# Blockchain for Video Advertising:

## A Market Snapshot of Publisher and Buyer Use Cases

February 2018

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**Executive Summary – Blockchain for Video Advertising: A Market Snapshot of Publisher and Buyer Use Cases**

- Blockchain technology has ramifications far beyond the financial sector.
- As an immutable, distributed, transparent ledger, blockchain is a natural fit for the digital advertising supply chain.
- Potential benefits of blockchain for advertising include increased efficiency, transparency, cost reduction, and the elimination of fraud.
- 2018 will be the year that a wide range of blockchain applications will be rolled out across digital and cross-screen video advertising including linear television, with 2019 likely being the year that these technologies begin to see broader adoption - provided certain risks can be mitigated.
- Long-form, premium video and TV advertising, with their high CPMs and low volume, is a compelling use case for blockchain. In the coming year, we expect to see some significant beta tests from both traditional media and new entrants.

**Section One: Introduction**

When the history of 2017 is written, many themes will jump to the fore, but in the realm of technology none will prove to be as important as blockchain. This was the year that blockchain, and bitcoin–the first, and arguably most well-known application of blockchain– entered the mainstream. Financial mavens on CNBC squawked almost daily about bitcoin, the price of which, at one point, topped $10,000; the first futures market for digital currency was launched, and venture funding for blockchain startups reached $3.7 Billion. Perhaps the most tell-tale sign of investment mania was ironically demonstrated by the Long Island Iced Tea company, which changed its name to the Long Blockchain Corporation, announced it was going to start mining bitcoin, and saw its shares more than quadruple in a single day.

Blockchain, best known in the context of financial markets and cryptocurrency – traces its origins back to a 2008 paper called “Bitcoin: A Peer-to-Peer Electronic Cash System”[1], attributed to fabled Bitcoin inventor Satoshi Nakamoto. While that paper presciently addressed issues of trust in peer-to-peer networks and digital currency, since then new transactional use cases are emerging for blockchain in many industries including media and advertising. Media companies are exploring blockchain to help assist with campaign reconciliation, whitelisting authorized sellers of inventory, validating advertising assets, and as a method to make the buying and selling of media more transparent.

This report provides a high-level overview of blockchain including key terminology and an overview of how it works. It will address some of the ways the technology is being utilized to bring greater efficiency into the media and advertising supply chain. The report has a specific focus on the use of blockchain with OTT, which is particularly suited to reap the benefits of the technology in many ways. We hope this serves as a useful snapshot of what the blockchain landscape looks like in the digital advertising space and how it is evolving. We look forward to providing future reports as the technology matures.

[1] You can access the Satoshi Nakamoto “Bitcoin: A Peer-to-Peer Electronic Cash System” here: https://bitcoin.org/bitcoin.pdf

**What is Blockchain?**

Blockchain is a ledger, or a database, that is stored in a distributed peer-to-peer network without any central point of control. While special permissions are required to write entries to the blockchain, in most cases, the ledger itself is publicly visible. Once an entry is made to the blockchain, it is pushed out to the network and is immutable, meaning that it can never be changed.

It is important to recognize that blockchain is a generic term. Many blockchains exist, and many more are in development. The first, most famous, and most widely used is the Bitcoin blockchain which keeps an accounting of all transactions that utilize bitcoin. The blockchain protocol underlying bitcoin is in essence a giant spreadsheet whose purpose is to store and exchange value in the form of the bitcoin cryptocurrency.

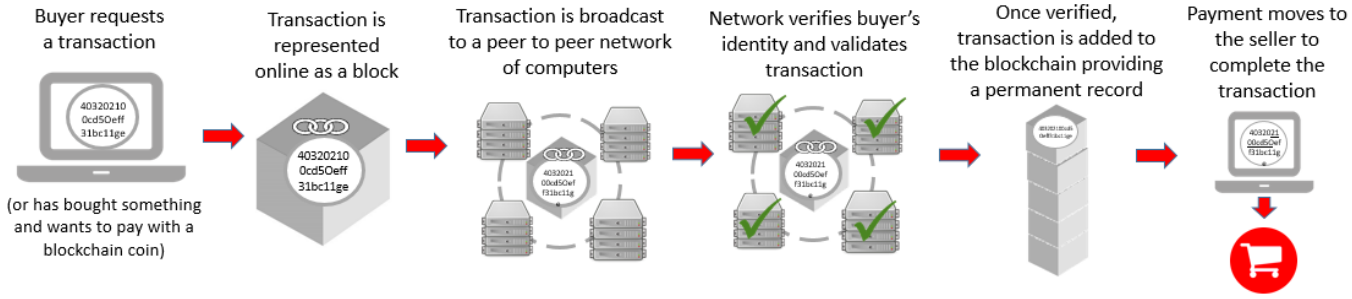
Another blockchain, Ethereum, was designed to handle a wider range of applications. Ethereum is the starting point for many of the applications currently in development for use in the digital advertising supply chain. Ethereum stores value in its own currency which is called ether. Ethereum has a robust scripting language and API support. Another important feature of Ethereum is its ability to create and deploy self-executing agreements between multiple parties. These are known as smart contracts.

**How Does Blockchain Work?**

When new, complex technologies like blockchain begin to enter the vernacular, it's tempting to try and compare them with something more familiar ("shared database", "distributed spreadsheet"). While these analogies hold true to some extent, they don't truly capture the essence of the innovation.

Blockchain provides a method for two parties to exchange value securely on a peer-to-peer network. Blockchain creates a record of the transaction on the network that is indelible and transparent to all parties. What's truly unique about blockchain is that the transaction and the value exchange happen *directly between the parties* without intervention from any intermediaries such as a bank or credit card company.

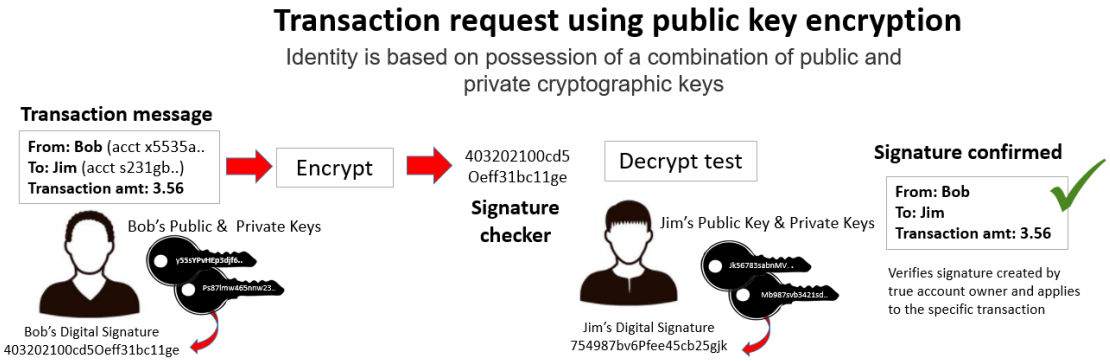
How Blockchain Works




The network itself validates the transaction through what is called a consensus mechanism. The most well-known consensus mechanism is used for the Bitcoin blockchain and is known as "proof of work." But other consensus mechanisms are possible.

Cryptography—the technology and math used to hide secret messages—plays an important role to prove identity and ownership in the blockchain. Every person or entity who transacts on a blockchain must own

a pair of cryptographic keys. One is a public key which can be used by other parties to send encrypted messages or exchange coins/tokens to the key holder. The other key is private and is used by the receiving party to decrypt the message or receive the tokens. Both keys are used for the process of creating a digital signature, required to prove that a transactional request was created by a verified account owner (see diagram below).




Another use of cryptography in blockchain happens after parties agree to exchange value via a transaction. Once a transaction takes place, it is time-stamped and hashed. **Hashing**[2] is a process that encodes the data, and puts it in a specific address on the blockchain. It takes data, performs an operation, and returns an output consisting of a fixed string of characters. In order to add another block to the chain, complex mathematical problems involving the hash need to be solved. To solve these problems requires substantial computing power[3], or "work." This work is done by **miners** who race to solve the problem, decrypt and thus validate the transaction, and add it to the blockchain. For performing this function (known as "proof of work"), the miners are rewarded with bitcoin or another cryptocurrency.

Although the term "miner" conjures up rugged individuals prospecting for precious metals, crypto miners are primarily pools of computers (run by individuals or large corporations) who deploy excess computing capacity to search for, and decode the hashed transaction records. When they do so, they write the record to the blockchain and it is copied to every node on the peer-to-peer network. Encryption and decentralization make the blockchain extremely secure.

**Key terms**

- **Bitcoin.** A digital currency that is accounted for on the Bitcoin blockchain.
- **Block.** The atomic unit of any blockchain, containing every recorded transaction up until the time the block is published. All blocks are time stamped. Once added to the blockchain, blocks cannot be edited.
- **Blockchain.** A decentralized ledger or database distributed across a peer-to-peer network and composed of a concatenation of blocks. Every node on the network contains a complete copy of

[2] For more information on hashing in the context of blockchain see: "Blockchain Underpinnings: Hashing"

[3] Concerns about the high amounts of electricity consumed by server farms in the "proof of work" computational process are spurring developers to explore alternate methods, such as "proof of stake". See NY Times "There Is Nothing Virtual About Bitcoin's Energy Appetite"

the blockchain, and every copy contains the full history of all recorded transactions. There are many different blockchains.

- **Cryptocurrency.** A digital store of value; digital money. Examples of cryptocurrencies include Bitcoin, Ether, and Litecoin.
- **Cryptographic Keys.** Used to unlock encrypted data. Blockchain users hold two keys. One is a public key that allows anyone to see what is in a digital wallet in a read only manner; the other is private which confers a capacity to write into the wallet so that cryptocurrencies may be exchanged between parties.
- **Digital Wallet.** A computer application used to store digital currency. The wallet equates a unique identifier with an individual and comes with a pair of cryptographic keys, one public and one private.
- **Ether.** The digital currency native to the Ethereum blockchain.
- **Ethereum.** A popular blockchain for business applications, especially useful for self-executing transactions known as smart contracts.
- **Hashing.** The process by which data is encrypted. It takes data, performs an operation, and returns output of a fixed size.
- **Miners.** Miners are servers run by individuals, groups of individuals, or companies to verify that transactions within a block are legitimate. Miners consume bandwidth and computing power to perform a mathematical function to validate a transaction and are rewarded with bitcoin, ether, or any other cryptocurrency that is offered as part of a public blockchain.
- **Node:** Members of the blockchain network that can share blocks and transactions
- **Off-chain.** Transactions which are recorded off of the blockchain with the potential to be published to a chain later for the purpose of creating a permanent record.
- **On-chain.** Transactions which are recorded directly onto the blockchain.
- **Payment rail.** Any established connection between a fiat currency (declared by a government as legal tender) and a utility token.
- **Smart Contract.** A self-executing agreement between two or more parties, defined in code and communicated and executed on the blockchain
- **Tokens** (also known as Utility Tokens). Custom coins created on a blockchain for the purpose of storing and exchanging value among a predefined set of peers for a predefined business purpose. Tokens may be held by anyone with a digital wallet.

**Section Two: Blockchain for Business**

Distributed, secure, immutable ledgers and databases have applicability for businesses large and small. It's no wonder that applications for the blockchain are emerging to satisfy a multitude of use cases. For the purpose of differentiating these applications, it is helpful to classify the blockchains on which they operate as either public, permission-based, or private.

**Public Blockchains** are the largest and most prominent manifestations of the technology. They are accessible to, and readable by, anyone. The Bitcoin blockchain is the best example of a public blockchain. It is completely open, transparent, and accessible. All one needs to become part of the Bitcoin ecosystem is a web browser and wallet software, both of which are free. Public blockchains may have an unlimited number of nodes, or peers, and each node stores a complete copy of the chain. Like the internet itself, no one owns the Bitcoin blockchain, or any other public chain. Ethereum is also a public blockchain, however, unlike the Bitcoin blockchain, its scripting capabilities allow for the creation of permission-based and private chains within its ecosystem. Thus, Ethereum exists as both a blockchain

and as platform for blockchain applications. There are many other public blockchains, such as Neo, with many more likely to emerge in the coming years.

**Permission-Based Blockchains**, also referred to as consortium blockchains, are owned and maintained by a fixed number of entities. The nodes, or peers, are pre-determined and participate equally in the chain. AdLedger is a nonprofit consortium made up of leading advertising and media companies from around the world, aligned in their efforts to drive true transparency and data security into the ad tech supply chain through blockchain technology. One of their proof of concept projects aims to use a permissioned blockchain to help companies comply with the EU's GDPR (General Data Protection Regulation) rules.

**Private Blockchains** are owned and operated by a single entity, such as a bank. For banks, private blockchains provide an immutable audit trail of transactions, allowing controllers and auditors to audit everything as read only. Unlike public or consortium blockchains, private blockchains have a central point of control. They are not distributed across a peer-to-peer network. While this characteristic negates one of the oft-stated benefits of blockchain, it may actually be beneficial in certain applications. As Richard Bush, Chief Product and Technology officer, NYIAX noted:

> *"Centralized authorities still provide a valuable service which they will maintain for a long period of time because there are many people on the web who want and need help securing their digital transactions. They don't want to do the work themselves. They want services."*

**The Benefits of Blockchain**

The enthusiasm for blockchain as a solution for many of the issues ailing the digital advertising supply chain becomes apparent when considering the overall benefits of blockchain through the lens of the digital media ecosystem. These benefits include:

- **Trust.** Blockchain provides a proven framework for creating trustworthy interactions between parties who do not necessarily know each other. Trust is ensured because parties cannot mask their identities, and because any transaction involving the exchange of value, or data, is encrypted. Only the parties authorized in the transaction hold the keys. As a result, there can be no undisclosed intermediaries in any transaction.
- **Transparency.** Every transaction that is written to a blockchain ledger, or database, is visible to anyone who has access to the chain.
- **Decentralization:** No central system, record, or controlling third party is needed
- **Safety and Security.** Blockchains are in principal designed to be decentralized, peer-to-peer networks with no central authority or point of control. As a result, there is less chance for the occurrence of a single point of failure, or "honey pot" for malicious hackers to target and steal data. The security and integrity of the blockchain is maintained by virtue of its distributed architecture[4]. Once an entry is made onto a blockchain it is nearly impossible to alter, because each block references the prior block and the entire chain is copied on every node in the network.

[4] It should be noted that there have been instances of hacking related to cryptocurrency. If there is one truism in the history of software and technology development, it is that all systems have the potential to be hacked.

- **Fraud reduction.** All parties interacting on the blockchain are disclosed and verifiable. Identities cannot be spoofed; inventory cannot be daisy-chained; data can be neither skimmed nor reused in subsequent transactions. In short, every intermediary to a transaction is known, disclosed and approved by all parties.
- **Efficiency.** FinTech, where blockchain began and has experienced its most significant operational deployments, offers proof that efficiency along with its twin benefit, cost reduction, are natural outcomes of successful blockchain implementations. Efficiencies stem from the reduction of intermediaries in any transaction, streamlined workflow, and a quicker reconciliation period post-transaction. Breaux Walker, SVP Blockchain, Kochava put it well:

> *"The fintech supply chain is not identical to the supply chain in digital advertising. However, there are many inefficiencies in the digital advertising supply chain as a result of many players and unnecessary ad tech cost. A distributed ledger could play a major role making the chain more efficient. The entire workflow improves and there are ways to innovate in terms of services. The quality of service goes up. The general relationships between partners improve."*

## Section Three: Blockchain Use Cases in Advertising

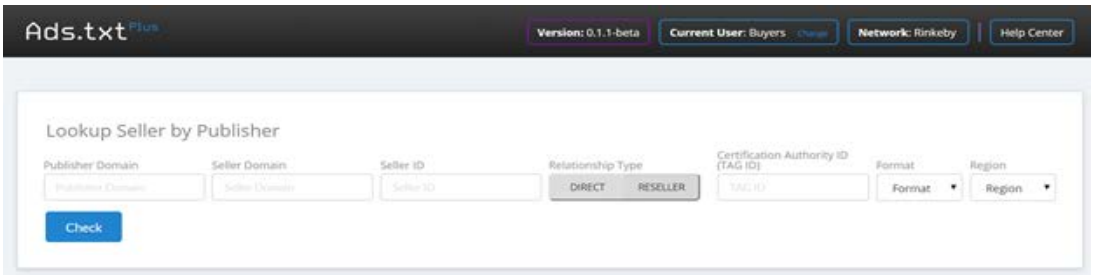
Fueled by a large influx of venture capital during the past two years, many companies have been actively coding and building applications for the use of blockchain in digital advertising. Many of these applications are at or near their alpha or beta release.

Below we describe several projects underway that use blockchain as a means to enhance and improve the digital advertising supply chain. We selected these projects based on input interviews that the IAB conducted with member companies that are actively exploring and experimenting with blockchain. They are by no means a comprehensive compendium of all the work being done by companies in this space though they do serve to illustrate how sweeping and disruptive blockchain may become to the way we conduct our business in the future.

### Digital Advertising

#### *Ads.txt Plus*

MetaX, a blockchain company based in Los Angeles, aims to address issues of fraud and lack of transparency that impact digital advertising using blockchain technology. The company has spent the past two years working on this and now has several applications ready for public beta testing this year. One of these applications is called Ads.txt Plus. It offers a compelling example of how the widely praised Ads.txt program initiated by the IAB can become even more effective, efficient, and secure using blockchain.




Q&A with Ken Brook, Chief Executive Officer, MetaX, about Ads.txt Plus:

***How does Ads.txt Plus work?***

*"We implemented Ads.txt Plus on the Ethereum blockchain and in tandem, built a front-end UI to manage publisher ads.txt files and buyer lists. Publisher ads.txt files can be downloaded in aggregate from one place for buyers. Publishers themselves can maintain their file versions and either keep it on the blockchain endpoint and/or export to their web server."*

***What does a publisher do in order to transact in this process?***

*"A publisher has to input their ads.txt file into* https://adstxt.plus*. In order to implement, you need a digital wallet. Using a browser extension called MetaMask (in Chrome), you can implement a digital wallet right in the user's browser. In this case, the user would be the publisher. They have a public address and they have a private key to this wallet. They take their public wallet address and they add it to their DNS records. In the text field, they add their wallet address. For example, today if you go to pubA*.com/ads.txt*, you can see all of the names of authorized sellers. In the future, if you augment that with your digital wallet and then go to pubA*.com/ads.txtplus*, you will see just the wallet address. The publisher can obfuscate all the authorized sellers so that it's not readable but it's still verifiable."*

***Only people who have the key can read it?***

*"By default, the file is publicly readable (and read only) and can be validated by all third parties. You can obfuscate the text using encryption and provide the key to your buyers. To update the file, you also need a separate private key."*

***XCHNG, brought to you by Kochava***

Kochava is a measurement and verification company based in Sandpoint, Idaho. They have created a research and development subsidiary, Kochava Labs SEZC, to architect a new blockchain framework that is uniquely suited to high-speed transactions such as those that occur in digital advertising. They intend to open-source the code for this chain in the coming year.

The instance of this blockchain for use in digital advertising is called XCHNG. The core value prop of XCHNG is that the insertion order, which governs all media transactions, can become a smart, self-enacting contract. Charles Manning, Chief Executive Officer, Kochava, explains:

> *"If you standardized blockchain and the smart contract in the blockchain around the insertion order, you are now at the kernel of the workflow for how buyers and sellers engage, how things are confirmed, how they are measured, how they are rated, and how they are paid. We need to think of this is as the future IAB 4.0 Ts & Cs[5] and terms of the IO. It's the blockchain implementation of IAB terms and our standard smart contract template that would become the standard that we collaborate on from a taxonomy standpoint. That is really meaningful and powerful..."*

On XCHNG, the elements of a digital media buy are abstracted and simplified into five basic components or parties: Buyer, Seller, Measurement, Ratings, and Payment. The premise is that inventory can be locked down on a confirmable ledger and then traded, sold, measured, and managed. Manning's call to action for buyers and sellers: "Use this as your system for guaranteed programmatic buys because it's traceable, trackable, and there is not any intermediary – you can work directly with your counterparty."

Indeed, one of the compelling aspects of migrating digital media transactions to any blockchain is the ability for all counterparties to work directly together in a secure, trustworthy manner. This minimizes the need for redundant processes in the supply chain, (e.g. having both the buy side and sell side counting impressions, measuring viewability, etc.), simplifying --- if not wholly eliminating --- the need for manual reconciliation.

***NYIAX***

NYIAX has been co-developed in partnership with Nasdaq. Nasdaq powers many of the exchanges worldwide and is an expert at providing a system to transfer value directly between counterparties, and across various asset classes. As a platform built on top of Nasdaq's Financial Framework, NYIAX provides an extension into a new asset class - digital advertising. By facilitating the assignment of value to advertising inventory (context, audience, unit size, etc.) and enabling it to be transferred in a direct way between buyers and sellers on the exchange using a smart-contract at its core, NYIAX enables direct trade between buyers and sellers, and for the first time, enables the possibility of re-trading inventory in a blockchain-enabled futures market.

Richard Bush, Chief Product and Technology Officer, NYIAX explains:

> *"We are storing trade and post-trade data inside the ledger. Today it is centralized, and NYIAX is the only party with access to the data. We are taking a traditional business approach to installing the blockchain rather than a cryptoeconomic approach because for our business, it enables us to come to market more quickly …You can think of it as the typical stock market approach with buy and sell orders. However, you have the media and spend being listed."*

[5] The current 4's/IAB Standard Terms and Conditions is Version 3.0

The NYIAX approach improves upon the current programmatic auction method by adding the critical missing component of transparency so that buyer and seller agree on what they are trading prior to the transaction, including the fees they will pay to intermediaries. It also holds the promise of collapsing clearing and reconciliation into a single step, ensuring that buyers and sellers keep more of the value themselves. Finally, in keeping with the stock market analogy at the core of NYIAX, one can imagine a futures market and even a derivatives market built on the digital advertising asset class. According to Bush, secondary markets are indeed a possibility:

> *"We are approaching this in two phases. In the first phase, we will build and facilitate liquidity with the primaries in our exchange. The primary traders are publishers and buyers. We think of this as a contracts exchange... We set out to create a forwards market for these contracts and entities… The forwards marketplace is the main focus for us right now. We do see an opportunity to create a secondary market on top of that but that's not going to happen until the primary market has liquidity."*

**Section Four: Use Case Snapshot – Blockchain and Video Advertising (Digital, OTT, and Unified Video)**

Interestingly, there is a lot of focus on blockchain applications in the digital video advertising space in particular for OTT. **Premion**, a division of TEGNA which is a leading OTT advertising platform, and **Comcast,** one of the largest MVPDs (Multichannel Video Programming Distributors), are each focused exclusively on this asset class with their blockchain efforts.

On balance, the advantages of focusing on the digital video/OTT asset class outweigh the disadvantages:

- Advantages of using blockchain for digital video / OTT inventory:
  - Low volume (queries per second) compared to digital display advertising
  - Well-established standards and transactional processes
  - High value, premium asset class
  - Fewer suppliers, most of whom are known to each other
  - Market is still nascent so players are motivated to innovate
  - Suppliers have lived through the first phase of programmatic and are more willing to be transparent, and warier of intermediation
  - Lots of content delivery networks (CDN) are involved in the supply chain, and the CDNs are already peer-to-peer

- Disadvantages of blockchain for digital video / OTT:
  - High demand inventory with sellers who may be less open to experimenting with new business models and processes
  - High margin buy so the inefficiency of the multiple intermediaries is less obvious
  - Complex set of OTT endpoints, or clients
  - Shared taxonomies, definitions and standards will be needed to enable "smart contracts" of the future, with flexibility to fix current problems and bring incremental improvements
  - Success requires adoption and participation from many players in the OTT ecosystem

> *"My hunch is that you are going to see blockchain flow out from PC and mobile first before you will see it kick off in OTT. For the OTT space, there are a lot of nuances in*

> *terms of how you integrate specific technology into devices like streaming sticks and connected-TVs. We've always found the way you do things for Roku is very different from how you do it for the Samsung TVs or Xbox or PlayStation. Seemingly, there is no one device on which it is the easiest to integrate and no devices we cannot integrate with. It's a bit of a chicken or the egg dilemma."*
> - *Adam Moser, Head of Ad Operations, Hulu*

**Premion** has partnered with technology company MadHive to develop a transaction platform for OTT using blockchain. According to Will Felcon, Premion's Head of Product and Technology:

> *"MadHive and Premion have partnered together to focus on the OTT marketplace with the goal of enabling premium content programmers to take back control of their OTT audience, data and inventory. Today, there's a significant gap across the OTT landscape as traditional digital DMPs are not able to collect cookie-less data and thus unable to provide content programmers with the data to understand their OTT viewers and their true value. Our DMP and the blockchain principle we've built are centered around transparency, rich data and allowing content programmers to sell more of their inventory directly, and at a higher premium. Ultimately, we are preventing premium OTT advertising inventory from being sold on ad exchanges where it's bid on for a fraction of what the total value is."*

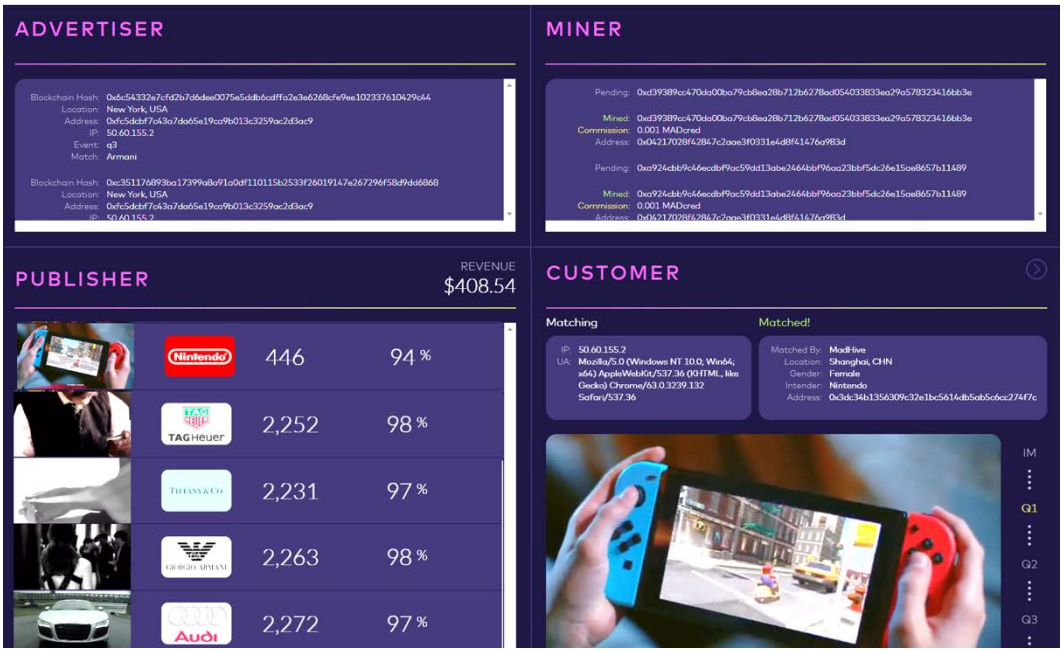
The initial implementation of the system will be for back-office purposes, but Premion's partner MadHive has launched MAD Network with a vision for blockchain in OTT that is much grander. MAD Network is a set of decentralized applications designed to connect every stakeholder within the ad tech value chain. Tom Bollich, Chief Technology Officer, MadHive explains:

> *"We launched MAD Network because we believe we need solutions built with privacy by design - an ad tech ecosystem built on blockchain technology. MAD Network is initially building a payment rail and reconciliation engine. But we see this ultimately becoming a distributed ad server linked to consumer devices, where their PII (personally identifiable information) never leaves their devices. A distributed system, where identity can be cryptographically proven without ever having to actually reveal the consumer's data, will enable privacy for the consumer, as well as the best possible decisioning for publishers and advertisers. We're initially focused on OTT, but the model could easily be applied to any form of digital advertising. That's where we see the future state going - inherent security and trust through decentralization. The beauty of blockchain is that no one owns it."*

While this deployment will begin via a payment rail for back-office transactions it will slowly incorporate more workflow elements. Tom Bollich, Chief Technology Officer, MadHive explains:

> *"Our goal is to have as little change as possible in the beginning. We already have a very large amount of ads flowing through our system today. The idea is that we can swap that out for the blockchain ecosystem and have not many people notice. Think of the idea "boil the frog". How can I make these incremental changes and everyone thinks that it's great and now we are suddenly on blockchain and nobody realizes it?"*

**MadHive Proof of Concept Interface:**




Source: MadHive: http://poc.mdhv.io/

In order to help guide the development and adoption of blockchain within the media and advertising industry, Premion, MadHive and several other companies founded **AdLedger** – a blockchain consortium. One of the consortium's initial projects is a proof-of-concept (POC) for **Campaign Reconciliation.** Christiana Cacciapuoti, who is VP Partnerships and Platform Operations at technology firm MadHive, and also serves as Executive Director of AdLedger, explains:

> *"AdLedger's POC is initially focused on premium video inventory - the highest value inventory in the ad tech space and an unfortunate target of massive, sophisticated fraud operations like Methbot. Blockchain is an incredible fix for the trust and transparency issues that plague the current programmatic landscape. Our mission is to build an industry protocol for working together within this new ecosystem."*

**Unified Video (Digital + Linear)**

***Comcast***

FreeWheel, formerly known as Comcast Advanced Advertising (FreeWheel, Strata, and Visible World), has embarked on an initiative, now named BlockGraph™, to deploy blockchain within the premium unified video supply chain across digital and linear TV. BlockGraph™ will enable marketers, programmers and operators to plan, target, and report on ad buys across digital, broadcast, and streaming using blockchain technology. In this platform, marketers can anonymously match their data set with programmers, operators, and others in the industry to target or analyze consumers on any device without giving up proprietary customer information. As of this writing, FreeWheel has signed up over a dozen companies to participate.

According to Jonathan Heller, Chief Product Officer, FreeWheel:

> "*Basically, the BlockGraph initiative is turning the television industry (i.e. advertisers, programmers, operators, and device owners) into their own peer-to-peer distributed database. That means you will have the effect of having the collection of everyone's data without anyone's data actually going anywhere, changing hands, or being exposed in any way. Then you can report or target off of that. All the blockchain does is add the trust layer.*

Blockchain allows for the sharing of data without the risk of data leakage, or loss of control by the parties who own that data:

> *"The whole point of the distributed database is that the industry needs a way of not exposing, moving, or handing over their proprietary datasets, yet still somehow being able to pull insights across many datasets in a way that's safe for the consumer and the industry participants. That's what a distributed system covered with encryption and blockchain can get you ...We want to turn the industry into its own distributed database."*

FreeWheel envisions components of BlockGraph™ rolling out sequentially, slowly absorbing various parts of the supply chain:

> *"We are doing it in waves…It's starting with the creators of first-party data (i.e. operators, programmers, marketers, device owners). Next in queue is all of their various partners who enhance this data in one way or another."*

When asked what a company should consider before signing up for a blockchain pilot, Heller, a veteran of both digital and television advertising, offered this advice:

> *"If the industry is interested in being its own platform and its own distributed system without the need for a central system of record vendor, then that puts a technology burden on the industry to be able to have reasonable quality data and be able to operate their own nodes."*

## Section Five: Looking Ahead

### The Next Two Years

Without a doubt, some of the first significant blockchain deployments, including all of those described in this paper, will touch the digital advertising supply chain in 2018. The initial deployments will by and large be proof-of-concepts or pilots. With success, 2019 could be the year that blockchain sees broader adoption and begins to scale across the supply chain.

> *"We are at an inflection point where something goes from a buzzword to practical reality… This is the year where blockchain will start to take form and the industry will begin to understand what its purpose is. This is the year we will see companies move to start testing, followed by complete adoption in 2019."*
> - *Adam Moser, Head of Ad Operations, Hulu*

There are, however, some significant challenges to overcome:

- **Terminology.** Scaled use of blockchain will require a consistent and agreed upon nomenclature and taxonomy.

  > *"For blockchain to work, everything needs to be defined correctly because there are no central players. Everything has to be standardized and have proper definitions."*
  > *Michael Palmer, Director of Product Management, [m]PLATFORM*

- **Speed.** The process of querying or writing to any blockchain currently takes minutes, whereas digital advertising processes happen in milliseconds. This would be a serious limitation to the vision of moving near real-time advertising decisioning to blockchain.

- **Cost.** Like any enterprise software deployment, resources will be required to become a peer on any blockchain or to develop private blockchains. There must therefore be a real or perceived return on investment (ROI) for swapping out existing systems.

  > *"In order to make blockchain attractive, it has to cost less and be more efficient than a current solution. There's a lot of places where we have a solution in search of a problem. I think there are some very definite places where blockchain is going to be extremely useful. But there are a lot of good solutions that are already out there that won't be replaced."*
  > - *Michael Palmer, Director of Product Management, [m]PLATFORM*
  >
  > *"I do believe that blockchain enables a better, more efficient, transparent and less expensive method of media buying compared to how things are being done in a private marketplace."*
  > - *Will Felcon, Head of Product and Technology, Premion*

- **Identity management:** The opportunity to connect the dots between data sets and match customers to a device graph so that marketers can connect with their customers across platforms, while ensuring a quality, trusted consumer experience is the holy grail of digital advertising (and still very much a quest versus a reality). At the same time, blockchain developers are looking beyond the present day identity morass to a time when consumers will be able to actively manage their data preferences and decide who may or may not query their profiles in an anonymous, privacy-compliant way.

  > *"Depending on how GDPR and other types of privacy regulation evolve, you will have the ability to turn on or off any awareness of, or access to, any element or information. The whole point is how can I get the insights without having to touch the data or expose anybody's individual information?"*
  > - *Jonathan Heller, Chief Product Officer, FreeWheel*

- **Legal and Regulatory Issues.** Blockchain and cryptocurrencies are still very much the Wild West. Absent some form of regulation and governance, we risk seeing the deployments that occur in 2018 remain confined to pilots or experiments, never achieving scale.

> *"The major thing that's holding it back is not the high latency issue… It's actually that case law legislation hasn't gotten there yet. No one wants to bet their 10-million-dollar campaign on something that is not proven or backed up in a court of law yet."*
> - *Michael Palmer, Director of Product Management, [m]PLATFORM*

> *"2018 is going to be the year of observation and initial regulation. I think we are going to see a lot of discussions around not just regulating digital advertising, but also how do you govern decentralized systems, overall? It is a problem for economists and supply chain experts with advice from the individual verticals (advertising, etc.). The notion of a vertical will change. Business units will be interconnected and silos will break down. MetaX is actively working with lobbyists in multiple countries and both vertical and crypto/blockchain standards organizations to help shape the future."*
> - *Ken Brook, Chief Executive Officer, MetaX*

**2020 and Beyond**

In order for blockchain to achieve massive scale and truly transform the digital advertising supply chain, individual consumers will also need to become involved. With identity management being a core element of the blockchain protocol, consumers will play an indispensable role in claiming, maintaining, and managing their digital identities and creating and adopting the use of digital wallets to participate in the "token economy." When this happens, it is expected that consumers can become true counterparties to the digital advertising transactions that today leverage their profile data in exchange for access to ad-supported content (though ideally in a more secure and consensual basis).

> *"The whole idea of "one-to-many markets" is that consumers can be part of [the data exchange]. The opportunity is to solve that problem and do it with blockchain because it does enable security at the core. It enables the transparency of your data when you want it. It provides that transfer of value, which is inherent."*
> - *Richard Bush, Chief Product and Technology Officer, NYIAX*

To realize this vision, the ad server itself must become a decentralized application on the blockchain.

> *"In the future, we would like to push the ad server out to the edges. Instead of housing user data in a centralized data store, MAD allows users to keep their data completely private by pushing ad decisioning to the edges—to the users' devices. For example, can I put an ad server in your TV that is cryptographically sealed and holds your personal information inside of it? The ad server actually asks for advertising as opposed to getting pushed advertising. You never actually tell anyone who you are. That's the future we see. Can your TV work with your phone, and then maybe even your fridge, to know who you are and give advertisers a deeper understanding of who the user is? We think so - and the blockchain can deliver it."*
> - *Tom Bollich, Chief Technology Officer, MadHive*

> *"There is an end state that is ideal for the industry. This idea goes back to the consumer connection with buyer and seller… The consumer engagement with the buyer and seller needs to be defined in a wallet-style connectivity with the market… They enable the explicit consent of use*

*of their data in exchange for some form of value (i.e. coupons or subscriptions) in return for their time or whatever other metric publishers are looking to get from them."*

- *Richard Bush, Chief Product and Technology Officer, NYIAX*

**Section Six: Conclusion**

A major attraction of blockchain for digital advertising is its potential to enable consensus, collaboration, and trust between buyers and sellers. Media inventory suppliers and buyers spend an inordinate amount of time reconciling campaign discrepancies be they for raw impression counts, viewability, brand safety, or quality of traffic. There is also the ongoing headache of managing multiple versions of terms and conditions, making the opportunity to improve the digital advertising contract process through smart contracts on the blockchain quite compelling. As Charles Manning from Kochava points out, smart contracts on blockchain could be the future version of the Standard Terms and Conditions with the promise of obviating the need for paper-based insertion order (IO).

Future smart contracts—enabled on blockchain—could include all the components of an IO and the associated metadata that today lives in the Open RTB protocol used for enabling at the ad tag level the delivery of advertising in automated (programmatic) environments. Smart contracts could not only record the terms and conditions (in code) but also enact the agreement on a self-executing basis. Parties put their assets (content and creative) into the blockchain and those assets are redistributed according to agreed-upon terms. The blockchain holds the buyers' and sellers' funds in escrow until the contract is fully executed and verified. Ultimately, parties to a smart contract will need to ensure the complexities of their obligations are executed accurately in code with enough flexibility to perform in algorithmic trading environments.

Consumers, whose permissioned data enables ad targeting, may also have a digital wallet through which they manage the value exchange associated with their attention and time spent with content and advertising. Identity will reside in the blockchain along with other metadata, though instead of buyers or sellers having direct access to consumer device identifiers as they do today, future blockchain implementations will enable the querying of profile data to determine if said consumer is a member of a particular target (while ad and device IDs never need to be transmitted from server to server). As Jonathan Heller succinctly put it: "you will have the abilities as if you could query everyone's data without any one's data actually going anywhere, changing hands, or being exposed in any way."

Perhaps the most interesting part of this new transactional ecosystem from a legal and social perspective, is that buyer-seller "peers" no longer need to be human. They can be machines fully executing contracts on our behalf. In a world of increasingly networked homes and devices, blockchain may power the "internet of things" in ways none of us can imagine as our devices will all soon be nodes, or peers, on multiple blockchains and have the ability to transact—and get paid—for those attributes of our identities we choose to share and in accordance with the terms specified by the smart contract. These smart contracts and their underlying assets may in the near future become tradeable in and of themselves. In this decentralized, consensus-based world of blockchain, a new media marketplace, purpose built for machine-to-machine transactions and enabled by a digital currency is beginning to take form.

For those compelled by the vision of a more transparent, brand safe, and fraud-free media landscape made up of trusted, verified trading partners (and who isn't?), we invite you to become part of the conversation. IAB members interested in joining business or technical working groups examining the future of blockchain, please send an email to commitees@iab.com.

**Appendix**

- IAB is grateful to the following people and companies who shared with us their knowledge and expertise related to blockchain, and also some of the exciting projects they are working on, all of which are nearing public beta:
    - Jonathan Heller, Chief Product Officer, FreeWheel
    - Michael Palmer, Director of Product Management for [m]PLATFORM, GroupM
    - Adam Moser, Head of Ad Operations, Hulu
    - Garrett MacDonald, Executive Vice President Sales, Kochava
    - Charles Manning, Chief Executive Officer, Kochava
    - Breaux Walker, SVP Blockchain, Kochava
    - Tom Bollich, Chief Technology Officer, MadHive
    - Christiana Cacciapuoti, Vice President Partnerships and Platform Operations, MadHive
    - Anthony Shook, Chief of Staff, MadHive
    - Ken Brook, Chief Executive Officer, MetaX
    - Richard Bush, Chief Product and Technology Officer, NYIAX
    - Michael Zimbalist, Chief Strategy and Innovation Officer, Philadelphia Media Network
    - Will Felcon, Head of Product and Technology, TEGNA/Premion

- Suggested reading:
    - Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto, 2008
    - Blockchain for Dummies, Tiana Laurence, 2017
    - Deloitte: Blockchain applications in the media industry, 2016
    - Edelman Digital's 2017 Trends Report (Blockchain Chapter – Pages 44 to 49), 2017
    - PwC Technology Forecast 2016: Blockchain and smart contract automation: How smart contracts automate digital business
    - Smart Contracts: 12 Use Cases for Business & Beyond, Smart Contracts Alliance, 2016
    - The Blockchain Revolution, Alex and Don Tapscott, 2016
    - The CMO Primer for the Blockchain World, Jeremy Epstein, 2017