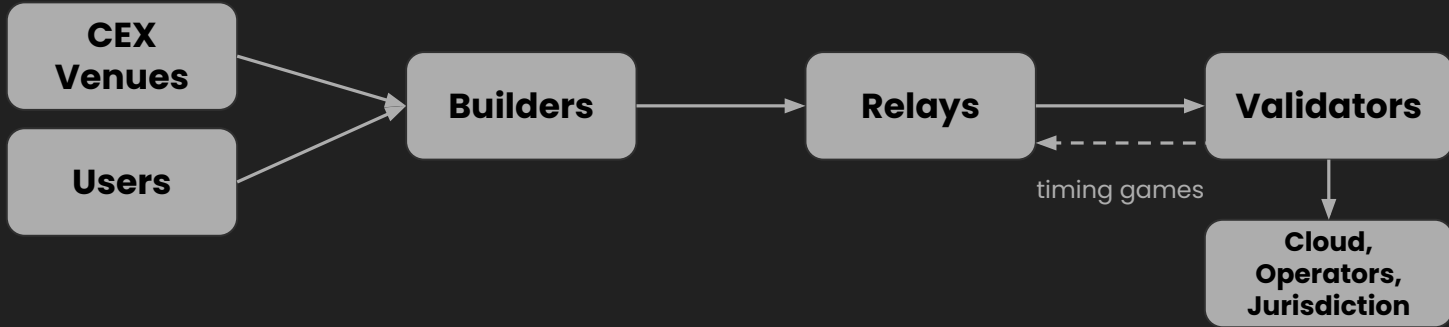
Validators cluster in a few regions. What drives this?

A chicken-and-egg problem. Validators locate near order flow, and order flow concentrates near validators.

Why order flow origin matters

- If validators follow high-value order flow, everyone else pays the latency cost.
 - High-value flow is likely driven by CEX-DEX arbitrage, so validators probably cluster near the data centers that host major CEXs.
 - Users far from the cluster likely get slower inclusion, worse execution, and censorship exposure in jurisdictions that are not their own.
 - Underserved regions likely cannot attract validators, so the imbalance may reinforce itself.
- **Open question:** Where does order flow originate, how much value does each region carry?

Who follows whom?



Validators came first. Cloud costs, operators and jurisdiction set where they started.

Since MEV-Boost, location matters. Does order flow now pull validators?

Legacy infrastructure set the starting point, but order flow may set the direction.

Inferring valuable order flow origins



Idea. For each block we know which relay instance delivered it. The proposer is usually closest to that instance.

Example. If US-proposer blocks carry much more CEX-DEX flow than Tokyo-proposer blocks, that flow is likely anchored in the US.

Caveat. Blocks may not differ meaningfully. But we can test other properties, like price freshness. E.g., Do Tokyo-proposer arbs track Binance more closely?

Ordinary users

The relay-region method can't locate users. Alternative approaches include:

Mempool first-seen. Listeners in several regions; triangulate where a public transaction entered. Misses private flow.

Builder / RPC ingress. Which regional instance hears a transaction first. Covers private flow, but shows the last hop, not the user; there is likely a form of intermediation.

Takeaways

Concern

relays a

Validat

We can

natural

SKYWAVES (HF / SHORTWAVE RADIO) TRAVEL LONG DISTANCES
AT THE SPEED OF LIGHT

Skywaves propagate back
from the atmosphere,
acting as a mirror

