BetProtocol

Start Your Own Blockchain Betting Application in Minutes

Secure, Scalable, Regulated. No Coding Required.

Whitepaper

Abstract

In the complex world of online gaming, three main groups exist who must have their needs met in order for the whole ecosystem to function: Regulators, who want compliance; Players, who want safety; and Developers, who want facilities. Currently, online gaming applications run on bespoke solutions, with each one having its own silo while competing with other apps in other silos. In order to enter the market as a developer, you need to build your own silo and redo the work others have done already to ensure compliance for regulators and safety for players. But what if a betting protocol existed that allowed for developers to use a standardized set of tools that ensured compliance and safety while offering them the facilities they want?

Introducing **BetProtocol**: The Blockchain Powered Gaming Engine

BetProtocol connects Developers to Decentralized Programmable Blockchain Resources to create a new paradigm of online gaming systems and infrastructure. BetProtocol is a proprietary set of tools that allows developers to program their own gaming applications using our white-label system. We ensure that compliance and safety are handled on the protocol level, freeing developers to focus on the content and form of their gaming apps, and not on the underlying infrastructure. We believe this will greatly reduce the barrier of entry for online gaming firms, lead to a proliferation of betting dApps, and unlock a new multi-billion dollar, regulated blockchain-gaming industry.

BetProtocol Whitepaper

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Disclaimer

BetProtocol is fully aware of the need to protect and provide only responsible gaming in accordance to the Gaming Act and the Gaming Player Protection Regulations (2018)[1], in order to ensure the following:

- Existence of proper controls, policies and procedures to prevent gaming by minors;

- Inclusion of proper controls, policies and procedures to protect vulnerable persons;

- The interests of all players are adequately safeguarded and that players are provided with information on any and all avenues of recourse they may have if they feel aggrieved by a decision of BetProtocol;

- All information relevant to the gaming service is readily available to players;

- Information related to responsible gaming is readily available to players;

- Tools are readily available empowering players or any other persons to control their use of gaming services and to safeguard themselves from the effects of problem gaming;

- Marketing and advertising of the gaming service is fair and in accordance with the Gaming Commercial Communications Regulations (2018) and any other applicable regulatory instrument or any other applicable law, namely:

  - Educational responsible gaming messaging shall be prominently included within all commercial communications related to gaming: provided that where impractical due to spatial limitations, such as on the screens of portable communications devices, the relevant commercial communication may make use of alternative means which capture the viewer's attention effectively.

  - There will be a web-portal address devoted to responsible gaming and to be carried on all commercial communications and will be presented in a manner which is clearly legible - provided that where impractical due to spatial limitation, such as on the screens of portable communications devices, the relevant commercial communication may make use of alternative means which capture the viewer's attention effectively.

Overview

BetProtocol : The First Universal Betting Protocol Powered by Blockchain.

Developers have never had an easy way to set up their own online betting applications. Problems such as compliance, safety of gaming, and lack of transparency have been expensive and difficult to manage. These problems have persisted due to programmability and technological challenges, while at the same time legal and regulatory challenges associated with them were not trivial to solve.

BetProtocol provides turnkey solutions to these problems. It allows large firms to create better and more sustainable ways to deliver their products, while creating conditions for small & independent developers to compete with them on a level playing field. We want to solve the hard problems of programmability and legality surrounding the creation of betting apps, in order to free developers of any protocol level concerns so they can focus on their content and product.

Financial ecosystems are now able to facilitate trust in transactions with the use of public decentralized blockchains such as Ethereum. New developments in the global betting industry need to leverage blockchain technology in order to create a system where trust is placed in the programmatic execution of code.

In EGR Global's 2018 report on Cryptocurrencies, the editor explains:

"Providers would be wise to implement blockchain technology into their systems sooner rather than later. By creating an immutable record of transaction, the technology mitigates risk, resulting in peace of mind for operators, players and regulators...The other key tech innovation is the rise of cryptocurrencies. The virtual currency could help to further transform the industry by enticing a new generation of players – a matter of high importance in an age of immediacy and innumerable entertainment options."

Market Overview

The size of the global gaming market was $418.83 Billion in 2017[2] and is projected to grow to $635 Billion by 2022[3]. The rise of mobile devices, smartphones, tablets, and computers has contributed to the growth of the online gaming industry that has risen from $44 Billion in 2016 and is projected to reach over $81 Billion in 2022[4]. Esports is a fast-growing vertical in the betting industry, netting $650 Million in 2017, and projected to grow to $1.5 Billion by 2020[5]. Lotteries accounted for $121 Billion in revenue in 2014, and is projected to grow at a CAGR of 8.85% over the period 2014-2019[6]. Sports betting continues to be a major industry netting 30 to 40% of the overall global betting market[7].

In May 2018, the US Supreme Court overturned a 1992 federal law (Professional and Amateur Sports Protection Act, PASPA) that had required states to ban sports betting. Nevada, whom was grandfathered in prior to the 1992 law, was the only state to allow legal sports betting in the US. Prior to overturning PASPA, the legal US sports betting market was $5 billion, but according to the American Gambling Association, Americans wager as much as $150 billion illegally[8]. Since being overturned, several US states have instituted new laws allowing sports betting, and more than a dozen additional states have legislature pending. It is estimated that as many as 35 states will allow legal sports betting within the next several years. As more states legally allow sports betting, significant portions of prior illegal wagers will likely move to legal markets. We believe that these states are currently searching for the best solution out there to fit their compliance needs.

BetProtocol is uniquely positioned to bring the facilities and tools required by developers to fill the needs of this evolving market. Currently, gaming backend systems are decades old, require a large percentage of revenue in costs, and need countless man-hours to maintain. Many existing firms struggle with thin margins, while new entrants are priced out due to the high monetary, personnel, and compliance costs of entry. Betting companies have difficulty being flexible enough to jump on new verticals such as Esports, while regulators still lack a unified, standardized interface to check compliance quickly and easily.

	Current Paradigm	BetProtocol
Cost	$500,000	$15,000
Time	6 months	1 month
Developers Required	15	3
Regulation/Licenses Required	B2C License, Incorporation, AML/KYC, Player Liability Report	BetProtocol's White-label System

Unique Value Proposition

BetProtocol has created a decentralized betting system running on the blockchain with a focus on compliance, safety, and developer resources. It's a platform where developers can tap into a growing ecosystem of betting dApps for synergy and shared resources, providing security and scalability for their customers' needs. Building trust is paramount in the creation of a new betting ecosystem, and with BetProtocol a new paradigm of transparency will be introduced.

For independent and small to medium size businesses, BetProtocol provides the resources and tools for their developers to compete in the global betting market. BetProtocol can also help large and established firms in the betting industry reduce costs, increase trust, and better connect with their customers. Our protocol ensures that developers and firms of all levels can leverage our tools to quickly and efficiently deploy their betting dApps.

Currently, for new entrants into the remote gaming market, the developer journey to set up shop is difficult and time consuming. For regulators, the open and immutable nature of public blockchain systems enables them to check compliance quickly and easily, without having to do verification themselves. Many hours and much effort are wasted each year on reverification of KYC/AML, gaming limits, and provenance of funds. In addition, compliance costs and fines for divergences between operators' reports and regulators' expectations are an on-going problem for the online gaming industry. Fines can reach from anywhere from hundreds of thousands of dollars to millions. With BetProtocol's technology, developers and regulators will have a standardized solution that enables fast compliance checking with the highest degree of transparency and trustworthiness of data redundancy and accuracy.

Business Model Overview

BetProtocol will operate on a commissions and subscription based model. A percentage of all deposits and wagers revenue in Ether and Bitcoin from the betting dApps on the platform will be collected as a commission to use our tools, network and services.

Time based subscriptions will also be a part of the business model, and are designed to scale as the business and the dApps on top of it grow. In any case, our business model encourages entrepreneurs to scale their business while giving them the tools and know-how to do so.

The Role of Decentralization

BetProtocol is a new standard: an easy and transparent protocol system where platform integration is seamless, connecting users and dApps in a blockchain ecosystem. The goal of BetProtocol is to provide a new adaptable framework to fill the needs for the often opaque betting industry by providing a uniform, standard application programming interface (API) with all the fundamental access semantics that applications require.

We want strong guarantees of compliance for regulators, strong guarantees of safety for players, and a strong set of tools for developers to ensure all of these parties' needs are met.

With such tools in place, BetProtocol aims to boost the productivity of dApp developers by freeing them to focus on content and design–while leaving the complexity of the underlying protocol to the technology. As such we envision a proliferation of betting dApps on the market, as well as a significantly lower barrier to entry for new market entrants. Once the full set of proposed libraries that powers the protocol is production ready, the network will be self-sustaining.

Decentralization of the betting industry through BetProtocol is more than a solution for only developers. By cutting out middlemen and unnecessary intermediaries, we can provide a trustless ecosystem of betting markets where financial and data transactions can be done peer-to-peer. The immutability and transparency of blockchain ledger systems are leveraged to prevent fraud, lack of transparency, and counterparty risk.

Blockchain immutability is handled through the process of Proof of Work (PoW) on the Ethereum blockchain and decentralized consensus. In order to change the blockchain ledger, a large quorum of PoW miners would all have to agree to do so. In the case of an attack, the attacker would have to gain more than 51% of the PoW power in the network, something that would be prohibitively expensive even for entire nation states. An exhaustive explanation of PoW and blockchain ledger immutability is outside the scope of this whitepaper, however curious researchers can look to Bitcoin's whitepaper for the core concepts[9].

Suffice it to say, the feature of immutability of records of transactions on a blockchain is a boon for regulators, since it gives them an easy and transparent way to query all the necessary financial information related to blockchain-based remote gaming, without even having to host the data or protect/certify its validity themselves.

Once the link is made between any given blockchain based wallet address and a real world identity, all necessary Customer Due Diligence (CDD), Anti-Money Laundering (AML) and Combating the Funding of Terrorism (CFT) checks can be made and certified to a high degree of compliance (and at lower cost to governments than is currently available). It is this process that BetProtocol will leverage and streamline for regulators, operators, and players.
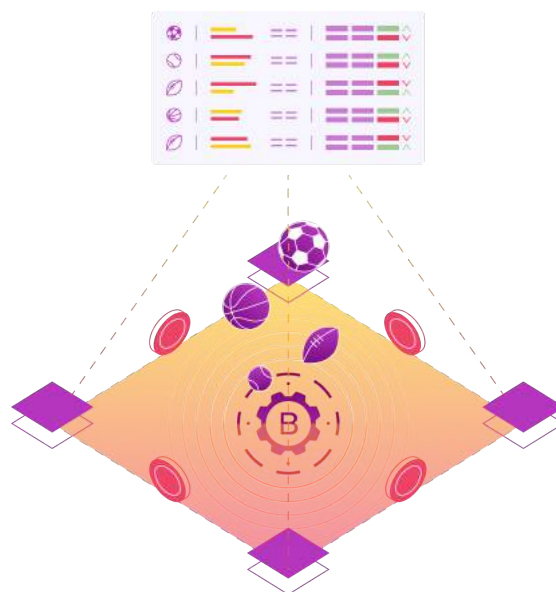
Core Concepts

The BetProtocol system works in a 3 layer system defined as:

- Protocol - Native Blockchain
- White-label Solutions
- Brand / dApp / User Interface

The Protocol and white-label solutions (and their associated functions) are the core value propositions delivered by the BetProtocol team. Here white-label solutions can be built for different types of systems.

Sports: Soccer, American Football, Hockey, Basketball, Cricket, Jai Alai, Racing, Baseball, Tennis, Horses

Esports

Casino: Blackjack, Poker, Slots, Bingo, Baccarat, Roulette, Dice Game, Craps

Prediction Markets

All gaming modalities will rely on BetProtocol facilities (KYC/AML, API, Smart-Contract calls/deployment), where these can then be used to provide User Interfaces and act as brands/decentralized Apps on Mobile or Web Stacks, thus ending the business cycle at a fully compliant consumer-facing product. See Roadmap for our development schedule for various white-labels.

First Iteration

BetProtocol will work as a native blockchain on top of Turing-complete public blockchains supporting smart contracts, as well as provide & White-label solutions delivered by the use of the following language stacks:

- Assembly
- Javascript
- Solidity

Delivered on decentralized systems such as:

- Ethereum ; Tron ; Others
- Interplanetary File System (IPFS) - Decentralized File Storage
- Loom Network

Blockchain Ledger

Decentralized betting will be supported on an Ethereum based system. Systems like Betting Exchanges will be provided with high TPS (> 1000 tps) since the need for low latency is a requirement for the type of use cases such as Bet Exchanges (i.e. BetFair) where actions like "LAY" and "BACK" will create an ecosystem of high throughput demand, which can be accomplished with side-chain solutions such as Plasma or Loom Network.

Other betting systems such as traditional book systems (i.e. bwin) where the customer plays against the house (developer) needs to be handled with high computational needs regarding Algorithmic Data Computation for outputting dynamic odds (White-label Solution).

Current protocol development is being done using a Decentralized Ledger Solution approach: a blockchain connected to other public blockchains such as Web3 v1.0 (Ethereum Blockchain) & IPFS. This architecture will constitute the first BETA test of this solution. Further developments are being made, and will be made in the future to ensure that all the standard use case scenarios that are possible to be regulated are hard-coded on the protocol level.

Currently public blockchains cannot handle this type of high computational demand this entails. To solve this problem, BetProtocol´s White-label solutions will opt to use Microservices in the beginning for Machine Learning needs integrated with the rest of the network. Further development is being made in this area of distributed computation by platforms like Matrix and Golem Network. If it is feasible to use such resources, they will be integrated in the network.

Ethereum

The first public blockchain use case of BetProtocol is being made on the Ethereum Blockchain using the Web3 Stack and smart-contracts language Solidity. In the future if other blockchains prove to be more useful, BetProtocol is flexible enough to move there. Event Hosting, Betting Submission, App Creation and User KYC/AML (i.e.; CIVIC) are handled on the protocol level by autonomous code creation, deployment and asynchronous calls, all provided by the protocol's network tools.

Programmability

Libraries will be in place for popular languages such as Javascript and Python, providing the bridges between the Interface and the Infrastructure. For booking systems, Algorithms will be available providing for an easy integration with data sources, and offering the ability to adjust for system aggressiveness, odd compensation and dynamic relaying.

Traditional Books

Traditional Books betting applications need resolutions where the customer plays against the house. In this case there is a need of a proposition value in any event resolution; this proposition can be taken as a percentage, which represents the belief of the house on this determined event occurring.

The house needs the best systems possible to predict the likelihood of events. Having datasets with prior information about similar events, mathematical tools like linear or multivariate regressions for pattern detection, and other methods are needed for the best predictions possible.

Here we are venturing into machine learning techniques and tools that will be made available to BetProtocol developers. These supervised learning facilities function as a way to reach the best outcome possible for the house. While at the same time, machine learning pipeline construction techniques will be used to search for which methodology yields the best results (through the use of multiple optimization algorithms) to provide the fairest odds possible to players.

These odds types can be defined as :

- **Static Odds** - The house holds on their belief in an event without correcting the odds over time given market changes or bets submitted. This type of system is easier to integrate, given the possibility for manually setting an odd to an event.

- **Dynamic Odds** - Every time a bet is submitted, a trigger occurs in the Machine Learning system which corrects the odds to provide possible financial advantages to the house. This system needs to be integrated via an API using a standard Messaging System provided by BetProtocol connected to Smart-Contracts or the Network in place.

In either case developers will be able to choose which type of odds they wish to offer.

Specific Use Cases

The system will provide specific **turnkey** use of machine learning algorithms with clean and usable, already polished datasets. Specific cases supported by R&D on dApps deployed by the protocol team will provide a mathematical and financial common ground for non-Machine Learning teams to compete in the ecosystem and deploy betting dApps on top of the protocol. Specific Cases will grow over time and through creating more ecosystems in different areas with the use of different approaches.

Dynamic Odds

Costly storage on public blockchains like Ethereum do not create conditions for dynamic odd changes. Systems like Traditional Books cannot handle daily fees rounding up to thousands of dollars, and latency of 2000ms for every change in the network. These types of systems need to rely on high throughput systems and zero fee blockchain transactions.

Given different types of models, some of them require non-open logic understanding of mathematical operations to prevent exploitability of the financial system. Whether off-chain solutions with API connections or Smart-Contract based, both solutions give mathematical opacity to the system in place by not allowing a reversible operation for the bytecode deployed.

There are several blockchain based scaling solutions under development, such as Loom, Plasma, Plasma Cash, State Channels and other Layer 2 solutions, and depending on the maturity of these technologies at the time of implementation, we will decide which solution makes sense.

Mathematical Tools

The ecosystem largely depends on the probability of a determined event, which would be calculated by analysing a clean data set. Most of the times these systems can be well designed just by using Logistic Regressions or Linear Regressions such as binary events, taking into account the needs of unique approaches to each set of problems in the system, the type of events, resolution types and timeframe resolutions.

We encourage each dApp to deliver and exhaustively test their own algorithms powered by datasets. However the protocol will provide a library of Machine Learning Tools plus clean datasets for ease of use and plug-and-play/turnkey solutions for betting dApps with similar event resolution needs.

Bet Exchanges

Exchanges work in an ecosystem where market participants forecast the outcomes of events by trading shares of those market outcomes. These shares can be unique or multiple. A complete set of shares is a collection of shares that consists of one share of each possible valid outcome of the event. Full use of this system can be handled entirely in Ethereum Smart-Contracts (Solidity).

Example

Consider a binary market with outcome A and B. One of them will happen and we know that each of the outcomes only have 1 unique share. As the event is created User 1 is willing to pay 10 ETH for a share of outcome A, and User 2 is willing to pay 30 ETH for a share of outcome B. BetProtocol closes the trade with a total of 40 ETH and awards this amount to either User 1 or User 2 depending on the outcome.

Limit and market orders will be supported by BetProtocol.

Oracle

Event Resolution Systems in BetProtocol require a global consensus on the event, or the trust of two different types of third parties to resolve these events. All of these solutions will be supported by the protocol since "pros" and "cons" exist in each scenario, and the ultimate choice of which Event Resolution System to use will be up to the dApp Developers.

Event Resolution

Once an underlying event occurs, the outcome must be determined in order for the market to finalize and begin settlement. Outcomes can be determined in three ways:

- **Community Driven Consensus**, which consists of users who simply report the actual, real-world outcome of the event. These reporters are rewarded for supplying accurate factual information, and punished for providing false information.

- **Bookings**, where the resolution event information is furnished from a set of information via APIs that rely on 3rd parties' event outcome reporting.

- **By Fiat,** where the developer of the dApp publishes the outcome of the event.

Community Driven Consensus

In order to ensure the highest level of truth and accuracy in outcome reporting under the community driven consensus model, a mechanism needs to be in place to reward truthful reporters and punish reporters who supply false information. BPRO utility token is utilized in this case where each reporter is required to "bet" their tokens on the veracity of the information they supply. Reporters are free to supply whatever information they like, however, if that information turns out to be false (for example they bet Team A won the match, when in reality Team B won the match) the tokens they bet on their report are forfeited to those who reported truthfully. This system sets up the game-theoretical structure to ensure that honest, accurate reporting of outcomes is always the most rational choice.

It is not clear which exact parameters grow the network efficiently at this stage. It is important then to test the system and come to an equilibrium that results in a quorum that is resistant to false-positives. For this purpose, each oracle will be associated with a reputation score which reflects the historical accuracy of the information provided by the oracle with respect to the latest results stored in the smart-contract system.

Records of Oracle Reputation

Records of Oracle Reputation in the protocol will be initially set in a Solidity smart-contract given the secure state of the network and architecture usability of the system. One problem arises given the fees associated with the Ethereum Blockchain, but this will be handled initially by solutions such as Raiden-Network or Loom Network that will provide an *all-in-one-update* of the network by holding off-chain data in a no-fee storage network, and sourcing the Ethereum Network in a minimum viable *time-frame*. Future work will put this problematic dependency on other blockchain scaling solutions as they mature.

Dispute Window

Given any type of resolution event, all parties involved will be provided with a window where disputes can occur. After event resolution and propagation to the network, every party will have 12 hours to create a dispute about the event. Given the start of a dispute, a new selection of oracles with higher average reputation will be notified to provide results for the event, creating an assurance of non-collusion of previous false-event reporting oracles.

BPRO tokens bet into the oracle system from the disputers are used as a potential reward for the new selection of oracles. This system relies on long-term high reputation oracles being the source of the majority of event resolutions.

Time Withdrawal

All betters and will have their funds frozen for 12 hours after event resolution given any circumstance. If a dispute is proposed in this time period a new locking period will occur for the next 24 hours until new oracle resolution, otherwise the funds will be released and available to use on the network. Only event resolution via consensus will be subject to this time withdrawal lock.

Books Based

Event resolution in a Books Based system is furnished from a set of information via APIs coming from 3rd parties the community must trust to deliver reliable event reporting. BetProtocol believes there should also be space for an ecosystem of traditional betting. By connecting bookmakers with the BetProtocol infrastructure, this ecosystem can even benefit from a set of live betting events where the high throughput needed cannot be handled by a consensus in a valid period of time.

This information provided by 3rd parties is normally given via JSON type data structures and RESTful APIs that will then be melded with the BetProtocol Resolution Messaging System given parameters such as:

- Sample Space (Ω)
- Set of events
- Outcome Data Type
- Metadata

Event Resolution *By Fiat*

There will be situations where the developer and/or owner of a betting dApp will want absolute control over event resolution. This type of solution might occur from the lack of public information on a certain event. Clearly, this situation is prone to exploitation and fraud. However we wanted to provide this as an option to developers on BetProtocol, and let the community decide whether or not to trust those dApps. Such dApps should explicitly state the Resolution method, and explain to the users of the dapp how it works.

An example use case of Resolution by Fiat would be if the Vatican set up a betting dApp on who would be elected the next Pope. In this case it is clear that the Vatican would want absolute control over the event resolution, in order to mitigate the risk of some news outlets or community members misreporting the true result.

Since the amount of trust that Event Resolution by Fiat requires, BetProtocol will require these types of dApps to escrow a large amount of BPRO tokens to make it financially unwise for them to engage in fraud. Should these By-Fiat dApps be found guilty of fraud by a quora of high-reputation oracles in the case of a dispute, the developers will be punished by having their escrowed BPRO tokens allocated to the dApp Development Fund. In any case, an opportunity to appeal and provide evidence to the community against an indictment of fraud will exist for dApp developers.

Legal Compliance

BetProtocol will always strive to the highest standards of compliance and safety for regulators and players, while allowing each dApp upon it to shape itself while complying with the existing regulations. As such and given different legal needs and compliance levels for each country, each dApp utilizing BetProtocol will be provided a set of information and deployment norms, considering the type of application use case and the set of tools available on BetProtocol.

Providing tools for Bet Exchanges (similar to marketplaces), Traditional Bookings (the user plays against the house), and *By Fiat* implies different demands from a regulatory perspective. These needs will exist, and BetProtocol will be flexible enough to address those needs. Arithmetic and logistical tools built by BetProtocol shall afford umbrella protection for dApps regarding regulatory needs and KYC/AML to be implemented on the network.

Distributed Ledger Technologies (DLT, blockchain) and Gaming are both regulatory challenging areas. On the DLT side, regulation is still being discussed globally, and only in leading nations such as Switzerland and Malta are legislation maturing. Gaming is more mature in regulation as it regards online/remote gaming using the standard banking system and fiat money controls. BetProtocol is at the intersection of where DLT and Gaming collide, and we aim to be a thought leader and standard bearer for compliance and transparency in this area.

Currently, the most advanced jurisdiction for the intersection of DLT and Gaming is Malta. BetProtocol will seek to operate all over the world, while initially it will setup remote gaming operations on Malta, and in other jurisdictions, ahead of key legislation being passed formalizing DLT's role in the remote gaming industry. Our technology is based on the latest DLT related guidelines, as they can be found in the so-called Closed Consultation by the Malta Gaming Authority[10].

In order to comply with regulations, security and code auditing must be done in order to make sure that smart contract code, decentralized facilities (wallets, game logic, regulatory data), and microservices are all compliant with the latest regulatory guidance.

BetProtocol is taking the following steps to ensure that its technology offering is both compliant and sound on a regulatory basis:

1. Fit & Proper Applications (when applicable)
2. Business Planning
3. Operational & Statutory Requirements
4. System Review
5. Compliance Review

The full details of the MGA guidelines BetProtocol shall follow are outlined here[11]:

https://www.mga.org.mt/gaming-sectors/mga-licensee-register/application-process/

The timeline required for just the application process is said to last 12-16 weeks plus an additional 60 days, with an overall cost of at least 22,000 EUR. The timeline and fiat costs represent significant outlays (in addition to other associated backend costs) for firms wishing to enter the online betting market with an MGA License in the Traditional Market.

By using BetProtocol's white-label system, which falls under paragraph 1(b) of the First Schedule to the new Gaming Authorisations Regulation, new entrants to the online gaming market will not have to pay such costs and be able to rely on our technology and previously audited code for their backends.

Transactions

Payment transactions on BetProtocol will be made through the most liquid cryptocurrencies (BTC, ETH). The user can choose to use funds from any of their cryptocurrency wallets for BetSubmission/Transactions, provided that those wallets pass CDD checks. Ether and Bitcoin are used to provide the most liquidity and price stability for bets that are placed. Other cryptocurrencies such as stablecoins may be offered in the future once a sufficient level of liquidity and regulatory clarity are achieved to support them.

Network Effects

By providing solutions for Messaging Systems, synergy among betting dApps, and a legal common ground, BetProtocol provides the essential framework for layers to be built on top of BetProtocol:

- Decentralized Betting Applications
- Prediction Markets
- Booking Systems (3rd Party APIs)
- Gamified Applications
- White-label Providers

Technology Components

BetProtocol provides a JavaScript Library given the language growth over the last years and general use of NPM. Other libraries will be in the roadmap for the next years to come. Growing programming languages like Go can, in the long-term, lead to new developers programming betting dApps or network tools without blockchain development knowledge.

Event and bet submission from betting dApps is abstracted by the BetProtocol network. This means that developers only need to interact with our libraries, and never have to actually touch any blockchain environment and language specific needs. Critical parameters required to validate all the various bet types are recorded in smart contracts. API use and authentication will be handled cryptographically as dApp owners will have an asymmetric-key system <Public Key, Private Key> to access different resources redundantly saved on an off-chain Network for sets of activities like event creation.

Overview

The protocol is built upon four independent layers that create an open system for further development, given new public and private blockchain creation and upgrades.
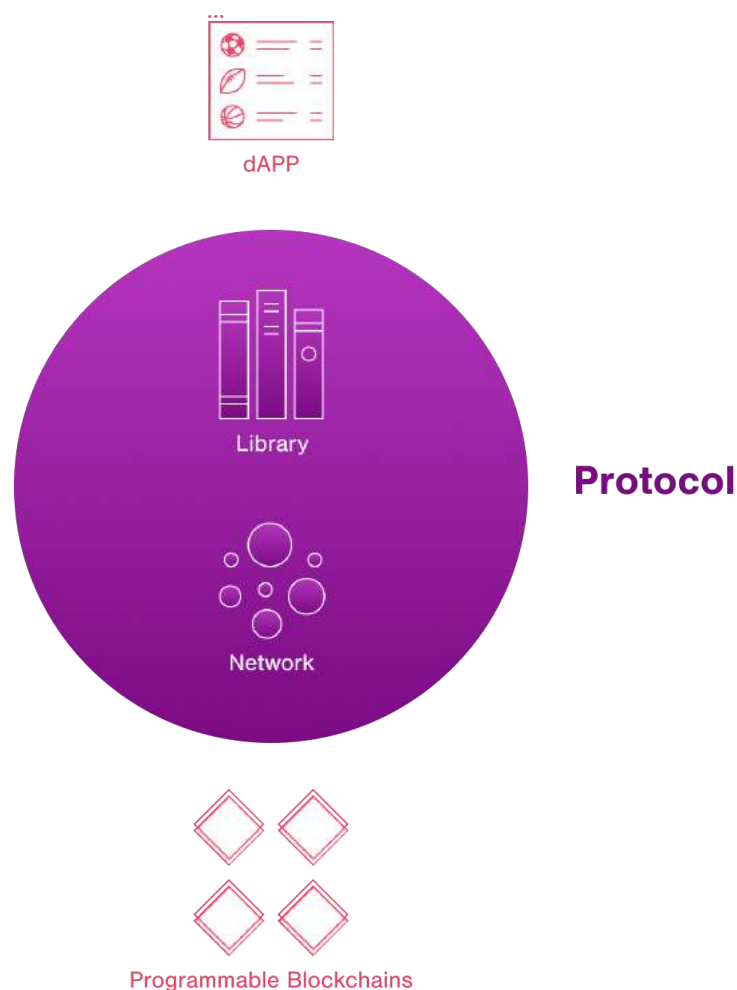
This system can be divided into :

- **Programmable Blockchains** - A smart-economy based on immutability and smart-contract systems will handle computing necessities, as well as create a truthful tokenized ecosystem where simple consensus or betting exchanges can be built upon. The system will take advantage of existing and functioning public and private blockchains.

- **Network** - The key value proposition of BetProtocol is the creation of a network upon which betting dApps can be deployed and have synergy - while providing standardized turnkey infrastructure and services for developers. These include hard computing needs for Smart-Contract creation and deployment, APIs and access to algorithms and Machine Learning tools. This network is built to create the bridge between developer needs and available decentralized technology that can provide a unique value proposition to their projects. This Network will be connected via REST APIs between :
  - webApp < - > Blockchains
  - Developer's Library < - > Blockchains

- **Library** - The entire messaging system between the Network and dApps should be led by library use. BetProtocol libraries create an abstraction layer for all the REST services provided between the Network and dApps. The use of this library is not necessary for BetProtocol compliance, but should be used for easy development of dApps in every case.

- **dApps** - Developers have the opportunity to create the best UI/UX system they can deliver to their users. From known Sports Betting principles to non-trivial Custom Markets, developers can now focus more on the content instead of the infrastructure to build on. Libraries will handle all the traded information among the Dapp Ecosystem of the Protocol. This way, the protocol provides almost 90% of all the needed infrastructure and understanding. It is our hope that this will help accelerate the growth of betting dApps.

Library

Javascript language adoption has been growing over the last years. The number of packages uploaded to NPM has grown faster than any other major language package manager, showing that JavaScript developers are not only using the language but continuing to release projects and code to accelerate that growth. With this influence BetProtocol (Docs 1.0) will be provided firstly via a JavaScript library. This abstraction layer will consist of:

- **Event Creation** *(BackOffice)* - This action can be handled either with library use, or via WebApp.

- **Bet Submission** *(FrontOffice)* - Handled solely by the Decentralized App, used by the library.

- **Oracle Consensus Resolution** *(FrontOffice)* - Provided by the dApp as a library to use, and handled by the network in place for this system.

- **Traditional Book Resolution** *(BackOffice)* - Handled via WebApp or via API previously set in the market creation.

Network

The complexity of blockchain, API use, new language understanding, and node structuring are all hurdles for dApp developers to overcome. BetProtocol seeks to make it easy for them by creating all the links between blockchain infrastructure and projects' needs.

Our decentralized node structure will combine the efficiency of state channels with the near instant on-chain settlement of bet submissions/order books. In this approach, cryptographically signed orders are broadcast off of the blockchain. We provide this approach by allowing anyone to act as the above layer. The main functionalities of this ledger exist to create synergy for the whole ecosystem, encourage network effects and provide for dApps'/Decentralized Resources' logic needs by furnishing the following:

- Side-Chain Solutions for Micro-Transactions
- Smart-Contract/Batch Deployment and Use
- Organized Data Structures Storage (IPFS)
- ERC-20 BPRO Trigger-Transactions
- Oracle Records
- Permanent Data Storage
- KYC / Wallet Structure

Custom Model Understanding

Critical parameters required to validate all the various bet types are recorded in smart contracts. Additional parameters that help describe the event are stored using IPFS and cryptographically linked to given events in smart contracts.

Market Creation

Developers set a number of specifications regarding their own model. With the current state of Blockchain, high demand odd dynamic changes cannot be handled by costly public ledgers like Ethereum given the fees, low TPS, and other criteria. Betting market and betting dApp creation is provided through BetProtocol's WebApp, which developers can use as a portal to dApp stats & resources. Here, the developers define their needs and are guided through BetProtocol documentation regarding parameters and structures on Library use. Thus, communication is created among:

- **WebApp (BackOffice)** - Event Creation and Stats.
- **BetProtocol (API)** - Bridge
- **dApp (User Interface)** - Bet Submission and Event Resolution.

Market Types

Offering different solutions require a specific and valued use case; the protocol must allow for different markets to be created and handled well. Market Type Resolution traditionally will fall into one of the following types:

- **Binary outcome** - Whether a given outcome does or does not occur
- **Multiple outcomes** - Which outcome out of a list of outcomes occurs.

Developers' BackOffice

BetProtocol´s BackOffice will serve as the gateway for every developer to understand the system, and point out the next steps to take. This way each dApp will be provided with guidance on BetProtocol's API use regarding:

- Model Case
- Event Based System
- Oracle Solution
- Docs Use
- Data Analysis
- Metadata

This interface is connected in-Browser with the Library where once connected with the Network, smart-contracts can be filled and deployed to the blockchain.

Messaging System

For any bet to occur, it requires a Backer and a Layer. In traditional bookmaking the customer is the Backer (bets that an outcome will occur) and the bookmaker is the Layer (bets that the outcome will not occur). Betting exchanges allow for the opportunity for anyone to be the Layer or Backer creating a marketplace for bet trading.

Messaging Systems are integrated in library use and provided with a layer of sufficient abstraction, providing easier understanding for the developer and library usability.

Event Creation

Depending on the Blockchain used, messaging formats outlined will slightly differentiate themselves in their core regarding data type, parameters number and costs for the developer. All these needs will be abstracted in Library use, while taking out the majority of failed data types and structuring messaging flaws.

Bet Submission

The messaging format allows for ETH/BTC to be wagered and is applicable for both traditional bookmaking (such as Bet365) and betting exchanges (such as BetFair). The ability to service both use cases is important for the long-term success and adoption of the Protocol. These developments also allow licensed operators to setup dApps easily with a low barrier to entry. Both systems (bet exchanges and traditional betting) can compete by setting their own rules and developing UIs that can attract customers, thus creating a competitive market.

Event Resolution

During an event resolution window, different types of systems can arise, denoting that bet resolution types are **always** set before event creation and are immutable given blockchain properties. This information is publicly known for every better given the conditions of the event, and this way we can consider 3 types of resolutions:

- **Consensus** - Reporters agree by majority consensus on an event resolution mapped to the real world.

- **Third-Party API** - A trusted third-party (API) is defined as the source of the event resolution trigger.

- **By Fiat** - dApp Owners set the result manually. (This system normally occurs in specific use cases which are not possible to be handled by any other solution type mentioned above)

In every scenario disputes can arise if a significant number of betters request a re-evaluation of the event resolution, providing sources for this proof-refutation.

Stats & Testing

BetProtocol´s WebApp allows developers to see what's happening in their dApps ecosystem. Stats of the system provided will get records of the following :

- Weekly Profits
- Best Events
- Competitors Analysis
- New Events and Financial Tips
- Machine Learning Systems Advising
- Risk Analysis Tools

In addition to this, some information stored on smart-contracts will also be available such as:

- Revenue
- Profits
- Numbers of events
- API Source
- Reputation

These will be publicly available via HTTP/Web Services/RPC (Infura) or by providing UI/UX (BetProtocol's WebApp).

Storage

All third-party user data that intermediates protocol libraries and network use will be stored via IPFS and the associated blockchain. Other data used or structurally coded by the developer is not compromised by the protocol. In every case it is compliant with the best practices of data protection (GDPR).

Some information required in dApps might be handled in-cloud with SQL or other relational databases for usability purposes regarding API use for static or dynamic use, given some limitations of current decentralized storage facilities and latency.

Apps

Regulators

Users

Public Blockchains
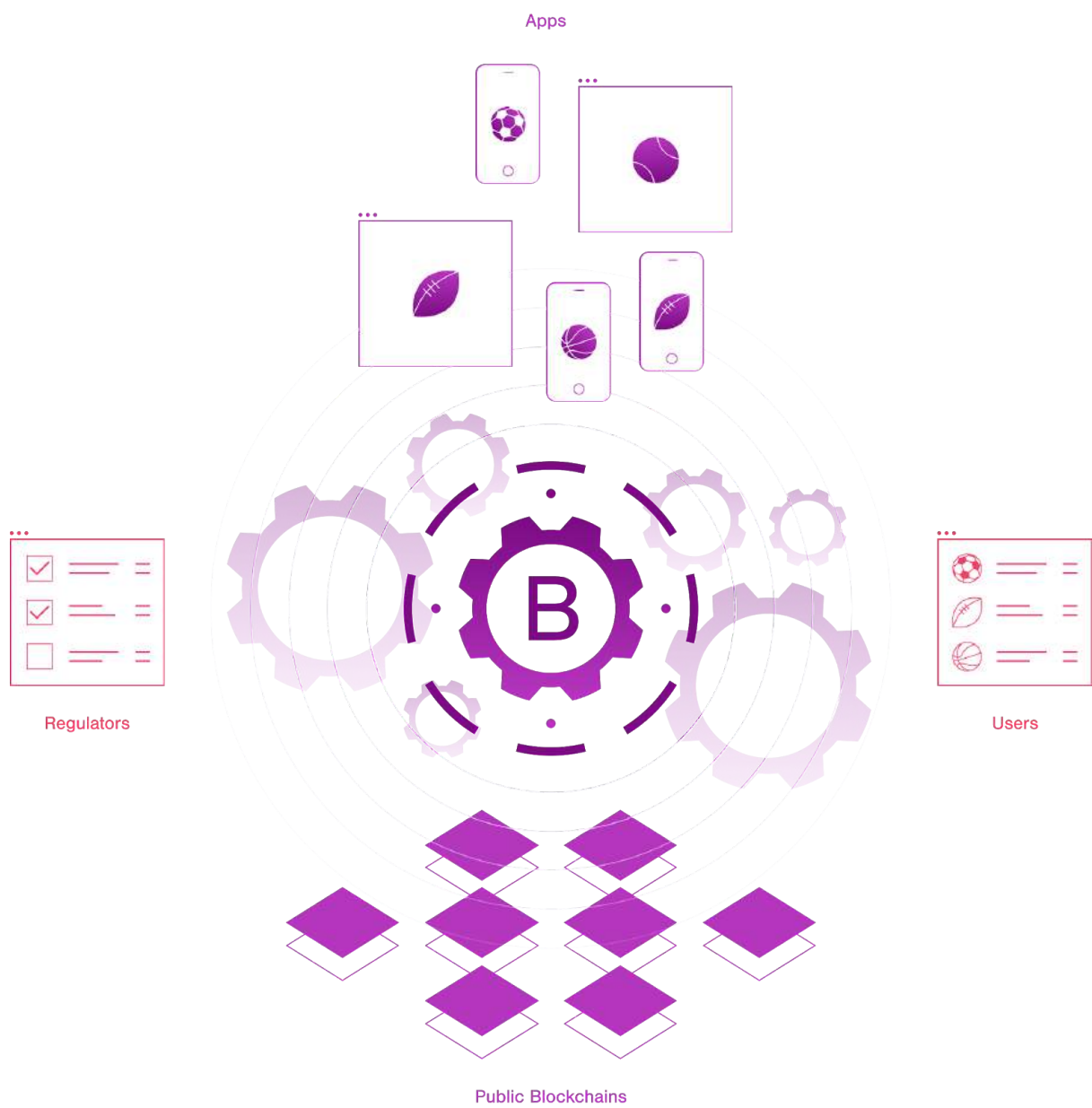
BetProtocol "BPRO" Token

BetProtocol's ecosystem, powered by the BPRO "Be Pro" ERC-20 utility token, will facilitate collaboration among developers, oracle solvers, bookers and betters for an optimal network of betting dApps.

The BPRO utility token will have the following use cases:

- **Fuel for dApps and Decentralized Network Services**
    - dApp Transaction Fees/Deployment Costs on the Protocol
    - Oracle Participation
    - Dispute Resolution

- **Backend Services**
    - Premium Services on dApps
    - KYC/AML & Compliance Fees
   - Premium Services on B2B WebApp

Developers/Operators

Deployment of betting dApps on BetProtocol and transaction use costs will be handled by BPRO utility token acting as pre-paid fuel. Developers will have to fuel their dApps with BPRO token in order to deploy on the network and transact bets on their dApps. BPRO token is designed much like how gas functions in an automobile. Initial dApp deployment (startup) will spend BPRO tokens, as well as continued dApp running (transacting bets) will spend BPRO tokens.

BPRO tokens will be deducted from dApp balances according to the amount of betting transactions executed by the dApp. As transaction betting volume increases in a dApp, the faster they will run out of BPRO tokens. dApps will need to acquire more BPRO tokens to replenish their supply to stay in operation. BPRO tokens expended as fuel in this manner will go to BetProtocol to fund on-going development and maintenance of the network. There is a minimum operating balance of BPRO tokens that dApps will be required to maintain to stay in operation, in order to provide a buffer for future transactions. This minimum balance ensures the smooth continual operations of betting dApps.

In summary, BPRO tokens will serve as a means of payment for the use of the BetProtocol network and tools. Every dApp deployment and transaction (bet) will have a cost to be deducted in BPRO tokens. Exact costs in BPRO tokens for dApp deployment and bets are to be determined, and will require live testing to find the proper formulas to maximally scale the network. In general, transaction costs in BPRO tokens will be proportional to the value of the bets, and BPRO tokens requirements for keeping a dApp running will be proportional to the amount of betting volume a dApp has.
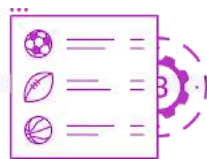
dApp Users/Players (Future Work)

Users of BetProtocol dApps will be able to initiate and resolve disputes, pay for premium services, and build their reputation in oracle participation using the BPRO utility token.

- **Resolution Dispute** - Tokens are required to create a dispute in the network to prevent spam.

- **Premium Services** - dApps will be able to create premium services such as gamification in exchange for BPRO.

- **Oracle** - BPRO tokens are needed to participate in oracle resolution to prevent bad actors and increase the quality of the truthfulness of oracles.

- **KYC** - BPRO tokens can be spent on fees for platform wide KYC for players.

Token Characteristics:

- BPRO token is a utility token
- BPRO Token may be found listed in on one or more established exchanges compliant with local regulations. This is to ensure liquidity, and to facilitate the acquisition of tokens by entrepreneurs who wish to become operators on BetProtocol. BetProtocol does not warrant or assure that such any listing will take place at any time.
- Acquiring and using BPRO tokens does not grant you any rights or benefits other than acting as a means of payment for BetProtocol services, namely, but without exclusion:
    - BPRO token does NOT confer any voting or governance right over the BetProtocol company, its management, its platform, intellectual property or shareholdings;
    - BPRO token does NOT represent nor confer any claim or right on profits, gain, dividends, revenue, interest, redemptions, equity, shares, voting rights or other special rights, including resale return, whatsoever in the BetProtocol company or from the BPRO tokens.
- There will be a maximum supply of BPRO tokens, to be determined by BetProtocol, that shall be created in a token generation event, and beyond this event no new tokens will be created.
- There will be NO burning of BPRO tokens.
- Because BPRO token is not to be considered as a security, end users who acquire BPRO tokens are NOT protected by any Securities Laws and Regulations.

On-going Work

The following topics represent ongoing work:

- A full messaging system specification
- Optimized Consensus & Machine Learning Algorithms
- Operational Limits on Gaming following relevant Legislation
- More robust decentralization as distributed computing becomes more viable
- Increased use cases for gaming and novel genres for new betting dApps
- Integrating BPRO use cases for dApp users / Players

Roadmap 2019 - 2020

CryptoCurrency Integration

Accept Multiple CryptoCurrencies for your Platform

0,5%

Per Transaction

Casino

A Casino Application from Layout, Engines, Games to Deposits

Coming in May

SportsBooking

A SportsBooking from Layout, Engines, Odds to Deposits

Coming in September

Prediction Markets

A Prediction API for the Type of Market you decide

Coming in 2020

Competitor Analysis

BetProtocol seeks differentiation from the vast array of gaming platforms and stand-alone dApps that have emerged in the blockchain-based betting space. BetProtocol at its very core is a protocol enabling online gaming application developers to more easily and quickly deploy their apps using our solution. We do not force a particular look, style, or niche on brands that wish to build on top of us. BetProtocol seeks to apply the spirit of open, generalized computing platforms to the online gaming industry, in order to break down silos and unlock efficiency gains through synergies.

BetProtocol is the "Shopify" for blockchain based betting applications. Our brief is to provide excellent backend tools, libraries, resources & documentation, and even customizable frontends and games–thus freeing up developers to work on marketing and customer acquisition. We believe this is the way to build the most robust and rich variety of gaming applications for users to enjoy.

Decentralization

BetProtocol is decentralized, whereas the legacy online gambling market and several blockchain competitors are not. These applications run on a centralized server, which represents a single point of failure. BetProtocol will run independently as a Layer 2 that is linked to the Ethereum blockchain (but could be other base-layer blockchains) for security and uptime. Nodes running BetProtocol will be physically dispersed and redundant, making for a robust and decentralized gaming solution.

There are many other ways in which BetProtocol is different from our competition, to illustrate:

@betprotocol	BetProtocol	FunFair	Dao.Casino	Wagerr	FansUnite	Augur
High Wager TPS	✓	✗	✗	✗	✗	✗
All Market Types	✓	✗	✗	✗	✗	✗
Regulatory Compliant Approach	✓	✓	✓	✗	✓	✗
Blockchain Independence	✓	✗	✗	✓	✗	✗
Facilitate Traditional Operators	✓	✗	✗	✗	✗	✓
Wager Currency Agnostic	✓	✗	✗	✗	✓	✗
Protocol Level (Layer 2)	✓	✓	✓	✗	✓	✓

High Wager TPS

By utilizing the latest research and technology in state channels, transaction batching, and the use of existing Ethereum scaling solutions such as Plasma, Loom Network, Matic, and others, BetProtocol is able to allow fast and smooth gameplay. Gameplay on BetProtocol dApps will not require individual transactions (and therefore user-paid gas fees) for each action, as is common in some competitors.

Support for All Market Types

While most of our competitors focus on one gaming niche, such as sports or casino, BetProtocol goes a layer deeper and provides the tools that allow for any betting market to emerge. These markets also include non-obvious and novel forms of gaming and gamification yet to be seen.

BetProtocol will provide plug & play white-label solutions for the most popular gaming markets such as major sports, Esports, major casino games, and prediction markets. However we encourage developers to take our tools and experiment with them to create new betting markets and gamification paradigms. We envision sports clubs who want to gamify their fanbase with a community engagement app with real stakes and prizes being built on BetProtocol. We can see March Madness betting bracket dApps and music chart and weather prediction markets popping up. The possibilities are endless.

Regulatory Compliant Approach

BetProtocol adheres to the highest standards of compliance and regulations. We are committed to responsible, safe gaming, and to the protection of players and operators. One of our distinguishing competitive advantages is that we enable easier and standardized compliance checking for regulators. Some of our competitors on the other hand have a non-compliant approach. We believe this is a mistake and incurs immense compliance and regulatory risk from competent law enforcement and gaming authorities. This is also not to mention the high risk of money laundering and illegal betting activity (underage betting, assassination markets) that can and will occur on non-regulated and non-compliant betting platforms. BetProtocol takes the stance that regular online gaming regulations apply also to the blockchain based gaming world.

Our competitors that do not offer robust KYC/AML tools to counter the funding of terrorism, underage betting, assassination markets, and money laundering are simply being irresponsible at best, and complicit in illicit activities at worst.

BetProtocol does offer robust KYC/AML tools that must be used before any Operator or Player accepts/makes deposits and wagers in the BetProtocol ecosystem. These KYC/AML checks will be handled on the protocol level, and will ensure that all monies and all players & operators in the BetProtocol ecosystem are subjected to KYC and AML. BetProtocol is committed to combating money laundering, the funding of terrorism, and illegal and underage betting activity. Our competitors that do not require nor offer these checks are incurring tremendous regulatory and compliance risk, as well as exposing their players and operators to the same risks.

Regulators will find BetProtocol's compliance system to be standardized and transparent to code auditing. This will undoubtedly save time, effort, and money on compliance checking, while making the entire process easier. Being standardized allows regulators to check a wide array of operators in less time, while being transparent through the use of blockchain allows them to trace any irregularities to the real world identities behind them.

From a business perspective, it is clear that blockchain based gaming will never attract large volumes from legitimate, established gaming firms without regulatory oversight and compliance. Well-known firms with established reputations will not risk having their money and their businesses involved with criminal activity such as money laundering and assassination markets. Lack of a regulatory approach is a major weakness in many of our competitors, and we urge all players and operators to avoid such platforms in order to avoid heavy regulatory, legal, and compliance burdens.

Blockchain Independence

Being compatible with multiple blockchains allows BetProtocol to survive whatever developments the blockchain industry goes through. The first version of BetProtocol will be Ethereum based, however in the future if a blockchain emerges that is somehow superior to Ethereum then BetProtocol will be able to port over to that new blockchain for base-layer

security and uptime. All of our competitors listed above do not have this flexibility because they are completely smart contract based on Ethereum.

This of course also leaves them at the mercy of Ethereum scaling issues on the base-layer of the blockchain. In contrast, BetProtocol can set the scalability requirements to meet and exceed load demands, while still having the security and uptime of Ethereum (or another blockchain) as the final settlement layer.

Facilitate Traditional Operators

BetProtocol is building the bridge between traditional operators and the decentralized gaming world, unlocking the possibility of drastically lower backend spend and higher margins. Our tools are all API based, and for a traditional operator switching costly legacy services is as simple as pointing APIs to a different target. Costs are low as well, considering that the "fee" to enter the BetProtocol ecosystem is to fuel up your dApp with BPRO tokens. This represents low risk, considering that an operator can always sell their BPRO tokens if they wish to leave the ecosystem. Compare this with the cost of acquiring large servers and staff to support them, or signing a year or longer contract with a gaming backend provider.

By not facilitating traditional operators, competitors are closing themselves to the larger gaming market. BetProtocol's strategy is to help the blockchain gaming market absorb larger and larger shares of the traditional market by offering unparalleled cost savings and efficiency gains.

Wager Currency Agnostic

All of our competitors use their own utility token as the wagering token in their respective siloed ecosystems. We understand the desire of our competitors to make their tokens relevant beyond fundraising by forcing their players and operators to wager with them. In the short-term this might seem a good solution for driving demand for their tokens in the secondary markets. However in the medium and long-term it seriously handicaps them, and pretty much locks them into small volumes. The reason for this is the price reflexivity of small-cap coins, and the currency risk involved in wagering large bets with a coin that only has a market cap of less than $50 million USD.

Imagine the scenario where a big operator wants to put a large market of a $25 million dollar sports book on Chelsea vs. Manchester United. It is clear that the big operator will not be able to run this market on any of our competitors, since it alone represents half or more of any of their utility/wagering token market caps. The act of acquiring enough tokens to even fund this market will wildly skew the prices between the first bettors and last bettors in terms of USD value. Cashing out such a market, even if it took place, would be equally chaotic as all the winners would look to dump their coins for ETH/BTC as soon as possible before others do, to preserve their winnings. All our competitors therefore expose themselves, their players, and their operators to massive currency risk and volatility.

BetProtocol has chosen to use only the most liquid cryptocurrencies, namely Bitcoin (BTC) and Ether (ETH) as the wagering tokens to avoid such problems. In the future, we plan on also integrating stablecoins such as Maker's DAI and others, once they reach an acceptable level of stability, liquidity, and regulatory clarity.

Protocol Level SDK - Layer 2 Solution

BetProtocol's success depends largely on the success of the operators that choose to build on top of our technology. One of our main goals is to provide them with great tools and documentation to allow them to build the best gaming dApps they can. Much like 0x Protocol and Loom Network, we will focus on developing for other developers. We believe this is the best way towards mass adoption.

Much of our competition rely on building their own silos. By analogy, they are building vertical skyscrapers, and asking you to rent an office inside. BetProtocol is building the horizontal foundation and tools, and inviting you to build your own house. Our Protocol Level SDK and white-labels are designed to allow any brand to quickly and efficiently deploy a gaming app with their own branding, game parameters, and design.

Team

Rui Pedro CEO and Co-founder

of BetProtocol, Blockchain Developer, Full-Stack Developer, and former Music Producer for Sony/Warner. A technologist at heart, Rui enjoys hacking together innovative systems to challenge the status quo.

Justin Wu COO and Co-founder

of BetProtocol, founder of Etherify, Associação Fintech e Insurtech Portugal (AFIP) blockchain group founding member, Crypto early adopter and advisor. Justin is passionate about the blockchain space and was an early pioneer in the Portuguese blockchain scene where he did consulting for IT firms, conferences and universities.

André Moniz CTO of BetProtocol

Co-founder of Tradiio, Co-founder of Blip.pt (BetFair exit). André brings tremendous project management and product development talent in the IT space. He has led large development teams to create innovative products where IT and gaming meet.

Miguel Leite CMO of BetProtocol and Co-founder

Successful serial entrepreneur and co-founder of several startups, including Coinvision, Tradiio, and Punch, Miguel brings a wealth of startup experience and grit.

Tiago Martins Engineering

Product builder, full-stack developer, and UI/UX designer, Tiago has been a pioneer in teaching others to code and creating fantastic software and products himself. Formerly from CodeBase where he grew the platform to 100k + students.

Gonçalo Simões de Almeida Legal

Partner at KGSA & Associates Law Firm. Director and Co-founder of Portal de Sabedoria.

Advisors

Lisa Rabbe

Former Managing Director Credit Suisse in Public Policy and Goldman Sachs in Government Affairs. Lisa brings a wealth of experience and know-how in RegTech as a current University of Oxford instructor at the Saïd Business School on the topic. She is currently the CEO and founder of Stratosphere Advisors LLC and Stratosphere Analytics Inc.

Nuno Correia

An early cryptocurrency investor, deeply involved in crypto markets and community since early 2011, has successfully co-founded several B2C ventures. With a background in Law and Marketing, he is passionate about the transformative future of digital payments.

Fakhri Ahmadov

Founding Curator of the Global Shapers Community at the World Economic Forum and Chairman of the Ahmadoff Private Wealth

Institute. Fakhri brings immense knowledge and experience in the governance, gaming, and fundraising realms.

Álvaro Gomez

Co-Founder and CEO of Tradiio, Entrepreneur in Residence at Intersection Ventures, and a visiting professor at Católica University and ISEG School of Economics in Lisbon.

Laura Toma

Co-founder and Head of Operations for Renowned & Company, a professional marketing and blockchain consultancy specializing in cryptocurrencies and ICO sales.

Endnotes

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