Blockparty: An Event Ticketing Blockchain Protocol

Abstract

The event ticketing industry is widely disparaged for its technology, fraud and sales challenges. We have all been there: after spending months waiting for and planning to attend a concert or sports match featuring your favorite artist or team, and despite your greatest efforts camping outside a box office, or furiously entering a captcha into a ticketing website, you not only miss out on the best tickets but often miss out on tickets entirely, and the best you can hope for is to find tickets at an enormous markup on a reseller site. Live events are designed by performers, event operators and venues to be life changing, once-in-a-lifetime experiences – yet the event ticketing industry more often than not fails to deliver ticket sales experiences to match.

Blockparty intends to deliver a blockchain-based decentralized event ticketing protocol to solve the debilitating challenges that currently render the event ticketing industry incapable of consistently delivering optimal experiences, seamless ticketing and fair prices. It plans to enable ticketing companies, venues and event operators to solve inefficiencies such as gate fraud, physical ticket accounting and bulk-buying by bots, while legitimizing ticket transfers by using facial recognition and fingerprint technology to validate tickets at the gate. Blockparty intends to be an integrative and disruptive protocol that serves both existing and new participants, improves enterprise profitability and substantially enhances customer satisfaction.

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1. The Problems

Three major challenges face the event industry today:
- Generating ticket demand. Enabling events to "sell out" or at least break even
- Solving inefficiencies. Solving fraud, ticket accounting and broker/bot power
- Increasing the pie. Creating year-on-year growth

1.1 Ticket Demand

Primary market participants (event operators, venues, performers and teams, and ticketing companies) are generally inefficient and interdependent on each other to "sell out" tickets for all but the rare high-demand events. Event operators and venues focus on carefully selecting performers, locations, venue capacity, and dates that will maximize ticket sales, but are often engrossed in event planning, securing sponsors, booking and paying deposits for venues and performers, managing marketing programs (radio, TV, billboards, street teams, social media) and other activities that limit their time and resources to sell tickets.

Furthermore, event operators and venues often market and/or host multiple events at or around the same time and are spread too thin to be able to sell out all of their events. While one event may sell out, two or three other events may undersell. Event operators and venues are therefore heavily reliant on ticketing companies to market events, on performers to promote events to social media followers, and on promoters to distribute physical tickets to demand centers such as colleges and city centers. This inefficiency in sales has led to the rise of resellers, brokers and bots – buyers of last resort.

1.2 Resellers, Brokers and Bots

It is commonplace for consumers to blame resellers (such as StubHub) for the industry's woes. In reality, event operators and venues ("primary market" participants) are equally to blame – primary market participants are incentivized to accept resellers and brokers ("secondary market" participants) into the ticketing economy because, by bulk-buying tickets early in the event cycle, secondary market participants effectively transfer ticket sales risk "off the books" of primary markets, providing predictability to otherwise unpredictable event ticketing revenue streams, and upfront cash to cover costs such as performance fee deposits.

While frustrating for ticket buyers, brokers, by acting as equity financiers for event operators, enable many events to take place that would otherwise not be possible. The broker/bot/ reseller dilemma mainly occurs for high-demand events, when brokers employ the bulk-buying bots to buy high-demand tickets faster than normal paying customers are able to, then reselling the same tickets at unaffordable prices online or via "scalpers" outside the event.

1.3 Insider Tickets

Insiders, such as teams, event operators, performers, athletes, sponsors and venue executives, as well as season pass holders, are often pre-allocated high-value tickets. These ticket holders occasionally re-sell their un-used seated tickets through brokers and reseller platforms, often at substantial premiums to normal market prices.

Such "insider" ticket re-sales are often prohibited under normal rules set by event operators and venues, yet it is often the only mechanism by which insider ticket holders are able to receive value for their un-used tickets. Further, if un-used insider tickets are not available for re-purchase by regular customers, stadiums may appear partly empty despite significant demand from regular customers.

However, by reducing the availability of attractively located seats through pre-allocation to insiders, and by propagating ticket pricing disparity and opacity, insider tickets are a source of confusion and frustration for regular customers, to whom it often appears that the best seats are always unavailable or unaffordable.

1.4 "Hard" Tickets

Event operators often utilize promoters to sell tickets – often for up to 50% of total event tickets sold. Such tickets are physically distributed to promoters in a complicated process that is wrought with inefficiency and fraud. The process of selling physical tickets (or "hard tickets" as they are referred to within the industry) typically involves searching for and identifying individuals and groups that may be able to sell tickets in bulk to their networks ("promoters"), holding face-to-face meetings with promoters, physically executing employment contracts with promoters, managing promoter "street teams" that distribute event flyers and sell hard tickets, arranging dates, times and locations where ticket revenue is collected, and eventually accounting for all physical tickets and associated revenues. Inefficiency occurs throughout the process and fraud typically occurs in the accounting of tickets sold and revenues received.

The system also limits visibility for event operators into hard ticket sales, as promoters are often unable to provide accurate sales forecasts – accordingly some promoters are over-allocated "quotas" of tickets relative to their sales capabilities while others are under-allocated, which negatively impacts total sales. Also, many promoters underreport sales and many so-called unsold tickets are actually fraudulently used at the gate. Due to poor accounting technology for hard tickets, most of this lost revenue is left unaccounted for in post-event accounting. Such issues continue to be widely reported amongst the largest event and ticketing companies.

1.5 Gate Fraud

In some cases, a multitude of ticketing systems are used at each event - an event operator often has an annual contract with one ticketing company while the venue has an annual contract with another ticketing company. In such cases, this becomes evident at the gate as multiple queues are created to handle each ticketing provider's methodology for the scanning of each type of ticket. Most online ticketing systems allow for printing of online tickets, scanning of mobile phone based QR codes, as well as provision of the actual physical ticket. Fraud is possible for each of these ticket types: printed tickets can be reprinted, screenshots can be taken of QR codes, and physical tickets can in some cases be replicated.

At the gate, there is an intense pressure for gate staff to move customers into the venue quickly and efficiently, often due to fire safety regulations. Gate fraudsters take advantage of the gate pressures and multitude of ticketing systems, by presenting replica tickets to gate staff who quite often let fraudsters in just to keep lines moving. The problem is exacerbated as gate staff lack the time and/or systems to identify replica tickets or to determine whether a customer's identification matches the name on the ticket.

1.6   Secondary Market Duplication

Multiple reseller websites often market the same event ticket, and in some cases, due to inefficient systems for tracking secondary ticket sales, the same ticket may be purchased at the same time by multiple buyers. In such cases, only the first to arrive at the event gains access.

2. The Industry

2.1   Industry Overview

U.S. live events contribute \$57.4 billion in direct gate revenue[1], not including television rights, sponsorship, employment and other indirect economic value add.

Amongst the largest sub-sectors in the global live events economy are sports, music, theatre, museums and other festivals and art shows, conferences, trade shows and corporate events. Direct participants include industry bodies (e.g. Fifa), event operators (e.g. Coachella), venues (e.g. Staples Center), ticketing companies (e.g. Ticketfly), content creators (e.g. U2) and sponsors (e.g. Redbull). Other major direct and indirect participants include hotels, airlines, cities/municipalities and media networks such as television, radio and internet companies.

For the purposes of this paper, we have focused on gated live events for music and sports, which comprise over 50% of U.S. gate revenues – however the protocol is also applicable to the other sectors, e.g. using decentralized ticket sales or facial recognition for admission to the MoMA.

2.2   Ticketing Companies

The event ticketing industry is divided into "primary" and "secondary" markets, described below.

2.2.1   Primary Tickets

Primary ticketing comprises companies and individuals that have contractual rights with event operators, venues and/ or content creators to market and sell newly-issued event tickets on their behalf. Examples of primary tickets include:

− Tickets sold online by primary ticketing companies such as Ticketfly
− Season ticket holders or multi-pass tickets
− Tickets issued to sponsors, agents, teams/players/performers, and corporations
− Tickets issued to promoters
− Tickets issued to fan clubs, credit card members and group discount services

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[1] Statista, 2017

2.2.2 Secondary Tickets

Secondary ticketing comprises any resold tickets – in some cases, secondary resellers have contractual arrangements with venues, primary ticketing companies and event operators – but in many cases the secondary reseller does not have legitimate re-seller rights. Examples of secondary tickets include:

– Tickets purchased specifically for resale by brokers/bots
– Tickets resold by individual ticket buyers
– Tickets resold by season ticket holders or multi-pass ticket holders
– Tickets resold by insiders: sponsors, agents, teams/players/performers, corporations

Figure 1: United States: Gate Revenue by Sector, US$ bn (2016)[2]
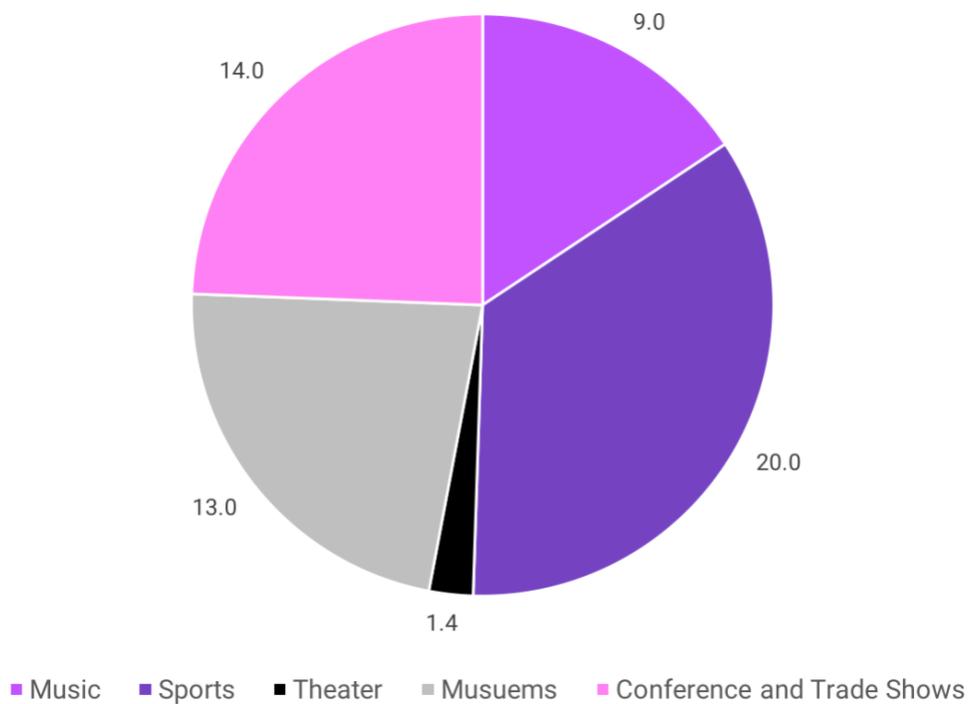
2.3 Major Players

The global event ticketing industry is highly concentrated amongst a few companies and then highly fragmented amongst a myriad of smaller ticketing companies. Each of the dominant companies has a differentiated competitive strategy that places it in a unique position to survive.

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[2] Statista, 2017

	Gross Ticket Value (US$bn)	Ownership
Primary		
Ticketmaster	28.0	Live Nation
Eventbrite	4.0	Independent
AXS	2.0	AEG
Ticketfly	1.0	Eventbrite
Secondary		
Stubhub	4.0	eBay
Viagogo	Unreported	Independent
Vividseats	1.0	Independent
Seatgeek	0.35	Independent

2.4   Events and Venues

The world's most iconic ticketed events include:

Figure 3: Some of the World's Iconic Ticketed Events (2016)[4]

	Location	Dates	Attendees
Music			
Donaiuinselfest	Vienna	June	3,100,000
Beyonce Tour	Various	Various	2,242,099
Coachella	Indio	April	675,000
Coldplay Tour	Various	April	544,376
New Orleans Jazz	New Orleans	April	435,000
Tomorrowland	Boom	July	360,000
Sunburn	Goa	December	350,000
Ultra Music Festival	Miami	March	330,000
Outside Lands	San Francisco	August	200,000
EDC Las Vegas	Las Vegas	June	185,000
Life Is Beautiful	Las Vegas	September	150,000
Governor's Ball	New York	June	150,000
Lollapalooza	Chicago	August	100,000
Burning Man	Nevada	August	70,000
Sports			
Summer Olympics	Various	July-August	8,200,000
Fifa World Cup	Various	June	3,400,000
Rugby Worldcup	Various	Sep-November	1,400,000
Wimbledon	London	June-July	470,000
MLB World Series	Various	May	450,000
Ryder Cup	Various	September	250,000
NBA Final	Various	May	120,000
NFL Superbowl	Various	January	104,000
Daytona 500	Daytona	February	101,500

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[3] Annual Reports, Company Public Announcements

[4] Wikipedia

Amongst the world's most iconic gated ticketed venues include:

Figure 4: World's Most Iconic Gated Ticketed Venues (2016)[5]

Venue	Location	Capacity
Michigan Stadium	Ann Arbor	107,601
Melbourne Cricket Ground	Melbourne	100,024
Camp Nou	Barcelona	99,354
Rose Bowl	Los Angeles	92,542
Wembley Stadium	London	90,000
Beijing National Stadium	Beijing	81,000
Staples Center	Los Angeles	21,000
Madison Square Garden	New York	20,789
McCormick Place	Chicago	10,387

3. The Blockparty Protocol

3.1 Mission

The live events industry is a complex world with a rich community of interconnected, interacting parties that function together to form a networked, diverse ecosystem. As with any ecosystem there are both mutualistic symbiotic relationships that serve to benefit all parties involved, and parasitic relationships, where one party benefits at the expense of the others. Parasitic relationships typically benefit only in the short term – as all parties lose in the long run due to economic value destruction caused by ongoing annual losses to the victim organization, typically the "value" creator. The premise of Blockparty is the inherent lack of, and need for, a holistic, optimized, decentralized, distributed protocol built using blockchain technology that resolves all of the symbiotic and parasitic relationships:

3.1.1 Enable Mutually Beneficial Symbiotic Relationship to Thrive

An enabling tool to improve value transfer and efficiency between ticket buyers, promoters and influencers on the demand side, and event managers, primary ticketing companies, venues and performers on the supply side.

3.1.2 Eliminate Parasitic Behavior

Disable fraudulent and destructive behavior such as counterfeiters, unsanctioned bulk buying and price hiking, and gate fraud.

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[5] Wikipedia

3.2 Economic Overview

Blockparty's protocol intends to serve two key marketplaces: primary market and customers. Boxx ("Boxx") are tokens that are planned to be used by Blockparty's protocol participants to reward value creation, among other uses.

3.2.1 Ticketing Layer

In the planned Ticketing Layer, Blockparty intends to enable the creation and management of events via an enterprise web application, and the purchase and sale of tickets via a consumer mobile application.

3.2.2 Marketplaces

Customer Market. Blockparty plans to target a customer market that comprises individual customers and influential customers. Blockparty intends to allow customers to interact with the protocol in a fraud-proof encrypted manner using facial recognition or fingerprint encryption.

Primary Market. We envision a primary market that comprises event operators, venues and primary market ticketing companies, which create, build and manage events, pricing and ticket sale rewards.

Figure 6: How the Blockparty Protocol Integrates into Existing Markets *

* SHA refers to "Secure Hash Algorithm", a cryptographic hash function.

3.3 Boxx Tokens

3.3.1 Overview

Boxx tokens are designed to enable the Blockparty protocol to function:

In the "introductory phase", Blockparty intends to reward customers and event operators with Boxx for participating in the Blockparty protocol. Initially, it is planned that customers will receive Boxx for:

- registering on the Blockparty Platform, in order to purchase event tickets through Blockparty
- purchasing tickets using fiat currency
- referring new users to download and use the Blockparty app
- transferring tickets to other users.
- Using Boxx at events to redeem rewards.

Following the introductory phase, as adoption of the Blockparty grows, Boxx are intended to serve additional features and functionality, including enabling instantaneous trustless transactions between participants in the Blockparty protocol using Boxx, and providing seamless integration and usability with all the facets and moving parts in the Blockparty protocol. While the reward level would decrease for those actions in the introductory phase set out above, it is planned that users will also be rewarded following the introductory phase for using earned Boxx to purchase tickets instead of using fiat currency.

3.3.2 Boxx Use Cases

Boxx tokens are intended to serve at least two key functions:

Reward Mechanism. Blockparty is designing the tokens to function as a mechanism to reward any action by one participant that is valued by another participant in the protocol, such as regularly attending events.

Exchange Mechanism Following Introductory Phase. Event ticketing is a complex industry with a multitude of interactions with disparate participants. Boxx are intended to serve as a single dedicated mechanism for exchange between the anonymized participants.

3.4 The Customer Market

Event attendees ("customers") are the primary source of organic cash flow for event ticketing. Customers drive cash flow through purchasing tickets and serving as gateways to other customers (friends, family) who, by purchasing tickets, are intended to add additional cash flow to the Blockparty protocol. Customers also serve as "co-creators" of event experiences through participation.

3.4.1   The Customer: A Case Study

Most malicious behavior within event ticketing adversely impacts the event customer. The following example simplifies such impact:

- Event operator issues 1,000 tickets to Event on a ticketing site at $10 per ticket
- Broker employs bot to purchase all 1,000 tickets at $10 per ticket
- Bot markets tickets on secondary market platforms at an average of $50
- Many customers are priced out - only 300 tickets are sold, at an average of $50

Analyzing the economics in this scenario:

Broker/ Bot:
- Purchased $1,000 tickets at $10 resulting in a cost of $10,000
- Sold 300 tickets at $50 resulting in revenue of $15,000
- Total profit or loss = $15,000 - $10,000 = <u>$5,000 profit</u>

Event operator:
- Issued 1,000 tickets at $10 to offset $9,000 of expenses (targeting 10% profit)
- Total profit or loss = $10,000 - $9,000 = <u>$1,000 profit</u>

Customers:
- Pay $50 for a $10 ticket
- Total profit or loss = theoretical loss of $40 per ticket, i.e. 300 x $40 = <u>$12,000 loss</u>

Reward Summary:
- Broker: reaps most of event rewards while taking financial risk as an "event financier"
- Event operator: benefits from mitigated financial risk (via the immediate sale of all tickets at the asking price), but suffers reputational damage having only filled 30% of the venue capacity while failing to protect its customers from being overcharged
- Customers: suffer from a venue that is 70% empty and a significantly overpriced ticket

3.4.2   The Customer Solution

Blockparty's protocol is intended to be customer oriented and customer friendly. It should secure anonymity while allowing for maximum personalization. Blockparty expects that customers and events would be protected from scammers, identity theft, fraud and troublemakers. With this and the convenience of phone-based ticket storage and scanning for gate entry and phone-based fingerprint or facial recognition for identification, it is Blockparty's vision to enable customers to finally attend events with ease, safely and truly enjoy the events they are passionate about.

Access

Blockparty plans for universal accessibility via iOS and Android apps and a web platform with responsive elements that supports basic browser requirements. Regardless of the device, Blockparty is designing the system security to be maintained within the system architecture, meaning security should be state-of-the-art no matter the method of access.

Advanced Security: Facial Recognition and Finger Printing

We plan for customer information and authorization to be controlled by either fingerprint or facial recognition that is in turn used to create the user's identification key ("digital fingerprint") in the blockchain, minimizing any risk of forgery, identity theft or exploitation of the system.

A customer's interaction with the Blockparty protocol would commence with their creation of a digital fingerprint, which would be created either by capturing the customer's fingerprint or facial recognition technology on the customer's mobile device:

− Facial Recognition: Blockparty has commenced development of proprietary facial recognition systems for any device that has access to a camera (such as webcam or a phone camera). This facial recognition system takes in a set of valuable data points, with measures in place to ensure that live facial data is being acquired

− Fingerprinting: Fingerprinting technology is highly prevalent today with both iOS and Android devices using fingerprinting for authentication purposes. The architecture already exists, and Blockparty plans to piggy back off these tried and tested systems with some significant enhancements to the system for security

This data is then intended to be converted to a digital fingerprint using state-of-the-art encryption to ensure confidentiality, and further convoluted with a hash for authenticity validation. There is no reason for the Blockparty protocol to store the actual facial images or fingerprints, but simply through complex cryptography, Blockparty intends to offer a foolproof mechanism to associate each ticket issued with a user's biometric data. The key benefits to a customer include:

− Fraud reduction: It would be extremely difficult, if not impossible, for a malicious party to use the digital fingerprint
− Anonymity: It would be very difficult to trace the origins of the digital fingerprint
− Security: Hashing is a one-way function, which is currently mathematically impossible to reverse engineer
− Non-Modifiable: The information is tamper proof and should not be modifiable

Why is biometric authentication and ticket association in the manner Blockparty has set up the system so valuable for the ticketing industry?

− We expect that counterfeiters and fraudsters will be eliminated: As they currently operate, they simply could not exist in the planned Blockparty protocol - the encryption is tailored to prevent anyone from being able to identify or recreate a digital fingerprint. Hashing means that Blockparty will be able to one-way verify that the customer who purchased the given ticket is indeed the person attempting to check in.

− Non-transference without permission: Tickets could longer be copied with a photocopier or other copying mechanism because of the uniqueness and one-way encryption of the digital fingerprint. Only one person can use, or transfer, the ticket.

Ticket Purchase and Resale

Blockparty plans to offer customers the option to make purchases on Blockparty Primary Market: tickets sold directly from event operators.

As an avid event attendee, what happens if I have purchased a ticket with my biometric data and am no longer able to attend? Did I just lose my entire purchase?

Blockparty intends to enable peer to peer ticket transfers for this scenario. Customers who have completed the process to purchase a ticket for the Blockparty event would simply transfer the ticket to another user directly. When the ticket has been sold, the ticket could be transferred to the new user and with a smart contract that includes the new user's biometric information.

This process would ensure legitimate anonymous transactions. Every transaction could be logged into the blockchain, so the concept of transactional visibility would perpetuate into the secondary marketplace. All ticket resales are intended to have a flat fee per transaction.

Convenience

Blockparty plans to maximize convenience and enhanced experience for customers and event operators alike. Blockparty has designed a way for customers to enter venues with only their mobile devices which contains their digital fingerprint and associated ticket.

Blockparty's experience with enterprise-grade application development and deployment enables it to deploy quality scanning applications to venues, events or parties involved in gate security. In seconds, gate staff would be able to use phone-based applications or other dedicated hardware to scan the customer's phone-based ticket, which is associated with the customer's digital fingerprint, ensuring that the entering individual is the valid ticket owner. This system intends to eliminate complicated manual identity verification procedures.

3.5   The Primary Market

Primary market participants are the principal sources of value creation in the event industry – they are the innovators without whom the protocol would not exist. The Blockparty aims to grow by heavily incentivizing the primary market through the Blockparty protocol, while creating a steady source of ticket demand to mitigate primary market financial risk.

3.5.1   The Primary Market Solution

Transparency

In the Blockparty protocol, each ticket issued to a user is intended to be a smart contract encrypted, hashed and logged into the blockchain. This means that regardless of whether a ticket has been issued to a customer directly via the planned Blockparty application or transferred from one customer to another, the primary market event creator would have 100% visibility regarding all of the previous buyers as well as the ultimate user of a ticket.

Fraud Prevention

As described earlier, by employing biometric data to authorize users to purchase a given ticket characterized by a smart contract, embedded in the digital ticket would be the user's digital fingerprint (encrypted, unbreakable, hashed and 100% anonymous), thereby mitigating instances of fraud and counterfeit tickets, unregulated ticket transference, and unauthorized use of ticket by the wrong individual.

Anonymized User Tracking

Blockparty plans to encrypt and hash all user data, and it does not intend to store any biometric data in its system. This essentially means that Blockparty would not need to know *who* any given user is; rather it would simply need to know an individual by the representation of a unique digital fingerprints attributable to the user, whether or not that information is ever rewired back to identifiable biometric data.

Control

Primary market participants should have the liberty to control their ticketing process both at the outset of the event and throughout the event process:

(i)   Ticket Issuance

It is intended that event operators will be able to deliver tickets directly to customers on the Blockparty protocol.

(ii) Control of Ticket Prices and Distribution

It is intended that event operators and primary market participants may set ticket prices, referral rewards and group discounts:

Protocol Registration

Event operators that wish to join Blockparty through the primary market would register in the Blockparty Primary Market through the Blockparty enterprise web application. In order to have an official Blockparty event listing, the event operator would pay an event-creation fee. This would allow the event to be registered on the Blockparty staging protocol.

In order to fulfill an event listing, the event operator would then include the event creation fee, if any, and add any necessary event details such as title of event, venues, administrator names, contact information, etc. Blockparty in turn would use the Interplanetary File System ("IPFS") protocol to hash the issued smart contract into the Blockparty protocol. Following the successful issuance of the IPFS Hashed Smart Contract, the Blockparty enterprise application would guide the event operator through the necessary steps to complete the event registration and present all the options that the event operator had in their control with regard to the event (ticket issuance details, secondary transfer restrictions, pricing, etc). Upon successful completion of event in the Blockparty protocol, the event creator could begin to fully flex its new Blockparty muscle.

3.5.2 The Secondary Transfer Solution

Ticket Tracking

Blockparty's plan is for a ticket to be a smart contract such that its history can be traced from the end user to the reseller to the event creator. When a ticket is issued by the event creator to a user, the user's digital fingerprint would indicate the sale to a final customer. However, if a ticket were issued to a reseller, the reseller ID would be embedded as a datapoint into the issued ticket. Until a final customer's fingerprint was linked to the ticket, the planned Blockparty management system (Oracle) would be aware at gate entry that the ticket had not been sold to the final customer. This process would allow for multiple transfers of tickets, and even a transfer from an end user in the case that a customer decide not to go to the concert and instead wants to sell the ticket to another user within the system.

3.5.3 Decentralized Demand Generation

Blockparty intends to encourage decentralized peer to peer (P2P) ticket sales. Blockparty's tickets will persist and will be infinitely transferable. This along with unlimited tracking potential of every digital fingerprint that the ticket has touched is intended to enable influencers to be identified (anonymously) and rewarded.

4. Application & Architecture

So far, we have attempted to explain the Blockparty protocol from the perspective of the users that it serves. Here we summarize the general application, that comes together to form Blockparty's planned architecture.

Generally, where blockchain applications are concerned, the typical reader will expect an explanation of a single "protocol" that summarizes how the system functions. However, in Blockparty's case, the protocol is built and dictated by the IPFS: Content Addressed, Versioned, P2P File System, however beyond that, we not only plan to extend the IPFS protocol as intended by the creators of IPFS in order to suit Blockparty's application requirements but we also intend to create our own basic protocols to allow for distributed communication more suited to Blockparty and its users' requirements.

To condense the material, Blockparty is composed of a number of Layers. Think of the Internet architecture design: the Defense Advanced Research Projects Agency ("DARPA") model comprised of four core layers, Application, Transport, Internet and Network Interface. A common pattern in system design is to have disparate layers built on top of each other, where a given layer only communicates to the layer adjacent to it thereby allowing for clean communication throughout the entire protocol. Blockparty is designed with this model in mind.

4.1   Protocol

Built solely on the Ethereum Blockchain, Blockparty deploys Ethereum smart contracts for almost the entirety of the system model.   Primarily ticket issuance, where each ticket is coded in an Ethereum smart contract, Blockparty should be able to issue tickets for sale, distribution, redistribution and transfer, all the while logging every transaction on the core blockchain backbone. Each contract would collect the requisite fee, for the sake of the processes that run on top of the smart contracts, however considering the value creation of each individual ticket and the scalability of the ticketing system, the cost of each smart contract should be relatively negligible.

4.2   Application Layer

The application layer is the set of tools that come together, intended to communicate throughout the Blockparty system via the API. The Applications in the Application Layer provide functionality to an otherwise unusable API and Protocol Layer. The Applications are either custom created and maintained by Blockparty such as: fingerprinting, facial recognition or peripheral check in services; Primary Market enterprise-level interface; Customer interface; and ticket transference tool. All UI/UX tools can be built in the Application Layer. As can be seen by the range of tools existing on the Application Layer, the planned Blockparty Architecture is made usable by the Application Layer.

A brief list of Applications that reside in the Blockparty Application Layer includes:

- Facial Recognition Application
- Fingerprint Application
- The User Application: iOS, Android, that allows customers to interact with the Blockparty protocol
- Token Purchase System
- Token Redemption Application
- Event Creator Enterprise Application: web interface that allows event operators to conduct ticket-related business
- Fiat and Crypto Wallet
- Digital Fingerprint management
- Application service for gate staff to scan ticket from user's mobile phone -- this would be provided as part of the enterprise package for the event operator in order to check in customers to events.

5. Tickets as Smart Contracts

5.1   Tickets vs. Boxx

A ticket is a smart contract within the Blockparty protocol, distinct from Boxx tokens, which serve as a transactional utility. Digital tickets are planned to be simply that: code that represents tickets in the Blockparty protocol. Tickets are intended to be non-fungible utilities that interact with the fungible Boxx tokens to form a cohesive system where digital tickets can flow through the system in a trustless, distributed manner, with each transaction being logged into the Blockparty blockchain in a secure reliable manner. With that distinction underlined, we delve below into Blockparty's planned ticketing.

5.2   Smart Contracts

As described earlier, a ticket is a smart contract. Smart contracts are simply blocks of code that store and define some set of properties. As Vitalik Buterin explained in a smart contract approach, an asset or currency is transferred into a program "and the program runs this code, and at some point it automatically validates a condition, and it automatically determines whether the asset should go to one person or back to the other person, or whether it should be immediately refunded to the person who sent it or some combination thereof." In the meantime, the decentralized ledger also stores and replicates the document which gives it a certain security and immutability.

The key to successful smart contract use in technology built on a blockchain is to avoid overloading it with unnecessary functionality. Blockparty intends to keep the ticket logic lightweight. Each ticket has a number of properties, with essential and transactional data stored on-chain in the contract while the remaining non-transactional, non-essential information is planned to be stored and determined by metadata in the application layer of the system. The categorization of each data field is indicated below (note: ticketing meta data is a vastly complex space with countless permutations, so not every variable has been listed):

− Ticket ID: unique key labels every ticket (stored in contract)
− Event ID: reference ID for each event created by event organizer (stored in contract)
− Number of tickets to be issued in circulation: This is a fixed number defined at genesis event (stored in contract)
− Price of ticket: external economy price fluctuations set by oracle (stored in metadata)
− General Event information: e.g. event date, time and venue (stored in metadata, application layer)
− Any other information the event operator deems necessary, selectable from a check list provided upon event sign up in the Blockparty application (stored in metadata, application layer)
− Customer Digital Fingerprint: field is filled out when sale to end user is completed (stored in metadata)
− History of transferred digital fingerprints: This is self-explanatory however it is a very powerful tool for data analysis and security. Tickets could be transferred for a fee, and it is important for the system to be able to track ticket transference history and patterns. (stored in metadata). Only the primary origin of the ticket i.e. Event Operator ID is stored in the contract

This basic information combined with closely coupled metadata provides the API enough information for the entire application to run using smart contract information, without having

to have complicated slow runtime smart contract logic run in every node of the decentralized network where the contract is stored.

5.3   Tickets

Throughout the system, Blockparty plans to denote ticket prices in terms of fiat currency. The user could then use fiat currency stored on their digital wallet associated with their digital fingerprint on the Blockparty application, facilitated by a third-party payment system.

6. Why Blockparty?

6.1   Competitive Advantage

6.1.1   Complementary with Incumbents

Blockparty's planned protocol not only eliminates fraud but addresses the industry's main problem: incentivizing ticket demand. Blockparty intends to deliver this by enabling buyers to become resellers.

Without increased ticket demand, event operators and ticketing companies have little incentive to eliminate secondary market brokers from the industry because those brokers provide upfront financing to cover event costs. By focusing on the industry's shortcomings, incumbents can partner with Blockparty rather than feel threatened and seek to restrict Blockparty's growth.

7. Conclusion

A technologically-unparalleled decentralized protocol that plans to enable a virtuous cycle of rewarding value creation in the live event space using the Boxx tokens, Blockparty intends to be an inclusive protocol that provides an industry-leading platform for existing and new participants across the live event value chain to thrive and simultaneously expand, while restricting rent seeking and fraud – ushering in a new era for event ticketing globally.