

Blockchain Integrity, Security, and Reliability for Cable Use Cases

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Blockchain Integrity, Security, and Reliability for Cable Use Cases Outline





What Good Are Distributed Ledgers and Blockchains, Anyway? What is what? Ledger Blockchain **Distributed** Signed Locked **Cryptographic Hash**





What Good Are Distributed Ledgers and Blockchains, Anyway?

Identity management and anonymity

Trust *≠* Identity Transaction *≠* Accuracy

You can have these things, but one does not guarantee the other, and you must design to what you require!







What Good Are Distributed Ledgers and Blockchains, Anyway?

Traffic flow management and message flow



- Complex network control is possible.
- A node or client can follow different rules based on the transaction details.
- Blockchain networks can thus be used to send complex, conditional information.
- By nature, strong reliability and security can be designed into the system, and directly controlled.



What Good Are Distributed Ledgers and Blockchains, Anyway?

Information reliability

- Once in the blockchain network, information remains as entered.
- Reliable information in means reliable information is kept.
- Likewise, unreliable information can be equally treated as fact, if allowed to enter.
- Some sort of security measures to assure reliable information enters the system is advised.





Blockchain Integrity, Security, and Reliability for Cable Use Cases

Use Case Summary



- New and direct
 revenue
- Cost optimization
 - Customer experience
- Reduce ecosystem
 friction
- The future may hold more!



New and direct revenue

Blockchain can play a pivotal role in enabling new revenue opportunities for operators in existing and new markets.





Cost optimization



In network operations, service creation and management, security and ownership, and even the customer experience, blockchain networks and distributed ledgers can help operators be more cost optimal.



Customer experience

Blockchain and distributed ledgers can enable many customer management capabilities. And as customers evolve in ways they are already ready to consume, it can be a layer of service and control they need.





Reduce ecosystem friction



This is fancy talk for just making things easier to do. Some things might be easy enough that you can do them for the first time. As a result, this category could be a ramp to many new capabilities not yet envisioned. More may come of this!



Comcast working with Charter, Viacom to roll out blockchain-based ad platform

https://www.fiercevideo.com/tech/comcast-working-charter-viacom-to-roll-out-blockchainbased-ad-platform

January 2, 2019 announcement

"Blockgraph is being positioned as an "identity layer" for the TV industry by providing a secure platform for sharing information without disclosing identifiable user data to third parties. Comcast division Freewheel has been developing the software to improve planning, targeting, execution and measurement across screens for TV advertising and marketing."



Blockchain Integrity, Security, and Reliability for Cable Use Cases

Complex Security and Reliability Design Concerns







Identity, transaction authentication, and transaction authenticity

- Are the parties who they say they are?
- Is what is in the blockchain what has been agreed to?
- Given the methods and tools available, can the design assure anything?
- Is a central authority needed?





Distribution and redundancy

- Byzantine General's Problem
- Distribute authoritative copies widely
- A majority may not be sufficient
 - Higher certainty needed in some applications
 - Consideration of the nodes
 and their conditions



Network scale and performance considerations

Measure	Small BC	Large BC
Time to get in	-	+
Time to propagate	+	-
Time to lock	-	+
Likelihood to split	+	-
Bad actors	+	-
Exposure risk	+	-
Reliability	?	?

 As blockchain networks get larger, depending on the design, certain performance and reliability issues are important considerations



Governance and code management

- Blockchain networks are complex systems, not always under authority or control.
- Software best practices are important, but are a double edged sword too.





Attack vectors as a reliability problem

- Blockchain networks age
 - New risks and attacks force changes.
 - Reality shifts from design and requirements.
 - All this impacts reliability.





Complex Security and Reliability Design Concerns What is the meaning of reliability for blockchain?



- As complex systems, it is important to consider the reliability (and security) of all the elements of the system.
- Each of these elements of the overall system has importance toward the overall mission of the blockchain network.
- Not well managed, and the system will have unintended consequences, including runaway costs or catastrophic failures.



Wrapping it up

What have we learned?

- Blockchains are networks
- Blockchains are designed
- Distributed ledgers are used
- Blockchains create histories of transactions called distributed ledgers how secure and reliable they are is designed according to the needs of the use case
- There are a host of opportunities for carriers, or most anyone, to use this technology to add revenue, reduce cost, open new markets, and simplify operations!
- But security and reliability must be designed into these systems, which means they must be purpose built, and design choices must be considered carefully!





IEEE Blockchain Initiative

https://blockchain.ieee.org/

Ramesh Ramadoss, PhD, Co-Chair, IEEE Blockchain Initiative Jason Rupe, PhD, Co-Chair, IEEE Blockchain Initiative Tim Kostyk, IEEE <u>Staff Program Director (Future Directions)</u>





Why Do We Care About Blockchain Technologies?

Hype Cycle for Emerging Technologies, 2018





Business value-add of Blockchain - \$176 billion by 2025, \$3.1 trillion by 2030



Source: Forecast: Blockchain Business Value, Worldwide, 2017-2030



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Blockchain Industries – Proof-of-Concepts Underway





Blockchain Activities







Advancing Technology for Humanity

IEEE Future Directions & Emerging Technologies

The IEEE Future Directions Committee (FDC) through its global initiatives determines the direction of existing, new, and emerging technologies.



Advancing Technology for Humanity

https://www.ieee.org/about/technologies.html

Blockchain Initiative -Society/Council/Other OU Engagement





IEEE Blockchain Initiative Activities



for Humanity

IEEE Blockchain Initiative: Committees

Initiative Co-Chairs blockchain@ieee.org

Community Co-Chairs blk-comdev@ieee.org

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200+ Volunteers!

Community Development Committee: promotes formation of local technical communities and outreach to the public.

Conferences Committee: organizes conferences and events.

Education Committee: coordinates the development of educational products and activities.

Publications Committee: publishes bimonthly interactive eNewsletter, plans to develops magazines, and transactions.

Standards Committee: explores pre-standards and standards opportunities in blockchain technology.

Special Projects Committee: conducts special projects, develops certification etc.



IEEE BCI Conferences

Our flagship event was at NIST (Maryland) in September. The third of these will be in May 2020



Decentralized 2019	30 October - 1 November 2019	Athens, Greece
2019 IEEE Global Communications Conference (GLOBECOM)	9-13 December 2019	Waikoloa, Hawaii, USA
Workshop on Blockchain for Telecommunications: Emerging Technologies for the Next Decade and Beyond Held at 2019 IEEE Global Communications Conference (GLOBECOM)	13 December 2019	Waikoloa, Hawaii, USA
2020 IEEE Summit on Communications Futures	18 January 2020	Honolulu, Hawaii, USA
2020 International Conference on Mainstreaming Block Chain Implementation (ICOMBI)	21-22 February 2020	Bengaluru, India
IEEE UK & Ireland Blockchain Group	24 February 2020	London, UK
2020 IEEE International Conference on Decentralized Applications and Infrastructures (DAPPS)	13-16 April 2020	Oxford, UK
2020 IEEE International Conference on Blockchain and Cryptocurrency (ICBC)	4-7 May 2020	Toronto, Canada



IEEE Blockchain Publications

IEEE Blockchain Technical Briefs - September 2019 A collection of short technical articles.

A Consortium Blockchain-based Incentive Model for Crowdsensing

By Lijun Wei; Jing Wu; and Chengnian Long (Corresponding author), Department of Automation, Shanghai Jiao Tong University, and Key Laboratory of System Control and Information Processing, Ministry of China

Crowdsensing is an emerging paradigm of data aggregation, which has a pivotal role in data-driven applications. It collects a large amount of sensing data by means of procurement or recruitment, which reduces the cost of data collection and improves the efficiency. With the continuous expansion of the network scale and the intelligent evolution of sensing devices, crowdsensing has a significant development in various IoT applications such as transportation, pollution measure, etc. Typical crowdsensing is composed of mostly three parts: requesters, workers and platforms.

Read More

Blockchain Value Realization: Promises, Realities, and the Journey towards Integration and Adoption

By Hazim Dahir; and Ammar Rayes, Cisco Systems

Blockchain is not ready for prime time. You can stop reading now. However, since most people observing the momentum behind blockchain would disagree, you probably should keep reading. There is no doubt the momentum and investments are increasing. however, the integration of Blockchain into a workflow or process is where the issue is. Furthermore, there is high level of certainty that blockchain will revolutionize how we conduct business (all business).

Read More

Proof of Prestige

By Michał Król; Alberto Sonnino; Mustafa Al-Bassam; Argyrios G, Tasiopoulos; and Ioannis Psaras, University College London (UCL)

Cryptocurrencies rely heavily on the blockchain technology that acts as a peer-to-peer, distributed database. In this database, each cryptocurrency stores essential information such as the amount of money of each user and a list of transactions. However, for the system to work correctly, the database must remain consistent across multiple copies. This is achieved by using different

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Read the top five most popular IEEE Blockchain Technical Briefs articles of 2018 Read more (PDF, 731 KB)

Past Issues	
June 2019	
March 2019	
January 2019	
December 2018	
September 2018	

- **IEEE** Calls for Papers
- **IEEE** Publications on Blockchain
- **IEEE** White Papers
- **IEEE Talks Blockchain**
- **IEEE Blockchain Articles**
- **External Publications**



IEEE Blockchain Groups

2018: Launched

Silicon Valley, CA, USA South Korea Shanghai, China Bangalore, India Beijing, China Dallas, TX, USA Waterloo, Canada Latvia Cleveland, OH, USA Shenzhen, China Hangzhou, China Kiev, Ukraine

Silicon Valley SEMICON WEST AUX 10-22, 2011 INOSCONI CENTER I SAN FRANCESCO, CH

2019: Launched Switzerland

Approved by the Local Section

Memphis, TN, USA Ahmedabad, India Portugal UK & Ireland San Diego, CA, USA Toronto, Canada

Discussion with the Local Section Singapore Estonia Boston, MA

Organizer Identified

Japan St. Petersburg, Russia Brazil Lithuania Brussels, Belgium Sweden Melbourne, FL, USA Hong Kong Melbourne



Advancing Technology for Humanity

IEEE BCI Educational Content

IEEE Blockchain eLearning Modules



The IEEE Blockchain Initiative offers a series of online eLearning modules on Blockchain. Learn from the experts about how this emerging technology will offer a new way of conducting transactions, securing networks, and recording the validity and origin of data. Courses will cover a range of topics, including the fundamentals of Blockchain, key technologies, architecture, potential applicatons, benefits, challenges, and more. Participants also have the opportunity to earn Continuing Education Units (CEUs) and Professional Development Hours (PDHs) with each course.

Modules Now Available

IEEE Blockchain Summit Keynotes



The 2018 IEEE Global Blockchain Summit @ NIST, held 17-19 September 2018 in Gaithersburg, MD, USA, brought together thought leaders, decision makers, and technologists to discuss the challenges and opportunities of blockchain technology. Attendees from academia, government, and industry presented on various topics including the current technology landscape, applications, use cases, policy, and regulations to help instill providence tracking functionality into vital internet applications reliant on trusted immutable data.

Access audio recordings and Q&As from the summit

Continuing Education on IEEE Xplore



Take your skills to the next level with these IEEE continuing education courses. IEEE now offers a collection of courses on Blockchain technology as part of the IEEE Xplore Digital Library. Topics include the history of the technology, costs and benefits for working with blockchain, a look at blockchain-based applications, case studies, the concept of decentralization, and more. Students are eligible to earn continuing-education units and professional development hours.

Access the courses at IEEE Xplore

IEEE Blockchain eLearning Modules

- IEEE Blockchain Summit Keynotes
- Continuing Education on IEEE Xplore
- **IEEE Virtual Events**
- Videos
- **Related Webinars**

IEEE Smart Grid Webinar: Blockchain Technology in the Energy Sector: A Systematic Review of Challenges and Opportunities - 25 July 2019

Presenter: Merlinda Andoni and Valentin Robu Heriot-Watt University

Blockchains have attracted considerable interest and are reported as a promising technology that could deliver significant benefits and innovation in the energy sector.

The webinar will provide a comprehensive overview of fundamental principles that underpin blockchain technologies, such as system architectures and distributed consensus algorithms. Next, we provide an overview of blockchain solutions and business cases in the energy industry. This summarizes the results of a comprehensive review of the potential of blockchain technology in the energy industry, which the presenters completed for the National Research Centre for Energy Systems Integration (CESI) in the UK.

Our review included 140 blockchain initiatives (both research projects and start-ups), which are systematically classified into different groups according to their field of activity, implementation platform and consensus strategy used. Opportunities, best practices and challenges encountered will be discussed for a number of applications, ranging from emerging peer-to-peer (P2P) energy trading and Internet of Things (IoT), to automation of decentralised marketplaces, EV charging and e-mobility. The webinar concludes with a discussion of challenges and market barriers the technology needs to overcome for mainstream adoption.

Access this webinar at the IEEE Smart Grid Resource Center



Related Webinars

IEEE Smart Grid Webinar: Blockchain Technology for Transactive Energy: A New Framework - 10 October 2019

View the courses



Presenter: Claudio Lima, Ph.D. Co-Founder, Blockchain Engineering Council - BEC

Transactive Energy (TE) will be an important technology enabler that will change today's utility business models towards the utility of the future. TE will also affect future energy markets, driven by new technologies, such as, energy automation, distributed solar photovoltaic, distributed energy storage systems (DESS), smart metering, distributed energy resources (DER), and so one. However, current TE models lack the "trusted transactive layer" needed to implement new energy market dynamics capabilities. New concepts of "Utility-Grade Blockchain-DLT" technologies will be introduced to meet these future TE requirements, introducing a new trusted, transparent and traceable transactive laver to register and authenticate TE grid assets, transactions and participants,

This webinar will introduce new TE-Blockchain concepts and applications, review some regulatory aspects of Blockchain-DLT TE, including the ongoing work of the IEEE P2418.5 Blockchain Energy Standards WG, transactive energy task force.

Access this webinar at the IEEE Smart Grid Resource Center

IEEE Blockchain Standards Working Groups

Active Working Groups

- IEEE P825: Transactive Energy Type of Ballot: Individual Chair: Paul Heitmann (<u>paul.heitmann.us@ieee.org</u>) Staff: Malia Zaman (<u>m.zaman@ieee.org</u>) Start Date: Dec 2016 https://standards.ieee.org/develop/project/825.html
- IEEE P2418.1: Standard for the Framework of Blockchain Use in Internet of Things (IoT) Type of Ballot: Entity Chair: Ramesh Ramadoss (<u>Dr.Ramesh.Ramadoss@ieee.org</u>) Staff: Soo Kim (<u>s.h.kim@ieee.org</u>) Start Date: June 2017 <u>http://sites.ieee.org/sagroups-2418/</u>
- IEEE P2418.2: Standard Data Format for Blockchain Systems Type of Ballot: Entity Chair(s): Ming Li (liming@cesi.cn) Staff: Meng Zhao (meng.zhao@ieee.org) Start Date: July 2018



IEEE Blockchain Standards Working Groups (Cont.)

New Working Groups

- IEEE P2418.3: Standard for the Framework of Distributed Ledger Technology (DLT) Use in Agriculture Type of Ballot: Individual Chair(s): John Johnson Staff: Soo Kim (<u>s.h.kim@ieee.org</u>) Start Date: July 2018
- IEEE P2418.4: Standard for the Framework of Distributed Ledger Technology (DLT) Use in Connected and Autonomous Vehicles (CAVs) Type of Ballot: Individual Chair(s): Richard Yu (<u>RichardYu@cunet.carleton.ca</u>) Staff: Mike Kipness (<u>m.kipness@ieee.org</u>) Start Date: July 2018
- IEEE P2418.5: Standard for Blockchain in Energy Chair(s): Claudio Lima (<u>crlima100@gmail.com</u>) Type of Ballot: Entity Staff: Soo Kim (<u>s.h.kim@ieee.org</u>) Start Date: Sept 2018



IEEE Blockchain Standards Working Groups (Cont.)

New Working Groups

- IEEE P2418.6: Standard for the Framework of Distributed Ledger Technology (DLT) Use in Healthcare and the Life and Social Sciences Type of Ballot: Individual Chair(s): Heather Flannery (<u>hflannery@blockchaininhealthcare.global</u>) Staff: Tom Thompson (<u>thomas.thompson@ieee.org</u>) / Pat Roder (<u>p.roder@ieee.org</u>) Start Date: Sept 2018
- IEEE P2418.7: Standard for Blockchain Use in Supply Chain Finance Type of Ballot: Entity Chair(s): Grace Chen & Hui Zhang, Ant Financial Start Date: Dec 2018
- IEEE P2418.8: Standard for Blockchain Applications in Governments Type of Ballot: Entity Chair(s): Frankie Zhang (<u>frankie.zhang@senses.global</u>) Start Date: Feb 2019



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P2418.X Series (Continued)

P2418.8 Standard for Blockchain Use in Government Affairs (Frankie Zhang, Senses Global) P2418.9 Standard for Cryptocurrency Based Security Tokens (Ramesh Ramadoss, BitCasas) P2418.10 Standard for Blockchain in Digital Asset Management (Hui Ding, ChainComp)

P2140.X Series

P2140.1 Standard for General Requirements for Cryptocurrency Exchanges (John Lin, Senses Global) P2140.2 Standard for Security Management for Customer Cryptographic Assets on Cryptocurrency Exchanges (John Lin, Senses Global) P2140.3 Standard for User Identification and Anti-Money Laundering on Cryptocurrency Exchanges (John Lin, Senses Global) P2140.4 Standard for Distributed/Decentralized Exchange Framework (Hehe Hu, Ontology) P2140.5 Standard for Custodian Framework of Cryptocurrency (Hehe Hu, Ontology)

P2143.X Series

PAR P2143.1 Standard for General Process of Cryptocurrency Payment (John Lin, Senses Global) PAR P2143.2 Standard for Performance Metrics of Cryptocurrency Payment (John Lin, Senses Global) PAR P2143.3 Standard for Risk Control Requirements for Cryptocurrency Payment (John Lin, Senses Global)

P2144.X Series

PAR P2144.1 Standard for Framework of Blockchain-based IoT Data Management (Hui Ding, ChainComp) PAR P2144.2 Standard for Functional Requirements in Blockchain-based IoT Data Management (Hui Ding, ChainComp) PAR P2144.3 Standard for Assessment of Blockchain-based IoT Data Management (Hui Ding, ChainComp)

Others

PAR P2142.1 Recommended Practice for E-Invoice Business Using Blockchain Technology (Miles Huang, Tencent) PAR P2141.1 Standard for Using Blockchain Against Corruption in Centralized Organizations (Frankie Zhang, Senses Global)



IEEE Blockchain Pre-Standards & Standards Projects

IC Goal: Establish viability and create documentation for PARs (Standards Working Group).

Industry Connections Programs (Pre-Standards)

- IC17-002-01: Digital Inclusion through Trust & Agency (DITA) Type of Ballot: Individual Chair: Greg Adamson (g.adamson@ieee.org) Staff: Maria Palombini (m.palombini@ieee.org) Start Date: March 2017 http://standards.ieee.org/develop/indconn/digital_inclusion/
- IC17-017-01: Blockchain Asset Management Type of Ballot: Entity Chair: Yu Yuan (<u>v.yuan@ieee.org</u>) Staff: Karen Evangelista (<u>k.evangelista@ieee.org</u>) Start Date: Dec 2017



IEEE Standards Association: Pre-Standards & Standards

Industry Connections Programs (Pre-Standards)

 IC17-012-01: Supply Chain & Trials Standardized Technology and Implementation Type of Ballot: Entity Chairs: Tim Mackey (<u>tmackey@ucsd.edu</u>) Staff: Maria Palombini (<u>m.palombini@ieee.org</u>) Start Date: Sept 2017

Work Streams in IC17-012-01:

- > Smart Contracts for Informed Electronic Consent in Clinical Trials (Adama Ibrahim, Biogen)
- Health Quality Data Scoring System Combined with Standard framework for Streaming Patient Data into the Blockchain and Linking to Patient Identity (Daniel Hwang)
- Clinical IoT Data Validation and Interoperability with Blockchain (with industry guidance on usage opportunities for other applications (Florence Hudson)
- Techno-Legal Standards for Smart Contracts for Supply Chain (Houman Shadaab, New York Law School/Accord Project)
- Blockchain, IoT and Cold Chain Logistics (Pharma Supply Chain)*
- Blockchain for Compliance of US FDA DSCSA (Drug Supply Chain Security Act)*
 - * Items noted in bold italics are in the recruitment phase









IEEE Blockchain Courses

Thank You, For More Information Please Contact,

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