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# A Hybrid Blockchain Framework for Secure and Efficient IoT Environment

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**Abstract:** *The recent advances in wireless communication have led to the problem of growing spectrum scarcity. The problem of spectrum allocation is due to advance research in wireless communication. As new wireless applications are emerging, day after another, and making use of the available wireless spectrum for communication, the demand for spectrum increase makes the available spectrum scarcer. Mostly part of the spectrum is not utilized significantly in the wireless network. Cognitive Radio (CR) is a new technology that enables an unlicensed secondary user to coexist with licensed primary users in licensed spectrum bands without inducing interference to licensed primary users communication. This technology can significantly ease the spectrum redundancy problem & enhance the efficiency of utilization of spectrum. Cognitive Radio Networks (CRN) or Dynamic Spectrum Access Networks are formed by several CR nodes and they are often called NeXt Generation (XG) communication network*

**Keywords:** *Blockchain, IOT, Error Rate, NES Algorithm*

## I. INTRODUCTION

Blockchain adoption is gaining huge momentum as industry is evolving at a fast pace. Many startups have initiated use cases and there is significant rise in investments in blockchain projects as well. Although blockchain is still evolving in terms of technological maturity, innovative experimental adoption and customization are continuously rising. Blockchain has the potential of displacing a setup innovation and stirs up the business or a pivotal item that makes a totally new industry and initial trends with the rise of crypto currencies has signaled that blockchain has been disruptive for the banking industry and financial services.

Crypto currency has the potential of shaking a centralized banking system by eliminating the need to pay fees for using credit or debit cards. Recent Trends have shown that blockchain is turning out to be a sustaining technology rather disruptive and has huge potential in supply chain, healthcare, Internet of Things (IoT), education and public services.Commercial viability and acceptability of blockchain are on the rise and 3021 patent families related to blockchain applications are divided into four sub-categories based on different types of application like Payments and Transaction systems, Financial services business, Administration and E-commerce. Extensive use of cryptography and decentralization makes it highly secure. Privacy issues over public blockchains can be addressed by implementing blockchain in a controlled manner (permissioned blockchain). Blockchains can be named public, private or half and half variations, contingent upon their application[4].

- Public – No one owns Public blockchains, they are fully decentralized and are visible by anyone.
- Private – These are also referred to as permissioned blockchains and uses privilege to control who can peruse from and write to the blockchain.
- Hybrid – These blockchains are public just to an advantaged bunch. Agreement measure is constrained by special workers utilizing a bunch of rules consented to by all gatherings.

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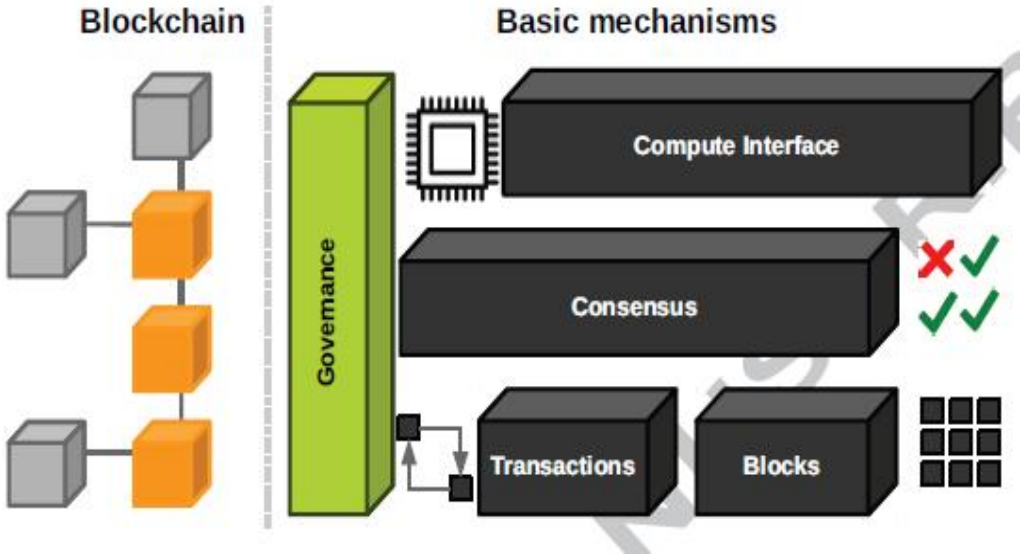


*Figure 1: An Overview Of Block Chain Architecture[4].*

Blockchain may record exchanges, contracts, data resources or for all intents and purposes whatever can be put away in advanced structure. Blockchain records are lasting, carefully designed, straightforward, and accessible. Each new "block" created is added to the furthest limit of a "chain." Initiation, validation, storage, and distribution of each new block is managed by a protocol. Blockchain replaces the need of third-party intermediaries and participants of blockchain run complex algorithms to certify the integrity of records in the block.

Blockchain hence is an interesting alternative to how data is stored. Databases have been the way to store data in databases. Though databases are quite fast and user friendly, they too have limitations and issues like lack of immutability. Following table highlights key differences between blockchain and databases[5]

Internet of Things (IoT) is an emerging technology integrates betweenphysical Gadgets featuring diverse detectors facilitate interaction amongst themselves autonomously. The Internet of Things (IoT) is a dynamically worldwide connection with configurable capacity, utilizing standardized & compatible connection methods [Vidhate and Deogirikar2017]. In the IoT environment, both online or physically objects possess academic identities, virtual personas, tangible traits, and utilize sophisticated interfaces, thereby dynamically integrating within a knowledge matrix. Now days IoT applications have started automatingdifferent tasks and empowers the inanimate physical things to performvarious task without any human intervention. As number of IoT devicesgrowing rapidly, Numerous novel applications & study initiatives are underway to enhance performance, the level of comfort, and automation to make humanlife more sophisticated [Kumar and Vidhate2023b].

IoT is stack of technologies enables the inter connection between variousdevices or Objects in our surrounding to facilitate computers & networking. Virtual systems, including detectors, moving parts, RF ID, geolocation systems, & the web, facilitate the transformation of surrounding items into intelligent individuals, allowing for interpretation & interaction among them. Smart things are equipped with monitors that assess, detect, and gather data from surroundings, apparatus, including human interactions. IoT gadgets are limited in retention, processing strength, and energy, and are frequently utilized in fast-paced, violent, and diverse situations. The Internet of Things (IoT) encompasses various gadgets that has instruments, motors, and protocols. Compared to traditional IT buildings, IoT encompassesof various technologies like smart objects embedded with electronic,various network infrastructures, communication protocols, cloud technologyand IoT software for users inter operating with different interfaces[Rathore et al.2021, George and Thampi2018, Park and Nam2020].

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Despite the various advantages of IoT, there is a major problem industryand research facing is vulnerability to safety threats. The interconnections among individuals, IoT devices, detectors, & offerings are ubiquitous & perpetual. Regardless of its layout, configuration, implementation, and maintenance, a safety technology will depend on human assistance and is susceptible to security risks. As IoT gadgets and applications proliferate rapidly, fundamental protection protections such as confidentiality, verification, & restoration from assaults are imperative[Gugueoth et al.2023, Lounis and Zulkernine2020].

## II. BLOCKCHAIN USE CASE SELECTION AND DESIGN PROCESS

Blockchain use case selection involves many decisions based on following criteria and NITI Ayog has published a blockchain use case selection framework [4] as shown in Figure 2 that covers all these.

- Is there a compelling business case to reduce intermediaries?
- Are Multiple Stakeholders Involved?
- Are we working with advanced resources rather than actual Assets?
- Do numerous gatherings require shared compose access?
- Do we require superior and fast exchanges?
- Do we plan to store non-conditional information as a feature of your answer?
- Do we need to depend on believed parties for consistence reasons?
- Do we have a powerful Tokenomics Model?
- Do we need the capacity to control usefulness?
- Should exchanges be public?
- The structure presents following four potential results dependent on models,
- Don't use blockchain

Blockchain can't do this effectively yet solutions are in development shown fig 2

- Strong case for public blockchain
- Strong case for private blockchain

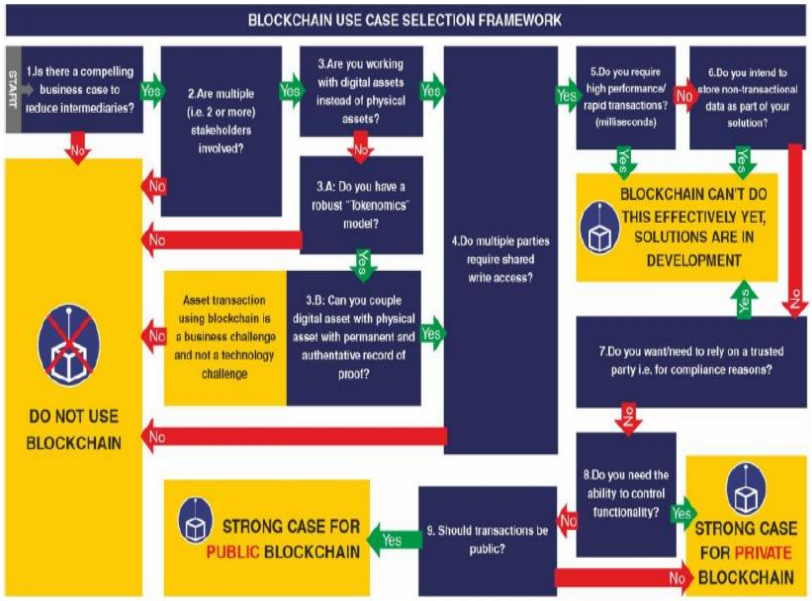


*Figure 2. Framework for Blockchain use Case Evaluation[5]*

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From that point onward, an assortment of plan choices around blockchain arrangement should be made, similar to the sort of blockchain, agreement convention, block size and recurrence. The bolts just represent one of the potential groupings to settle on plan choices. A few choices are required to set up acceptable levels of expansion (like block size and rate of occurrence), security, cost of processing and performance [5].

## III. BLOCK CHAIN BASED CRN SECURITY TECHNIQUE

Block chaining is a basic innovation preoccupied via Bit-coined. It is another use of conventional innovation in the web period, that incorporates conveyed information stockpiling innovation, remote organizations, agreement system and cryptography [29]. As a decentralization publically data set, block-chaining utilizes publically keying cryptographicalcalculations, hashing capacities, agreement instruments & different innovations to fabricate a decentralization non-verification framework that could be utilized in internet business to guarantee client data security. Basically, blockchaining could be broadly utilized in web nance or a more extensive market. It would additionally advance the course of monetary globalisation& would enormously affect the current monetary marketingdesign& surprisingly the socially design [30].

Block chained innovation enjoys the benefits of least exchange costing, solid straightforwardness, & highest securities. It could adequately work on the proficiency of data usage, make-out the exchange interaction straightforward, share management, and secure the authentic rights and interests, all things considered, to the exchange. Normal issues like significant expense, low effectiveness, and low information stockpiling security in the normalized data set give groundbreaking thoughts [31]. Blockchain is a sort of carefully designed, full history information base stockpiling innovation, ordinarily utilizes highlight direct innovation toward coordinate every hub. Every hub understands the elements of steering, new hub distinguishing proof and information dispersal via multicast. It could show up at any hub in the framework. By utilizing cryptography's, it can create relating information blockings. The created information could actually look at the legitimacy of the data, & could likewise understand the solid connection via the following information [32]. In remote organization correspondence, blockchain innovation is a sort of innovation that can't be altered among similar level auxiliary clients who don't confide in one another or have feeble trust without go-between investment. With respect to authentic cooperation in the information base as a publically record books, every hub storing the chronicled association recording of the entire organization, & records of information assortment, exchange, flow and computation and examination are kept on the blockchain, which causes the nature of information to acquire exceptional solid trust support, and guarantees the rightness of information investigation outputs& the impact of mined data [33]. Taking into account the benefits of blockchain innovation, this chaptergives a psychological remote organization security calculation dependent on block-chainingThe I.o.T gadget sending hub data to the combination place, & the combination community inquiries the blockchain framework for the presence of its hub data, & afterward the hub sending the information endorsed via the privately keying to the combination place, & checks whenever the detecting hub had a relating privately keying pairedsignture it. Assuming it is, forward the hub's solicitation to the block chaining framework, and forward the reaction of the block chained framework back to the detecting hub. The information endorsed by the detecting hub can affirm the character of partaking in range detecting, and can likewise guarantee that its information has not been altered or produced.

## IV. BLOCKCHAIN TECHNOLOGY BLOCK CHAIN BASED SECURE SPECTRUM

This report presents the blockchain innovation and notoriety system into the range detecting measure. Another safe range detecting strategy is proposed. This security detecting strategy incorporates the assessment of the client's immediate standing and suggestion notoriety.

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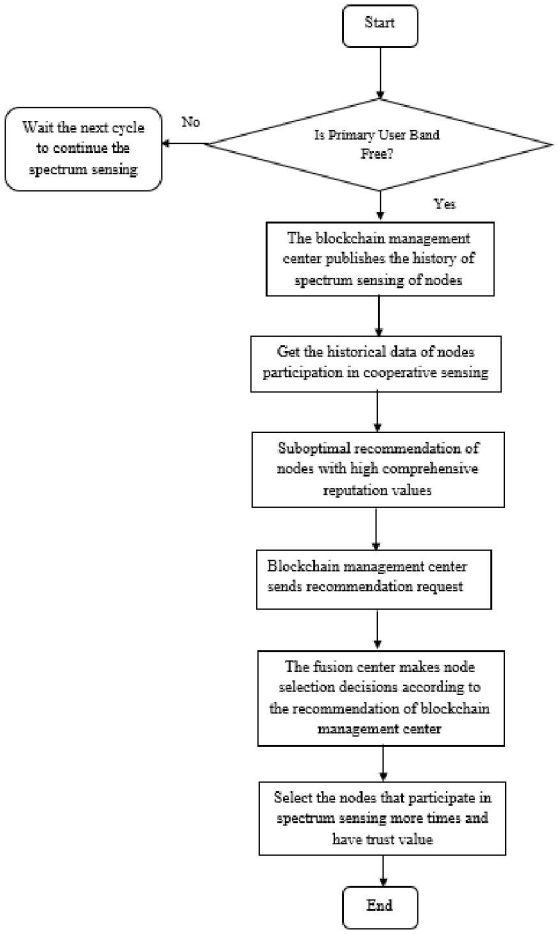


Figure 3 Secure Spectrum Sensing Algorithm Based on Blockchain In Cognitive Wireless Networks

At the point when a helpful hub solicitation to get to a specific recurrence band, it needs to detect whether the recurrence band is inactive. In case it is inactive, it will send a proposal solicitation to the combination place. To stay away from conspiracy assault and malevolent hub conduct, the detecting results are more precise. Utilizing the blockchain innovation, the verifiable detecting records in the data set and the distance of cooperation history is viewed as a public record, which can be shared by each neighbor hub, and no hub in this situation can change the record data. The particular working course of safety range detecting dependent on blockchain innovation is displayed in Figure 3

## V. RESULT ANALYSIS

In this section, we have to discuss the result analysis of Blockchain technology in cognitive radio network.

The cognitive radio topology is defined in the fig 4. The different no. of primary and secondary users is placed in particular geometry. The range of network lies between -500 to 500 m. There is one primary user and multiple secondary users. The primary user is located at the center of area while secondary users are locating around the primary users with the specific pattern.

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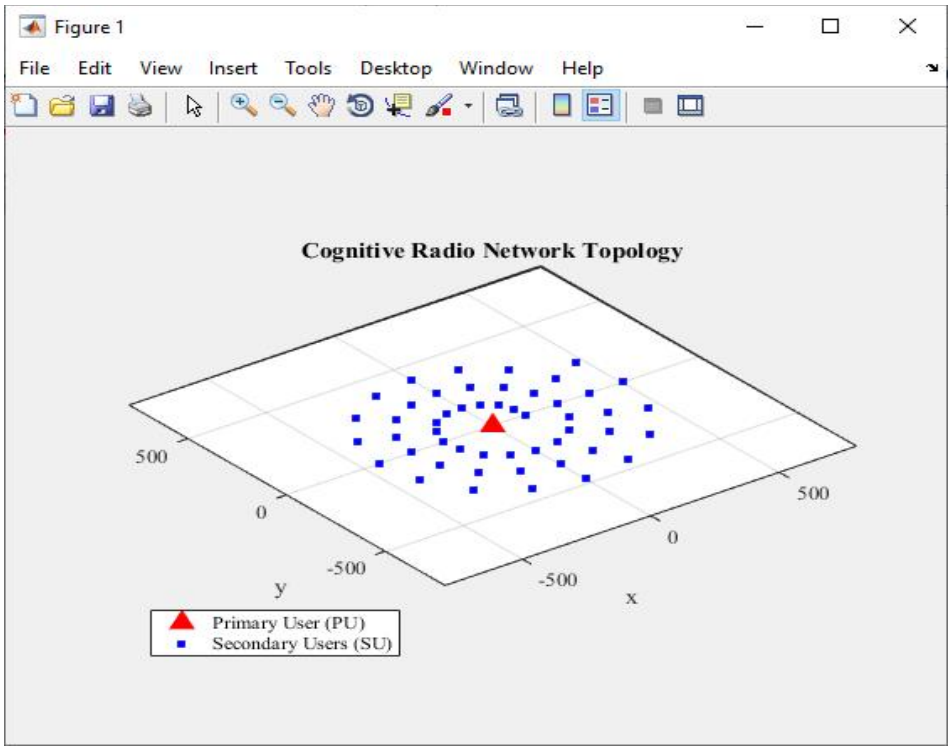


Fig 4 Cognitive Radio Topology

## VI. CONCLUSION

This paper designs an inside and out examination on the model of intellectual remote organizations. In the pragmatic application situations of intellectual remote organizations, there are typically genuine mistakes when the hubs detecting the information, which causes the detecting esteems to go amiss from the ordinary reach, or a few hubs purposely, send some unacceptable information to the combination community. Accordingly, focusing on the security issue of noxious hub assault in intellectual remote organization, this paper proposes the hub assessment and planning (NES) calculation and the Secure Spectrum Sensing, which respects the client's collaboration history and association distance as a public record book, and is overseen by the blockchain the executives community, which is helpful for the combination place to call hubs with astounding execution to take an interest in agreeable detecting

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