



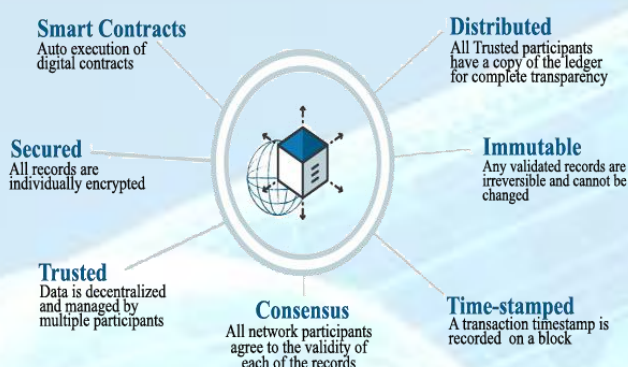
1. Blockchain Technology (BCT)

The sovereign identity parameters including IDs, documents, etc. enable citizens to partake in various interactions with the government for accessing services and benefits. There has been a constant lookout for robust technology-enabled solutions for authentication and validation of records. Blockchain Technology's unique combination of cryptography and distributed peer-to-peer network of nodes allows a tamper-resistant,

Blockchain adoption provides several benefits to the existing systems – It enables traceability of information and ensures nothing is unduly modified. This is a big advantage in enhancing democratic governance and adds accountability. End-to-end asset lifecycles including ownership and provenance can be tracked. Universal data loss becomes a lesser issue. The technology reduces the risk of human errors and hastens the process of sanctions to citizens. Smart contracts eliminate the misinterpretation of business rules and reduces its discretionary application. Also, Blockchain allows users to own and control the data sharing through private and public keys. Secured encryption and verification technologies enable trusted participants to share information.



Properties of Block Chain



append-only, and immutable ledger that can maintain confirmed and validated data in a trusted ecosystem.

Improving trust in transactions and information processing is the fundamental advantage of Blockchain over other tools and technologies. As a thumb rule, Blockchain can be implemented in areas where there is a need to improve or establish social trust.

Benefits of BCT

Adoption of Blockchain in governance does not require replacement of existing systems. The existing digital systems continue to function the way they do so, and at critical stages in the workflow process, the digital transaction/data can be stored in the Blockchain or read from it. Governance applications that require secure storage of documents / assets, need provenance, or require track-and-trace features would benefit from Blockchain. Systems requiring an intermediary to prove the correctness and genuineness of the claim, would greatly benefit using Blockchain technology.

2. Centre of Excellence in Blockchain Technology (CoE-BCT)

Several State Governments in the Country are drawn to the use of Blockchain technology as it promises to address the pain areas in the current Governance systems. However, the cost of setting up Blockchain networks across different geographical locations & its up-gradation, selection of vendors & platforms, use case identification, shortage of expertise to manage these networks has hindered the large-scale adoption of this technology.





NIC has set up a Centre of Excellence (CoE) to overcome these challenges in line with MeitY's strategy. The CoE provides a platform that Governments can look to for consultancy, capacity building and as an incubation centre where the departments can develop Proof of Concepts before moving on to production.

The CoE also helps Government departments to integrate their line-of-business application with Blockchain by developing the smart contracts and APIs. The CoE is providing the Blockchain related Services and ICT infrastructure for the government departments to integrate their systems and use the BCT.

The Centre has explored Blockchain protocols such as Hyperledger Sawtooth and Fabric and Ethereum, and developed and deployed applications on State-of-the-Art Infrastructure. These development frameworks have been deployed on Docker and Kubernetes. As part of the "National Blockchain Framework (NBF)" project, infrastructure is setup at Hyderabad, Bhubaneshwar, and Pune.

3. Block Chain Initiatives

Blockchain is widely used in the industry in use cases that involve multiple stakeholders in the value chain. The Financial Services, Insurance, healthcare, land registry, tele-communications sectors are potential use-cases in this category. Use cases such as eKYC, Identity Management are widely explored.

National Informatics Centre had identified a few areas for blockchain implementation such as property/land records, remote voting, certificate /document storage, drug logistics supply chain and Judiciary. The work is in progress in other application domains such as GST, payment, etc.

Certificate Chain

The challenges in the current system of issue and use of the certificates amongst the stakeholders include rampant use of fake documents for exploiting Government benefits, enhanced paperwork for document verification, delay in the process for service delivery etc.

To overcome the above problems associated with paper-based documents, National Informatics Centre (NIC) has adopted Blockchain technology to build 'Certificate Chain' for secured storage and retrieval of such records. The main advantage of this Certificate Chain system is that the Certificate can be accessed online by any authorised person / institution and be assured that it is genuine and not tampered – all this without the need for an intermediary. This provides the necessary trust to the agencies which use these documents to ascertain the eligibility for providing benefit to the citizens.



CBSE Chain has been built to record marks-sheet of Class X and XII students. Marks-sheet of four years totalling about 2.10 Crore are available in Blockchain. Certificate Chain for Karnataka has been established and mark-sheets of X and XII have been stored in this chain. About 1.39 Crore marks-sheets stored in the chain can be used by other agencies for verification. Manipur – council of Higher Secondary education started using the certificate chain and about 70 thousand marks-sheets are stored. Maharashtra State Board Of Nursing & Paramedical Education has stored around 74 thousand Marks card and for verification also it is being used.

Certificate Chains are planned to be used for the admission to professional colleges, beneficiary schemes and recruitments in Karnataka for verification of eligibility.



Property Chain

Blockchain powered property management system enables the availability of common ledger of the property facilitating a single source of truth. The property details and all the transactions on the property (pledge, release of pledge, inheritance mutation, sale, gift, acquisition initiation, alienation, etc) would be stored in the Blockchain. So that while executing the mutation process in the land records system to reflect the transactions on the property, all the stakeholders will be able to see the complete history before taking decision. The prospective buyers will benefit greatly in ascertaining the ownership and also the rights, liabilities, details of GPA etc. This will greatly reduce the litigations and speed up the disposal of disputes/cases.



Bhoomi, e-asthi, e-swathu, RCCMS applications of Karnataka are getting integrated with Property Chain for recording the transactions and state of the property. West Bengal, Andrapradesh, Odisha, Pudduchery and Assam have shown interest in using this system and are working on PoC.

About 2.04 Crore Land records data of Karnataka and around 4K property records of Jharkhand state is available in the property chain. In Karnataka on an average 8 Lakh property details are verified in a day.

Document Chain

Document Chain is a single platform that provides the issuing authorities and consuming entities a standard procedure for storage and retrieval of any document issued by the government such as caste, income, ration card, driving license, birth & death certificates etc.

The Document Chain provides a mechanism for any agency to verify the details of the applicant. It could help government departments, educational institutions, job providers and financial institutions to get the documents verified without the need for a third party.

About 52 Lakhs Birth and Death Certificates issued since April 2022 by the Planning Department-Karnataka, are available. 2.98 Cr of Caste and Income Certificates issued by Revenue Department-Karnataka, from Jan 2018 are recorded. About 3.87 Lakhs of Ration cards of Puducherry, 7 Lakhs of caste certificates of Delhi Government and 11K of Consumer Affairs data is available with the Document chain. These Document Chain is being used by the systems for admission and verification purpose.

Logistics Chain



One of the use cases of Logistics chain is the online Supply Chain Management System for medicines (Aushada) of Karnataka. The Aushada system is integrated with Blockchain to record the transactions related to movement of drugs from the manufacturer to supplier to warehouse and then to the hospitals including quality checks. Smart contracts provide the checks and balances

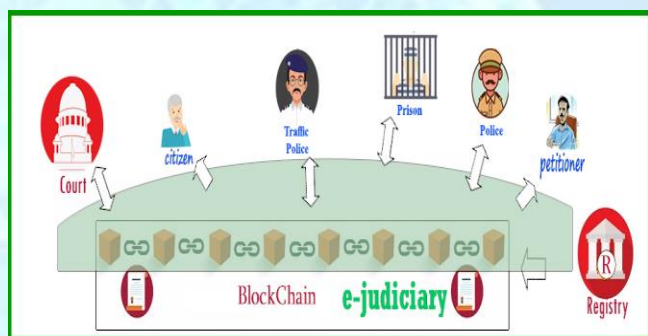


at each stage in the supply chain and also ensure that non-standard drugs are not moved down the supply chain.

Patient can check the details of the manufacturer, expiry details & quality of the medicine before consumption. It provides traceability in the transactions (track & trace) reducing the chances of entry of spurious drugs, enhances precision and brings transparency. Efficient recall system can be implemented when the quality of the drug is found to be not-of-standard. The resulting integrated supply chain system brings in all stake holders to a common platform. This system is working since last four years.

Judiciary Chain

The different pillars of the Criminal Justice System namely the Prisons, Police, Forensic labs depend on exchange of documents between themselves. Documents such as Bail Order, Release order, Forensic reports, Judgments, Decree etc. are extremely important documents. The need for securely storing these and exchanging them in-time is of paramount importance in Justice Delivery. The need for trust between these systems w.r.t availability of immutable, time stamped documents is the need of the hour.



Integration with the existing Judicial system will ensure that all sensitive data related to the case documents are updated in Judicial Chain. This will control the data hacking and manipulation of the data related to the case history. Hon., Supreme Court is using Blockchain integrated FASTER 2.0 application to share the bail orders with Prison authorities. Hon., High Court of Karnataka started using the Judicial Chain System. Around 12 Lakhs case details are stored in the Judicial Chain.

Remote Voting Chain – PoC

The remote voting system is Blockchain-based distributed system developed to enable migrants and other in-service voters posted at different locations to cast their votes from their place of work (Host Constituency) without commuting to their Parent constituencies, thereby saving time and money, and enabling higher voter turnout. A Proof of Concept (PoC) was developed as per the directions of Election Commission of India and demonstrated.

The system enables secured storage of details of remote votes, ballots, and encrypted vote in the Blockchain. The returning officer of the parent Constituency only would be authorised to download all encrypted votes from the Blockchain on the day of counting and decrypt the same to count the votes.

GST Chain – PoC

GST Chain has been established using the Blockchain Technology to record the GST transactions of various stake holders involved in GST management, by linking them like a chain. GST Chain will store all transactions of the tax payers and maintain the running tax liability of tax payers.



It can be used by the various organizations like Financial Institutions, Government, Suppliers, Recipients, GST Officers involved in GST Management to verify GST documents. The tax payers can monitor their tax liabilities.

Recipients can ascertain their GST ITC claims, supplier documents, without hassle. The financial institutions can use this system for sanctioning/providing loans. GST officers can authenticate the sales and purchases while carrying out the assessment, audit, inspection, refund, etc. as there will not be any fake invoices.