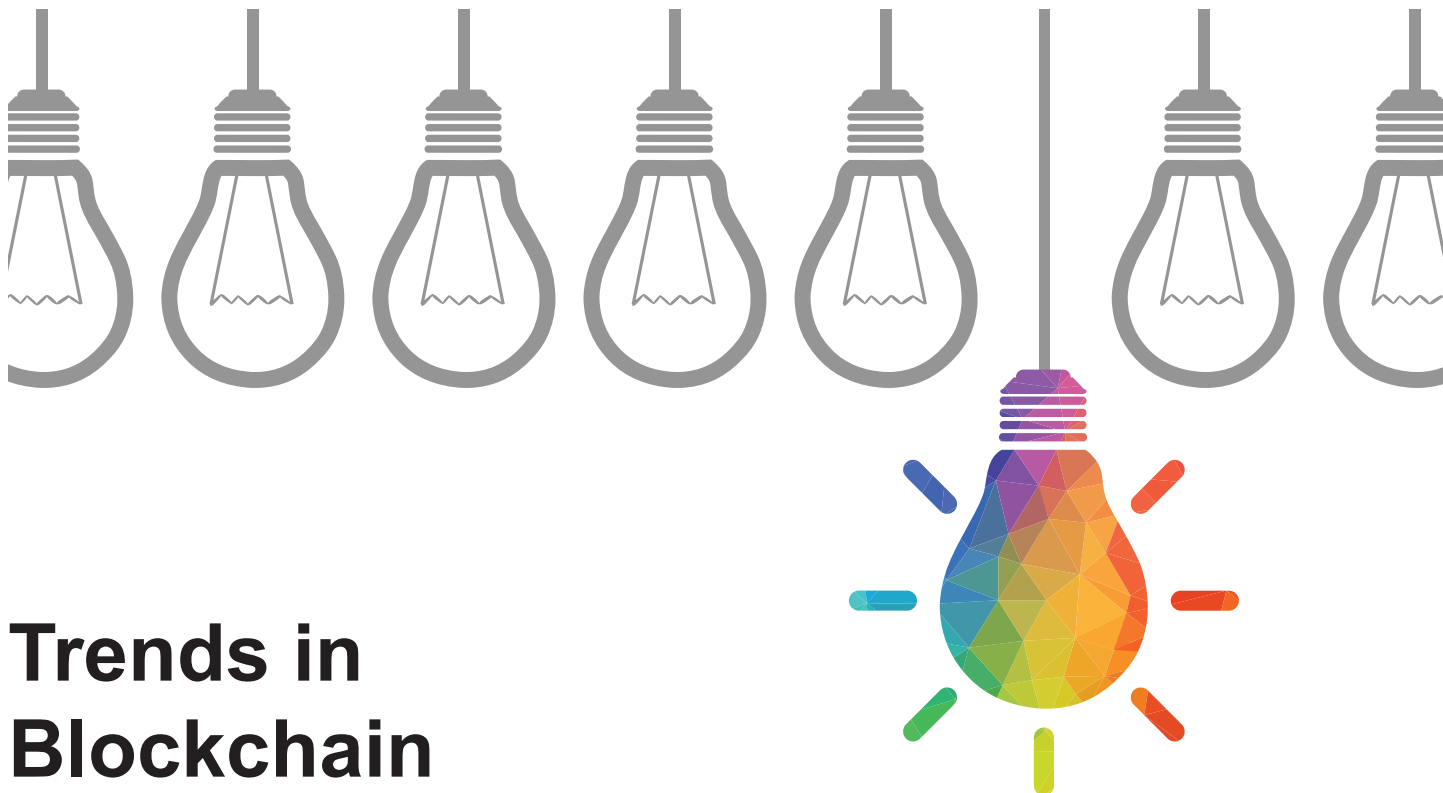




Trends in Blockchain

Blockchain patent filings are quickly diversifying. In addition to a growing number of patent filings for non-cryptocurrency-related FinTech applications, patent filings for supply chain logistics and healthcare applications are growing at a steep pace as well. We foresee growing diversification as more industries incorporate blockchain technology into their operations.

Blockchain and distributed ledgers hold the promise to make transactions more transparent and trustworthy using algorithms and technology. Blockchain is perhaps best known for its essential role in cryptocurrencies, but it has a wide variety of other applications - from ensuring supply chains to managing contracts - that will eclipse its value to cryptocurrency. Therefore, it is increasingly being adopted by businesses that see it as being foundational and disruptive in a way that no industry is immune to.

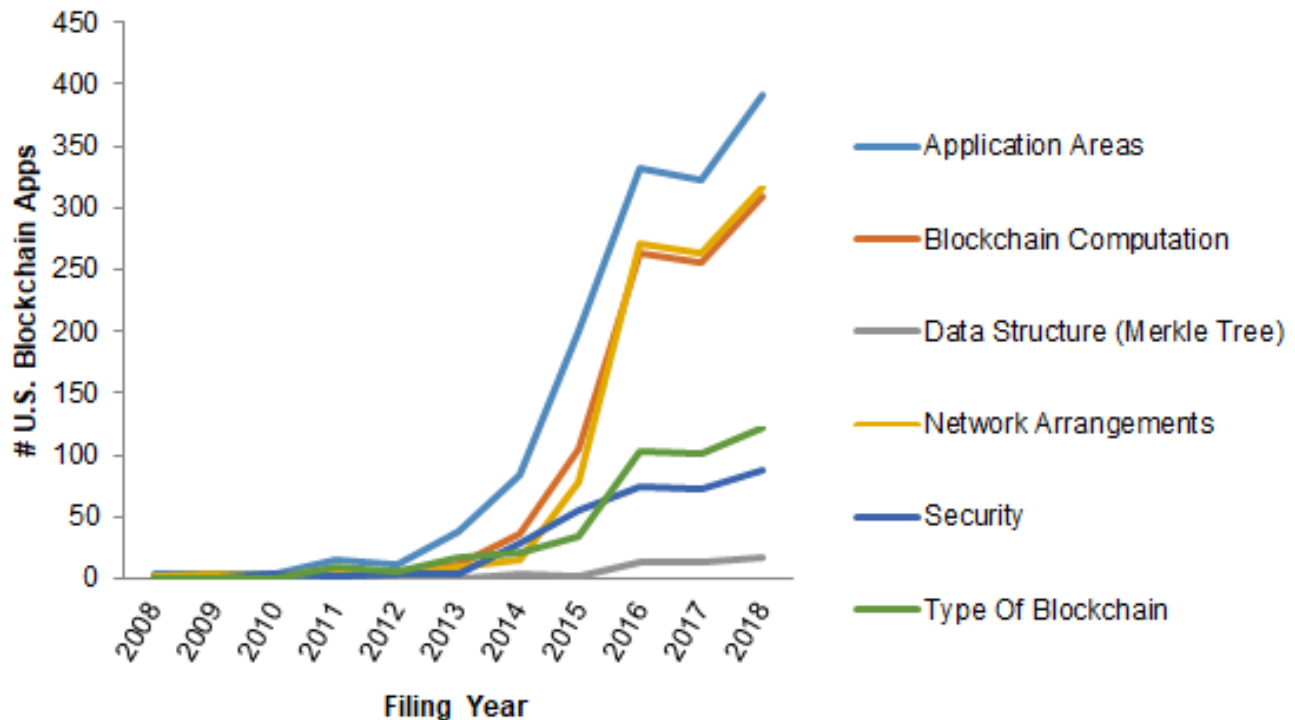
For our study, we have defined the following technology clusters within the general blockchain industry, which has enabled us to observe several distinct trends about this industry:

Application Areas	Level II Clusters
Application Areas	Digital Media
	Energy Distribution/Smart Grids
	Fintech (Cryptocurrency)
	Fintech (Other Aspects)
	Gaming
	Healthcare
	Internet Of Things
	Supply Chain/Logistics/E-Commerce
Blockchain Computation	Block Generation
	Block Hashing
	Block Mining
	Block Sharing
Data Structure (Merkle Tree)	
Network Arrangements	Decentralized Database/Ledger
	Peer-To-Peer Networking
Security	
Type Of Blockchain	Federated/Consortium Blockchain
	Private Blockchain
	Public Blockchain

Taxonomies and expanded definitions of these clusters are included in appendix A.



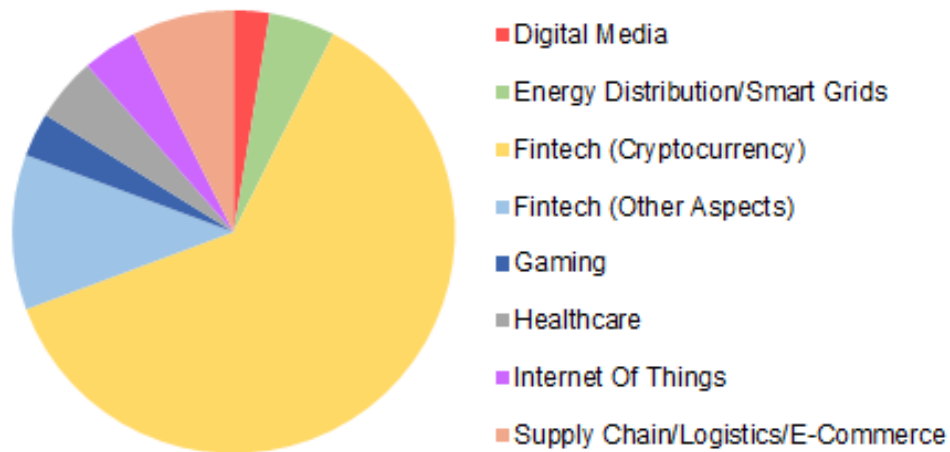
Blockchain patent filings are growing in every technology cluster



Within five years of Satoshi Nakamoto's seminal 2008 white paper, which first described Bitcoin and the blockchain, technology leaders have seized on the promise of blockchain and launched robust programs of innovation that will revolutionize all sectors of the economy. Moreover, in many countries, fiat currency - although government-backed - has less credibility than algorithm-created, secure cryptocurrency, such that the pace of innovation is stoked by political manipulation of government-issued money.

Since its inception, the technology cluster where patenting activity has been the highest for blockchain relates to its possible applications. Although there is significant and increasing patenting activity around blockchain computation and data structure, the most heated patenting race is for protecting the innovative ways in which blockchain can be used, which are predicted to disrupt many industries.

Distribution of Blockchain's Application Areas in Patent Data Set



While the highest number of patent filings for blockchain applications still relate to cryptocurrencies, patent filings are quickly diversifying. In addition to a growing number of patent filings for non-cryptocurrency-related FinTech applications, patent filings for supply chain logistics and healthcare applications are growing at a steep pace as well. Currently, more than a quarter of patent filings relate to non-FinTech applications, and we foresee this percentage rising as more industries incorporate blockchain technology into their operations.



IBM and Bank of America lead in all technology clusters of blockchain patent filings³⁵

USING 2016 DATA		
		Most Families Filed by
		Applicants in alphabetical order)
Blockchain		Bank OF America, Cognitive Scale, IBM, Intel, Mastercard
Level I		
Application Areas		Bank Of America, IBM, Intel, Mastercard, The Toronto- Dominion Bank
Blockchain Computation		Bank Of America, IBM, Intel, Mastercard, The Toronto- Dominion Bank
Network Arrangements		Bank Of America, Cognitive Scale., IBM, The Toronto-Dominion Bank, Walmart
Security		Bank of America, Deutsche Bank, Fujitsu, IBM, Idm Global, Microsoft
Type Of Blockchain		Bank Of America, Business Information Exchange System Corp., IBM, Intel, Mastercard
Data Structure (Merkle Tree)		Coinplug, IBM, Idm Global, Mastercard, Nec Corp., Workday
Level II		
Application Are	Fintech (Cryptocurrency)	Accenture, IBM, Id m Global, Intel, Mastercard, PayPal, VISA
	Fintech {Other Aspects)	Bank Of America, The Bank Of New York Mellon, Deutsche Bank, JPMorgan Chase Bank, Mastercard, Monetago
	Supply Chain/Logistics/E-Commerce	Bank Of America, Cisco, Cognitive Scale, IBM, Raise Marketplace, Walmart
	Energy Distribution/S mart Grids	Causam Energy, Inc., IBM, Intelligent Energy Limited, Netspective Communications Llc, Sichuan Energy Internet Research Institute (Tsinghua University), Walmart
	Healthcare	Acron's International Gmbh, Bank Of America, Cognitive Scale, IBM, Walmart
	Internet Of Things	Cisco, IBM, Intel, SAP SE, VISA
	Gaming	IBM, Priv8Pay, Spur Trail Investments, Swirls
	Digital Media	Dot Blockchain Music, IBM, Intel, Oxford-Downing, Priv8Pay, The Toronto-Dominion Bank, VISA
Blockchain Computation	Block Generation	Bank Of America, Coinplug, IBM, IP Morgan Chase Bank, Mastercard
	Block Mining	Bank Of America, IBM, Intel, Mastercard, The Toronto-Dominion Bank
	Block Hashing	Cisco, Coinplug, IBM, Mastercard, Sony Corp., Walmart
	Block Sharing	Bank OF America, Deutsche Bank, IBM, JP Morgan Chase Bank, Mastercard, Nasdaq, Sony Corp.
Network Arrangements	Decentralized Database/ Ledger	Bank OF America, Cognitive Scale, IBM, Intel, The Toronto-Dominion Bank, Walmart
	Peer-To-Peer Networking	Accenture, Bank OF America, IBM, Mastercard, Nasdaq
Type Of Blockchain	Public Blockchain	Bank OF America, Business Information Exchange System Corp., Coinplug, IBM, Intel, PayPal
	Federated/Consortium Blockchain	Bank OF America, Capital One Services, Causam Energy VISA, Vmware,
	Private Blockchain	Bank Of America, Cognitive Scale, Coinplug, IBM, Mastercard

³⁵ Although patent filings are growing in this industry, the actual numbers are still small. In some clusters, more than one entity has filed the same number of patent applications, necessitating listing more than five leading filers per cluster.

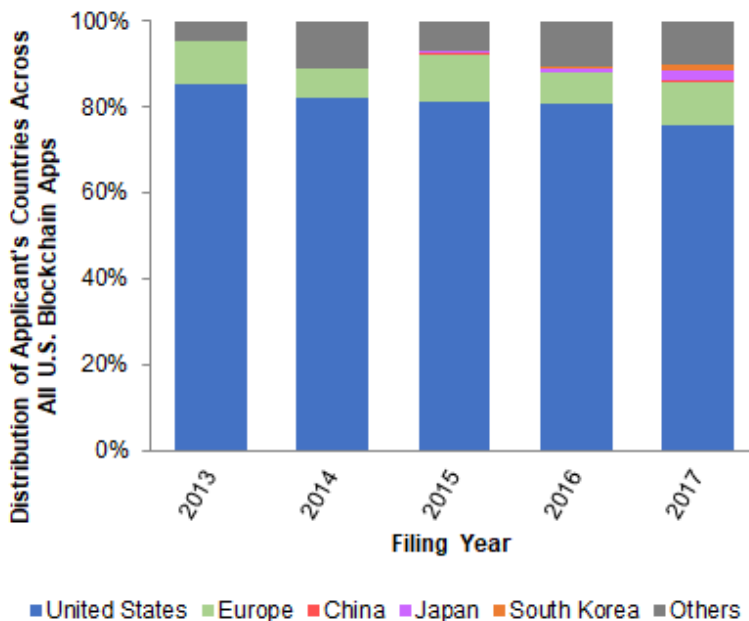
From the increasing number of its patent filings in this industry, it appears that IBM intends to continue its push for leadership in blockchain. Indeed, IBM's patent filings are compatible with its statements about blockchain being a current and future research priority. With the recent open sourcing of IBM's Hyperledger code base,³⁶ we can expect the value of these patents to increase with broader adoption of their technological approach.

Bank of America is also a prolific patent filer in the blockchain space. Its patenting strategy suggests that it does not want to be left behind and risk being shut out of this emerging industry that could displace some traditional financial services. Even if its patents do not relate to any particular product or service in its current pipeline, a strong patent portfolio gives Bank of America a defensive advantage, should it face a patent war relating to blockchain in the future as new competitors begin to dominate beyond their emerging roots in the blockchain area.

Not to be left out, Mastercard has emerged as a patenting powerhouse.³⁷ Their innovation effort in blockchain technology is notable. Traditional card brands may benefit from blockchain technology, but their legacy systems are well established and mature. Blockchain innovation could disrupt that status quo to displace entrenched incumbents who do not extend their brands to address displacing innovation.

While familiar names are the dominant players in blockchain patenting, it is of note that hundreds of other entities and individuals have filed patent applications in this space. Because blockchain is a young and fast-evolving technology, it is possible that some of these smaller entities may have a seminal patent on a core pioneering innovation that could shape the future of this technology.

The percentage of U.S.-based applications is declining



Despite the push for filing patents on blockchain innovations by American corporations such as IBM and Bank of America, an increasing percentage of patent applications are filed by foreign entities. As blockchain's economic significance continues to rise globally, we expect this trend to continue.

For example, Japan is an early adopter of digital currency and the use of blockchain for other business and civic applications. Bitcoin became legal currency in Japan in 2017, and a municipal election held last year allowed voters to start using blockchain technology. It is, therefore, not surprising to see a trend of an increasing blockchain-related patenting activity by Japanese applicants in the USPTO.

³⁶ <https://www.kilpatricktownsend.com/-/media/Files/articles/2018/Blockchain-Patents-and-Open-Source-Software-Daily-Journal-041818.ashx>

³⁷ <https://ethereumworldnews.com/mastercard-investing-heavily-blockchain/>



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We help leaders create, expand, and protect the value of their businesses and most prized assets. Our attorneys bring a balance of business savvy, technical skills, and creative thinking to the opportunities and issues our clients face daily. From the most complex challenges to the routine, we work together to make businesses better, smarter, more protected, and more successful.



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