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Blockchain in Social Media

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ABSTRACT: Social media, such as Facebook, Twitter, Instagram, Youtube, Whatsapp, Snapchat, etc. have changed our way of communication. They have become the center of the modern Internet. Blockchain has emerged as a viable solution for solving many issues, including social media. It is essentially a chain consisting of blocks of information. The main advantage of leveraging blockchain technology on to social media platforms is its decentralized nature. Blockchain technology offers a promising solution for a new social media architecture. The decentralized nature of blockchain allows for the creation of platforms where users control their data and have a stake in the network. This eliminates the need for a central authority or intermediary, promoting transparency and fairness. This paper provides a primer on the use of blockchain technology in social media.

KEYWORD: blockchain, Bitcoin, social media, blockchain social media, decentralized social media, blockchain-enabled social media.

INTRODUCTION

Social media has become a huge part of our life. We turn to it to form groups, foster relationships, and keep in touch with long-distance friends. The social media platform has served as an entry point for establishing connections, content sharing, and social interactions for many users. Social networks play a massive role in our daily communications and interactions. However, centralized control of these platforms has created many problems: data breaches, server outages, de-platforming, censorship, and privacy violations. To combat these issues, developers are building social networks on Ethereum [1].

A blockchain is a decentralized distributed ledger that maintains a record of all transactions on the chain. It is the basis for a new, decentralized version of the internet known as Web 3.0. It makes it possible for users to securely and profitably share content on social media platforms. Web3 proponents think they can build a new system altogether that sidesteps the concentrated power of platforms, a decentralized social media (DeSo) ecosystem where users ideally have more ownership over the content they create.

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OVERVIEW OF BLOCKCHAIN

Blockchain (BC) technology is a permanent record of online transactions. It is a distributed tamper-proof database, shared, and maintained by multiple parties. It is a new enabling technology that is expected to revolutionize many industries, including business. It has the potential for addressing significant business issues. The BC technology allows participants to move data in real-time, without exposing the channels to theft, forgery, and malice.

The term "blockchain" refers to the way BC stores transaction data – in "blocks" that are linked together to form a "chain." The chain grows as the number of transactions increases. Since every entry is stored as a block on a chain, the care you receive is added to your personal ledger. The first Blockchain was conceived in 2008 by an anonymous person or group known as Satoshi Nakamoto, who published a white paper introducing the concept of a peer-to-peer electronic cash system he called Bitcoin [2]. Generic blockchain images are shown in Figure 1 [3]

At its core, blockchain is a distributed system recording and storing transaction records. In a blockchain system, there is no central authority. Instead, transaction records are stored and distributed across all network participants. Rather than having a centrally located database that manages records, the database is distributed to the networks and transactions are kept secure via cryptography. BC eliminates the need for a middleman that traditionally may facilitate such transactions. Figure 2 shows how blockchain works [4].

Fundamentally, blockchains are distributed digital database that record and maintain a list of transactions taking place in real time. They may also be regarded as decentralized ledgers that sequentially record transactions or interactions among users within a distributed network. They have the following properties [5]:

- Firstly, they are autonomous. They run on their own, without any person or company in charge.
- Secondly, they are permanent. They are like global computers with 100 percent uptime. Because the contents of the database are copied across thousands of computers, if 99 per cent of the computers running it were taken offline, the records would remain accessible and the network could rebuild itself.
- Thirdly, they are secure and tamper-proof. Each record in blockchain is time stamped and stored cryptographically. The encryption used on blockchains like Bitcoin and Ethereum is industry standard, open source, and has never been broken.
- Fourthly, they are open, allowing anyone to develop products and services on them.
- Fifthly, as blockchain is a shared system, costs are also shared between all of its users.

The Blockchain was designed so transactions are immutable, i.e. they cannot be deleted. Thus, blockchains are secure and meddle-free by design. Data can be distributed, but not copied. When it comes to digital assets and transactions, you can put almost anything on a Blockchain. Different scenarios call for different Blockchains. Blockchain is used in different areas such as depicted in Figure 3 [6].

The BC technology currently has the following features [7,8]:

1. *Peer-to-Peer (P2P) Network:* The first requirement of BC is a network, an infrastructure shared by multiple parties. This can be a LAN at a small scale or the Internet at a large scale. All nodes participating in a BC are connected in a decentralized P2P network. Transactions are broadcast to the P2P network. Due to some limitations of P2P networks, some vendors have provided cloud-based BCs.

2. *Cascaded Encryption:* A BC uses encryption to protect transaction data. Blocks are encrypted in a cascaded manner, i.e. the encryption result of the previous block is used in encrypting the current block. The BC is secured by public key cryptography, with each peer generating its own public-private key pairs.

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3. *Distributed Database*: A BC is digitally distributed across a number of computers. Each party on a BC has access to the entire database and no single party controls the data or the information. Since BC is decentralized, there is no need for central authorizes such as banks.

4. *Transparency with Pseudonymity*: Each node or participant on a blockchain has a unique 30-plus-character alphanumeric address that identifies it. Users can choose to remain anonymous or provide proof of their identity to others.

5. *Irreversibility of Records:* Once a transaction is entered in the database and the accounts are updated, the records cannot be altered. Records on the database is permanent, chronologically ordered, and available to all others on the network.

There are two types of Blockchains: public and private. Public Blockchains are cryptocurrencies such as Bitcoin, enabling peer-to-peer transactions. Private Blockchains use Blockchain-based platforms such as Ethereum or Blockchain-as-a-service (BaaS) platforms running on private cloud infrastructure. A private BC is an intranet, while a public BC is the Internet. Companies will be disrupted the most by public Blockchains.

SOCIAL MEDIA BASICS

Social media (SM) is consumer-generated media that covers a variety of new sources of online information, created and used by consumers with the intent on sharing information with others. It employs mobile and web- based technologies to create, share, discuss, and modify consumer-generated content.

These are some common features of social media [9,10]:

1. *Accessibility*: They are easily accessible with little or no cost.
2. *Connectedness*: They facilitate the development of online social networks by connecting people and bringing the world together.
3. *Communications*: They foster communication between individuals or organizations.
4. *Reach*: They offer unlimited reach to all content available to anyone, anywhere.
5. News media: They allow political news and information, true or not, to spread quickly.
6. *Collaboration*: They are computer-mediated technologies that facilitate the creation and sharing of information and ideas.

Social media takes on many forms. The six basic forms are [11]: (1) social networks such as Facebook and Twitter, (2) blogs - websites which allow users to subscribe, update, and leave comment, (3) wikis – collaborative website such Wikipedia which used to edit content, (4) podcasts – audio or video files that are published on the Internet, (5) content communities which share particular kinds of content, and (6) microblogging - allows instant publishing of content via Twitter. Blogs is probably the most commonly employed social media tool. Other forms include Internet forums, photographs or pictures, video, and social bookmarking. These and other activities on the social media are illustrated in Figure 4 [12].

Social media is consumer-generated media that covers a variety of new sources of online information, created, and used by consumers with the intent on sharing information with others. It employs mobile and web-based technologies to create, share, discuss, and modify consumer-generated content. Consumers are most likely to leverage their power in social media to be more demanding of marketers [13]. The four most popular social media platforms are described here.

- *Facebook:* This is the most popular social media in the US and the rest of the world. It was launched on February 2004 by Mark Zuckerberg. Facebook can sensitize individuals (consumers) about many products and services. Different

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people use it to communicate with friends and family. A company can use Facebook to communicate their core values to a wide range of customers. Facebook consists of six primary components: personal profiles, status updates, networks (geographic regions, schools, companies), groups, applications, and fan pages.

- *Twitter:* Twitter was launched on July 2006 to provide a microblogging service. It allows individuals and companies to post short messages, share content, and have conversations with other Twitter users. Many Twitter posts (or "tweets") focus on the minutiae of everyday life.
- *LinkedIn*: This a networking website for the business community. It allows people to create professional profiles, post resumes, and communicate with other professionals. LinkedIn is where companies see the largest audiences.
- *YouTube*: YouTube has established itself as social media. It was launched in May 2005. It allows individuals to watch and share videos. YouTube may serve as home to aspiring filmmakers who might not have industry connections. YouTube can be both a blessing and a curse for some companies.
- *MySpace*: This social networking site bases its existence on advertisers who are paying for page views. It is an online community that allows you to meet your friends' friends, share photos, journals, and interests. It has a lot that users could do. There are MySpace sites in United Kingdom, Ireland, and Australia.
- *Instagram:* This is an image-based social media platform with more than 700 million active monthly users. The design is centered on a visual mobile experience. Instagram allows a simple and creative way to capture, edit, and share photos, videos and messages with friends and family.
- *TikTok:* This is the fastest growing social media platform of all time, with

800 users worldwide. This is a relatively new platform where users create and share short videos. Businesses are finding ways to use it as a marketing channel. They should tread lightly on TikTok, since most of its users are digital natives, who are very media savvy.

Other social media include WhatsApp, Reddit, Pinterest, Flickr, Snapchat, WeChat, and Vine Camera. Some of these media are shown in Figure 5 [14]. Choosing the right social media platforms for your business is crucial. Social media allows you to do at least four important things [15]:

- Discover new ideas and trends.
- Connect with existing and new audiences in deeper ways.
- Bring attention and traffic to your work.
- Build, craft, and enhance your brand.

BLOCKCHAIN SOCIAL MEDIA

This is also known as blockchain-enabled social media or decentralized social media. It is a social media platform that operates on a blockchain. It is a decentralized ledger technology and therefore has no centralized authority. Instead of being a centralized hub that distributes information and data from the top down, it consists of individual blocks that are controlled by the user. Centralized systems surround and link to a single central component, while a distributed system is a collection of interconnected components with no central coordination. Figure 6 illustrates centralized, decentralized, and distributed networks [16]. Despite having many advantages, a centralized architecture still contains several fundamental disadvantages [17]: (1) The content ownership is not in the hands of its creators; (2) Internet censorship is another thread of centralized architectures; (3) Due to their large userbase, social networks are being exploited for commercialization by marketing companies and advertising agencies. Due to these drawbacks, distributed social network architecture has been proposed as a reasonable substitution. Social networks that use a

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blockchain are decentralized to varying degrees. Some use a blockchain for data storage, some for monetization, and some for both data storage and monetization. Some of the blockchain protocols that support the development of social media are Ethereum, Steem, and Stellar, to mention a few.

Many decentralized social networks exist as alternatives to established social media services, such as Facebook, LinkedIn, Twitter, and Medium. The decentralized social networks can fix many of the problems of traditional social networking platforms and improve users' overall experience. Decentralized social networks can be found on Bitcoin Cash, Ethereum, Steem, and numerous other blockchain protocols. Compared to the currently popular centralized online social media, the blockchain-based decentralized online social media platform presents a different business model. Social media networks built on the blockchain are revolutionizing the way we share, interact and communicate with people online. Popular blockchain-based social media sites include STEEM, Steemit, Verasity, Binded, Audius, Dtube, and Sapien. Blockchain-based social media platforms are taking social media on-chain. They platforms run the gamut from decentralized versions of Twitter, Medium, and LinkedIn to on-chain livestreaming and beyond.

The primary benefits of Blockchain for social media include the following [18]:

- *Decentralization:* Blockchain technology allows for decentralized social media platforms where users control their data and have a stake in the network. This eliminates the need for a central authority or intermediary, promoting transparency and fairness.
- *Transparency:* The lack of transparency on social media sites is often criticized. Most sites have been charged with using arbitrary standards to determine what constitutes “acceptable” information. A blockchain is intended to be completely transparent and what content is considered “acceptable” must be open, fair, and accurate in the application.
- *Immutability:* The blockchain creates a distributed, immutable digital ledger, making it difficult to add or remove data covertly. Blockchain technology enables the establishment of social media platforms that guarantee immutability, i.e. making it impossible to alter or tamper with the information.

BENEFITS

Blockchain-based social media provide more benefits than just security and privacy. The "blockchain + media" model is showing great vitality. Benefits of the blockchain-based social media platforms include enhanced privacy, censorship-resistance, and the ability for users to both receive and send crypto via the social media platform itself. Because blockchains are public and unalterable, transactions are fast, efficient and secure. Since blockchain social media networks are decentralized, there is no central proprietary authority in charge of all data. Blockchain also provides encryption or validation techniques to protect user data. The blockchain-based application puts the interests of the users ahead of the corporation. Because there is no centralized authority, users on these networks have more privacy.

Other benefits of decentralized social media (DeSo) include [19]:

- Decentralized social networks are censorship-resistant and open to everyone. This means users cannot be banned, deplatformed, or restricted arbitrarily.
- Decentralized social networks are built on open-source ideals and make source code for applications available for public inspection. By eliminating the implementation of opaque algorithms common in traditional social media, blockchain-based social networks can align the interests of users and platform creators.

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- Decentralized social networks eliminate the "middle-man." Content creators have direct ownership over their content, and they engage directly with followers, fans, buyers, and other parties, with nothing but a smart contract in between.
- Decentralized social platforms offer an improved monetization framework for content creators via non-fungible tokens (NFTs), in-app crypto payments, and more.
- Decentralized social networks afford users a high level of privacy and anonymity. For instance, an individual can sign in to an Ethereum-based social network using an ENS profile or wallet—without having to share personally identifiable information (PII), such as names, email addresses, etc.
- Decentralized social networks rely on decentralized storage, not centralized databases, which are considerably better for safeguarding user data.
- Blockchain-based social media is fair in its distribution of revenue.

CHALLENGES

Although traditional social media's popularity is skyrocketing due to the enhanced marketing and entertainment opportunities it provides to its users, concerns about data and privacy breaches linked to these sites are growing. Other fundamental limitations of social media platforms include fake news, excessive trolling, censorship, data ownership, privacy, such as misinformation, lack of effective content moderation, digital piracy, data breaches, identity fraud, and demonetization. Major platforms like Twitter, Facebook, and YouTube can censor users and content. They can also demonetize material and restrict money flow on their own. There are obvious concerns about the major social media tycoons. They are frequently blamed for selling user data to advertising firms and have faced criticism for how they regulate content. There are rising concerns about the negative impact of social media. Just 27% of Americans say they have at least "some trust" in the information that comes from social media. Most blockchains behave like expensive, slow databases that sacrifice efficiency for immutability and global consensus. Blockchains are logically centralized, exerting great effort to make many untrustworthy computers behave like one computer.

Decentralized social networks typically struggle with monetization. We must be aware of the flip side of centralized social media networks, which include the following [20]:

- In social media networks, advertisers are the customers while users are the products. Social media platforms like Facebook earn revenues by selling users' personal data to targeted marketing or advertisers.
- Social media is also used as a propaganda platform for instigating users to think in a certain way regarding a social issue.
- Centralized services are easy to hack.
- Blockchain will cause a moderation challenge for social media
- A challenge that stands in the way of blockchain social media is transactions fees.

CONCLUSION

Blockchain technology is regarded one of the main disruptive technology of the millennium. Several research fields have tried to use it by exploiting its intrinsic characteristics. In many industries, blockchain is considered as a breakthrough that can resolve data security concerns to a large extent. Several Web3 proponents believe they can establish a pioneer in the social media ecosystem with blockchain that can overcome the centralized dominance of platforms.

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Blockchain social media are decentralized networking platforms built using blockchain protocols. They constitute a new layer-1 blockchain created from the ground up to expand decentralized social applications to one billion users. Blockchain technology is a promising, yet not well understood, enabler of large-scale societal and economic change. Social media is evolving, and so is the technology that enables it. The relationship between social media and blockchain will continue to evolve at lightning speed. Blockchain social media, with its decentralized and distributed networks, enables users to assert greater control over their data. More information about blockchain in social media can be found in the books in [21-26].

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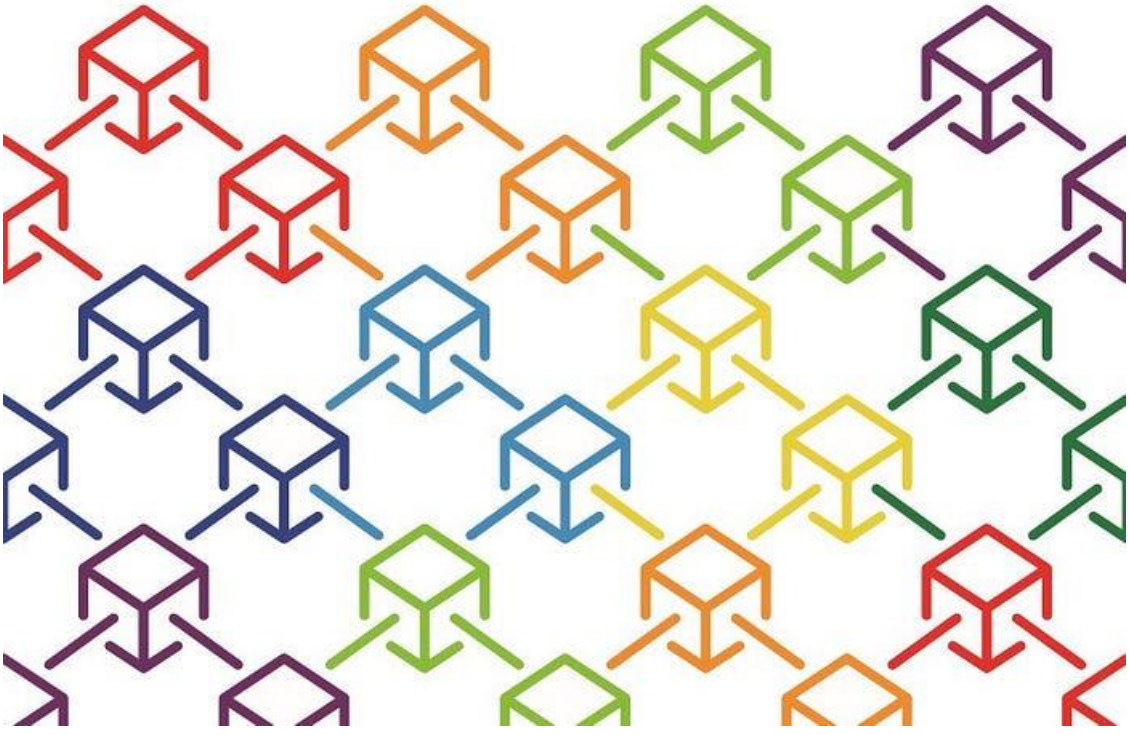

Figure 1 Generic blockchain images [3]

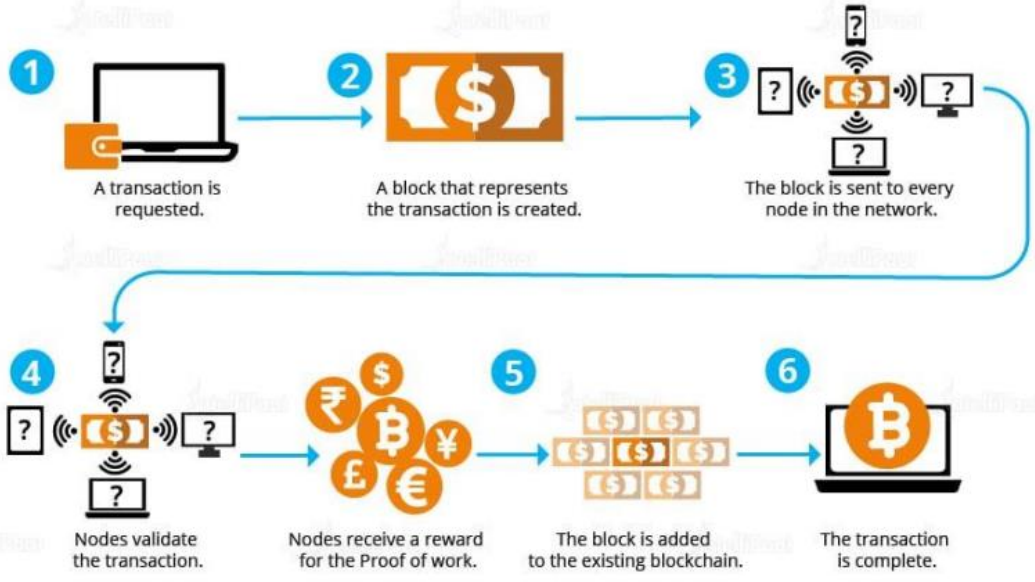

Figure 2 How blockchain works [4].

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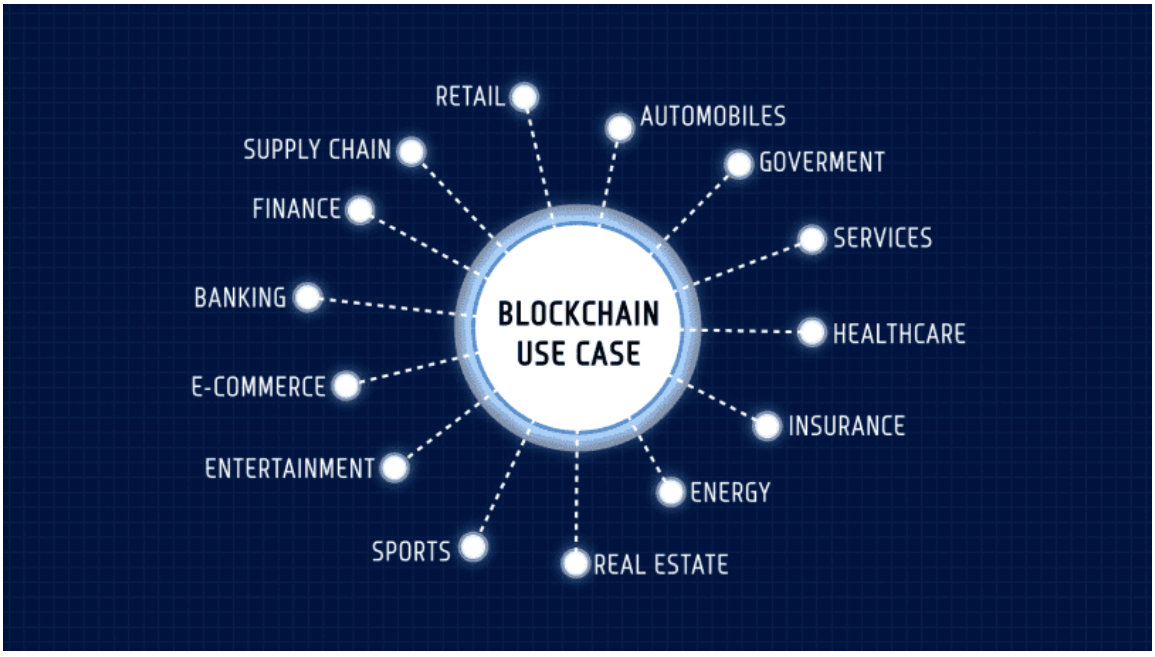

Figure 3 Different uses of blockchain [6].

Figure 4 Activities on social media [12].

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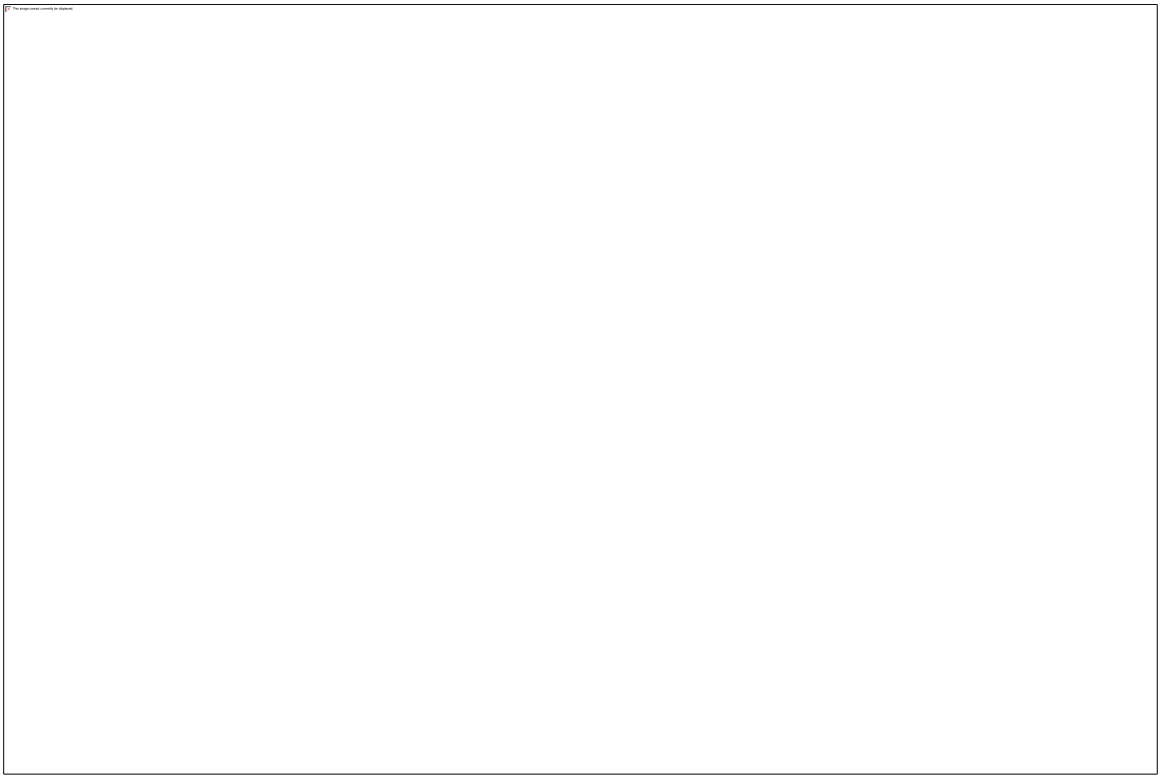

Figure 5 Some social media [14].

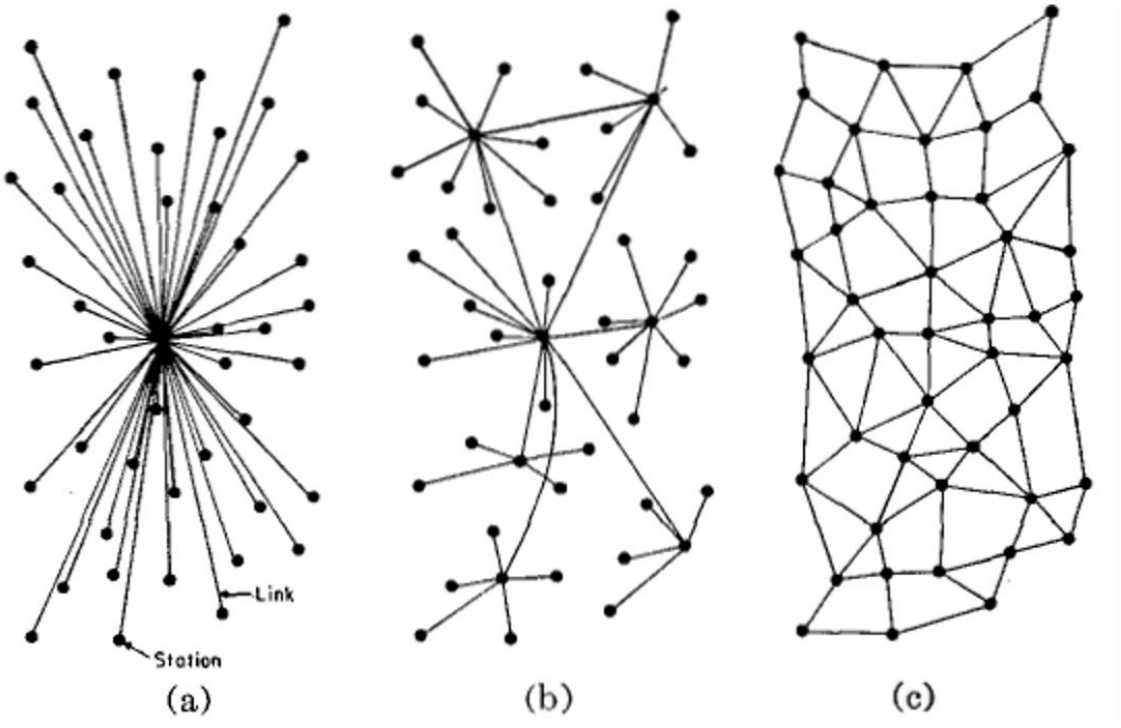

Figure 6 (a) Centralized, (b) decentralized, (c) distributed networks [16].

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