Patenting Blockchain Technology

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Patenting Blockchain Technology

1. Understanding What is Blockchain Technology
2. Determining What To Patent In The Blockchain Stack
3. Obtaining Patents That Cover Evolving Technology In The Blockchain Space
4. Making It Patent Eligible
5. Avoiding Divided Infringement
6. Identifying the Prior Art
Patenting Blockchain Technology

1. Understanding What is Blockchain Technology
<table>
<thead>
<tr>
<th>Problems vs. Solutions of the Bitcoin Version of Blockchain</th>
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</thead>
<tbody>
<tr>
<td><strong>The Technical Problems Sought to be Solved By Bitcoin Version of Blockchain</strong></td>
</tr>
<tr>
<td>“Inherent weakness of the trust based model”:</td>
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<tr>
<td>• Reversibility of transactions</td>
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<tr>
<td>• Transaction costs of mediating disputes</td>
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<tr>
<td>• No small transactions</td>
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<tr>
<td>• Need for personal information</td>
</tr>
<tr>
<td>• Physical cash can’t be transmitted over a communication channel</td>
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</tbody>
</table>
How the Bitcoin Blockchain Works

1. Alice sends to Bob 1.00 Bitcoin
2. A Miner Solves A Difficult Math Problem and Saves The Transaction As A Block on the Chain
3. The Block is Broadcast to Everyone In The Network
4. The Block is Approved and Transaction Validated by Network
5. The Block is Added to the Blockchain
6. Bob receives 1 Bitcoin from Alice
How the Bitcoin Blockchain Works

Key Elements/Aspects of Bitcoin Blockchain:

1) Authentication Mechanism: Uses Public Key-Private Key Cryptography to Authenticate Transactions
2) Consensus Mechanism: Proof of Work (Bitcoin, litecoin)
   a) Other Consensus Mechanisms:
      I. Proof of Stake
      II. Proof of Capacity
      III. Byzantine Fault
3) Peer-to-Peer Network: Open and Transparent Network
4) Version Control: Majority of Computing Power Adopts Protocol (This results in forks)
5) Block Authentication: Each Block is tied to earlier blocks mathematically
   1) Alternative – Merkle Tree
6) Timing of Blocks: Every 10 minutes
“Clones” in Bitcoin Also Inspired Other Bitcoin Like Blockchains

Bitcoin spinoff in 2011 –
Quicker block time

Bitcoin spinoff in 2011 –
stores data in transactions
Alternative Protocols Have Been Developed (and continue to be developed)

Monero
- Offers hidden and shielded wallets

Ethereum
- Introduces Smart Contracts and Tokens

Ripple
- For Fast Cheap Money Transfer

Hyperledger
- Formed by the Linux foundation, and many other partners such as IBM, Intel, SAP, Cisco, Daimler, and American Express, to design and develop enterprise blockchains

Facebook’s effort to introduce a new blockchain and stable coin
Patenting Blockchain Technology

2. Determining What To Patent In The Blockchain Stack
The Blockchain Stack

- **Tokens** - e.g., Gas, Gemini Dollar, Pre-sale of inventory, etc.
- **Messages/Embedded Code/Smart Contracts** - e.g., Bitcoin Messages, CryptoKitties Software, Gemini Dollar Smart Contract, etc.
- **Crypto-Currency** - e.g., Bitcoin, Litecoin, Ethereum, Zcash, etc.
- **Protocol (Software Code)** - e.g., Bitcoin Protocol, Litecoin Protocol, Ethereum Protocol, Zcash Protocol, etc.
- **Computer Systems Running Protocol** - e.g., Nodes (administrator computers), Miners, clients (wallets), custodial systems, etc.
Public vs. Private Blockchains; Updating Established Protocols v. Creating New Protocols, etc.

Off Ramps

- ICOs, Kickstart Sales, Electronic Transactions, Autonomous Devices
- Convey Info, Share Pictures, Stable Coins (Gemini Dollar), Replace Contracts, Replace Securities,
- New Coins, Inventory Control Systems, Exchanges (Gemini) Store & Transfer Value, Financial Products (ETP/Options/Futures), BTMs,
- Hardware for Miners (e.g., new asics), Mining Consortiums, Wallets, Custodial Systems, etc.
- Public vs. Private Blockchains; Updating Established Protocols v. Creating New Protocols, etc.

Tokens

- Messages/Embedded Code/Smart Contracts
- Crypto-Currency
- Protocol (Software Code)
- Computer Systems Running Protocol
3. Obtaining Patents That Cover Evolving Technology In The Blockchain Space
Blockchain Technology is always evolving and disclosure needs to cover variations what might be considered key attributes:

- Public Blockchains → Private Blockchains
- Proof of Work Consensus Mechanisms → Proof of Stake and other Consensus Mechanisms
- Sending Messages → Smart contracts and Tokens
- Public and Transparent Data → Shielded Wallets
- Blockchains → Merkle Trees
- Fungible Coins → Nonfungible tokens
Public Blockchains → Private Blockchains

Public Blockchain

Semi-Private Blockchain

Private Blockchain
Proof of Work Consensus Mechanisms ➔
Proof of Stake and other Consensus Mechanisms

Proof of Work

Proof of Stake

Byzantine Fault

Proof of Capacity
Sending Messages → Smart contracts and Tokens

Sending Messages

Smart Contracts

Tokens
Public and Transparent Data → Shielded Wallets

Public and Transparent Data

Shielded Wallets

- Bitcoin
- Monero
- Zcash
Blockchains and Merkle Trees

Blockchain

- Tokens
- Messages/Embedded Code/Smart Contracts
- Crypto-Currency
- Protocol (Software Code)
- Computer Systems Running Protocol

Merkle Tree

- H_{ABCD}
- H_{EFGH}
- H_{MF}
- H_{CD}
- H_{EF}
- H_{G}
- H_{H
Fungible Coins → Nonfungible tokens

Fungible Coins

Non-Fungible Tokens

Kitty 240616 - Gen 8
Snappy

Kitty 240611 - Gen 4
Swift

Kitty 240609 - Gen 7
Snappy

Kitty 240603 - Gen 7
Snappy

Kitty 240601 - Gen 9
Snappy

Kitty 240570 - Gen 7
Snappy

Kitty 240568 - Gen 18
Mooding

Kitty 240580 - Gen 9
Snappy
Patenting Blockchain Technology

4. Making It Patent Eligible
**Specification**

Specification should include discussions of:
- Technical Problem and Technical Solution
- Sample Pseudo Code showing this is a computer-based technology

**Figures**

Figures should show:
- Topology of Network
- Components of computers and associated electronic devices
- Process flow charts

**Claims**

Claims (and specification) should:
- Meaningfully tie invention to blockchain technology
- Claim interaction with blockchain – e.g., sending messages to blockchain
- Detail is important
- Have claim include some action beyond storing information
Making it Patent Eligible

MPEP flowchart

Streamlined Analysis

PRONG ONE
Does The Claim
Recite An Abstract Idea,
Law Of Nature, or Natural
Phenomenon?

YES

NO

PRONG TWO
Does The Claim
Recite Additional Elements
That Integrate The Judicial
Exception Into A Practical
Application?

YES

NO

PATHWAY B:
The claim is
not directed to
a judicial
exception.

Claim Qualifies As
Eligible Subject Matter
Under 35 U.S.C. 101

Step 2B

January 2019

2019 PEG - Introductory Module

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5. Avoiding Divided Infringement
Avoiding Divided Infringement

- Blockchain technology is based on peer-to-peer networks in which many actors are involved.
- Inventions should be claimed from the perspective of the potential infringer
  - General Exemplary Perspectives:
    - User’s Perspective
    - Digital Asset Exchange’s Perspective
    - Cryptocurrency Wallet Provider’s Perspective
  - Smart Contract Exemplary Perspectives:
    - Issuer’s Perspective (e.g. the party who writes the smart contract language)
    - User’s Perspective (e.g. the party who interacts with the smart contract)
- Avoid requiring each node to be an active participant to infringe
Exemplary Transaction – Alice Sends Bob 1 Bitcoin

User 1: Alice
- Generate and Send Transaction Request

User 2: Bob
- Receive 1 Bitcoin

Blockchain:
- Miner(s)
  - Receive Transaction Request
  - Solve Math Problem
  - Save Transaction as a Block
  - Publish Block
- Validator(s)
  - Validate Transaction
6. Identifying the Prior Art
Sources of prior art go well beyond traditional patent literature

- News media write about new projects all the time
  - Coindesk.com
  - Medium.com
- White Papers (like the original Satoshi Nakamora 2008 Bitcoin papers) are common
  - https://cbr.stanford.edu/research.html
- GitHub contains lots of repository of relevant code
  - https://github.com/
- Reddit and Quora contain extensive discussions on latest blockchain developments
  - https://www.reddit.com/
  - Quora.com
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Questions?

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MPEP 2106 flowchart
Groupings of abstract ideas

**Mathematical concepts**
- Mathematical relationships
- Mathematical formulas or equations
- Mathematical calculations

**Mental processes**
- Concepts performed in the human mind (including an observation, evaluation, judgment, opinion)

**Certain methods of organizing human activity**
- Fundamental economic principles or practices (including hedging, insurance, mitigating risk)
- Commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations)
- Managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions)

**NOTE**: The recitation of generic computer components in a claim does not necessarily preclude that claim from reciting an abstract idea.
Step 2A: Prong two considerations

Limitations that are indicative of integration into a practical application:

• Improvements to the functioning of a computer, or to any other technology or technical field - see MPEP 2106.05(a);

• Applying or using a judicial exception to effect a particular treatment or prophylaxis for a disease or medical condition – see *Vanda* Memo;

• Applying the judicial exception with, or by use of, a particular machine - see MPEP 2106.05(b);

• Effecting a transformation or reduction of a particular article to a different state or thing - see MPEP 2106.05(c); and

• Applying or using the judicial exception in some other meaningful way beyond generally linking the use of the judicial exception to a particular technological environment, such that the claim as a whole is more than a drafting effort designed to monopolize the exception - see MPEP 2106.05(e) and *Vanda* Memo.

Limitations that are **not** indicative of integration into a practical application:

• Adding the words “apply it” (or an equivalent) with the judicial exception, or mere instructions to implement an abstract idea on a computer, or merely uses a computer as a tool to perform an abstract idea - see MPEP 2106.05(f);

• Adding insignificant extra-solution activity to the judicial exception - see MPEP 2106.05(g); and

• Generally linking the use of the judicial exception to a particular technological environment or field of use – see MPEP 2106.05(h)

Whether claim elements represent only well-understood, routine, conventional activity is considered at Step 2B and is not a consideration at Step 2A.
Limitations that are indicative of an inventive concept (aka “significantly more”):

• Improvements to the functioning of a computer, or to any other technology or technical field – see MPEP 2106.05(a);
• Applying the judicial exception with, or by use of, a particular machine – see MPEP 2106.05(b);
• Effecting a transformation or reduction of a particular article to a different state or thing – see MPEP 2106.05(c);
• Applying or using the judicial exception in some other meaningful way beyond generally linking the use of the judicial exception to a particular technological environment, such that the claim as a whole is more than a drafting effort designed to monopolize the exception – see MPEP 2106.05(e) and Vanda Memo; and
• Adding a specific limitation other than what is well-understood, routine, conventional activity in the field – see MPEP 2106.05(d).

Limitations that are not indicative of an inventive concept (aka “significantly more”):

• Adding the words “apply it” (or an equivalent) with the judicial exception, or mere instructions to implement an abstract idea on a computer, or merely uses a computer as a tool to perform an abstract idea – see MPEP 2106.05(f);
• Adding insignificant extra-solution activity to the judicial exception – see MPEP 2106.05(g);
• Generally linking the use of the judicial exception to a particular technological environment or field of use – see MPEP 2106.05(h); and
• Simply appending well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception – see MPEP 2106.05(d) and Berkheimer Memo.
Search and prior art

- MPEP 904: How to Search
  - Analysis of Claims (904.01)
  - General Search Guidelines (904.02)
  - Conducting the Search (904.03)
- MPEP 719.05: Field of Search
  - Searches listed in the “SEARCHED” boxes and/or “SEARCH NOTES” box of the “Search Notes” form
Search and prior art, cont.

- Classification of blockchain-related patent applications

<table>
<thead>
<tr>
<th>Subject matter</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data structures for information retrieval</td>
<td>G06F 16</td>
</tr>
<tr>
<td>protecting data against unauthorized activity</td>
<td>G06F 21</td>
</tr>
<tr>
<td>financial, business, cost/price, or management</td>
<td>G06Q</td>
</tr>
<tr>
<td>cryptography</td>
<td>H04L 9</td>
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</tbody>
</table>

- Classification depends on many factors so this is not an exhaustive list