With the introduction of bitcoin long-term storage and availability of data problem solved in P2P networks. Before there were BitTorrent, Kademlia, ICN that used similar approaches like in bitcoin but bitcoin added coins as an incentive. However, the system still inherits previous generation problems. Next generation technology of IPFS improved current network even more with features: decentralized sharing and storing of data. It gained popularity mostly because of usage as storage layer for blockchains. Main difference in protocol of IPFS is using content-based addressing which allows efficient storage of data. Files are signed and updated using InterPlanetary Name System. When new node is connected to the system it discovers peer nodes using gossip-like system and communication between nodes is encrypted. Files in IPFS is divided into blocks and mapped by Merkle DAG and newer file versions are allocated more bandwidth, file is accessed using tree root. Peers access to files if they know root CID of the file and request it putting root CID in bitswap want list. To keep system alive Filecoin is used. It incentivizes and maintains market for storage using Proof-of-Replication and Proof-of-Space-Time protocols.

Swarm is updated version of IPFS from Ethereum Foundation, main purpose is decentralized storage. Uses the same content-based addressing but with storage location, Merkle tree and ETH for incentive. The system structure mostly depends on neighbors by distance. Data exchange is managed by SWAP protocol. Management is better than IPFS because here.

The idea behind Storj is similar to any blockchain technology, providing decentralized storage using less bandwidth from nodes while ensuring end-to-end encryption. The network is maintained by three type of nodes: satellite-admins, storage-users and uplink-storage. The rest is similar to Swarm.

Arweave is more like a blockchain system, contains from blocks that are connected by order and data can not be changed. Nodes are ranked according to their performance, so good workers are incentivized to receive data first and low performers are pruned over time.