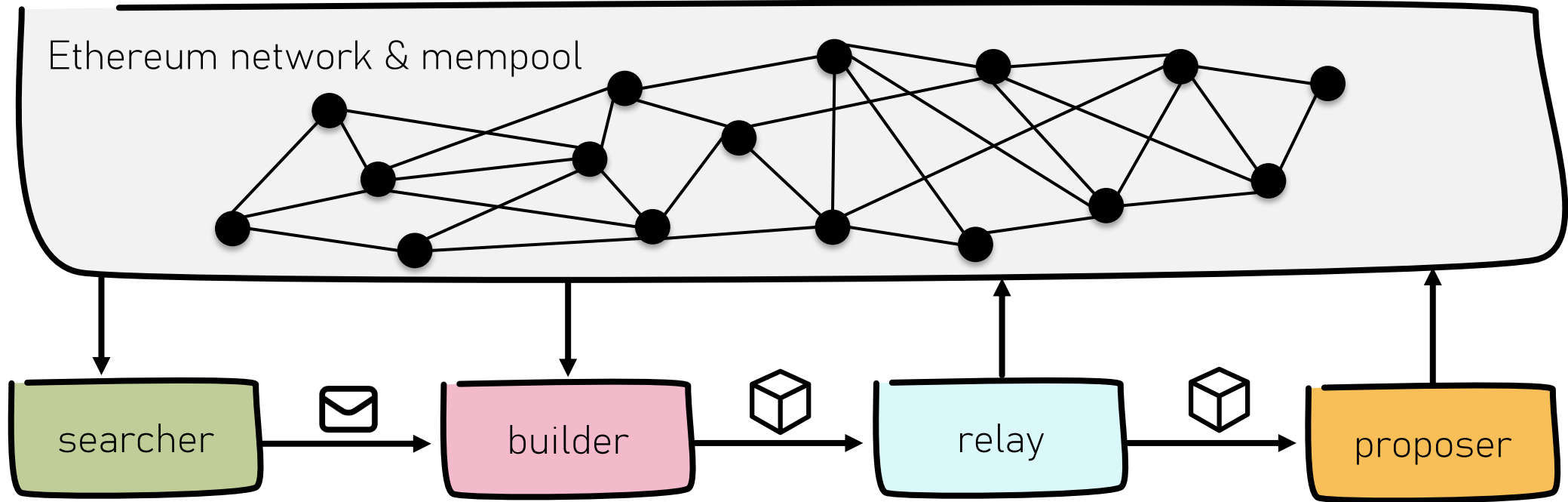
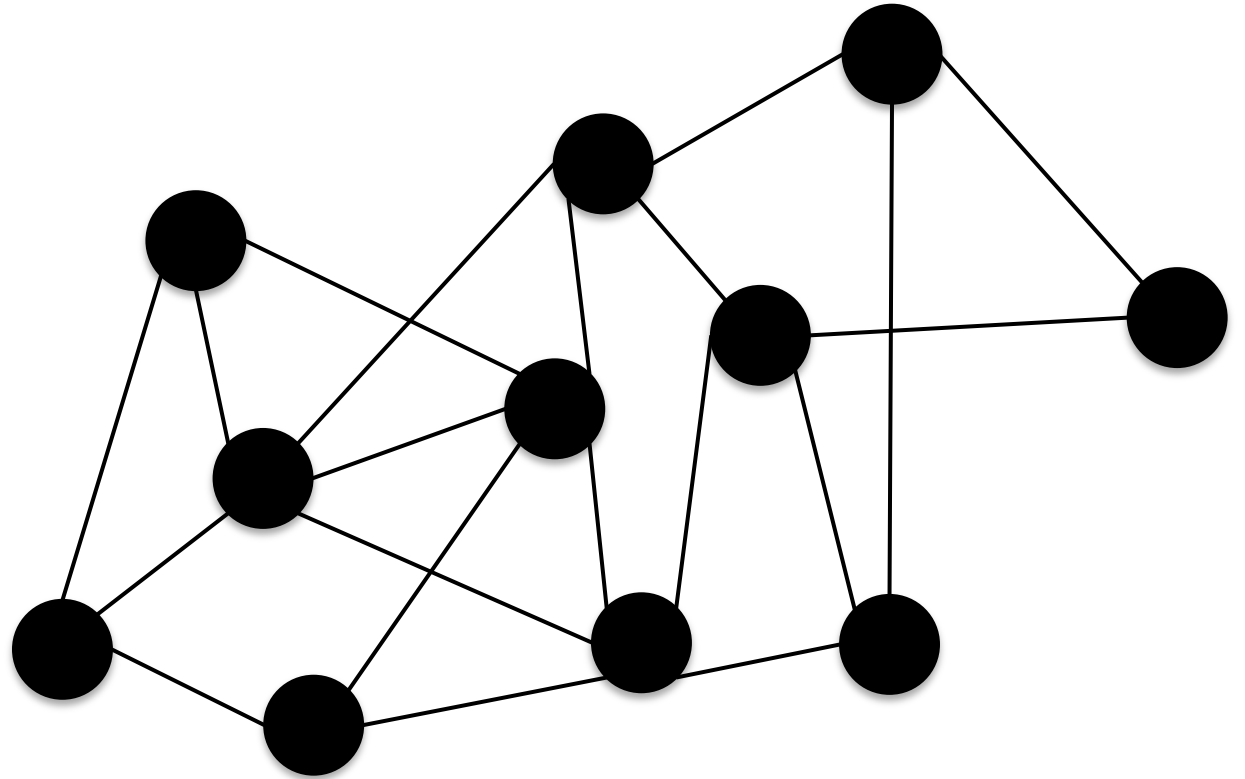
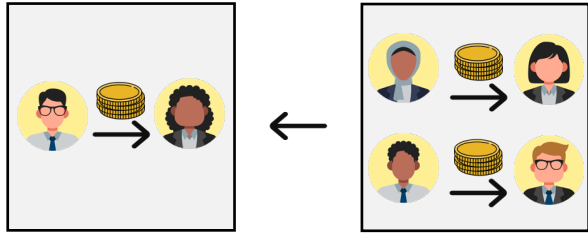


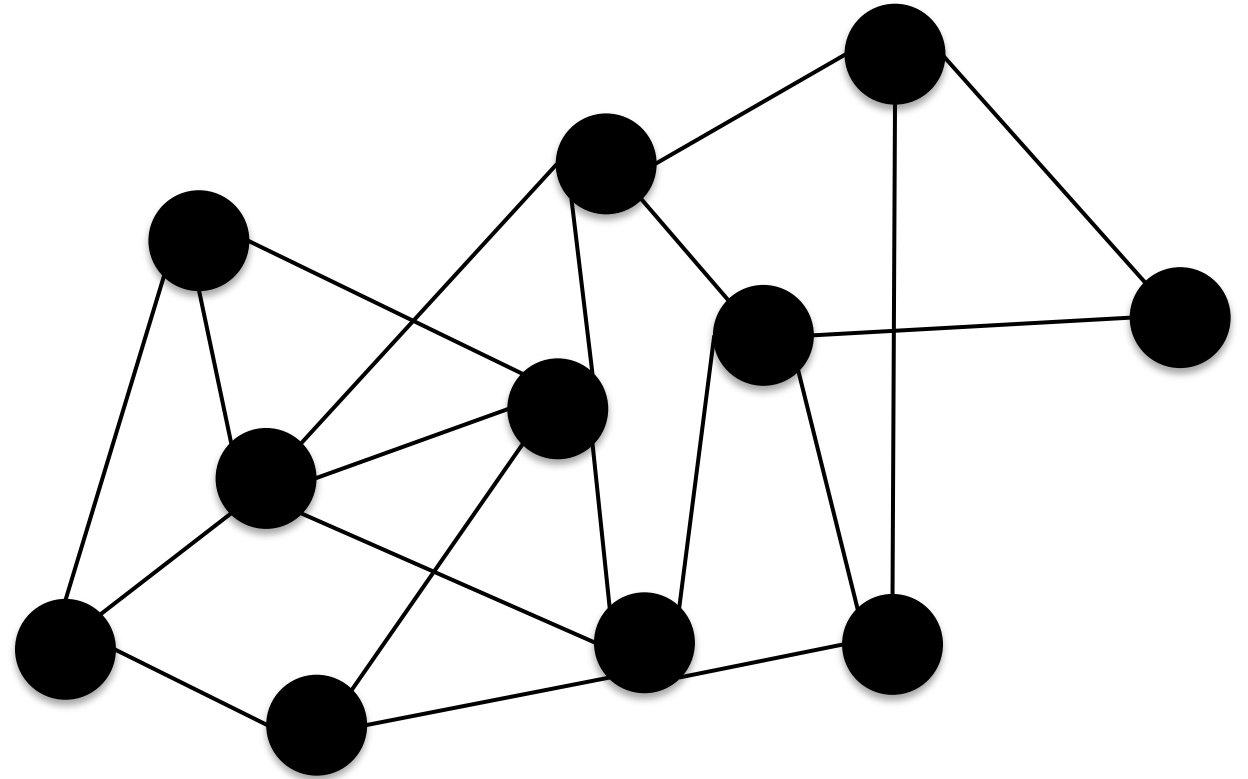
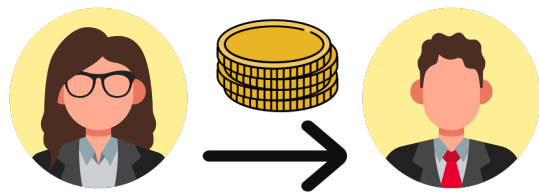
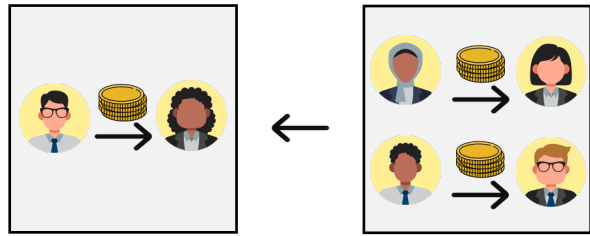
Ethereum's Proposer-Builder Separation: Promises and Realities



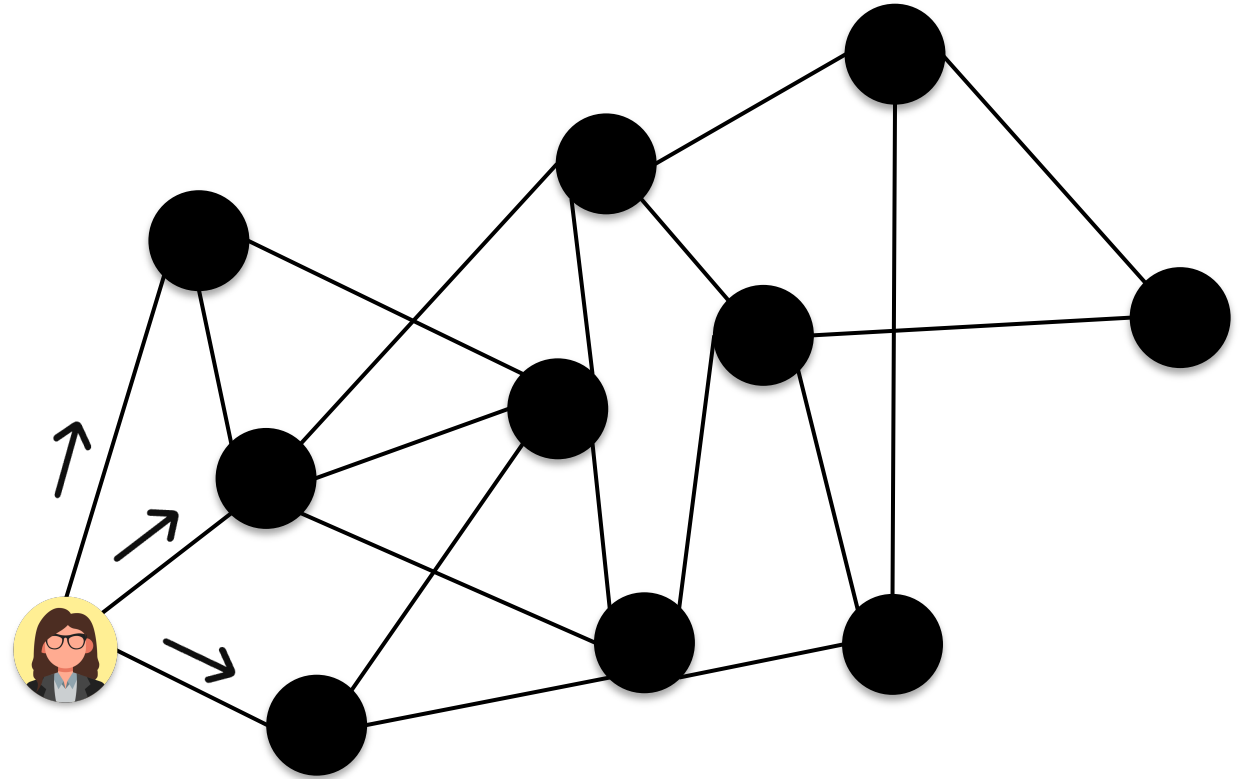
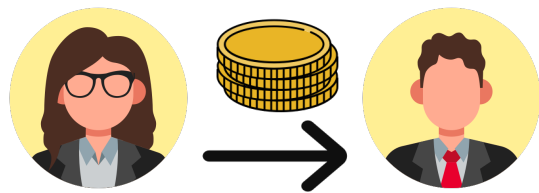
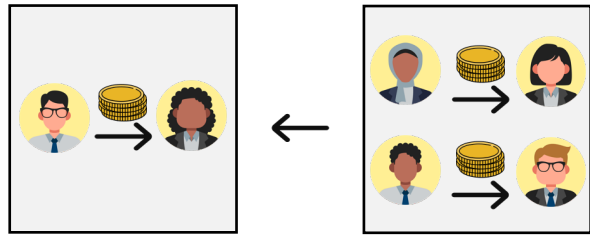
OG Ethereum design



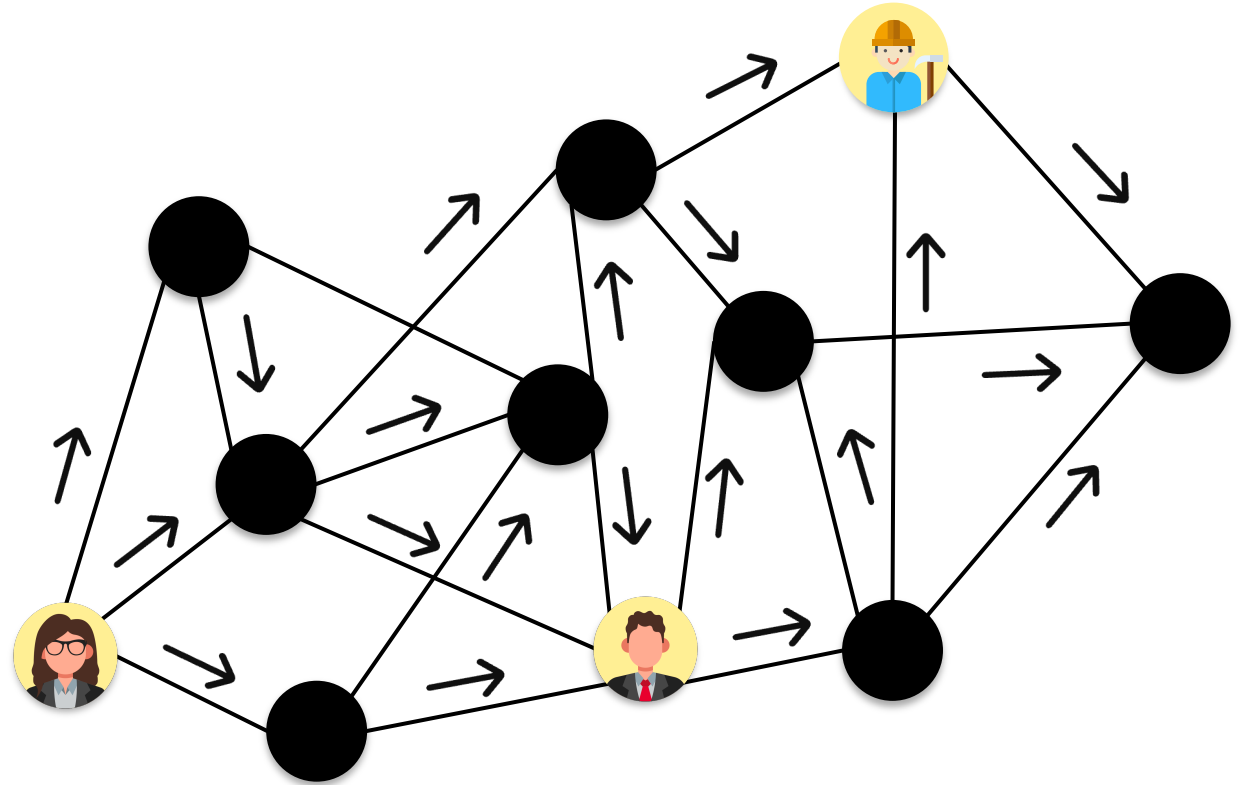
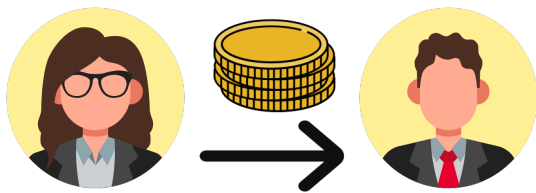
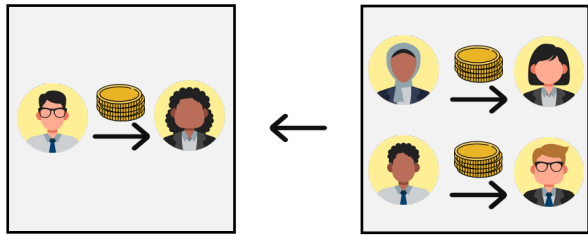
OG Ethereum design



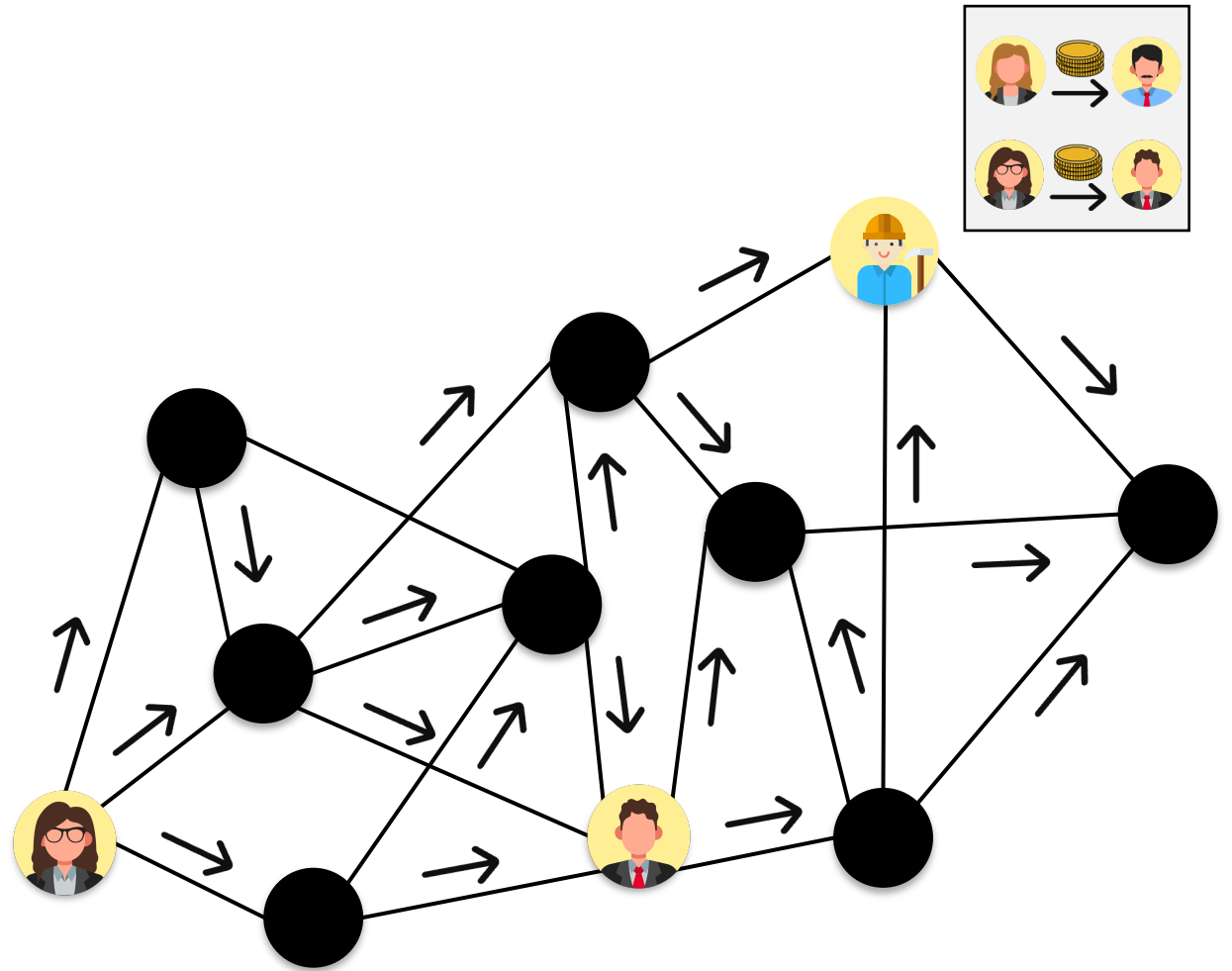
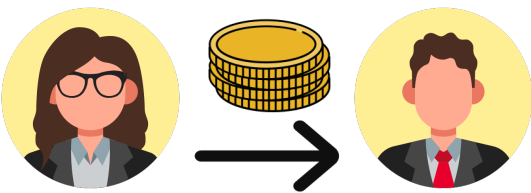
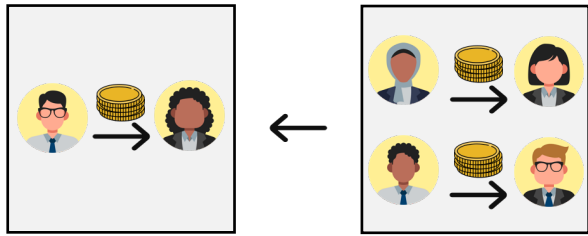
OG Ethereum design



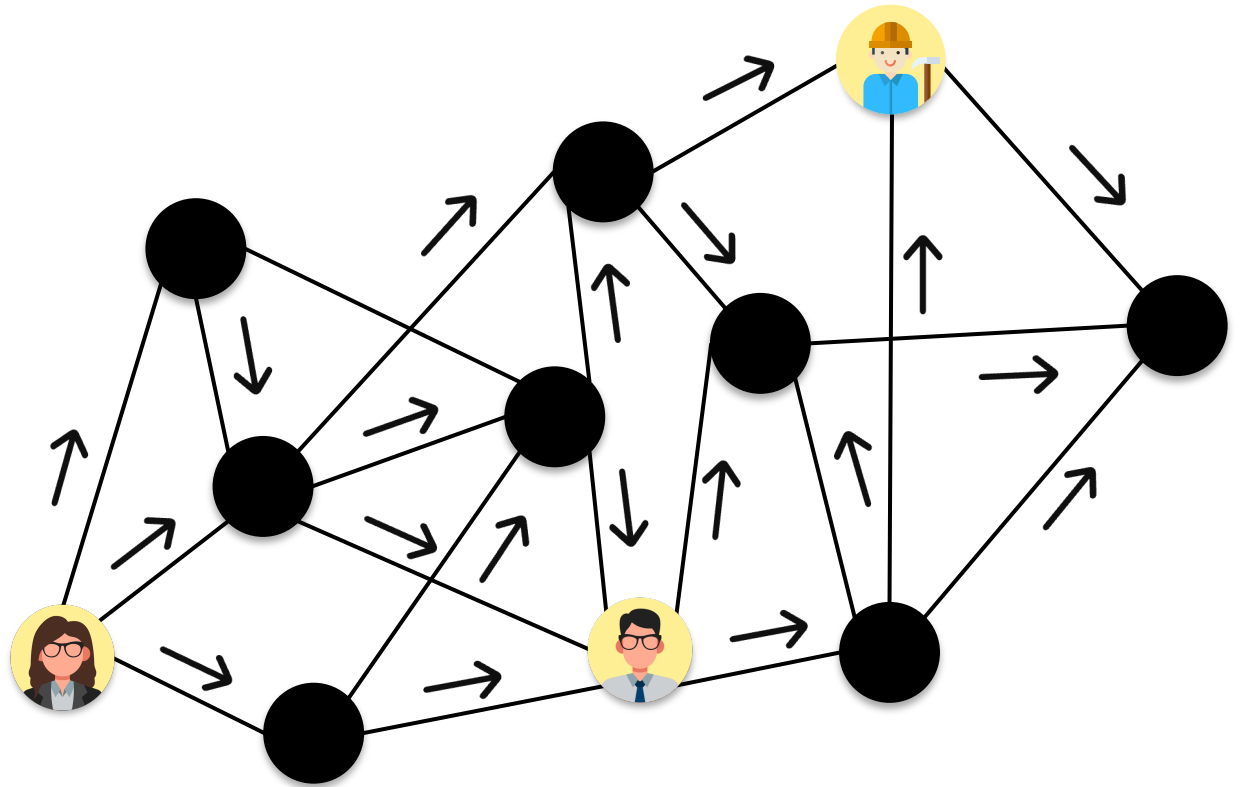
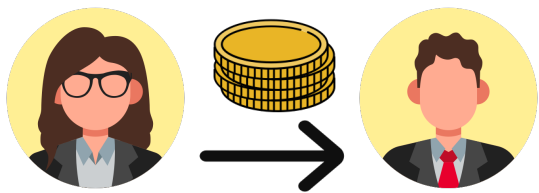
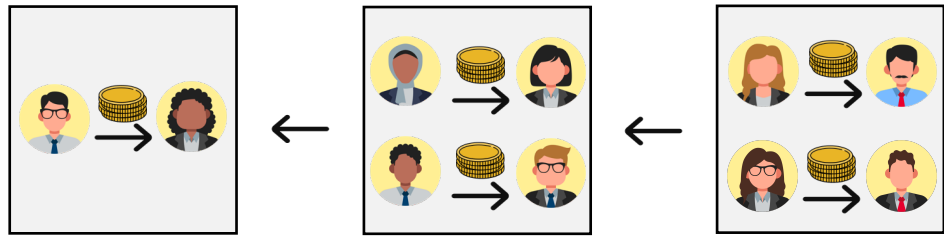
OG Ethereum design



OG Ethereum design



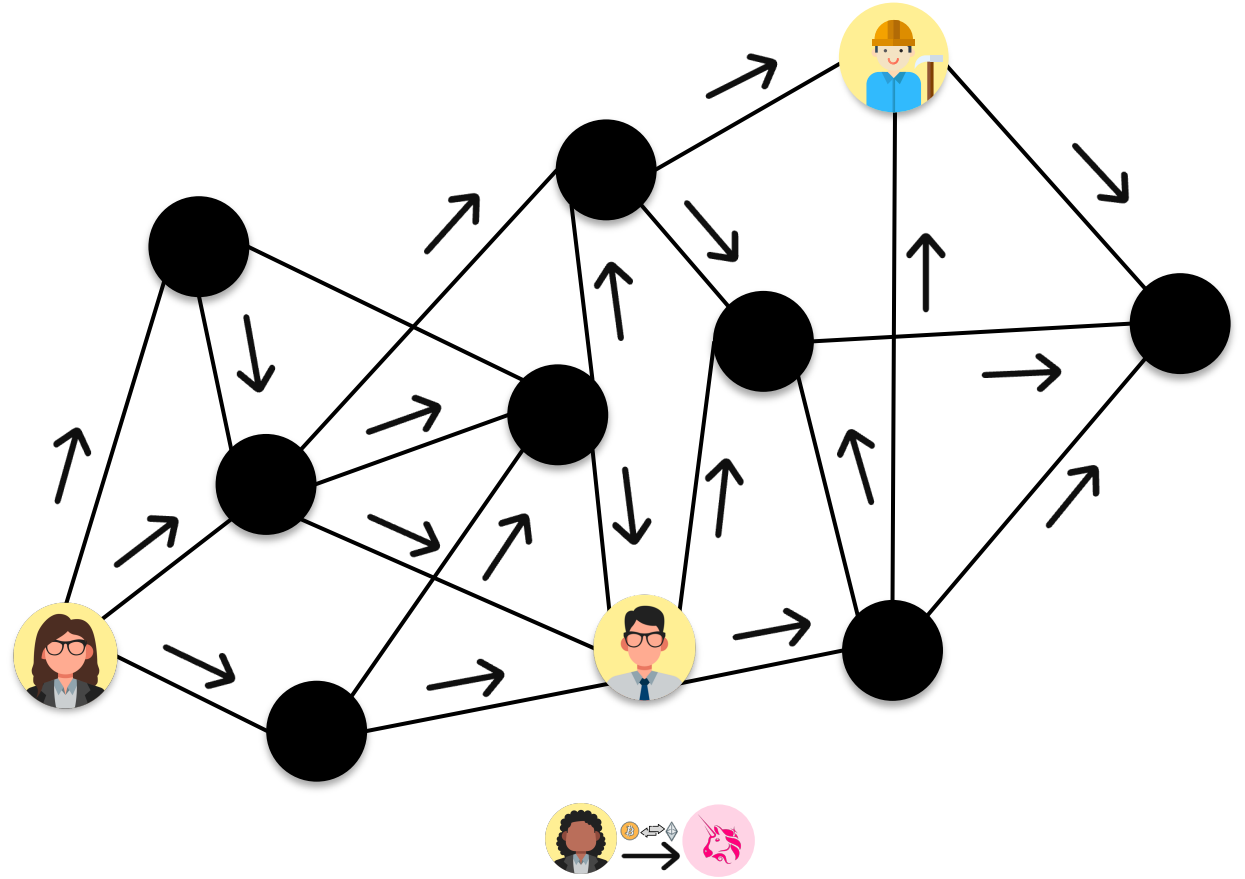
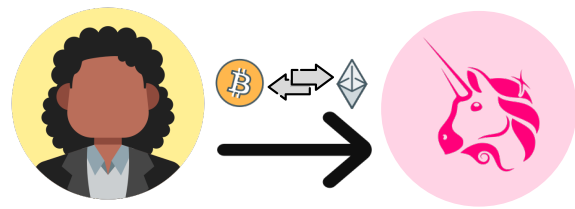
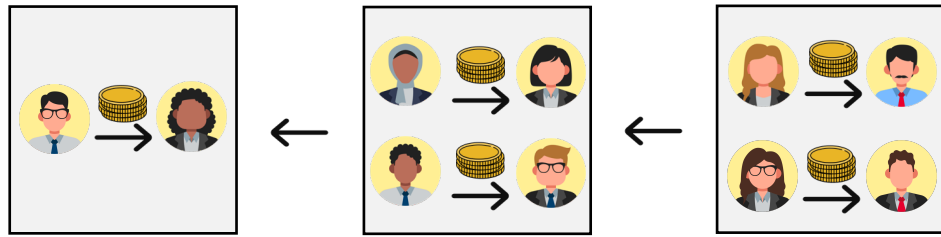
OG Ethereum design



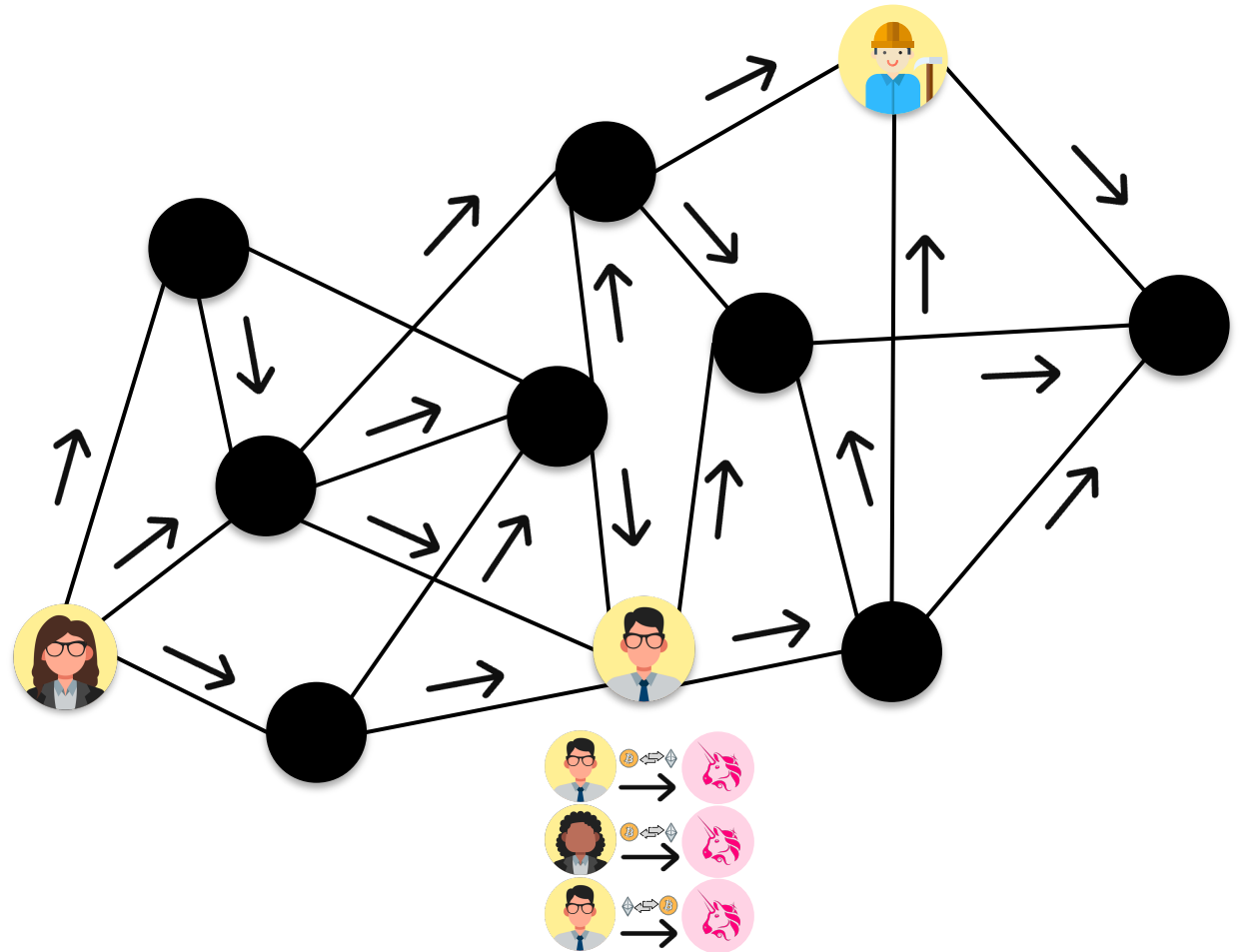
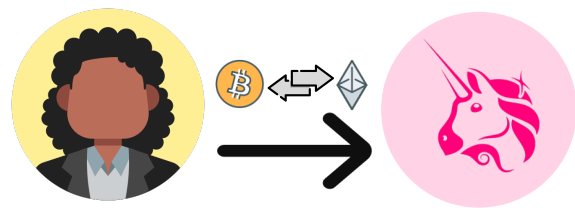
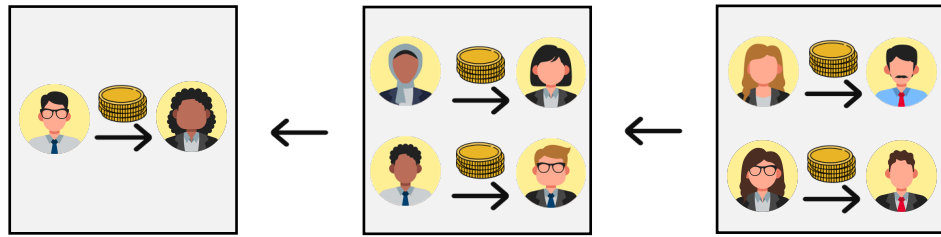
A dark, misty forest scene with tall trees and dense undergrowth, overlaid with the text "dark forest". The image has a greenish-yellow tint and a hazy, atmospheric quality. The text is centered and written in a white, lowercase, sans-serif font.

dark forest

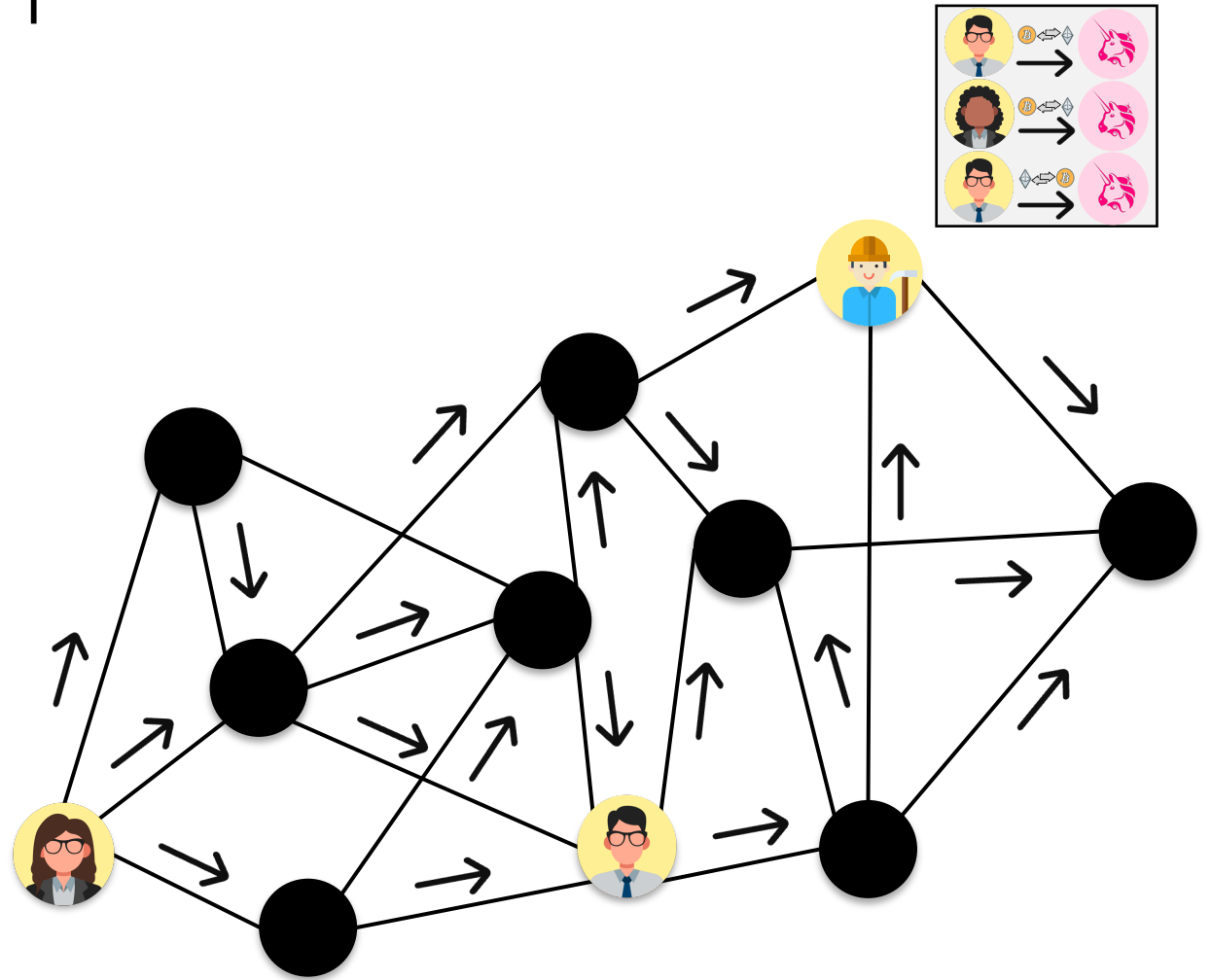
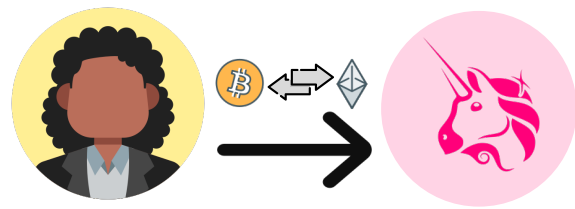
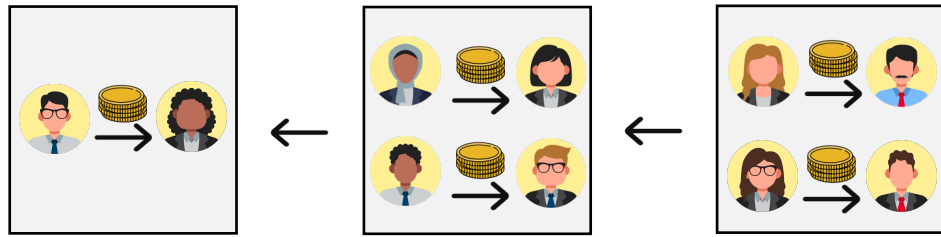
OG Ethereum design



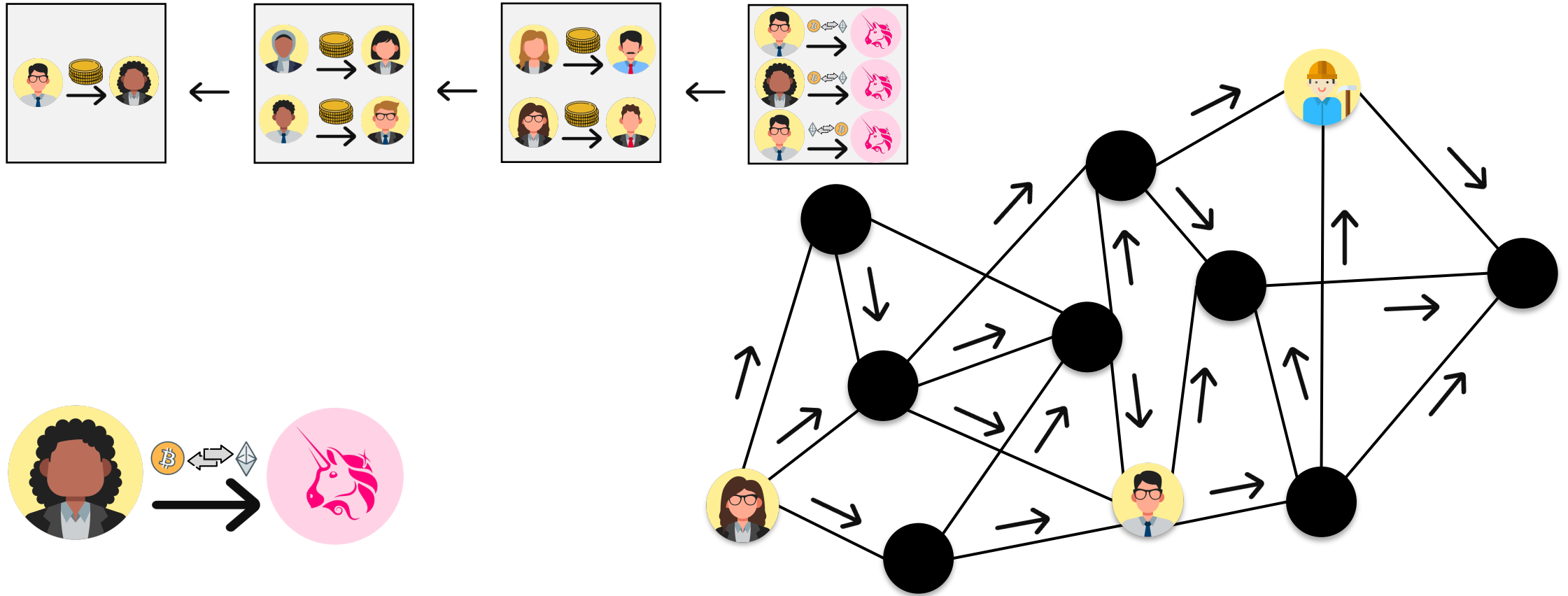
OG Ethereum design



OG Ethereum design

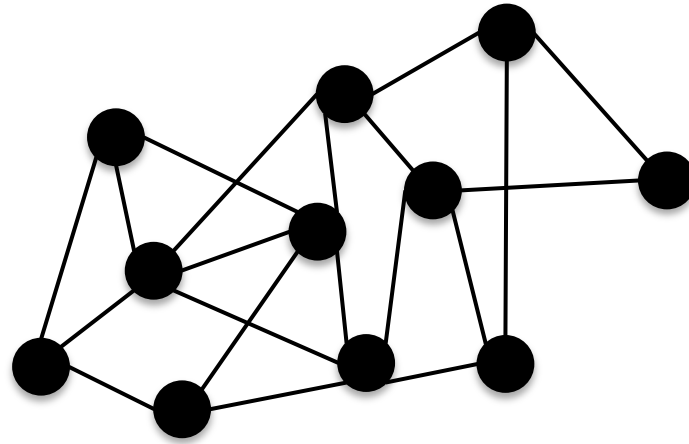


OG Ethereum design

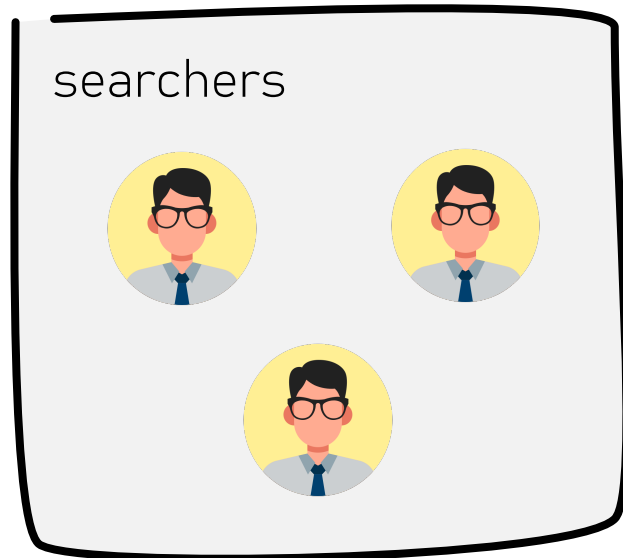
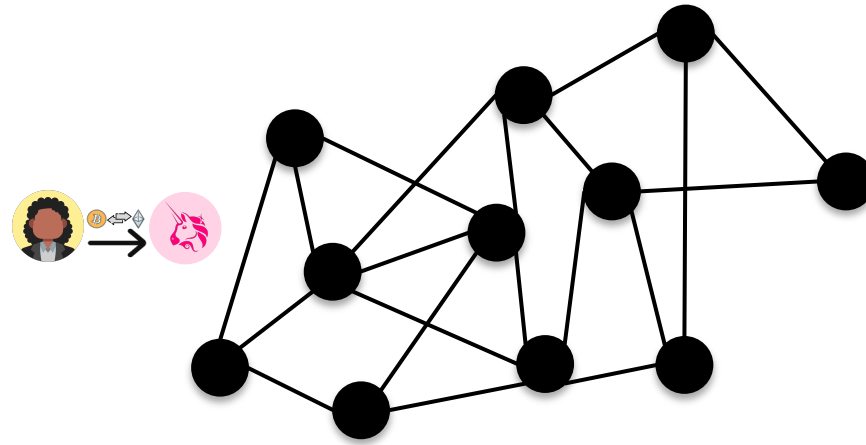


"MEV" = maximal extractable value

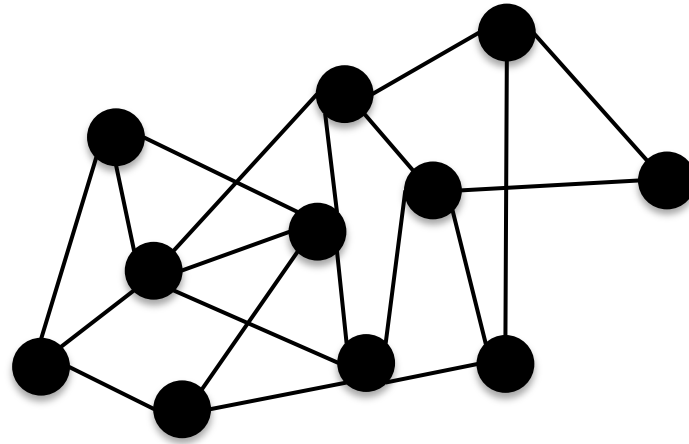
Flashbots



Flashbots



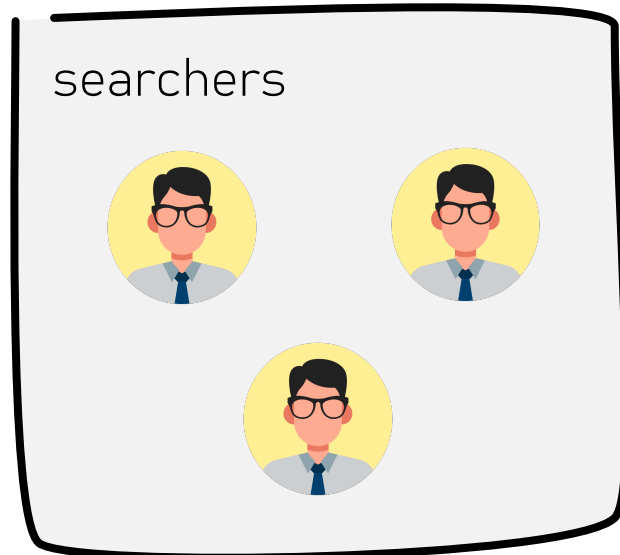
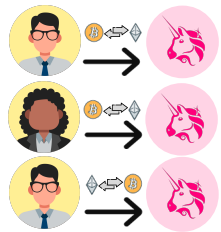
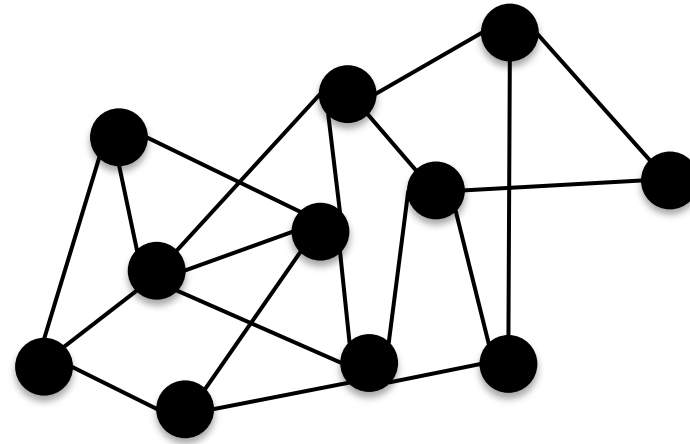
Flashbots



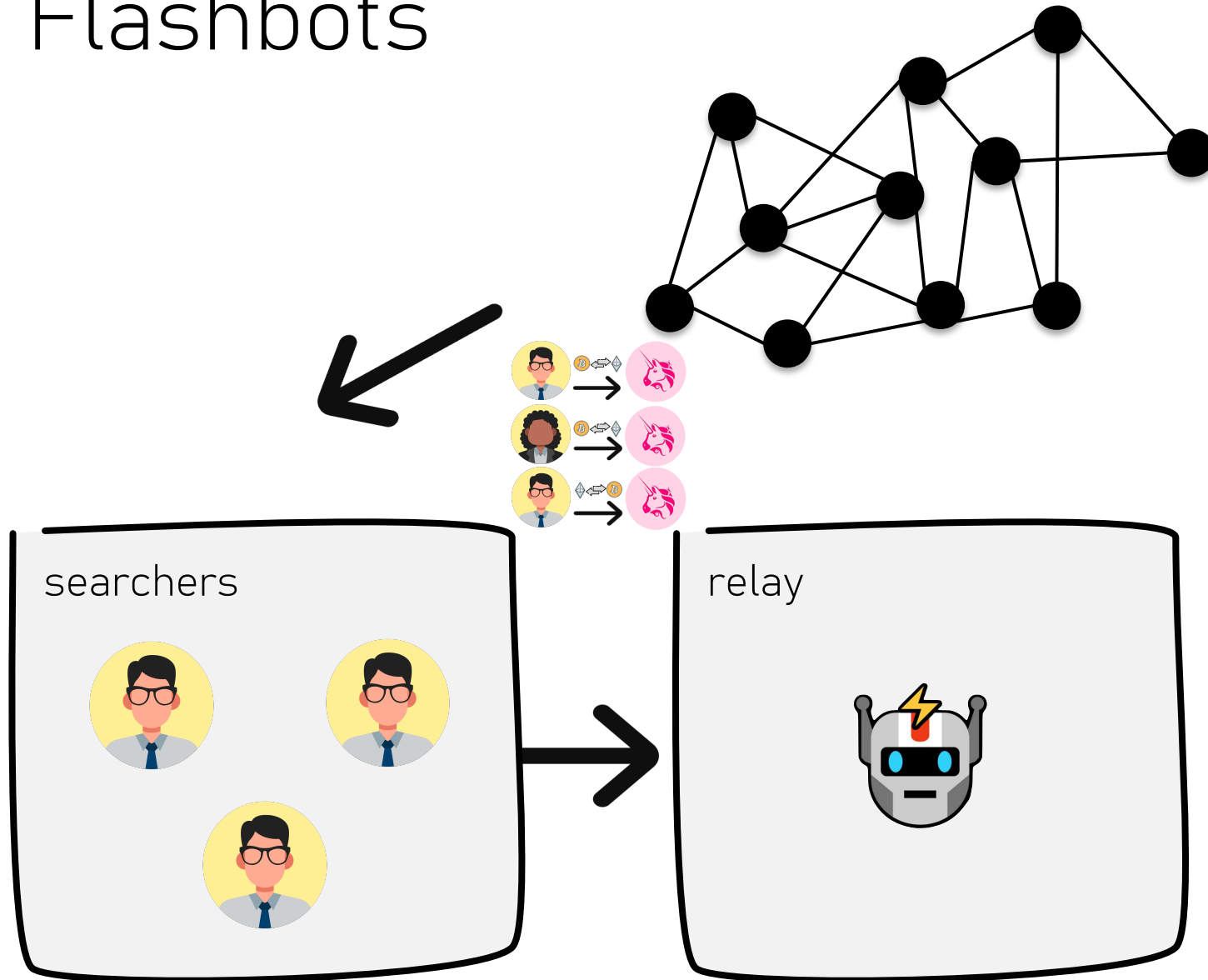
searchers



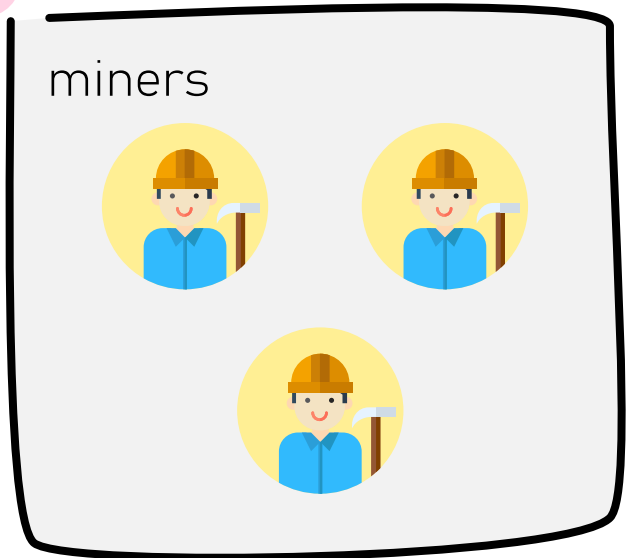
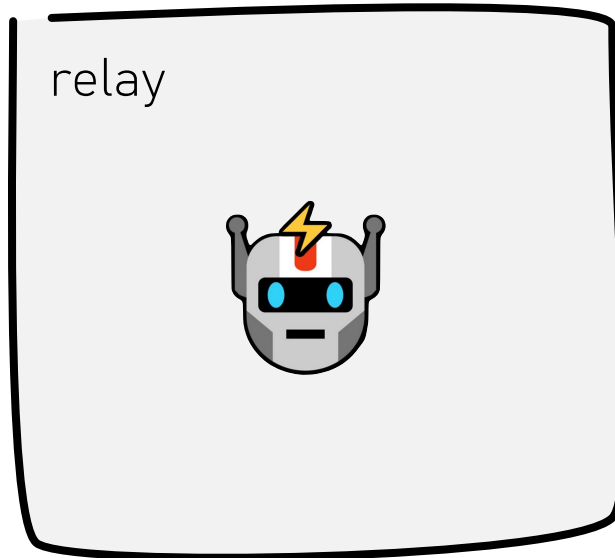
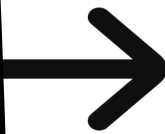
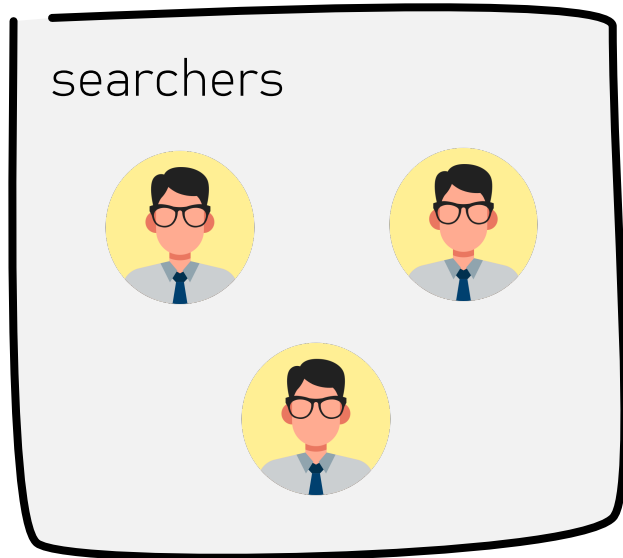
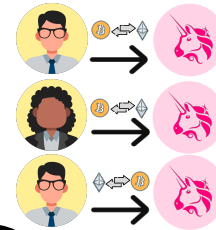
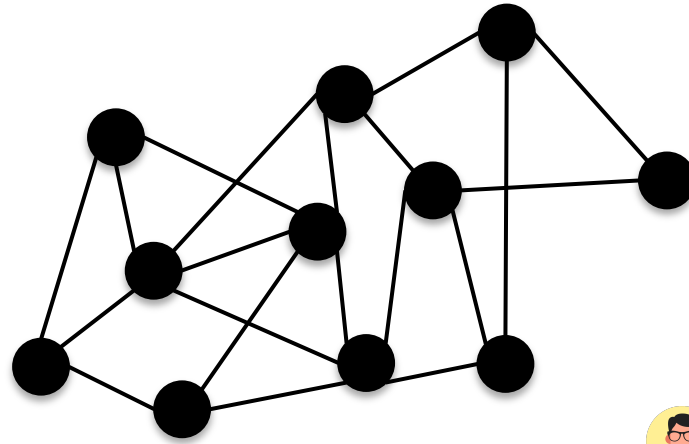
Flashbots



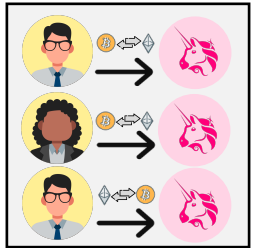
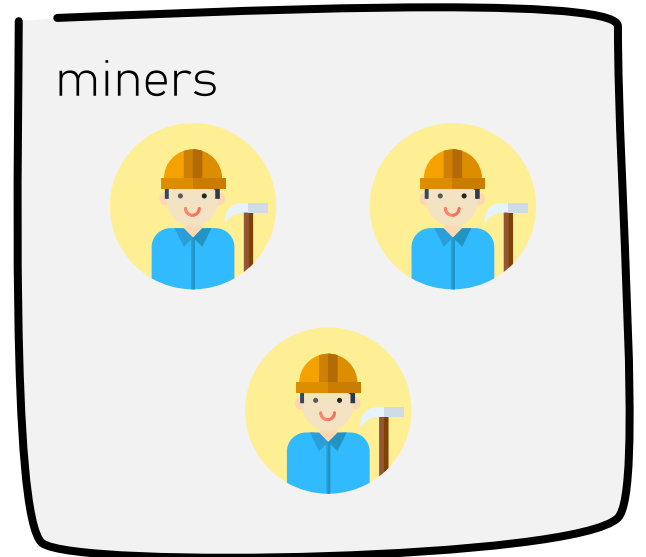
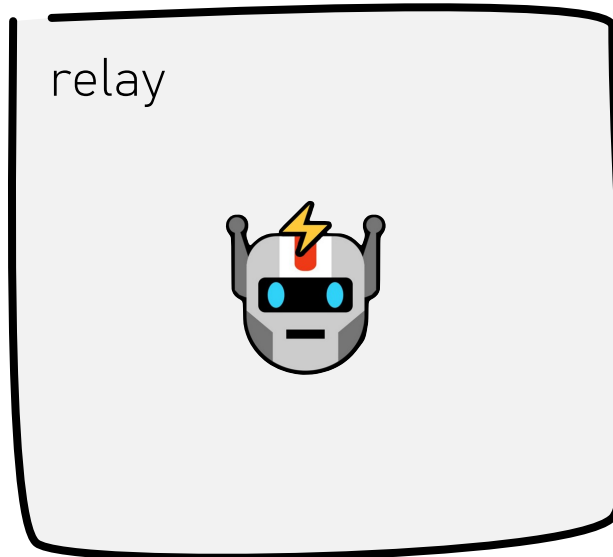
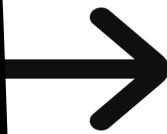
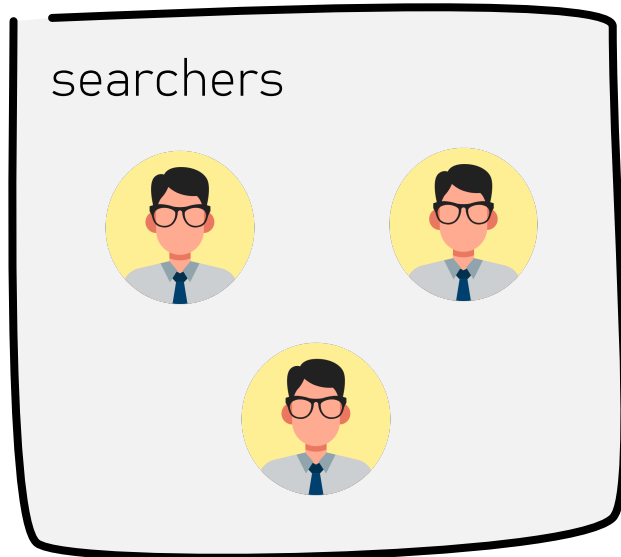
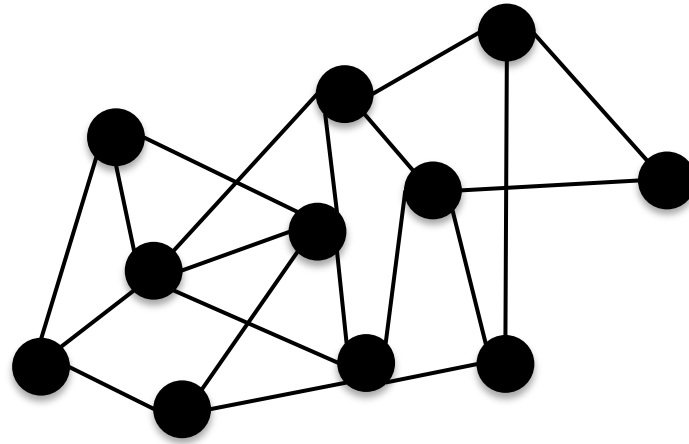
Flashbots



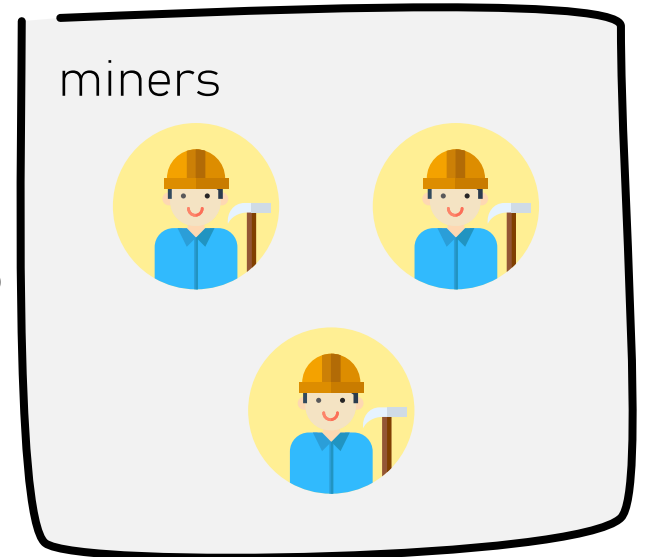
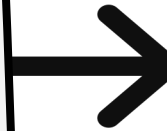
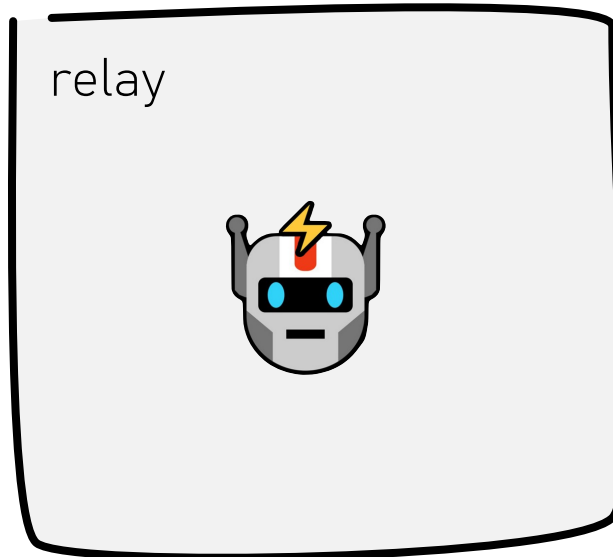
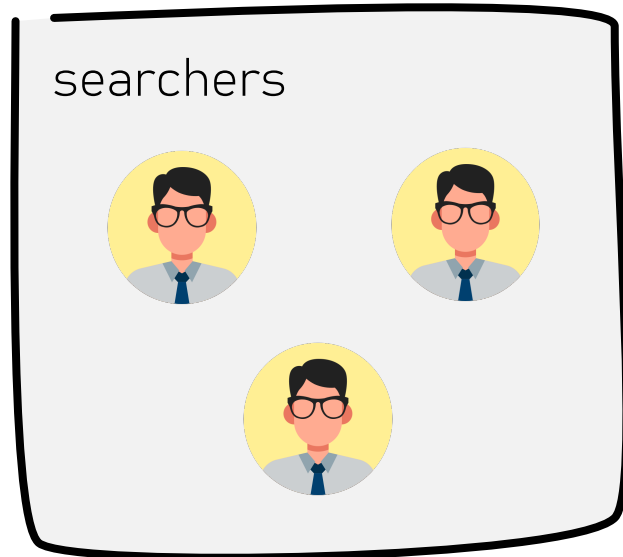
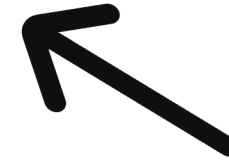
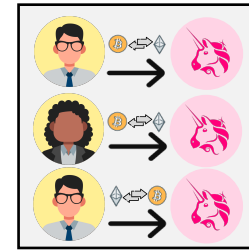
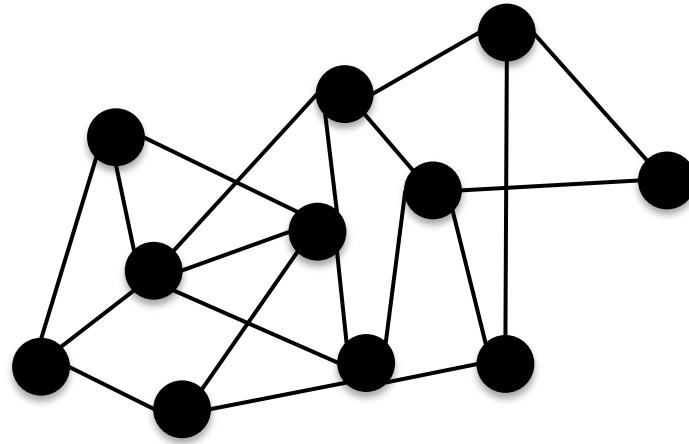
Flashbots



Flashbots



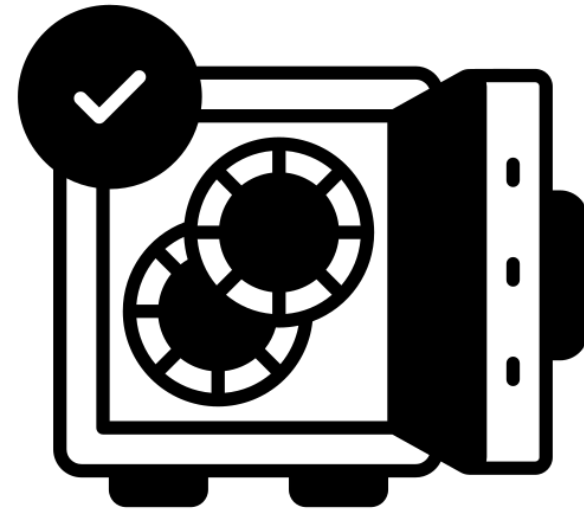
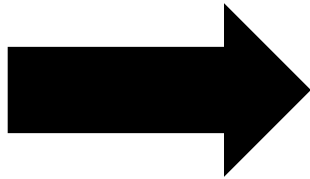
Flashbots



Moving to proof-of-stake

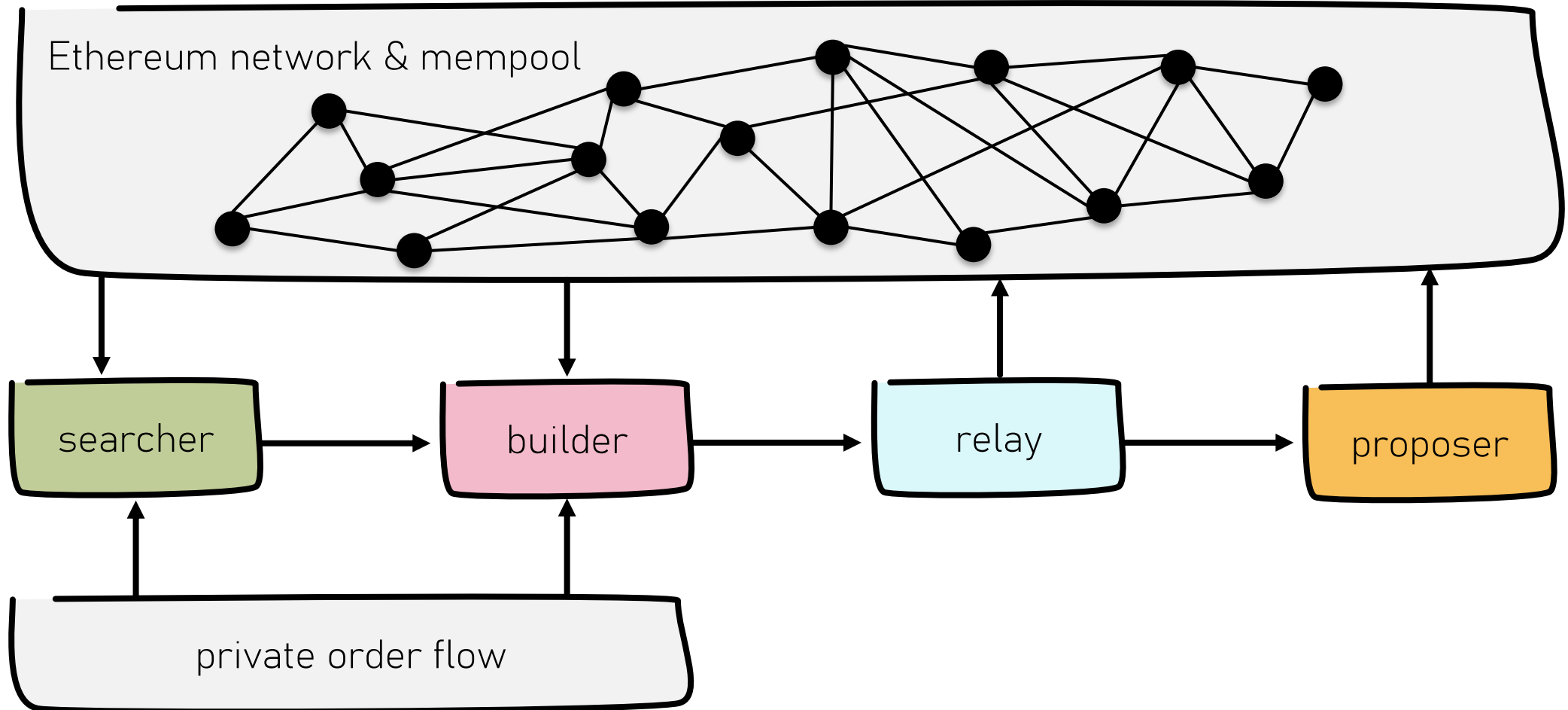


proof-of-work

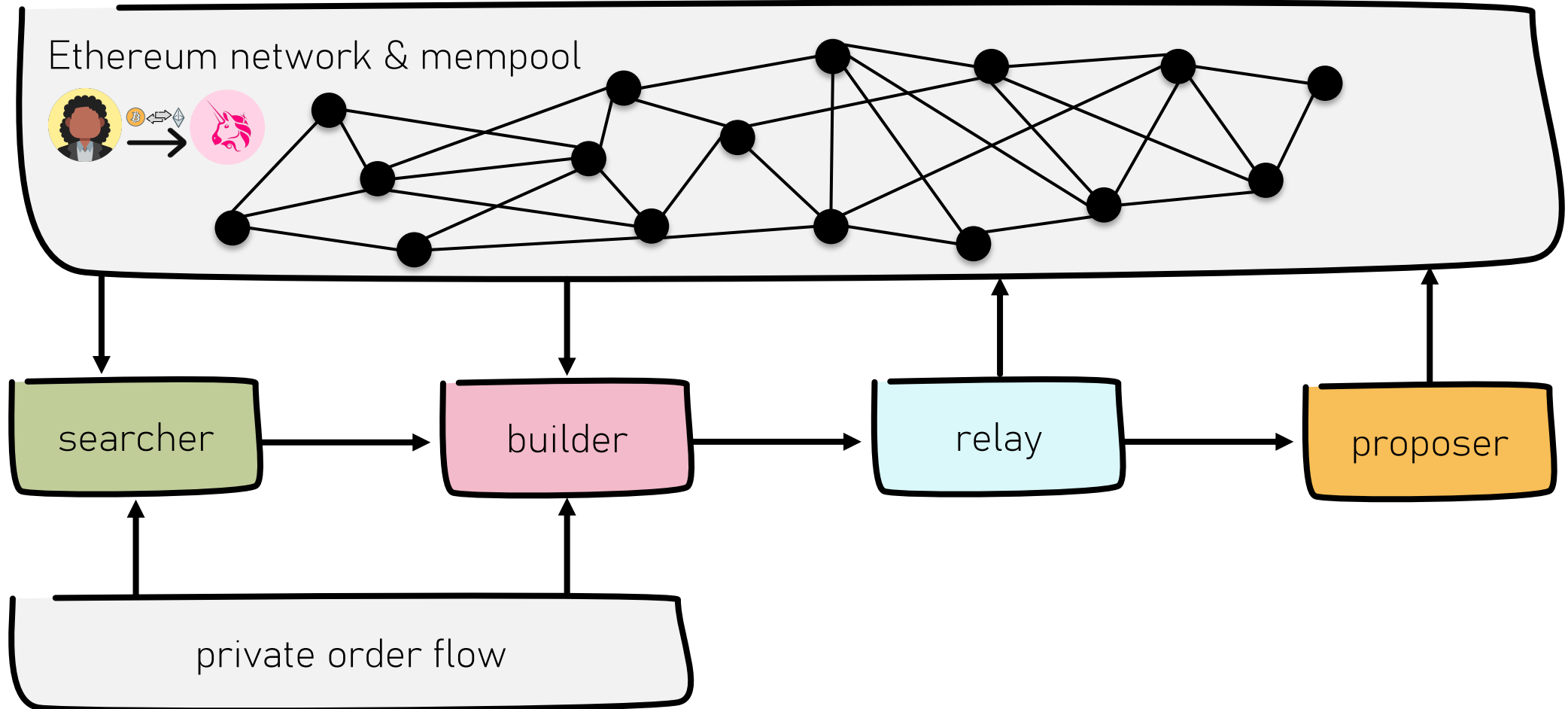


proof-of-stake

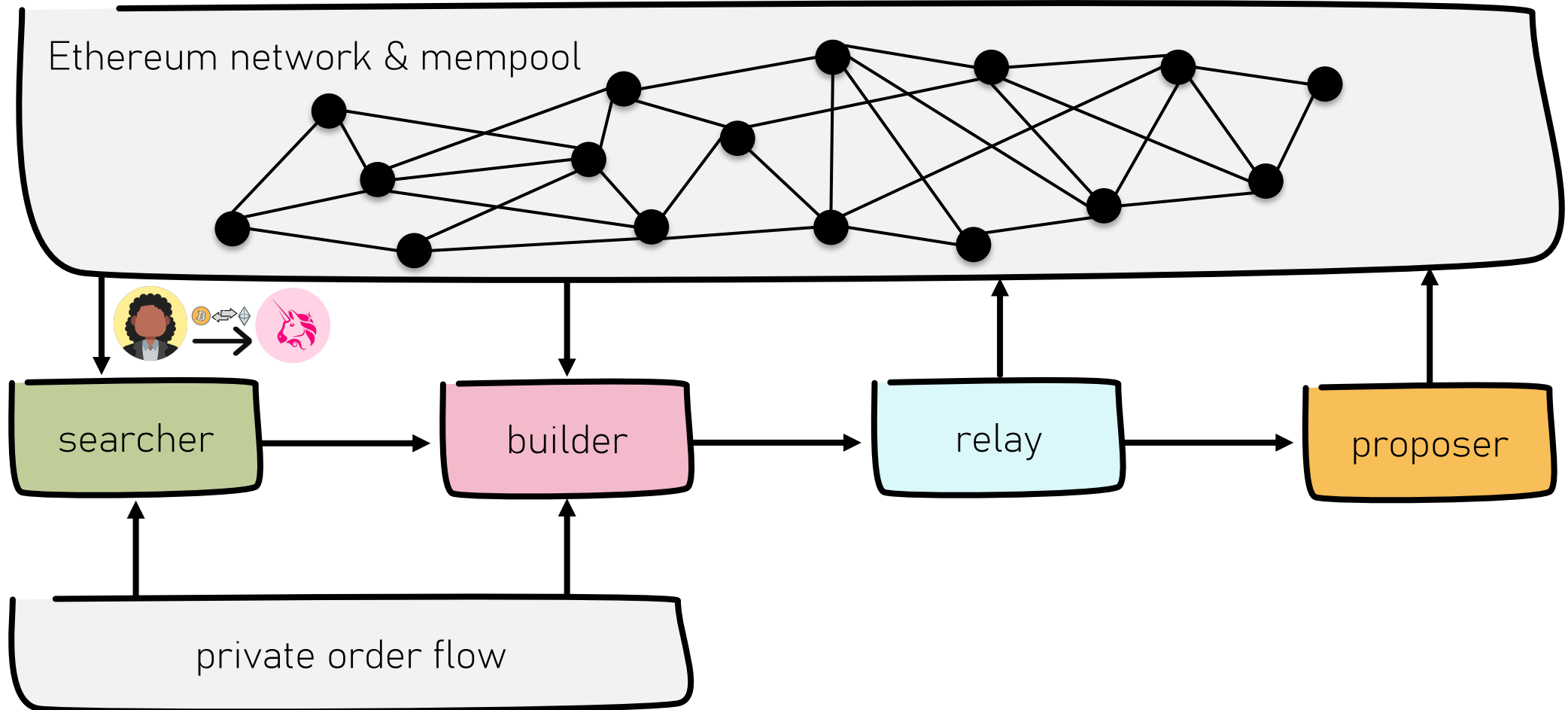
Proposer builder separation (PBS)



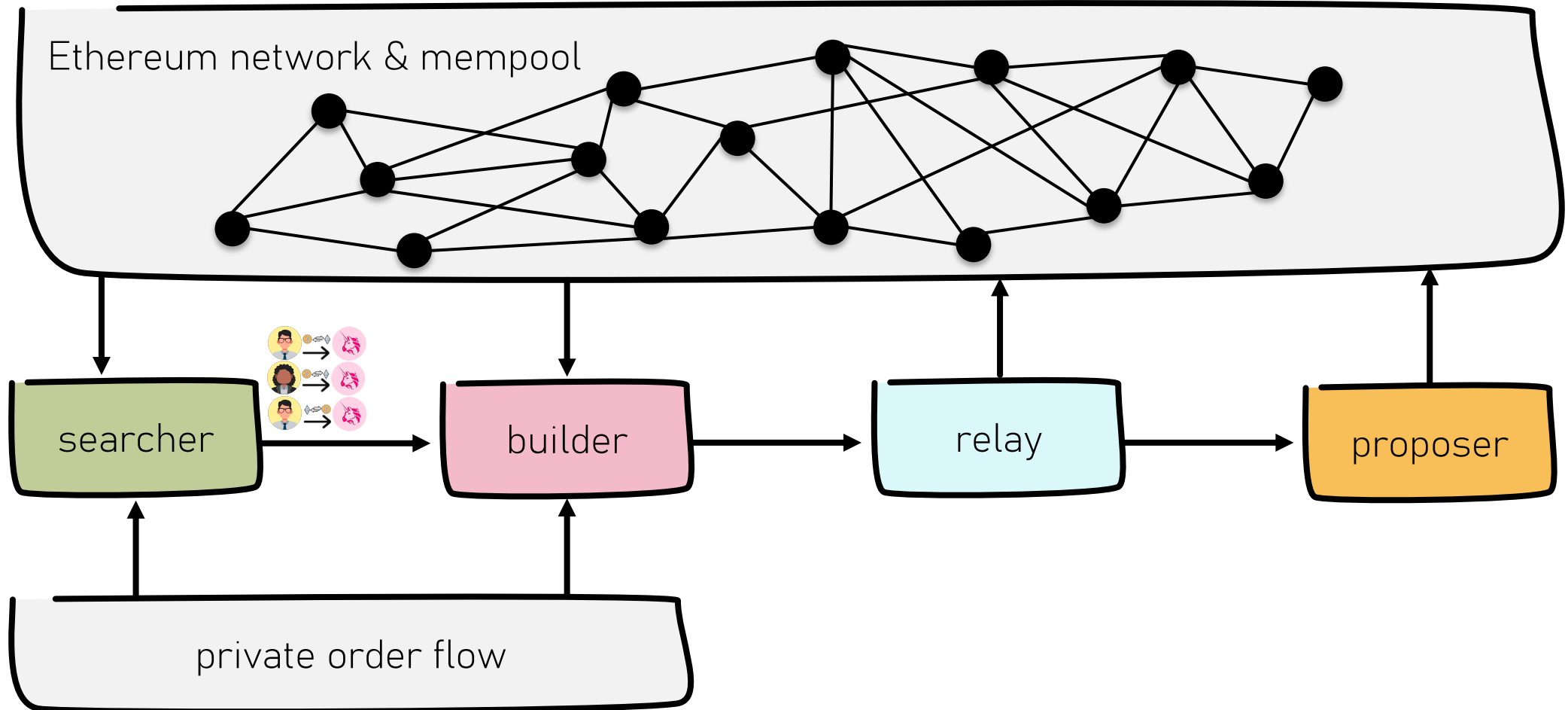
Proposer builder separation (PBS)



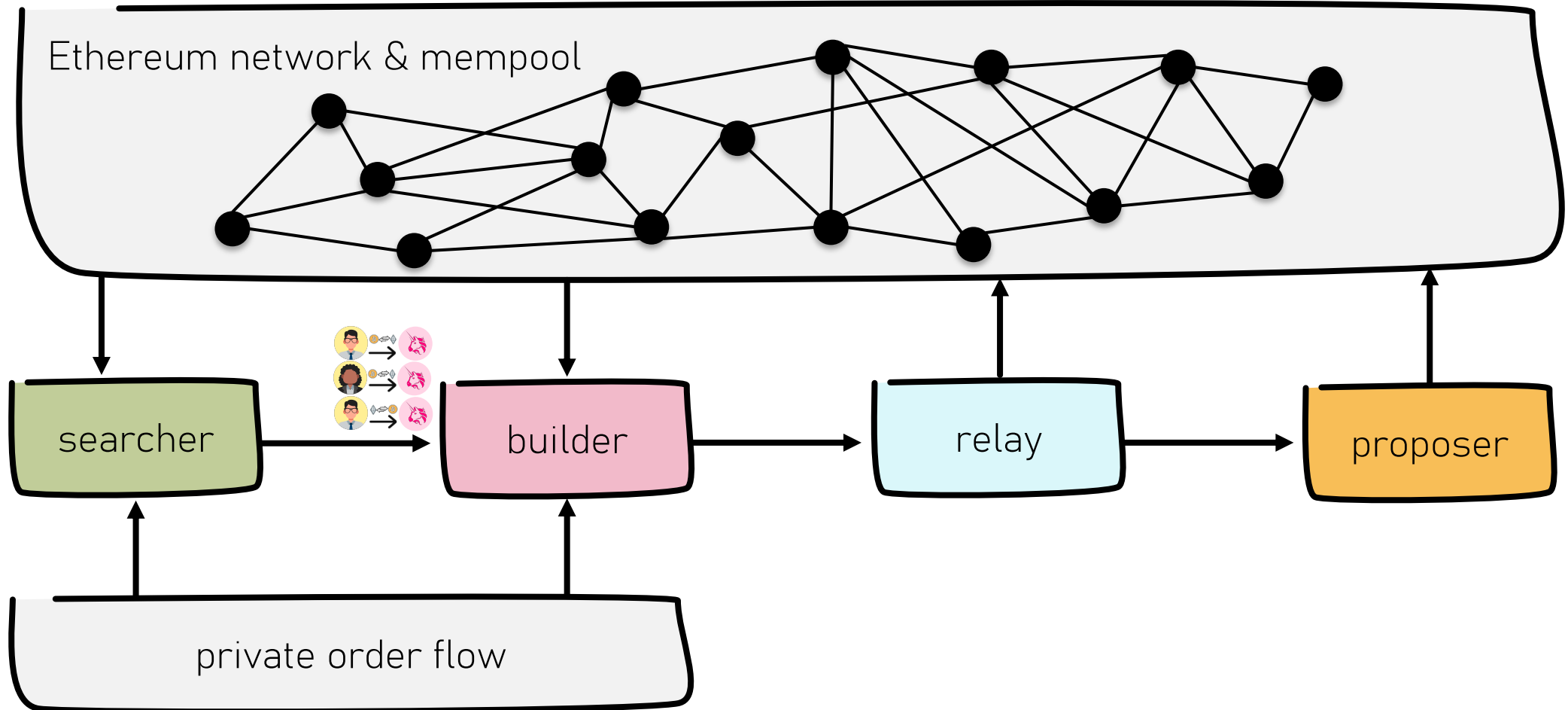
Proposer builder separation (PBS)



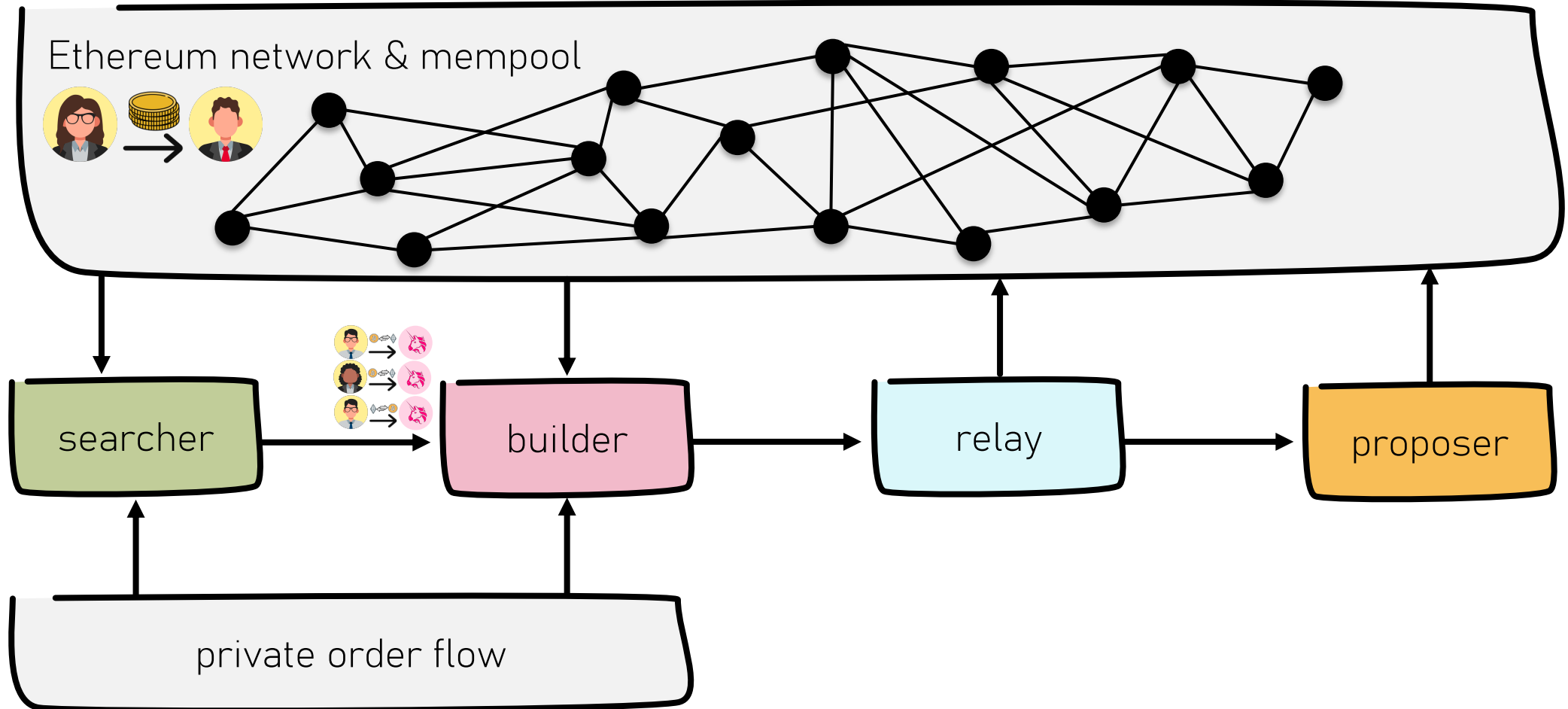
Proposer builder separation (PBS)



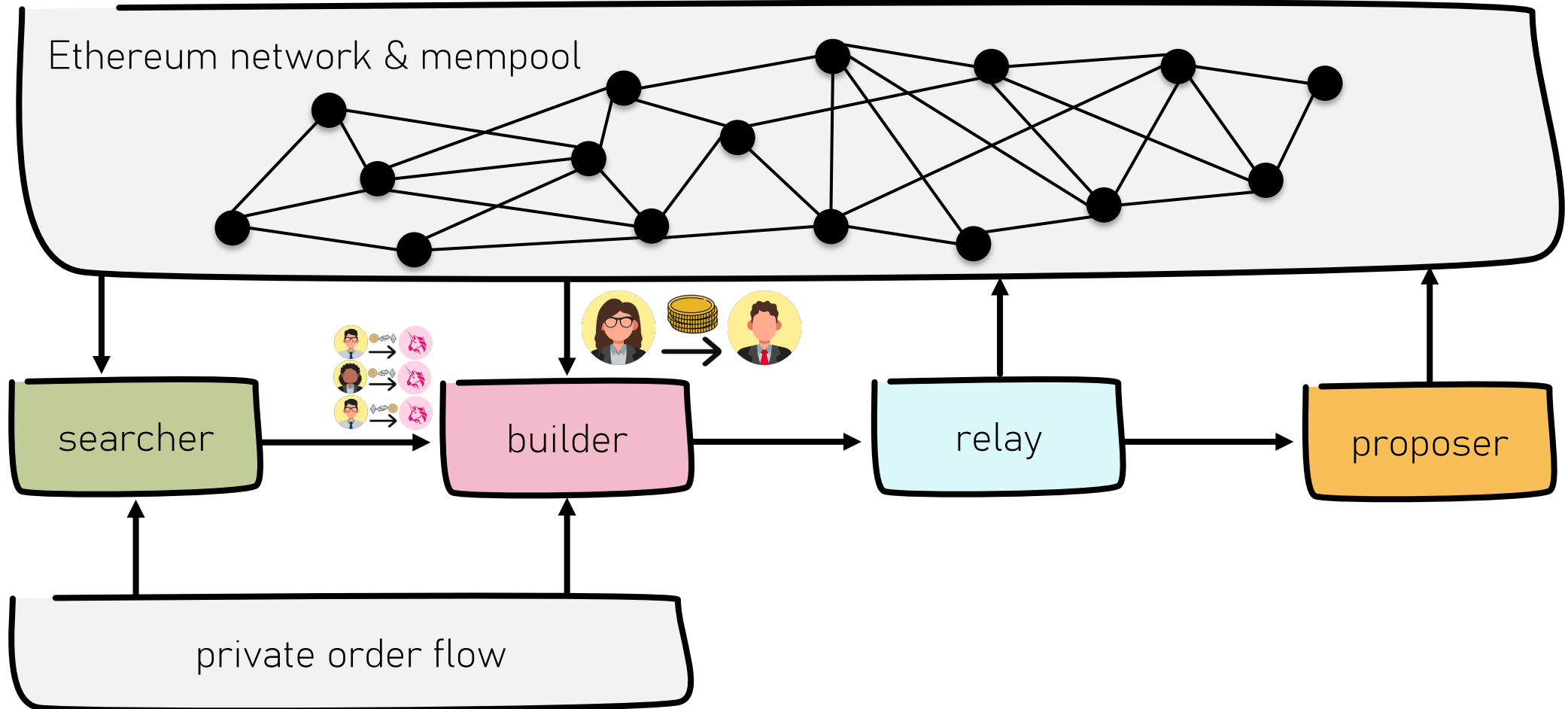
Proposer builder separation (PBS)



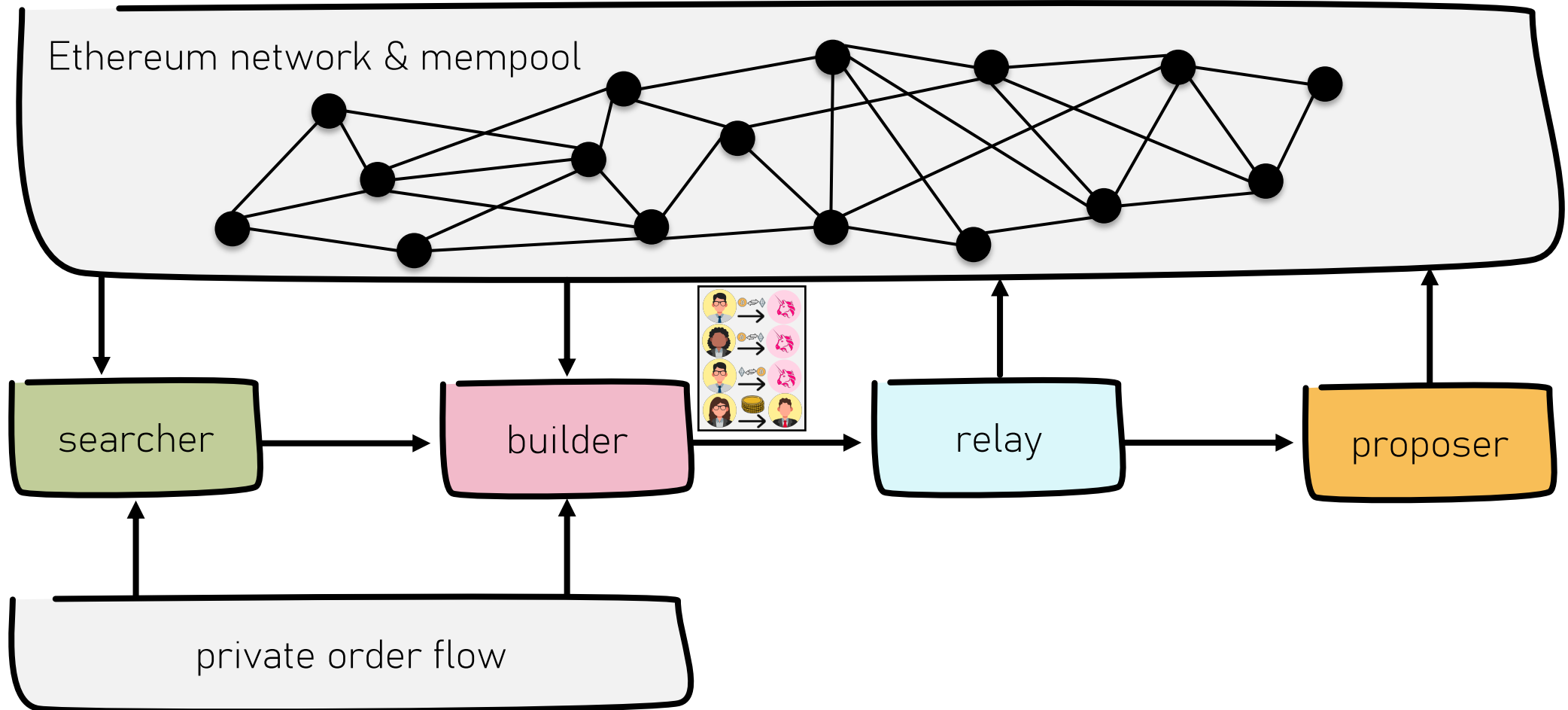
Proposer builder separation (PBS)



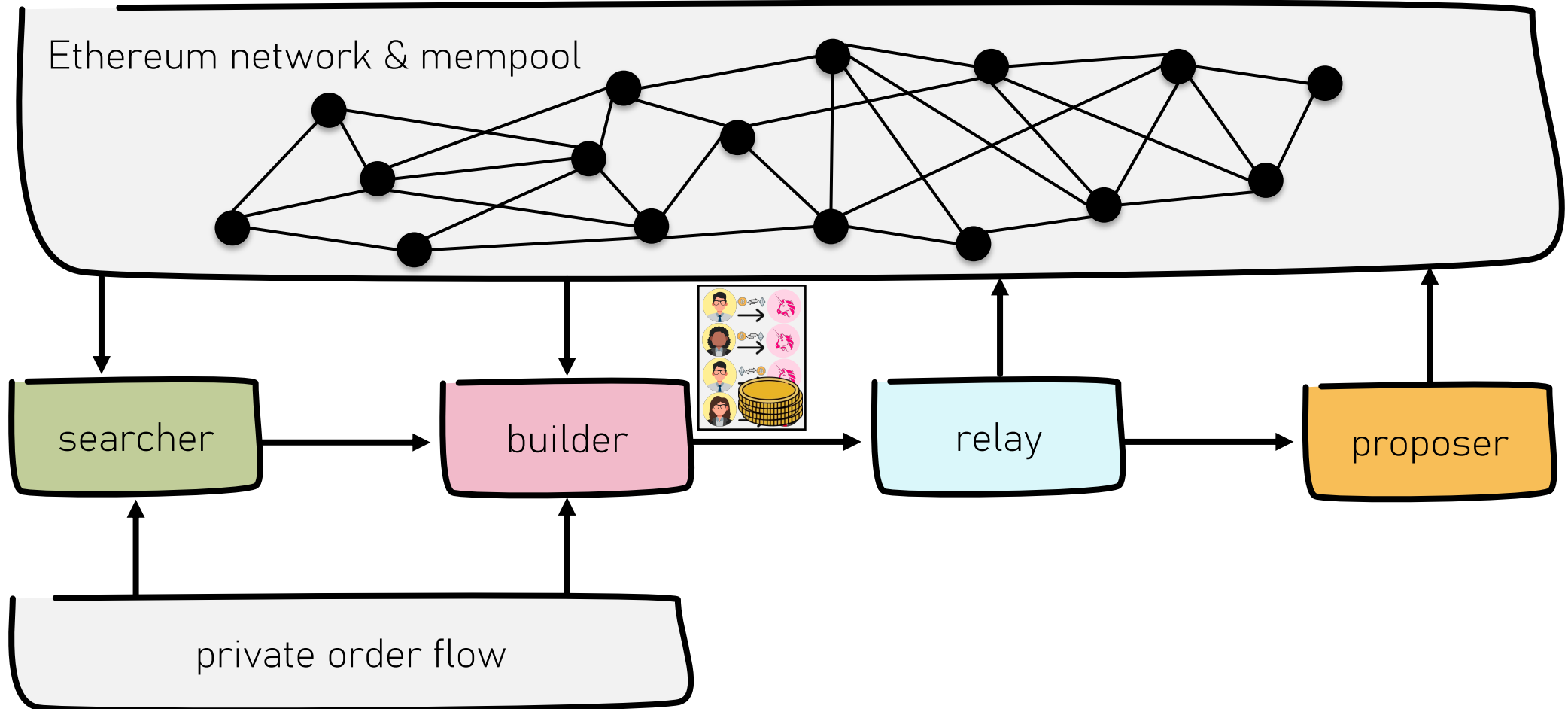
Proposer builder separation (PBS)



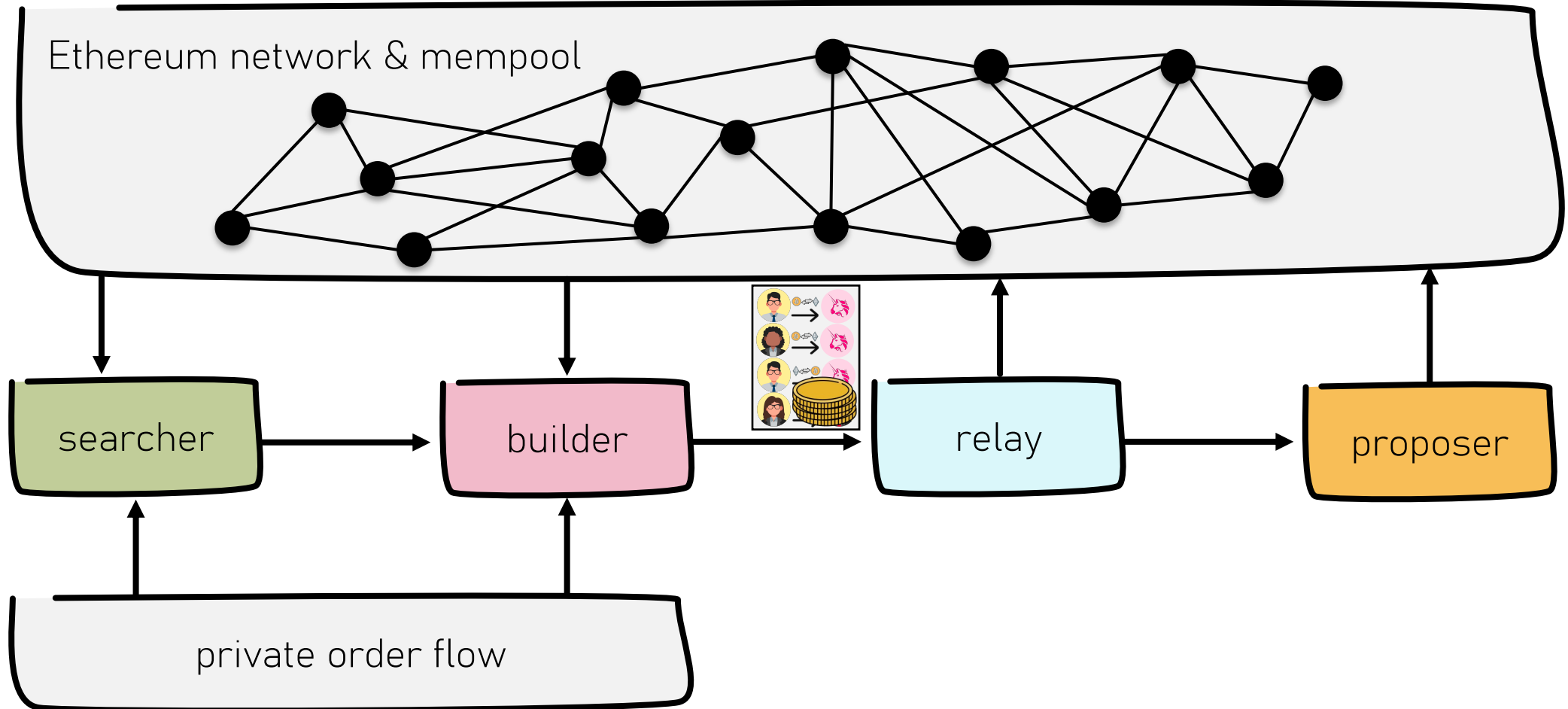
Proposer builder separation (PBS)



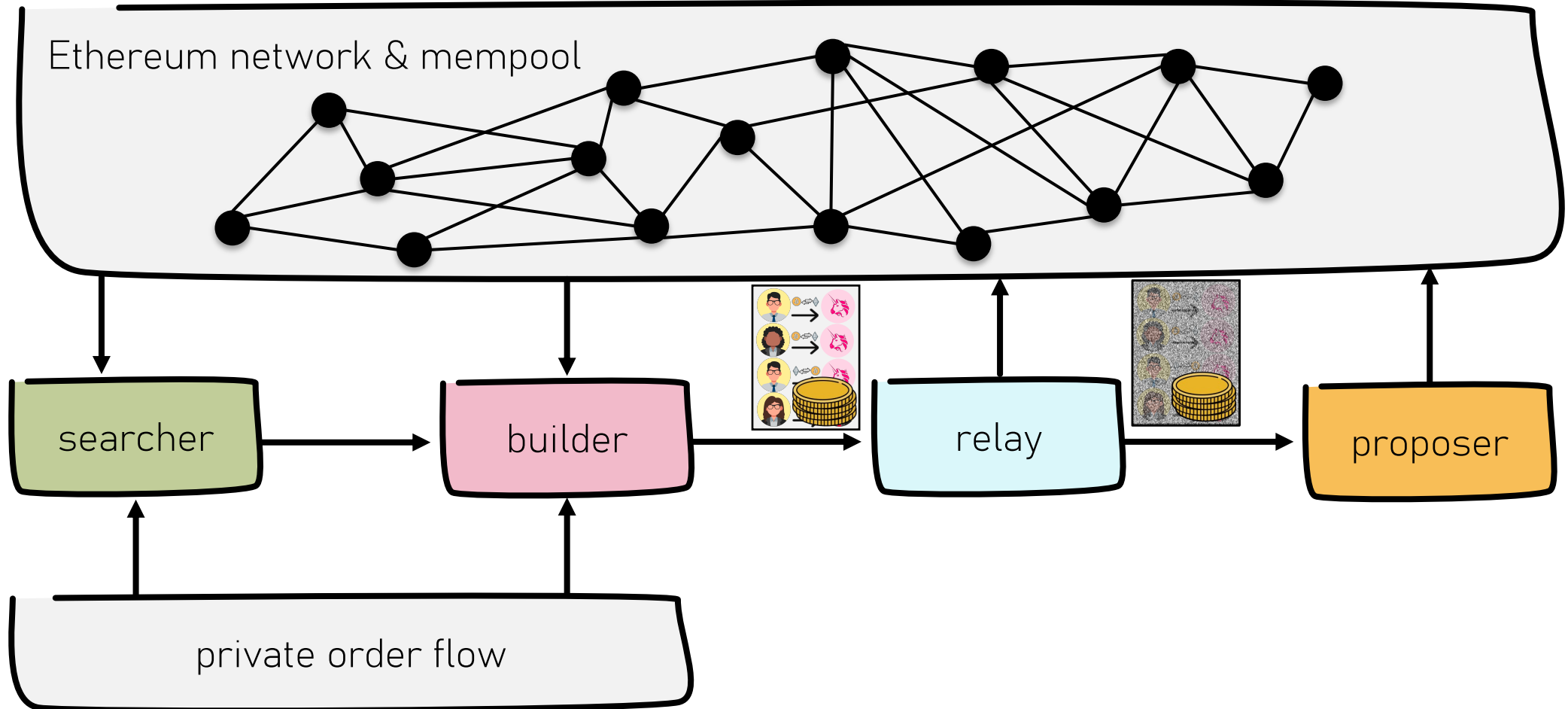
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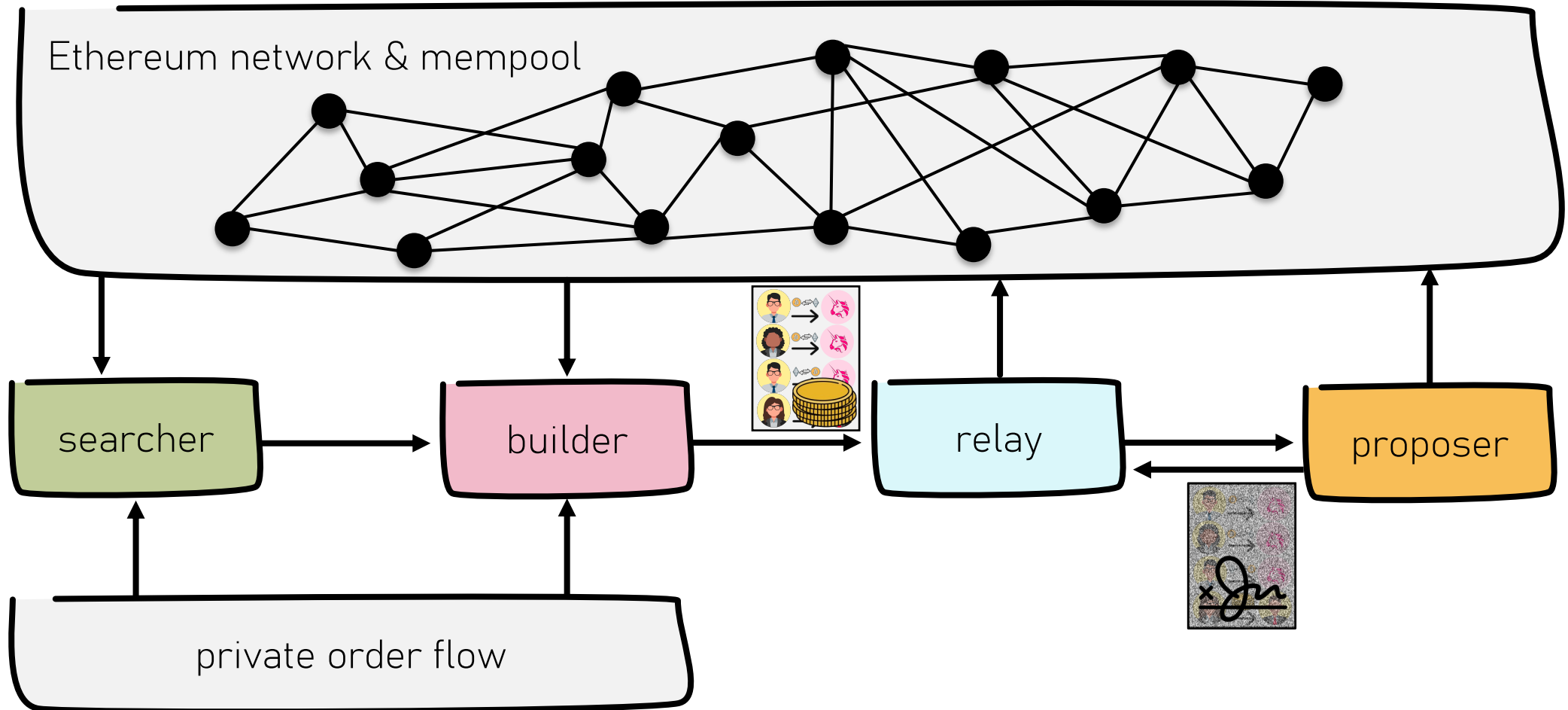
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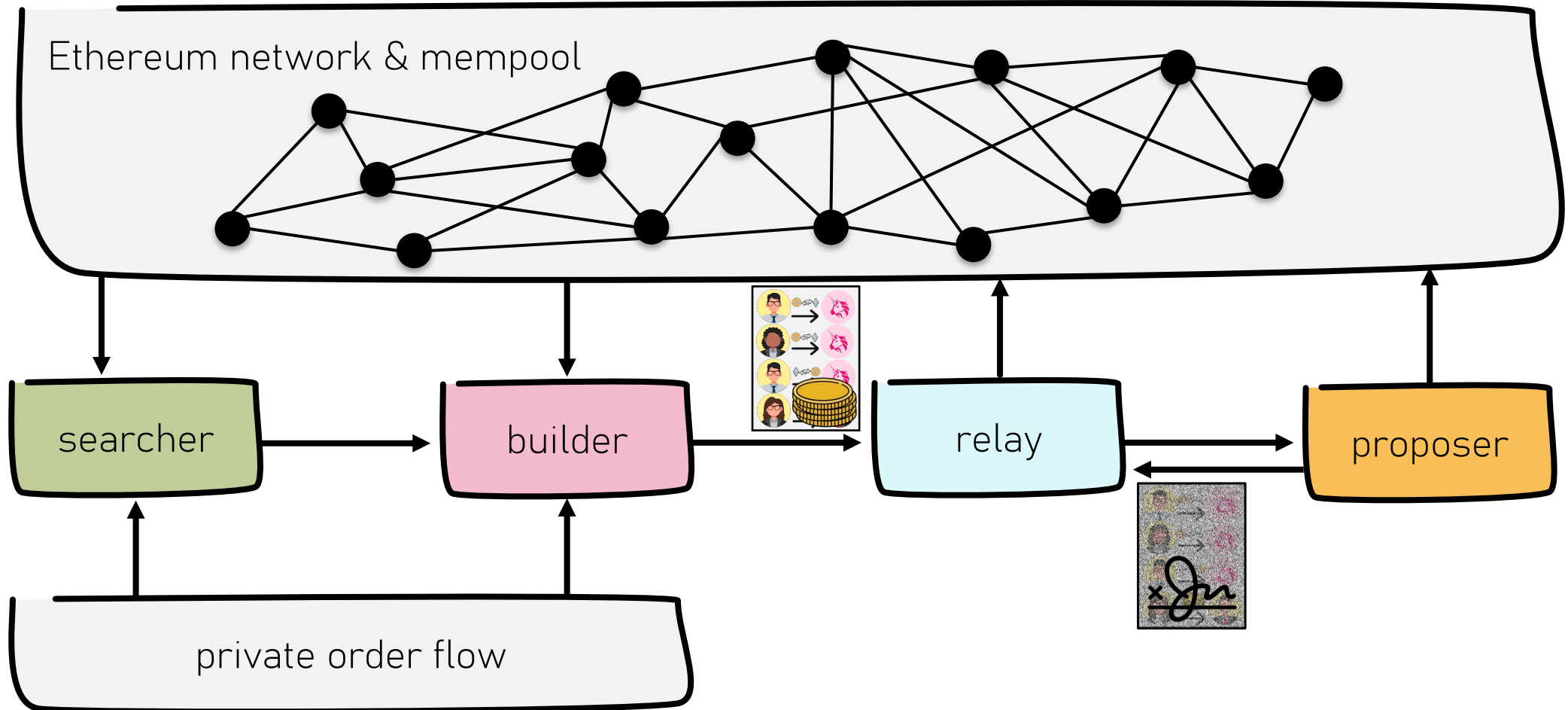
Proposer builder separation (PBS)



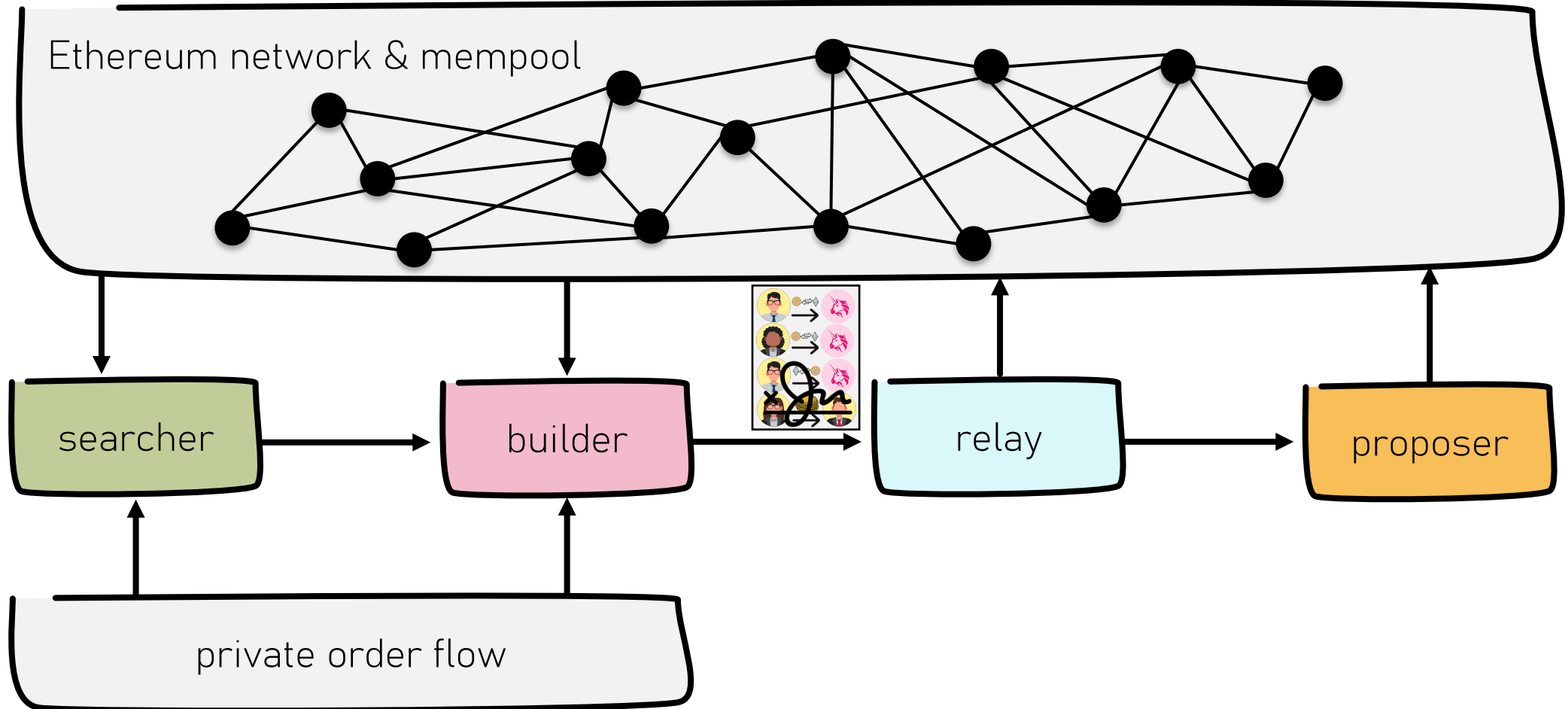
Proposer builder separation (PBS)



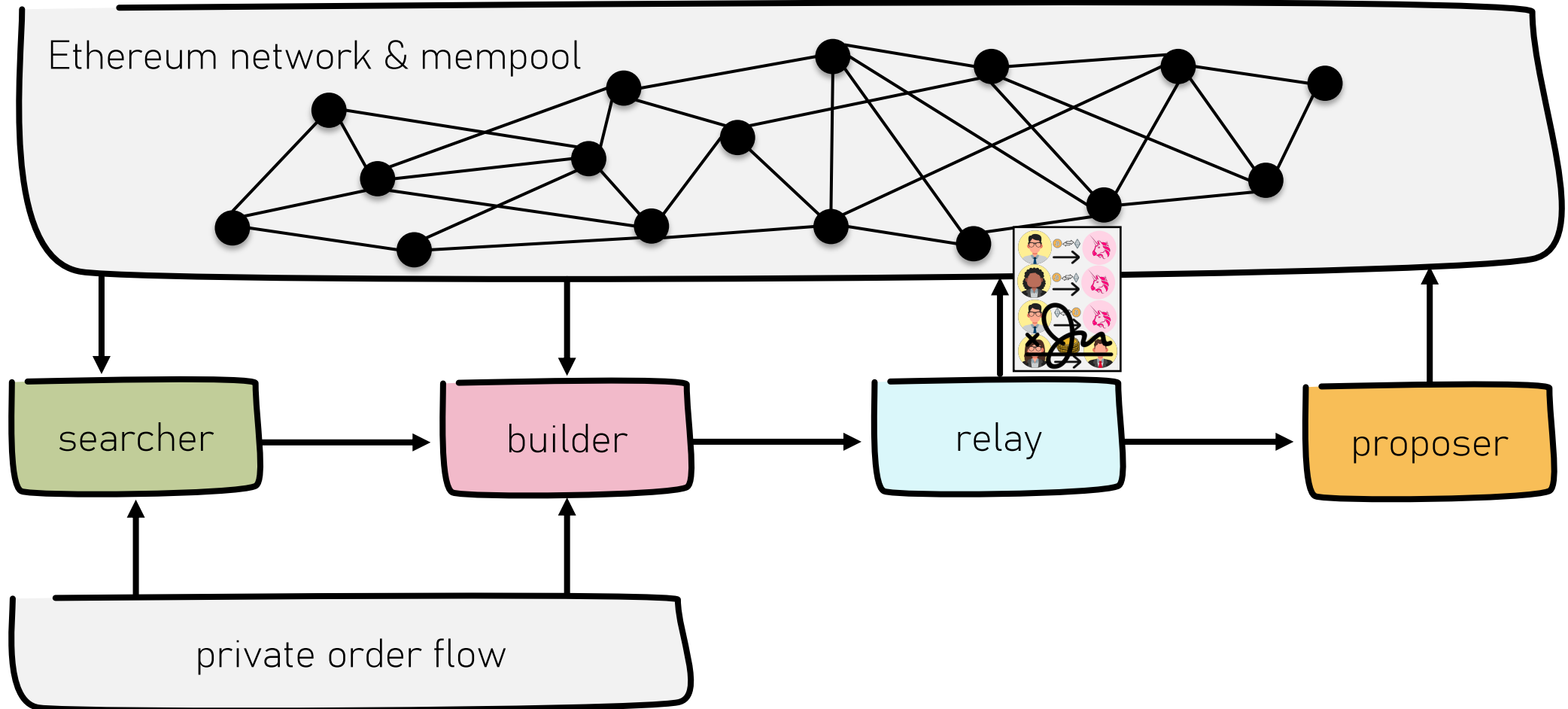
Proposer builder separation (PBS)



Proposer builder separation (PBS)



Proposer builder separation (PBS)



PBS was introduced for PoS Ethereum to decouple block *building* from block *proposing to*



prevent hobbyist
validators from being
out-competed
by institutional players



prevent transaction
censorship at the
protocol level

Proposer-builder separation

trends

decentralize
block profits

censorship
prevention

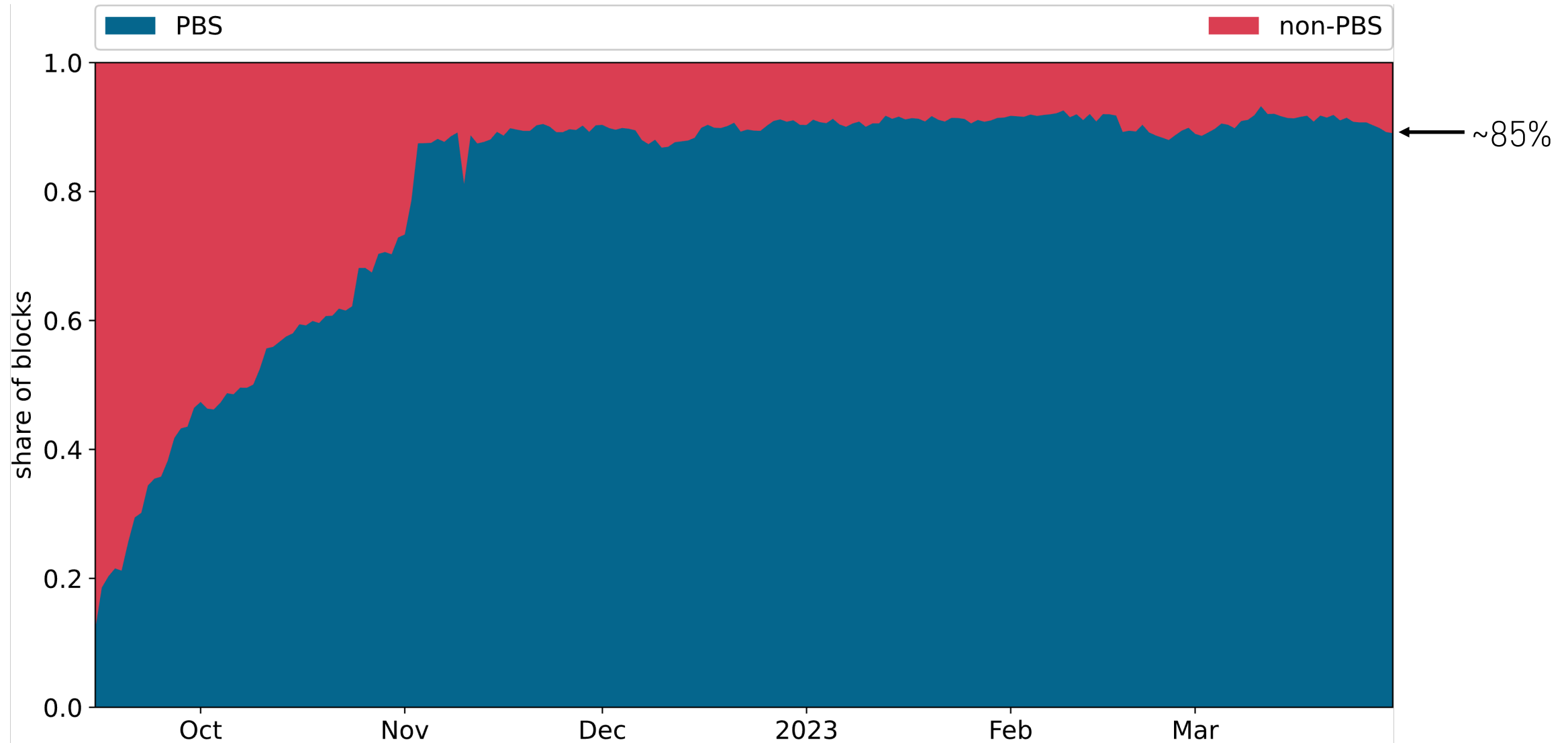
Proposer-builder separation

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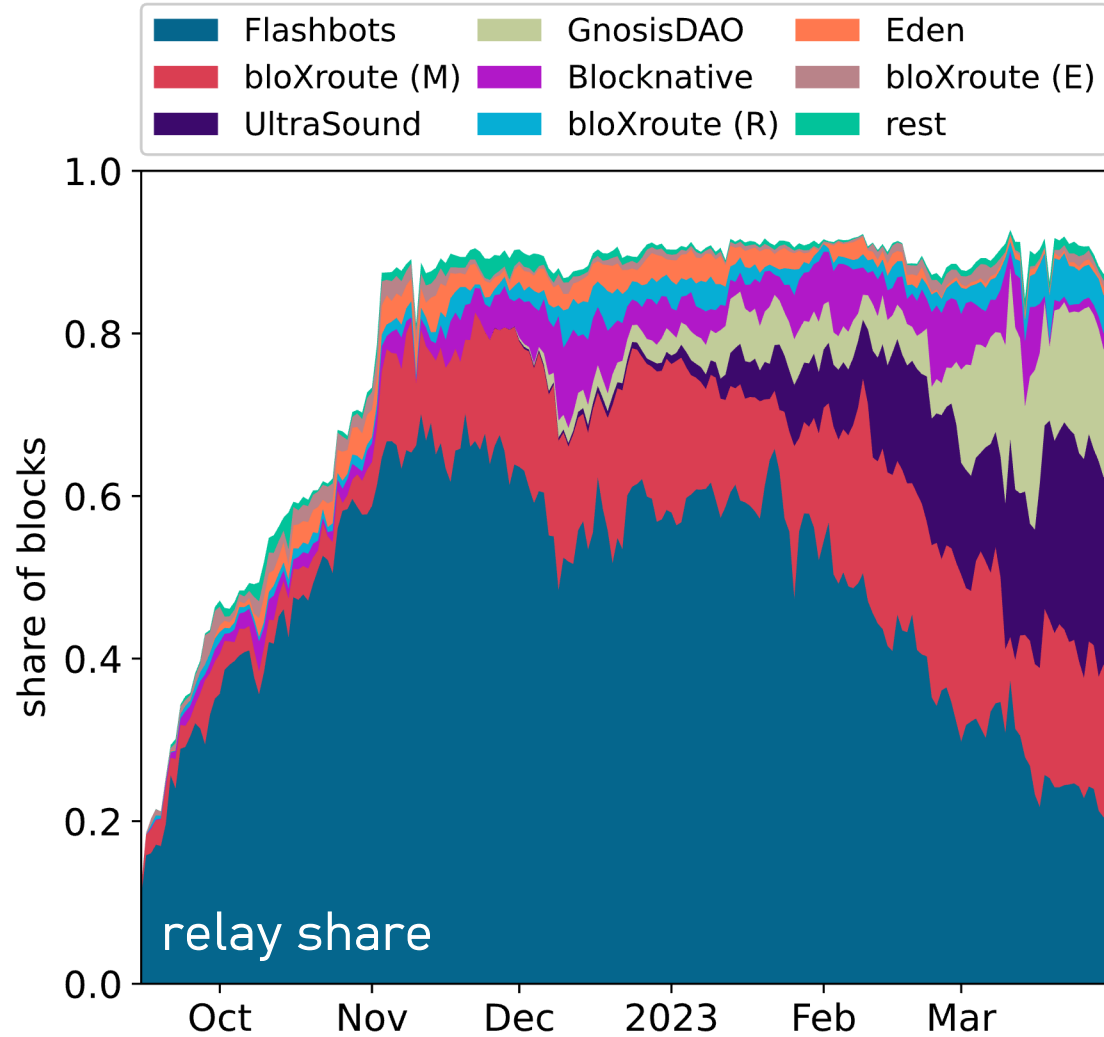
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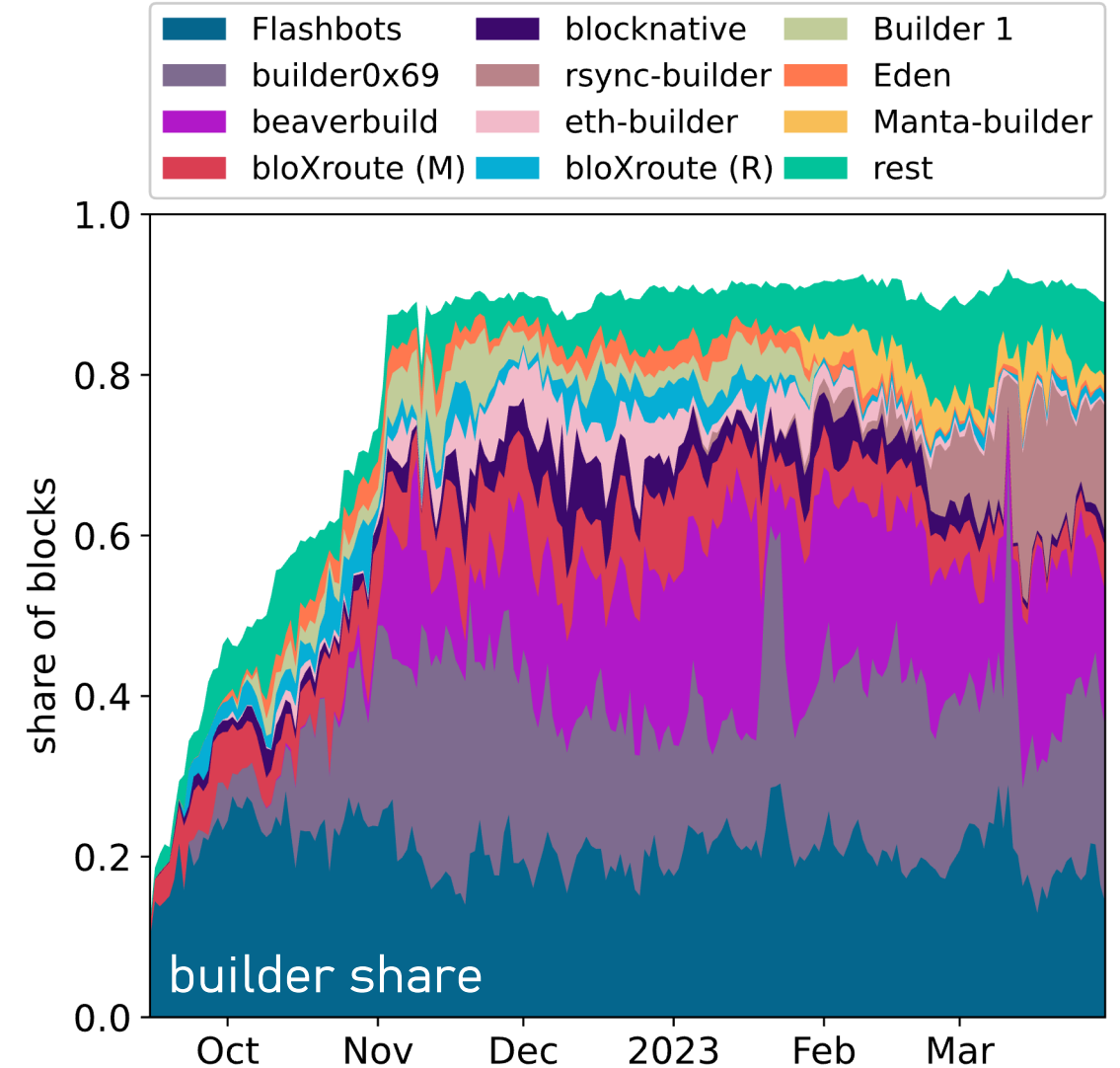
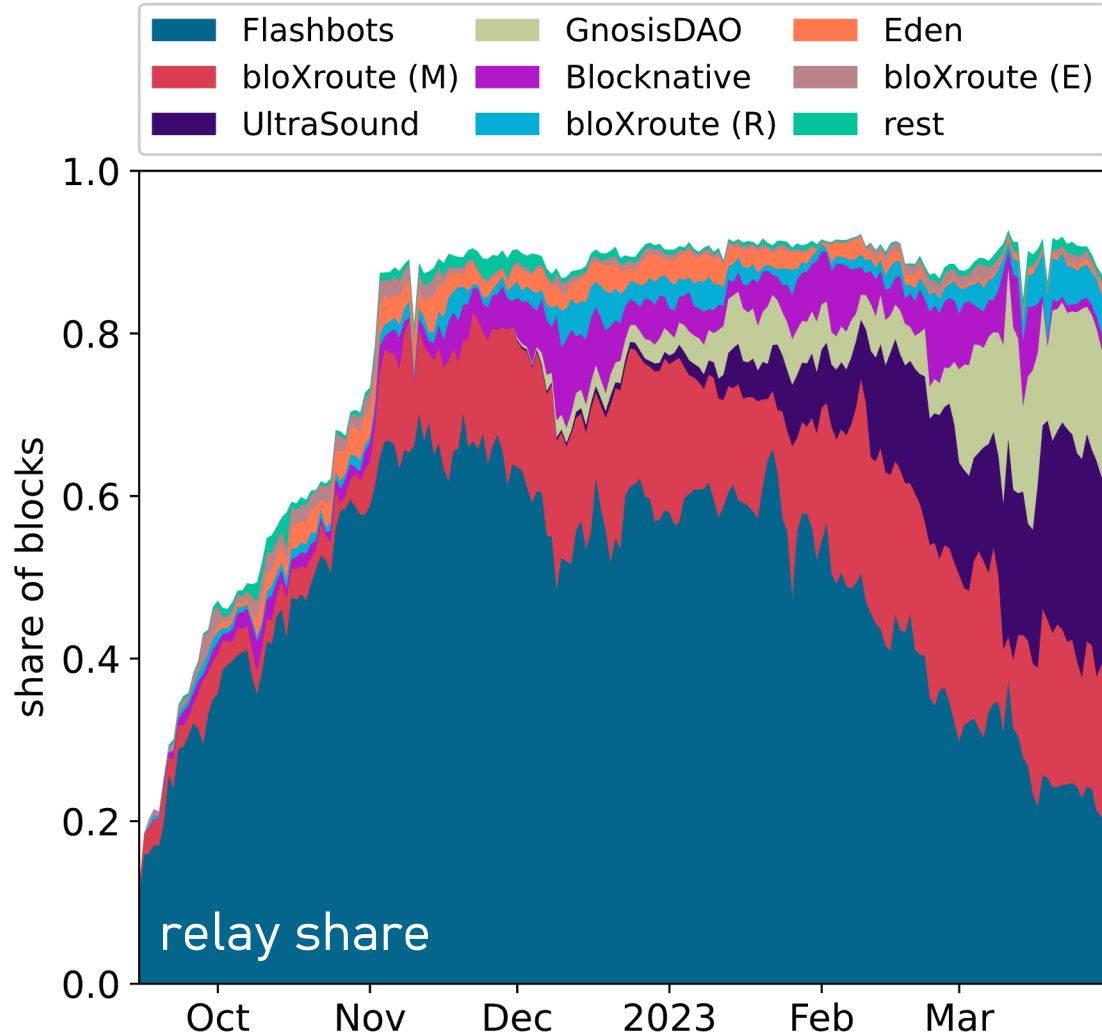
Share of blocks built through PBS



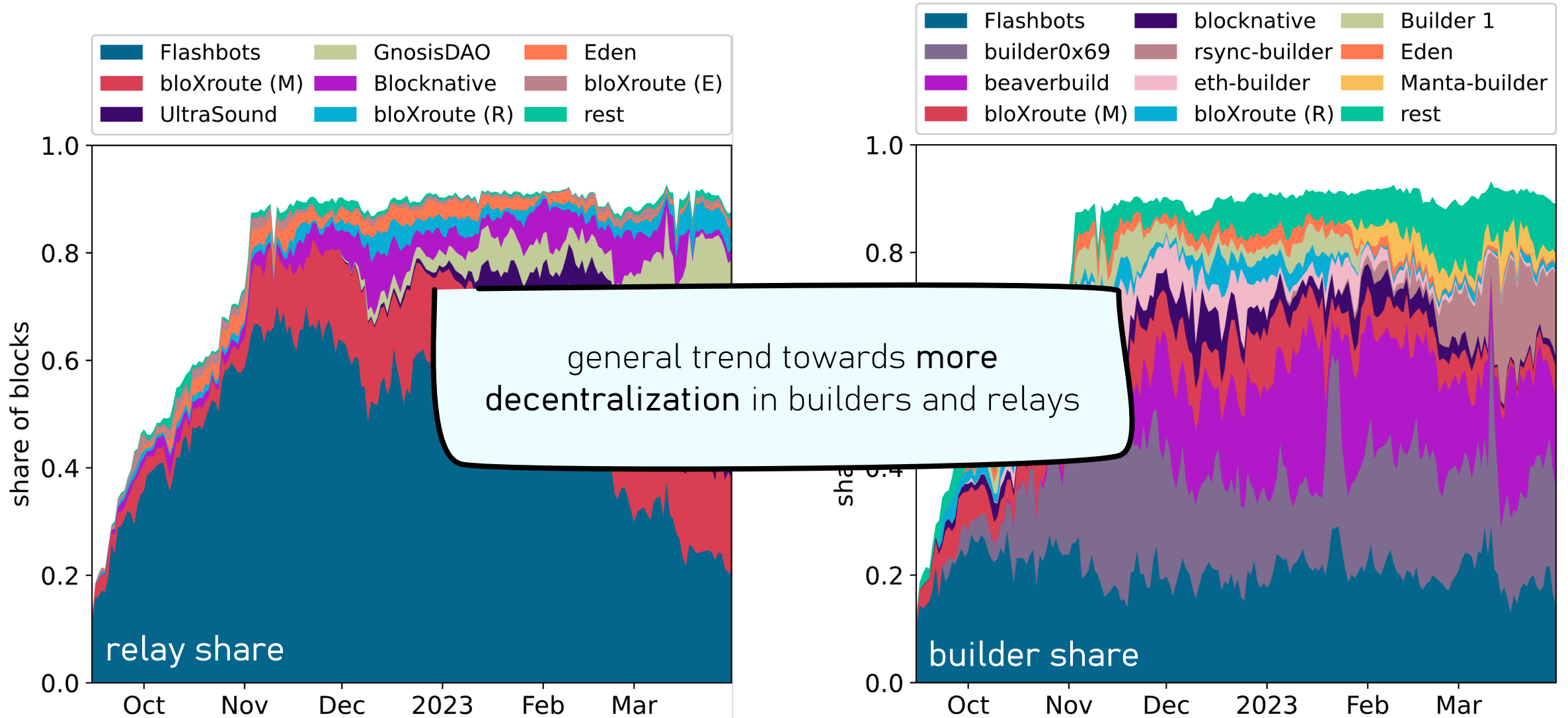
Relay and builder overview



Relay and builder overview



Relay and builder overview



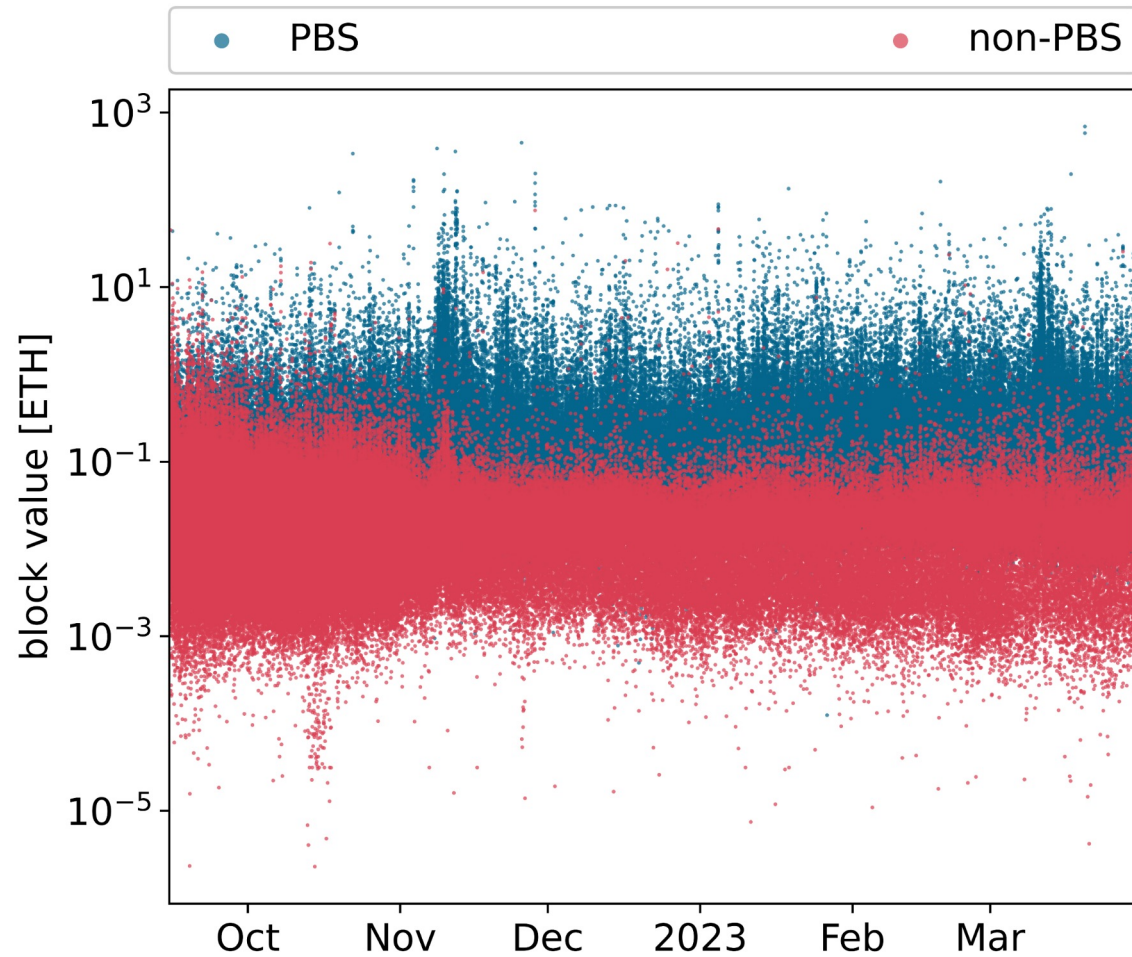
Proposer-builder separation

trends

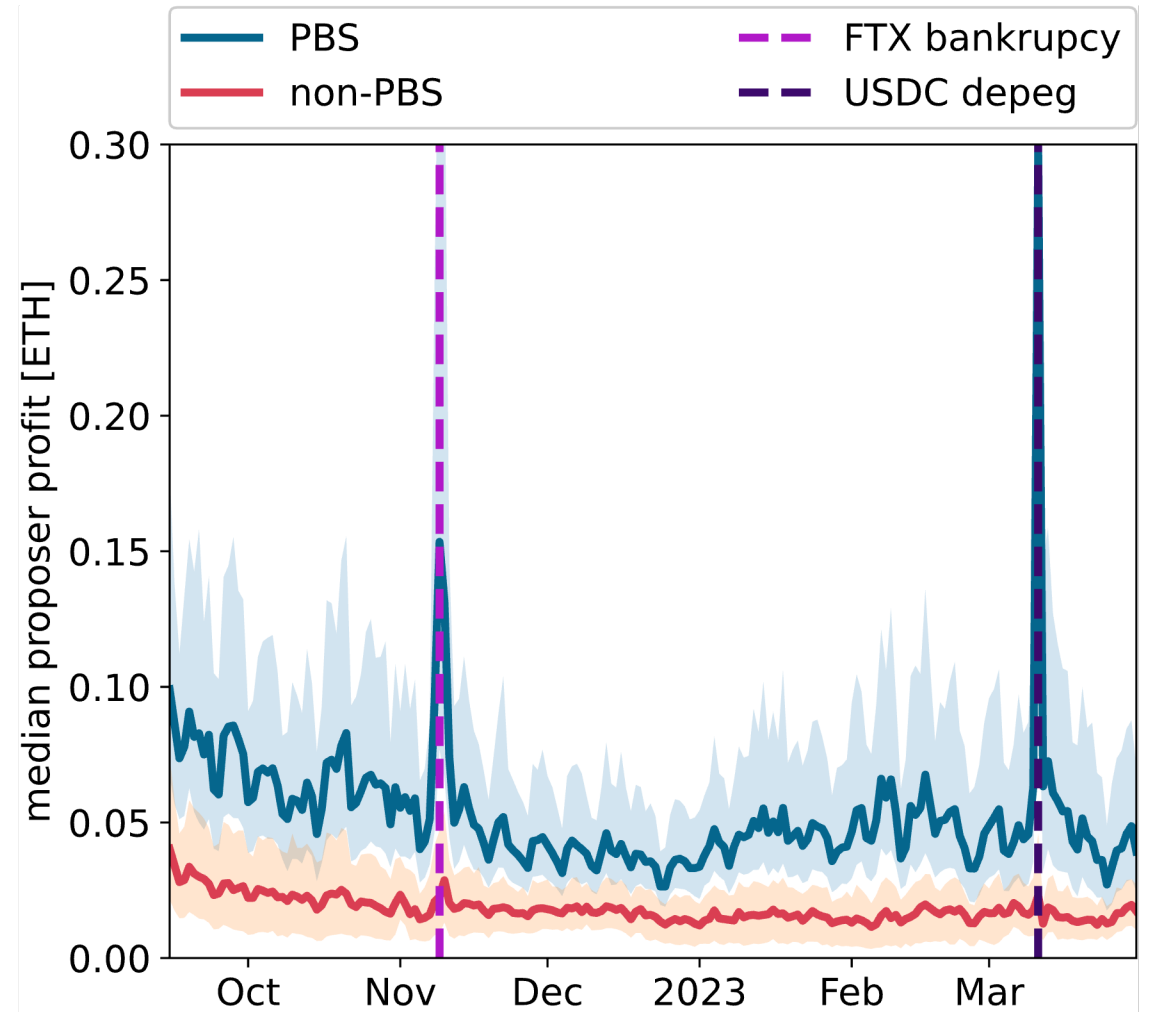
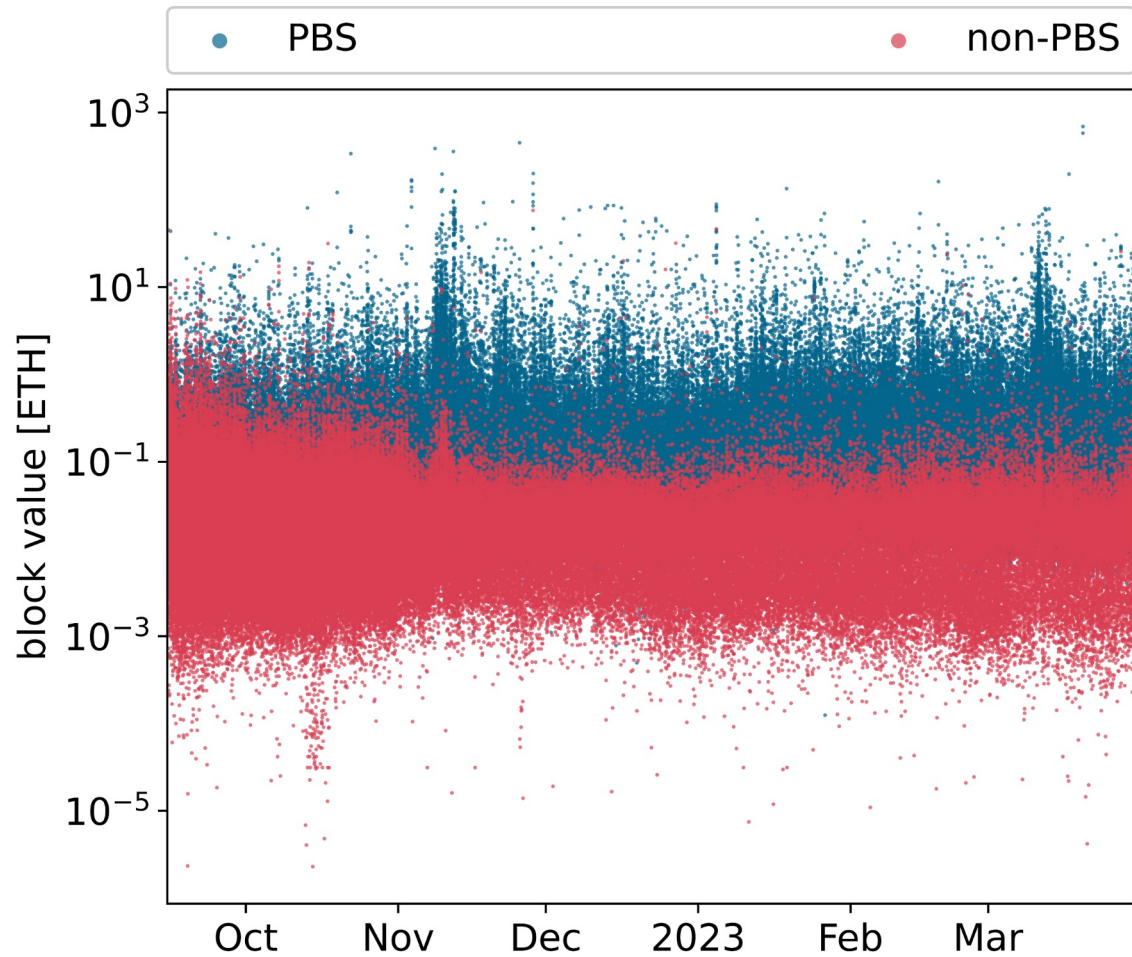
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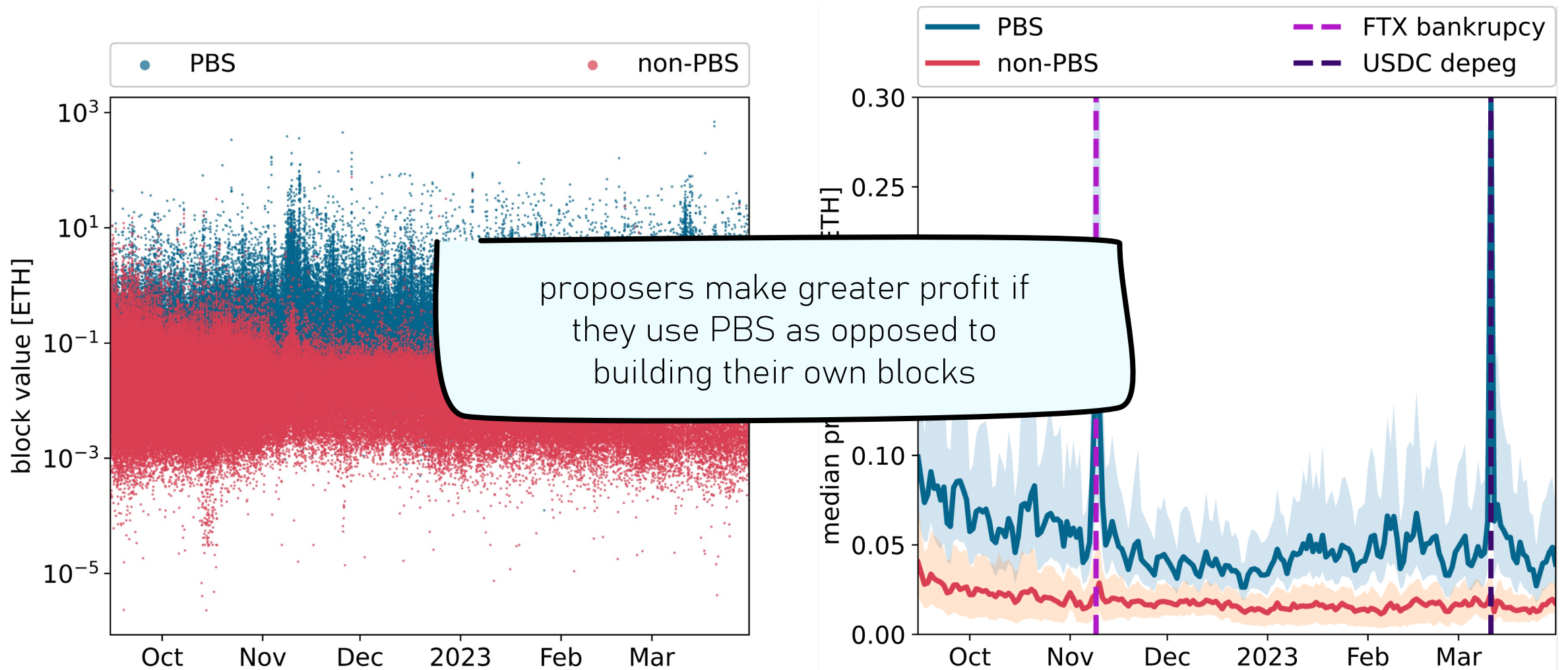
Block value and proposer payments



Block value and proposer payments



Block value and proposer payments



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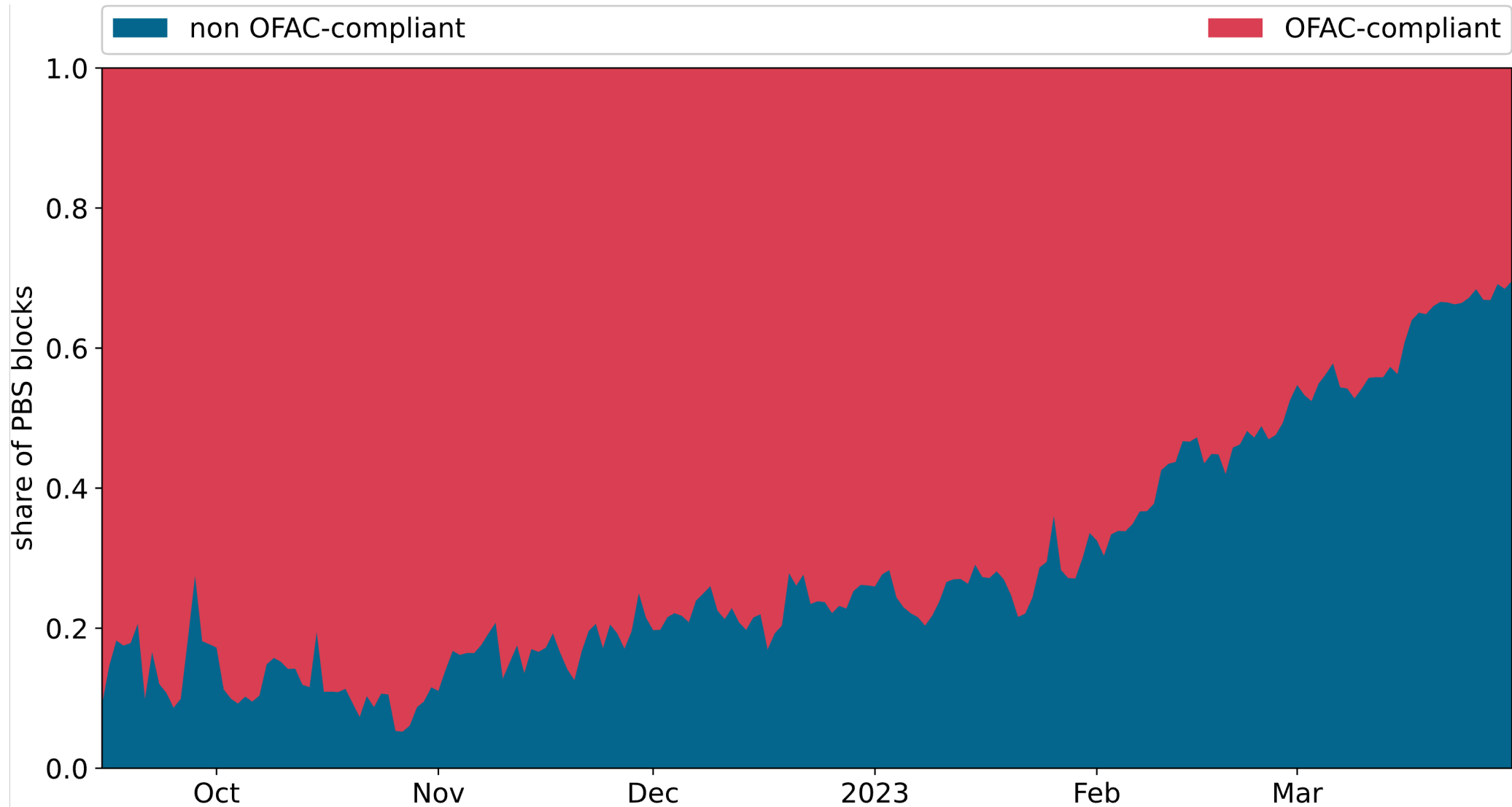
Proposer-builder separation

trends

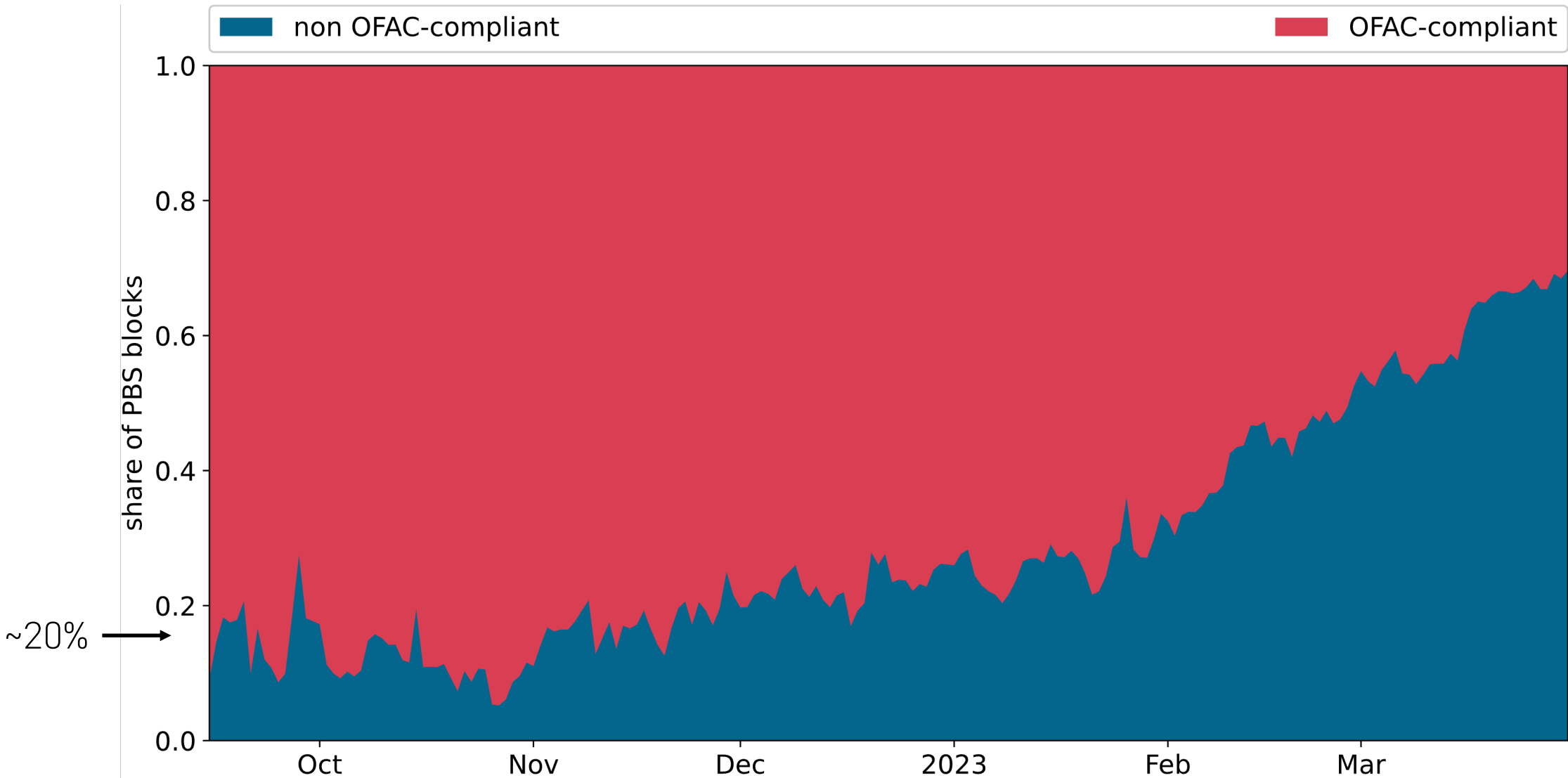
decentralize
block profits

censorship
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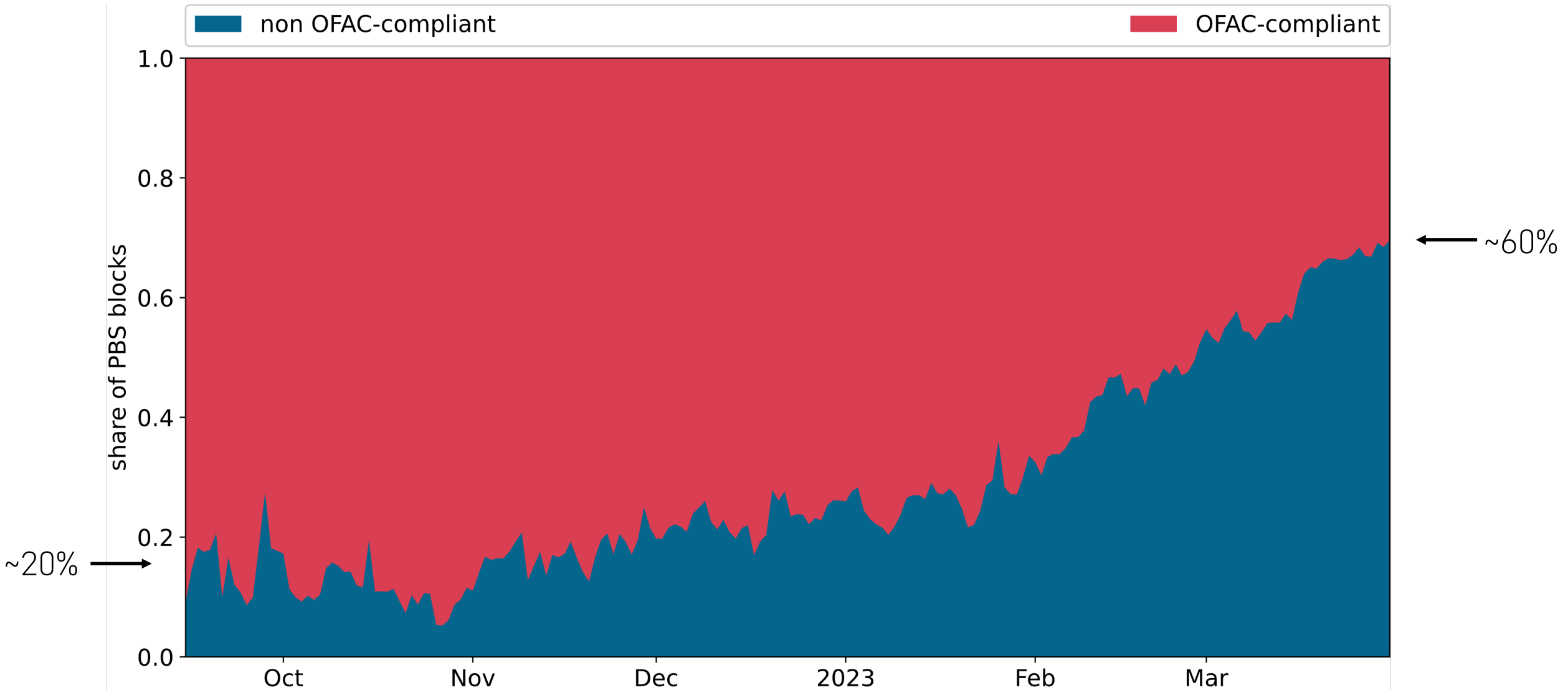
OFAC censorship



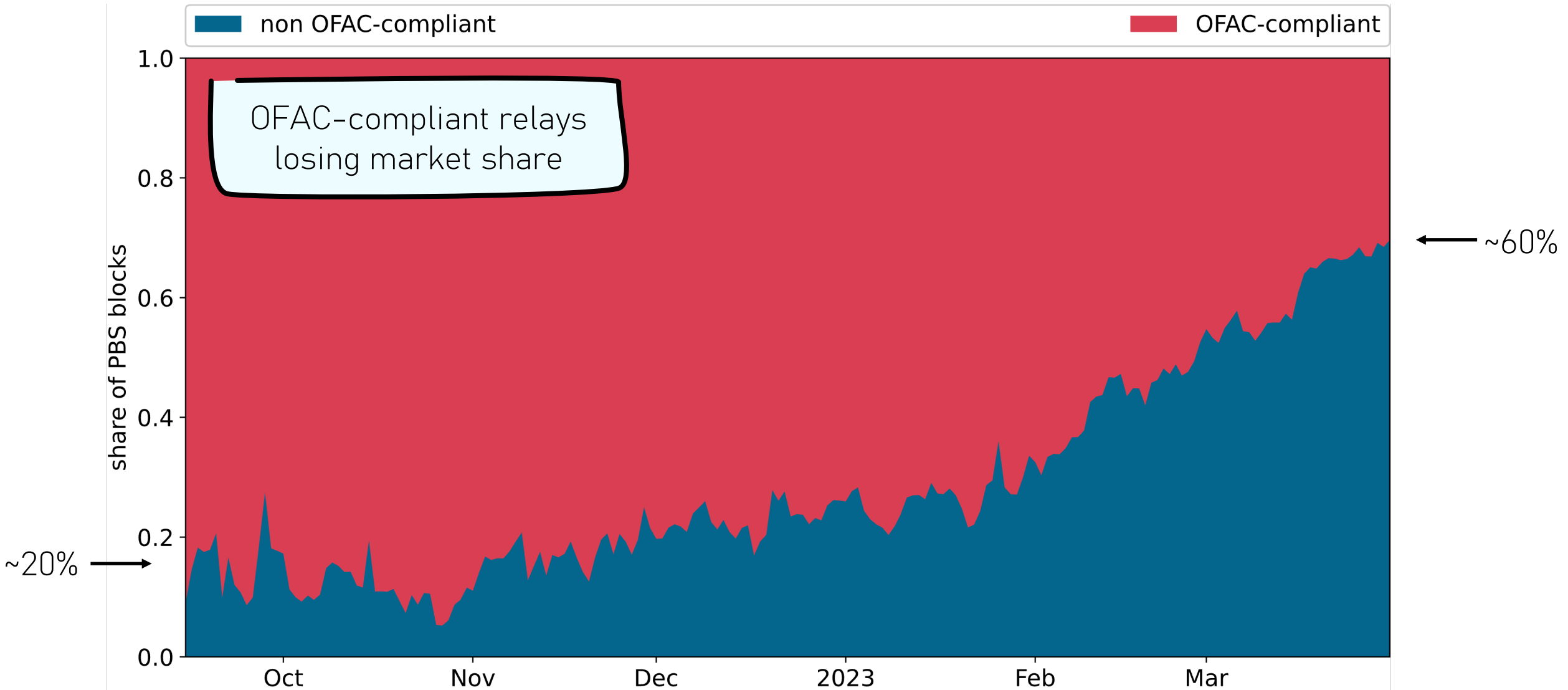
OFAC censorship



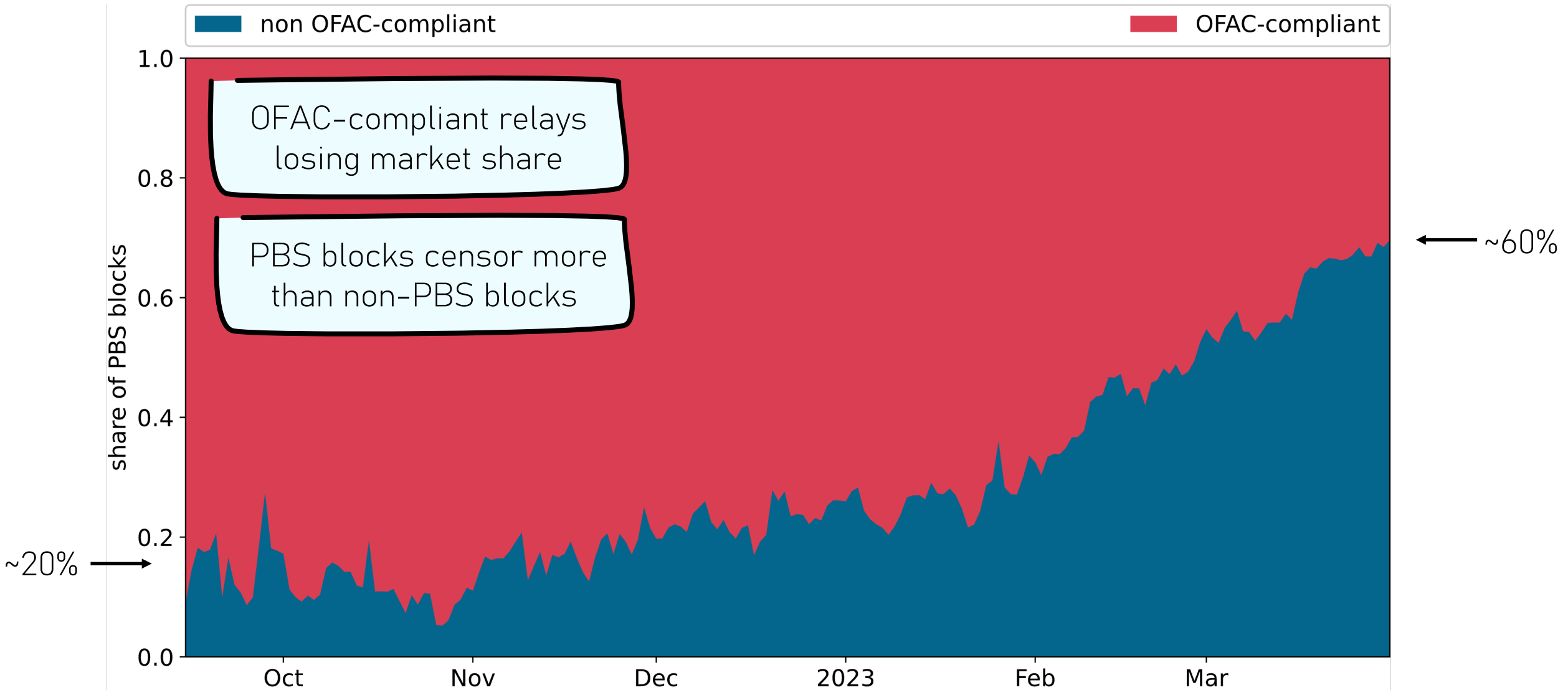
OFAC censorship



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by institutional players

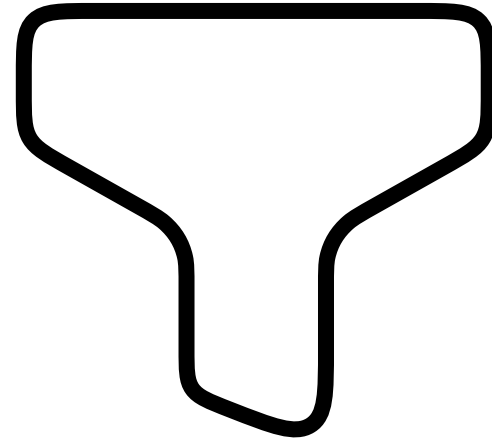
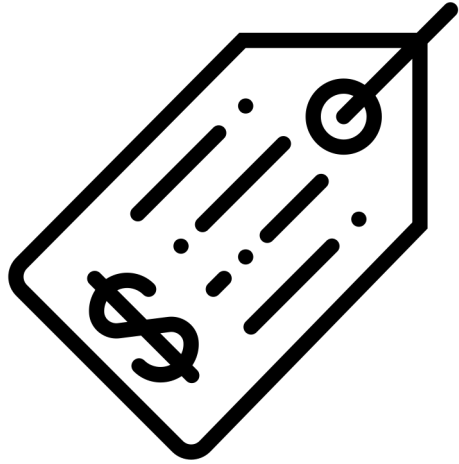


prevent transaction
censorship at the
protocol level



builders trust relays & proposers trust relays

Relay trustworthiness



Relay trustworthiness

	delivered value [ETH]	promised value [ETH]	share of value [%]	share over-promised of blocks [%]
Aestus	404.582057	404.582057	100.000000	0.030921
<i>Blocknative</i>	6086.147269	6087.225188	99.982292	3.553043
bloXroute (E)	1027.721708	1028.849142	99.890418	4.449079
bloXroute (M)	19248.859647	19250.965641	99.989060	2.723592
<i>bloXroute (R)</i>	3689.983494	3690.389671	99.988994	0.113681
<i>Eden</i>	4204.908110	4483.541341	93.785421	0.047946
<i>Flashbots</i>	90812.869179	90818.879444	99.993382	0.032546
GnosisDAO	12461.847484	12462.572553	99.994182	0.894293
Manifold	416.283800	2095.806623	19.862701	6.880409
Relayoor	319.504570	319.608181	99.967582	2.095704
UltraSound	13970.478128	13971.955037	99.989429	0.953061
PBS	152643.185446	154614.374878	98.725093	0.855103

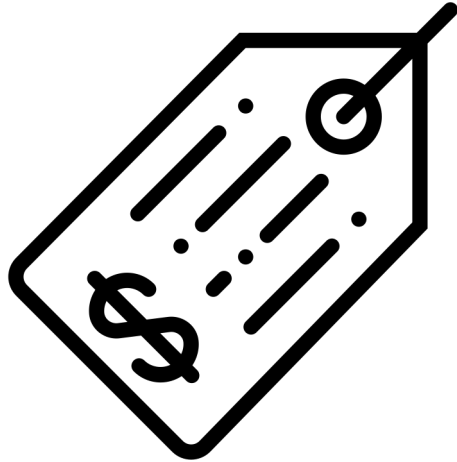
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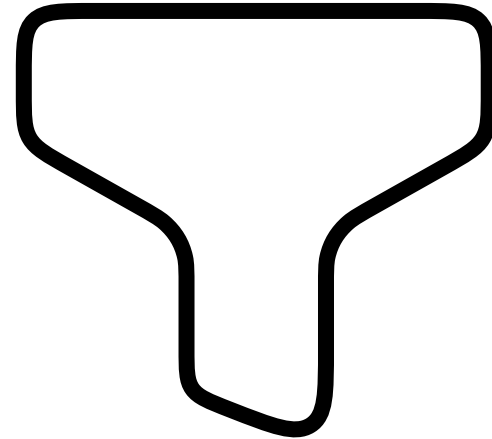
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Relay trustworthiness



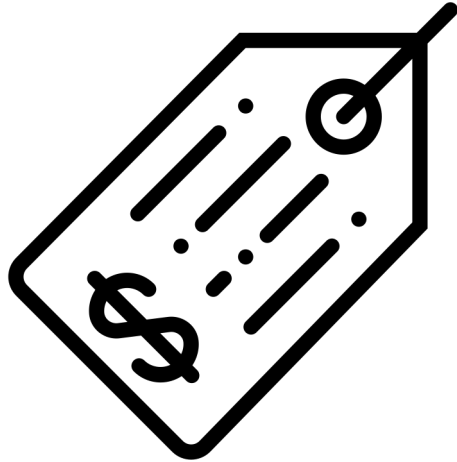
~1 % of block the value
indicated in the bid too high



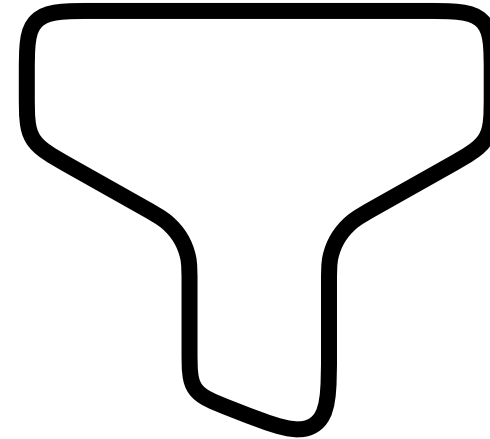
Relay trustworthiness

	sanctioned blocks	share of sanctioned blocks [%]
Aestus	35	1.082251
<i>Blocknative</i>	1001	1.807610
bloXroute (E)	780	5.420431
bloXroute (M)	10038	5.375475
<i>bloXroute (R)</i>	254	0.824756
<i>Eden</i>	81	0.323586
<i>Flashbots</i>	1451	0.210801
GnosisDAO	2225	2.956300
Manifold	1012	14.356646
Relayooor	162	5.658400
UltraSound	3289	3.309419
PBS	20328	1.710460

Relay trustworthiness



~1 % of block the value
indicated in the bid too high



relays have holes in their
filtering policies

PBS was introduced for PoS Ethereum to decouple block *building* from block *proposing to*



prevent hobbyist
validators from being
out-competed
by institutional players



prevent transaction
censorship at the
protocol level



builders trust relays & proposers trust relays

Ethereum's Proposer-Builder Separation: Promises and Realities



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