



Blockchain Network Simulator

P2P Blockchain Simulator (Open Source)

Realistic Setting

- Validation with existing Blockchain networks

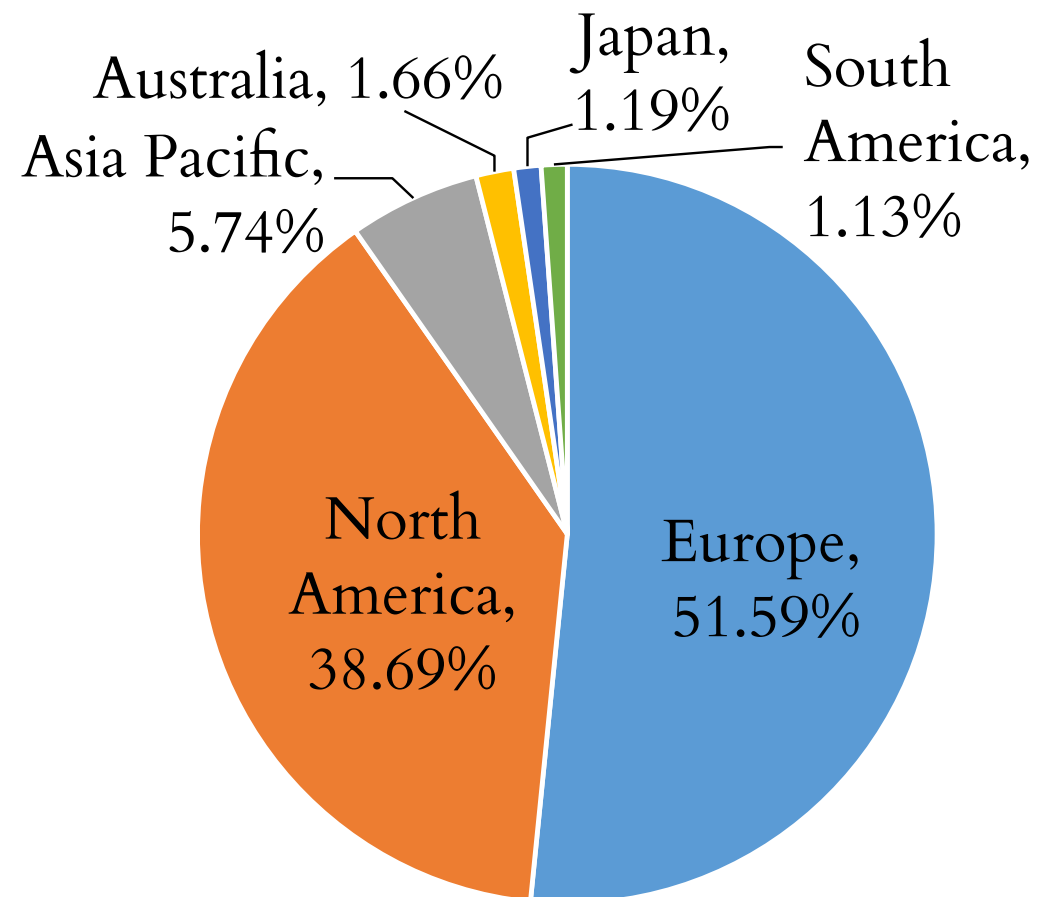
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Realistic Setting

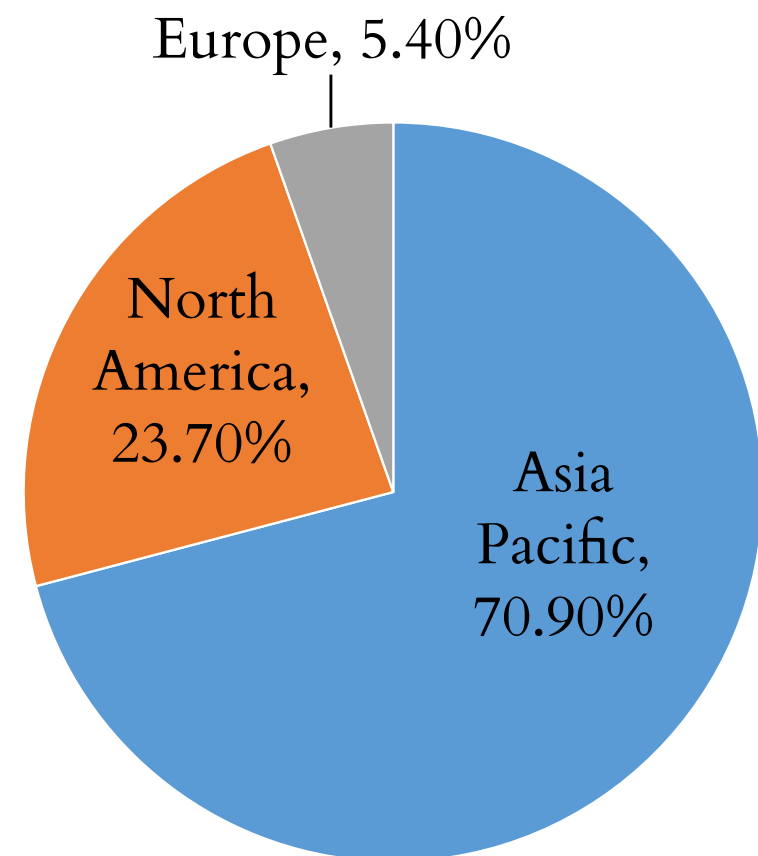
- Validation with existing Blockchain networks

Consensus Parameters	Network-Layer Parameters
Block interval (distribution)	Block size (distribution)
Mining power (distribution)	Geographical location of nodes/miners
	Number of connections of nodes/miners (distribution)
	4 different propagation protocols

P2P Blockchain Simulator (Open Source)

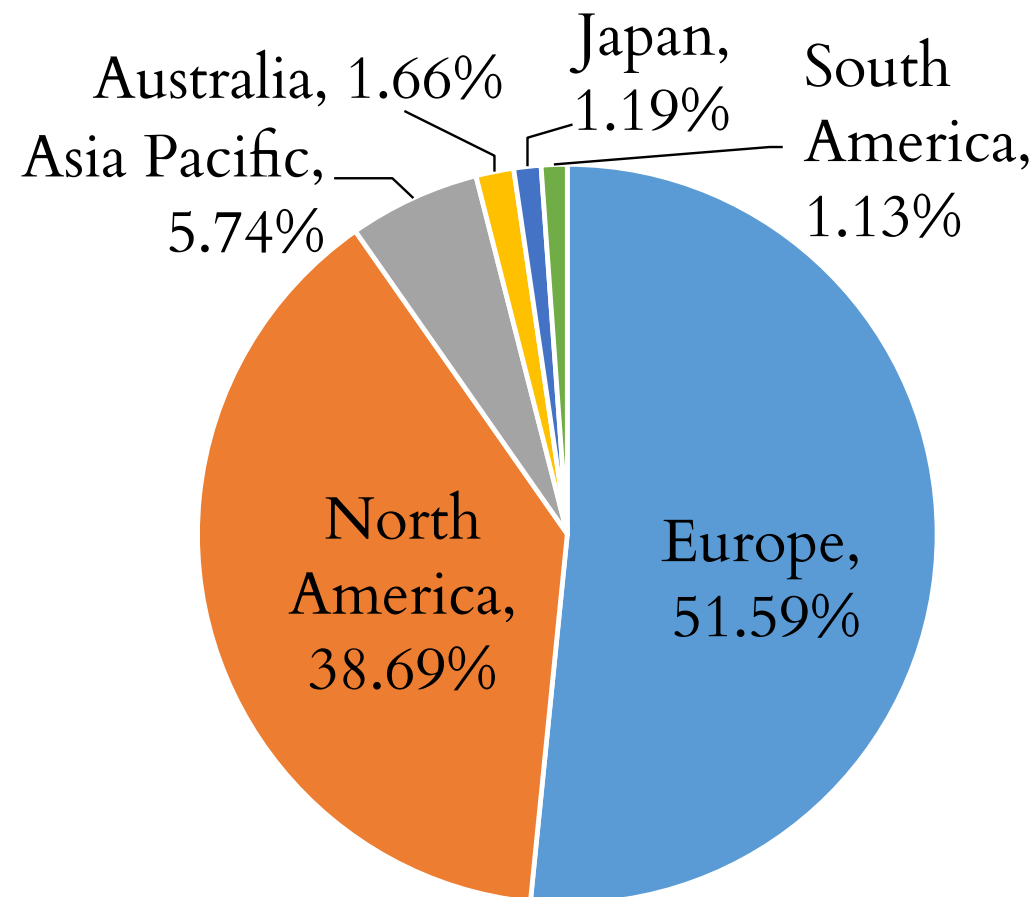


Relaying nodes

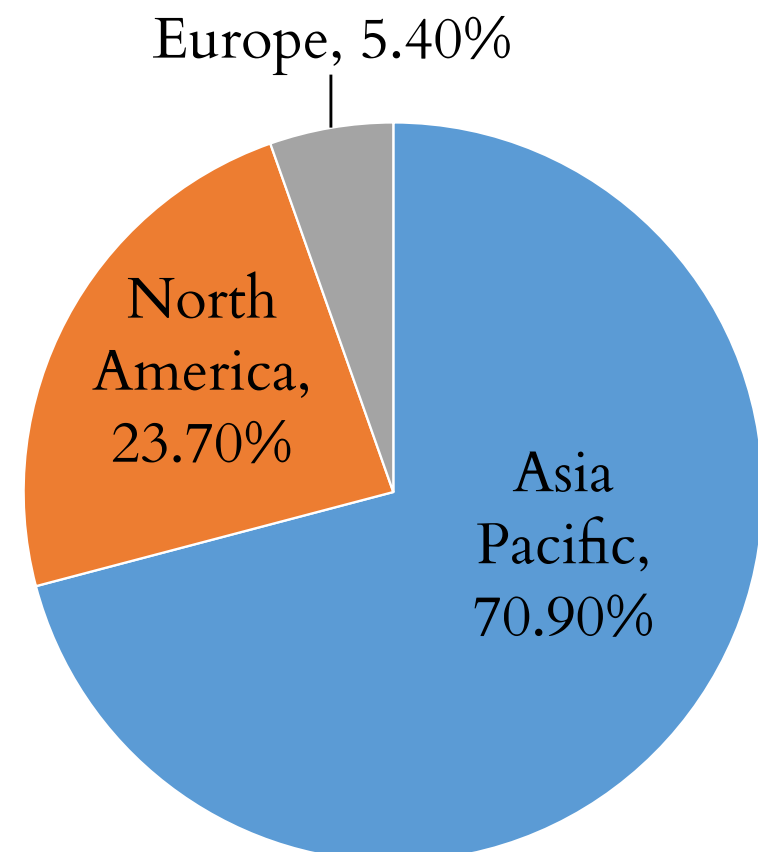


Miners

P2P Blockchain Simulator (Open Source)



Relaying nodes



Miners

<https://github.com/arthurgervais/Bitcoin-Simulator>

BITCOIN SIMULATOR

IMPACT OF BLOCK GENERATION INTERVAL

STANDARD								
Interval	t _{mean} (s)	t _{median} (s)	t _{10%} (s)	t _{25%} (s)	t _{75%} (s)	t _{90%} (s)	s _r	Bandwidth (kbps)
25 mins	61.23	35.73	18.43	24.15	52.59	91.02	1.72%	14.14
10mins	25.83	14.7	7.87	10.14	21.29	35.47	1.51%	14.26
2.5mins	6.83	4.18	2.52	3.06	5.76	9.12	1.82%	14.51
1mins	3.02	2.08	1.43	1.65	2.68	3.76	2.15%	14.71
30s	1.81	1.43	1.07	1.2	1.77	2.3	2.54%	15.39
20s	1.45	1.21	0.95	1.05	1.45	1.83	3.20%	16.12
10s	1.09	1	0.8	0.88	1.13	1.38	4.77%	17.67
5s	0.93	0.89	0.73	0.79	0.97	1.13	8.64%	21.03
2s	0.85	0.84	0.68	0.74	0.91	1	16.65%	31.44
1s	0.84	0.82	0.67	0.71	0.89	0.97	26.74%	49.83

BITCOIN SIMULATOR

IMPACT OF NUMBER OF MINERS

16 MINERS

32 MINERS

64 MINERS

128 MINERS

256 MINERS

Block Size (MB)	Block Interval	s_r	Throughput (tps)
0.25	30s	0.76	33.4
0.1	10s	1.76	40
0.25	20s	1.11	50
0.25	15s	1.45	66.7
0.5	30s	0.98	66.7
1	1mins	0.74	66.7

Scaling Bitcoin

Several weeks of simulation

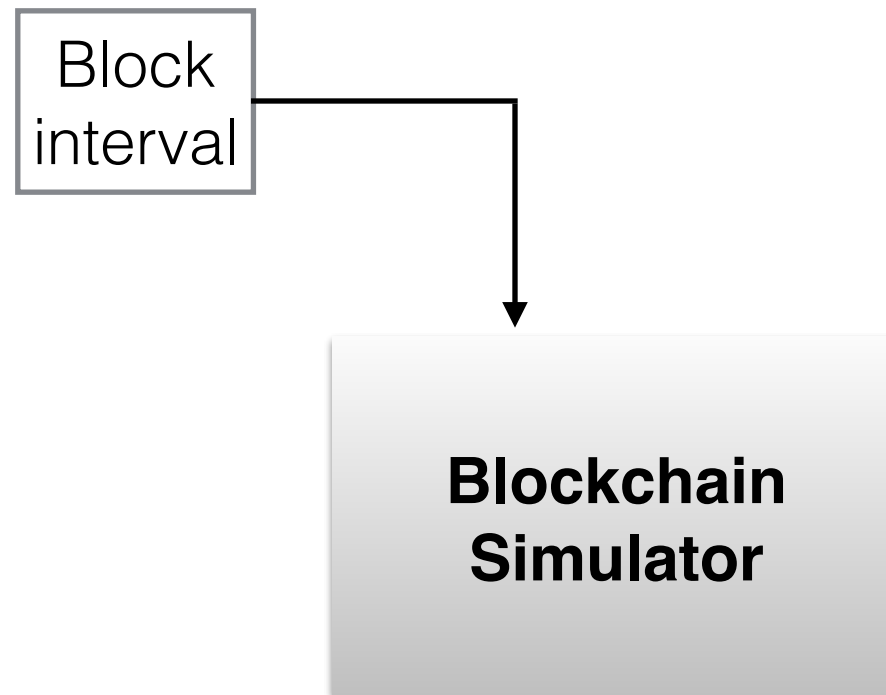
A rectangular button with a light gray gradient and a subtle drop shadow. The text "Blockchain Simulator" is centered on the button in a bold, black, sans-serif font.

**Blockchain
Simulator**

Scaling Bitcoin

Several weeks of simulation

0.5 sec - 25 min

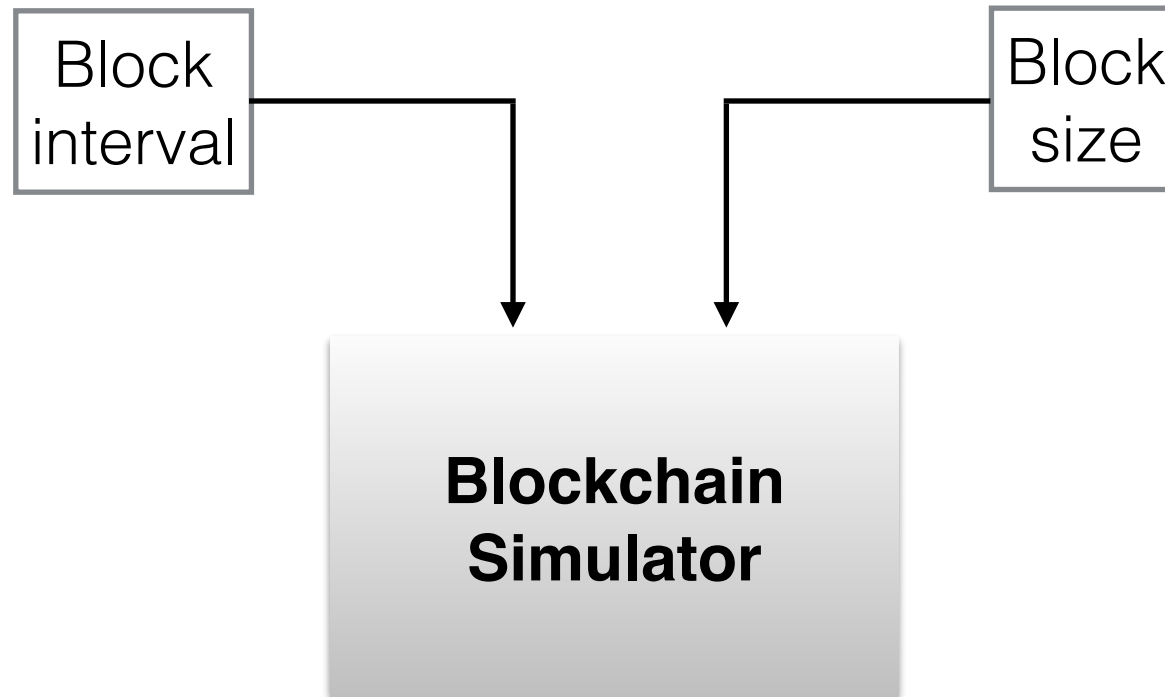


Scaling Bitcoin

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0.1 - 16 MB



Scaling Bitcoin

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Block
interval

Block
size

**Blockchain
Simulator**

Stale block rate

Scaling Bitcoin

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Block
interval

Block
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**Blockchain
Simulator**

Stale block rate

- 1 MB blocks
- 1 Minute Block interval

No stale block rate increase

Scaling Bitcoin

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0.5 sec - 25 min

0.1 - 16 MB

Block
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Block
size

**Blockchain
Simulator**

Stale block rate

- 1 MB blocks
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No stale block rate increase

**From 7 tps to 66 tps,
without sacrificing security**