

# Effectiveness of Bitswap Discovery Process



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# Motivation

- ⬢ Measure whether Bitswap is efficient to discover content
- ⬢ Bitswap has a `ProviderSearchDelay` parameter whose value is set to 1 second
- ⬢ Get rid of IPFS magic numbers

# Measurements Setup

- ✦ Request CIDs collected by sniffing the Bitswap network
- ✦ Bitswap has 15 seconds to find and fetch 1 block
- ✦ Prevent DHT lookup inside Bitswap
- ✦ If Bitswap fails to discover content, verify if content is still available
- ✦ Prevent recursive content resolution
- ✦ Run on a Google Cloud VM in Central Europe

# Discovery Process Stats

- 🟡 98.37% discovery success rate (within 15 seconds)
- 🟡 On average 856 distinct remote peers are solicited for each Bitswap request
- 🟡 On average 1714 messages are sent for each Bitswap request

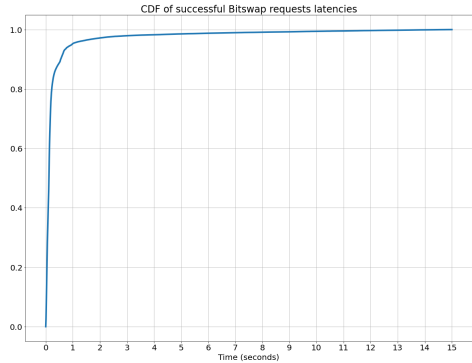
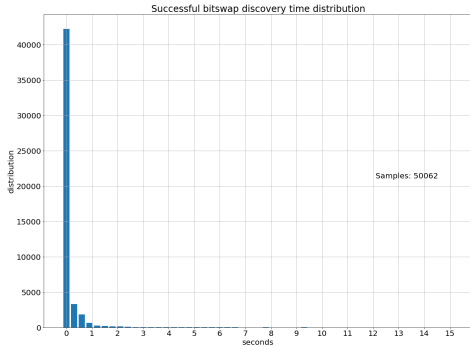
# Content Providers Stats

🟢 Total requests: 50'062

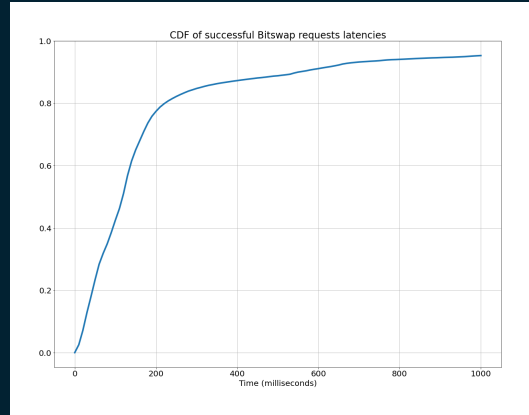
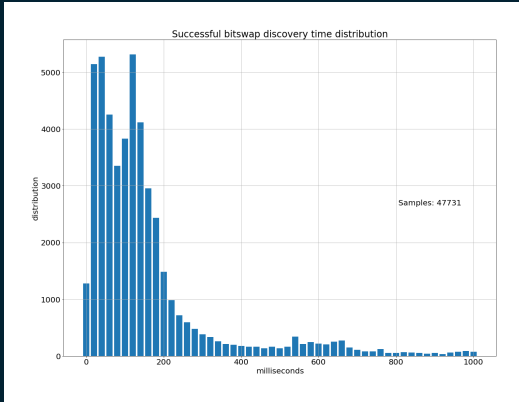
Top N providers	Percentage of blocks served
Top 1	10.61%
Top 3	25.65%
Top 5	37.93%
Top 10	58.12%
Top 20	75.41%
Top 50	84.39%
Top 361	98.49%
Top 723	100.0%

	PeerID	Number of blocks served	Operator
1.	12D3KooWGtRcWvihm4hX2gT6bQu3uyjb78rgyQR3hPhkxMwivscY	5398	
2.	12D3KooWLsSWaRsoCejZ6RMsGqdftpKbohczNqs3jvNfPgRwrMp2	4113	nft.storage
3.	12D3KooWGRJo1vLDBtfS8a4cVss2QVqvbCaPgtmwwgpUtW675QRa	3543	nft.storage
4.	12D3KooWAuBxG5uMBkeyFwHD9JyHaJGTqn7NhJbmmukNDPHSLKts	3167	nft.storage
5.	12D3KooWJc7GbwkjVg9voPNxdRnmEDS3i8NXNwRXD6kLattaMnE4	3085	nft.storage
6.	12D3KooWEGeZ19Q79NdzS6CJBoCwFZwujqi5hoK8BtRcLa48fjdu	2357	
7.	12D3KooWJ59N9z5CyLTtcUTnuTKnRTEVxiztijiEAYbP16aZjQ3D	2287	nft.storage
8.	12D3KooWENiDwDCPnbEQKHHSdnSsE5Y3oLyXnxuyhcCEBK9TvkU	2051	
9.	12D3KooWC9L4RjPGgqzpBUBkcVpKjjYofCkC5i5QdQftg1LdsFb2	1826	
10.	12D3KooWKd92H37a8gCDZPDAAGTYvEGAq7CNk1TcaCkcZedkTwFG	1750	nft.storage

# Bitswap Discovery + Fetch Latencies



# Bitswap Discovery + Fetch Latencies Zoom



# Takeaways

- ✦ Bitswap is currently **fast** (discovery+fetch  $\leq$  200ms in 80%) and **accurate** (98.37% of accessible content found)
- ✦ Bitswap is **inefficient** (856 peers solicited for each request)
- ✦ Bitswap content discovery **does NOT scale** (e.g if the network grows by 10x, the number of open connection must be 10x to keep the same discovery success rate)
- ✦ The top 20 peers serve 75% of the requested content
- ✦ Should data transfer and content routing be bundled together?



# References

- ◆ Detailed report
- ◆ Complete measurement methodology
- ◆ Additional data and plots
- ◆ Improvement recommendations



RFM-16 Report

- ◆ Soon available at <https://github.com/protocol/network-measurements>