Tron Gold Whitepaper

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Please note that we are in the process of undertaking a legal and regulatory analysis of our token sale model and the intended utility of tokens and Tron Gold tokens (TRXG) on the underlying platform. Following the conclusion of this analysis, we may decide to amend the intended utility of tokens and/or Tron Gold tokens (TRXG) in order to ensure compliance with any legal or regulatory requirements to which we are subject. To the extent that we make any such changes, we shall update the white Paper and publish a notice on our website together with the latest version of the white Paper. It is your responsibility to regularly check our website for any such notices and updates.

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No promises of future performance or value are or will be made with respect to Tron Gold's ERC20 Tokens, including no promise of inherent value, no promise of continuing payments, and no guarantee that Tron Gold's ERC20 Tokens will hold any particular value. Unless prospective participants fully understand and accept the nature of Tron Gold's business and the potential risks associated with the acquisition, storing and transfer of Tron Gold's ERC20 Tokens, they should not participate in the Tron Gold ERC20 Token Sale. Tron Gold's ERC20 Tokens are not being structured or sold as securities. Tron Gold's ERC20 Tokens hold no rights and confer no interests in the equity of Tron Gold. Tron Gold's ERC20 Tokens are sold with an intended future functionality on the Tron Gold application and all proceeds received during the Token Sale (referred to as an Initial Community Offer in the white paper) may be spent freely by Tron Gold on the development of its business and the underlying technological infrastructure.

This white paper does not constitute a prospectus or disclosure document and is not an offer to sell, nor the solicitation of any offer to buy any investment or financial instrument in any jurisdiction. Tron Gold's ERC20 Tokens should not be acquired for speculative or investment purposes with the expectation of making an investment return.

No regulatory authority has examined or approved any of the information set out in this white paper. No such action has or will be taken under the laws, regulatory requirements or rules of any jurisdiction. The publication, distribution or dissemination of this white paper does not imply that applicable laws or regulatory requirements have been complied with.

Participation in Tron Gold's ERC20 Token Sale carries substantial risk and may involve special risks that could lead to a loss of all or a substantial portion of your contribution. Further information about the risks of participating in the Token Sale are set out in the Token Sale T&Cs. Please ensure that you have read, understood and are prepared to accept the risks of participating in the Token Sale before sending a contribution to us.

The Token Sale and/or Tron Gold Tokens could be impacted by regulatory action, including potential restrictions on the ownership, use, or possession of such tokens. Regulators or other competent authorities may demand that we revise the mechanics of the Token Sale and/or the functionality of Tron Gold Tokens in order to comply with regulatory requirements or other governmental or business obligations. Nevertheless, we believe we are taking commercially reasonable steps to ensure that the Token Sale mechanics and issue of Tron Gold Tokens do not violate applicable laws and regulations.

CAUTION REGARDING FORWARD-LOOKING STATEMENTS

This white paper contains forward-looking statements or information (collectively "forward-looking statements") that relate to our current expectations of future events. In some cases, these forward-looking statements can be identified by words or phrases such as "may", "will", "expect", "anticipate", "aim", "estimate", "intend", "plan", "seek", "believe", "potential", "continue", "is/are likely to" or the negative of these terms, or other similar expressions intended to identify forward-looking statements. We have based these forward-looking statements on current projections about future events and financial trends that we believe may affect our financial condition, results of operations, business strategy, financial needs, or the results of the Token Sale.

In addition to statements relating to the matters set out here, this white paper contains forward-looking statements related to Tron Gold's proposed operating model. The model speaks to our objectives only, and is not a forecast, projection or prediction of future results of operations.

Forward-looking statements are based on certain assumptions and analysis made by Tron Gold in light of its experience and perception of historical trends, current conditions and expected future developments and other factors it believes are appropriate, and are subject to risks and uncertainties. Although the forward-looking statements contained in this white paper are based upon what we believe are reasonable assumptions, there are risks, uncertainties, assumptions, and other factors which could cause Tron Gold's actual results, performances, achievements and/or experiences to differ materially from the expectations expressed, implied, or perceived in forward-looking statements. Given such risks, prospective participants in the Token Sale should not place undue reliance on these forward-looking statements.

Introduction

This paper sets out multiple interdependent innovations that work together to enable a large shift in the landscape of crypto applications and currencies. After a brief overview to provide context for these innovations, we explain each:

1. Technological Innovations: Scalable P2P applications on Tron Gold blockchain,
2. Technological Innovations: server management P2P apps for mainstream users,
3. Currency Innovation: Double-Entry Crypto-Accounting system for rewarding clients,
4. Business Model Innovation: Leveraging excess capacity using Sharing Economy principles,
5. Funding Innovation: Bonding ICO with Crowdfunding to demonstrate real demand and establish stakeholders in an ecosystem backed with real world assets.

These innovations weave together to form a coherent approach. In order to have a self-regulating ecosystem server management distributed applications, we need an accounting method that improves efficiency as it scales so we can reward clients in the sharing economy of the ecosystem which is created by inviting all stakeholders to participate in the system through our ICO (Initial Community Offering) which provides the right to purchase server management services.

clients

Tron Gold takes server management of sophisticated social applications out of centralized data centers to the edges of the Internet where our devices live. It makes self-scaling infrastructure a reality through peer-to-peer architecture, which automatically performs load-balancing and load-sharing across thousands or even millions of peers.

Tron Gold enables clients to turn a consumer-grade mini-computer into a source of revenue, where they get paid for server management distributed applications. clients choosewhat apps to serve, and set their own server management prices and priorities.

Tron Gold is where the crowd becomes the cloud.

Distributed Apps

Some of the most popular apps todayare made in a way that already needs **Tron Gold** . Using **Tron Gold** would mean that Wikipedia wouldn't have to keep doing fundraising, or social apps like Twitter wouldn't have to struggle for a revenue model while pushing advertising to fund massive infrastructure. Imagine if the more popular an app became, the more server management power it received from new users installing the app and sharing the load.

What if developers could build distributed applications in familiar languages like JavaScript? What if they could use Rapid Application Development tools to orient themselves to the process, with ready tools for testing apps for scalability and vulnerabilities? These are some of the ways we're making the road to a distributed internet easy, while incentivizing thousands of clients to support the process.

Credits

clients are paid in **Tron Gold's** crypto-credits, called **Tron Gold**, which are efficiently designed to transact a high volume of micro-transactions. The value of server management credits stays stabilized because they're backed by a valuable modern asset: computing power. As more clients come online and share computing power, the network becomes more valuable, giving the credits more purchasing power in relation to the service they are designed to support.

Tron Gold tokens (TRXG) functions by enabling the long-proven standardized practice of double -entry accounting with layers of cryptographic assurance on top of it. Both parties in a transaction sign the transaction to each other’s account chains, and these transactions are validated by peers on a shared DHT(distributed hash table).

Tron Gold provides a crypto-accounting infrastructure audited and notarized by the network.

Payment Flow

A common payment flow might be as follows: (See diagram below.)

1. **Application Provider purchases server management** (bybuying credits from Tron Gold). Their means of payment (dollars, euro, Ether, Bitcoin, etc.) remains held in a Reserve Account, which enables that account to transfer the credits to the App Provider's account.
2. **client generates signed service logs** asthey field requests and provide responses to people accessing the app through their web browsers.
3. **client submits a Proof-of-Service invoice** to the App Provider when they accumulate a chunk of server management in their log.
4. **App Provider pays the client** in server management credits after validating the Proof-of-Service.
5. **client might opt to cash out their server management credits** from the Reserve Account where the original payment was made. Cashing out will be in cryptocurrency initially: As we grow we will work with appropriate regulators to determine the best way to include national currency cash out.

6. A client can only cash out credits earned for server management.

1. Tech Innovations: Scalable Applications Scalable dApps

Tron Gold blockchain provides the underlying cryptographic fabric with data sharing and validation protocols that enable massive peer-to-peer applications. The agent-centric approach to computation[1] removes the need for consensus, eliminating synchronization bottlenecks.

Rather than thinking of ***Tron Gold blockchain*** like blockchain, it may be better to think of it like git repositories for each agent which can be published, shared, synchronized or merged via a BitTorrent-like DHT (Distributed Hash Table). The provenance of all shared data is strictly enforced and the structure, content, and its compliance with shared application rules are validated by randomized peers.[2]

Comparing Blockchain and Tron Gold blockchain

The following chart offers a comparison between several aspects of blockchain and ***Tron Gold blockchain*** in terms of approach, energy usage, volume, scalability, platform and efficiency. This summary can help a developer or community determine whether ***Tron Gold blockchain*** or blockchain is the right platform for their application. The efficiency and scalability of ***Tron Gold blockchain*** drives the benefits of energy use and transaction volume.

	blockchain	**Tron Gold blockchain**
Hash-chain approach	Data-centric, a single global data set - one shared reality across all nodes.	Agent-centric, allows nodes to act independently, or in tight coordination only with counterparties, and then share independently evolving data realities that come to agreement over time.
Energy Use	Bitcoin consumes more than 0.1% of the world's electricity[3] [4] to power less than 0.0001% of the world's money.	Since no mining is required, no specialized processors[5] are needed, making it feasible to run full nodes on low-power computers or cell phones.
Transaction Volume	Neo currently processes +1000 transactions per second. Bitcoin and Ethereum considerably less at a handful per second.	Expected to surpass financial exchange backbones like the Visa network which has a max of 56,000 transactions per second.
Scalability	Even ignoring proof-of-work, there are serious scalability limits on synchronizing a global ledger across many nodes.[6]	With a sharded DHT, the transaction load per node gets lighter as the network grows [7] .

1 rock, Arthur: TheTwo Main Fallacies of Distributed Computing and Blockchain
3 https://digiconomist.net/bitcoin-energy-consumption Energy usage statistics: .1% for Bitcoin plus .02% for Ethereum
4 https://digiconomist .net/ethereum-energy-consumption
5 Examples: https://asicminermarket .com or https://en .bitcoin.it/wiki/Mining_rig
6 http://www .comp.nus.edu.sg/~prateeks/papers/Bitcoin-scaling.pdf

Platform	Can now only run effectively with special mining rigs or wasteful staking algorithms.	Can run on a Raspberry Pi or a mobile phone.
Computational efficiency of architecture (not 1 machine)	O(n*m) for validating transactions on blockchain as a whole distributed architecture.	O(n/m*log m) for validating transactions.
Consensus Effects	Core consensus algorithms centralize power (make the rich richer). Proof-of-Work results in infinitely growing computational overhead for finite data set.	No mining or staking. No consensus. Not vulnerable to majority attacks. You only have to trust the code on your own node and can validate counterparty's history directly.

At the time of publication, ***Tron Gold blockchain*** is already in Alpha release with a number of important early applications (such as a distributed Twitter-clone, and distributed public key infrastructure), which have been designed to demonstrate its scalability and usability.

While ***Tron Gold blockchain*** is a critical innovation, we created the bridge back to the world of the web through
Tron Gold (a technology built on top of ***Tron Gold blockchain***)to reach mass market.

2. Tech Innovations: server management P2P Apps for Mainstream Users

Tron Gold extends P2P applications to the web by bridging into existing Internet architectures. Specifically this means generating web gateways, providing DNS resolution across thousands of peers, and
virtualizing ***Tron Gold blockchain's*** cryptographic fabric to operate partially on client machines and partially on end-user's web browsers.

Distributed application server management is no simple task, and it only becomes possible by the unique way that **Tron Gold** weaves all of these innovations together along with the cryptocurrency incentives to drive server management.

Tron Gold will be able to perform competitively with server management of web applications outside of the crypto space. The following chart compares Ethereum, **Tron Gold** , and Amazon Web Services as an example of centralized cloud server management.

	Ethereum	Tron Gold	Amazon Web Services
Architecture	Global Ledger Blockchain	Peered chains with entries shared to DHT	Centralized
Efficiency	Extremely Low	High	High
Systemic Complexity	Poor: O(n*m) plus Proof-of-Work	Good: O(n log m)	Good: O(n)
Price of Computation	Extremely high	Mid-range – set by clients	Low
Exposure	High – Public	Mid – Custom membership	Low – Private
Evolvability	Immutable Contract	Can link to Replacement Code	Dynamic Code
Interoperability	High between Ethereum Contracts.	High between Tron Gold blockchain Apps	Low

For server management, AWS has many strengths, specifically efficiency, price, and risk reduction. **Tron Gold** , while competitive, differentiates itself primarily through distributing server management services throughout the network. This approach avoids the increasing concerns with issues of centralization:

- Network agents' interactions are mediated by third parties.
- Centralized data storage and proprietary permissions make user data an easy target for government audits; security breaches; surveillance by privileged actors; and undisclosed sales, distribution, and manipulation.
- Ownership of user and network data is held by web platforms.
- Unreliable for zero-latency requirements where local synchronizing data is needed, e.g. IOT, self-driving cars.

With **Tron Gold** , those challenges are addressed by distribution, rather than centralization, of storage and processing across the network. However current approaches to distributed services bring their own challenges:

- Consistency, Availability, and Partitioning
- Approaches using unified data sets creates two major inefficiencies:
    - High computational overhead for data-centric consensus.
    - Creates the additional challenge of having to manufacture universal time sequence across disparate clocks and network delays.

Tron Gold blockchain addresses these challenges by providing an agent-centric, relativistic frame to establish underlying data integrity such that applications can resolve the occasional collision of rival data sets by means appropriate to the social context of that app.

3. Currency Innovation: Double-Entry Crypto-Accounting

Designing a currency to support the **Tron Gold** ecosystem required us to meet several challenging criteria. These criteria demanded an efficiency far beyond current cryptocurrency and at a micro-scale that
traditional transaction fees prohibit. These were the design constraints for **Tron Gold's** currency system[9]:

- Must cost less in computing cycles and in fees than the original computing and funds being counted.
- Must support millions of transactions per second and account for service provision in batches, surpassing financial exchange backbones like the Visa network, which has a maximum estimated capacity of 56,000 transactions per second.
- Must optimize market value of its units in relation to cost of server management, for a steady and stable trajectory, preferably growing in value over time.

We solved these issues through crypto-accounting where credits are backed by a real-world asset: server management as well as through selective automation, our approach to smart contracts (described further on page 18). The solution requires abandoning tokens altogether[10] and focusing on accounting. While double-entry accounting is ancient, bringing it forward into cryptocurrency is an innovation that solves the design constraints needed for **Tron Gold** to responsibly handle a massive transaction volume at scale.

Cryptocurrency: Comparing Crypto-coins to Crypto-accounting Credits

The following chart demonstrates the significant differences between Crypto-coins and **Tron Gold's**crypto-credits (**Tron Gold**),which is then further explained below.

	Crypto-coins	**Tron Gold's Fuel**
Issuance method	Fiat (by randomized authority from Proof-of-Work or Proof-of-Stake)	Mutual credit. Never created from nothing — always an offsetting debit for any credit
Shared "Ledger"	A Single Global Blockchain	Sharded Validating DHT
Value	Fluctuating (not asset-backed)	Stable (asset-backed)
Ontology	Data-Centric: requires consensus	Agent-Centric: No consensus required.
	typically achieved by Inefficient proof-of-work or proof-of-stake	Mutual counter-audit + randomized validation to build CALM[11] shared DHT

9 Additional information on the design constraints is provided in the Appendix.
10 http://wiki .p2pfoundation.net/Arthur_Brock_Against_the_Consensus_on_Data_Consensus_in_the_Blockchain
11 Consistency As Logical Monotonicity

Chain	Global competitive	Local collaborative
Accounting	Single authorization spend	Mutual authorization double-entry

Crypto-Accounting rather than Cryptocurrency

Tron Gold fuel is not a crypto-token or cryptocoin, but a mutual credit accounting system where every transaction is countersigned on the local chains of both counterparties. This allows us to design the crypto-credits to forge new patterns of social and market behaviors that have not previously been utilized for cryptocurrencies.

In particular, we are optimizing **Tron Gold** to function as a medium of exchange currency, rather than a store of value currency. To build a thriving crypto-economy, credits need to circulate rather than be retained as a speculative investment.[12]

There are several important characteristics of **Tron Gold**:

- It is asset-backed.
- It does not use tokens or coins.
- Transactions are counter-signed by both parties.

This enables a currency supply that breathes, so it can be value-stable without being value-static.

Asset Backed

Tokens are issued by fiat: they come from nothing, and can really only be spent. A currency is **backed** by something when it can be redeemed for that thing.

Technically "redemption" is different than "spending." If you have a local currency backed by dollars, when you redeem it for dollars, the currency you redeem has left circulation, and the reserve of dollars has been diminished, and the reserve must be expanded again to issue more of the local currency.

Tron Gold has a huge negative balance when this system starts because funds raised in the ICO are credited ***from*** the **Tron Gold** Infrastructure Provider account. Also the ReserveAccounts (all initially managed by **Tron Gold**)are always negative because these accounts are debited for the credits people purchase (with outside funds now held on reserve).

There are two ways **Tron Gold** gets paid for server management:

1. For server management provided **directly** from **Tron Gold's** servers (minimal), **Tron Gold** is paid credits. These come
   from someone's positive balance reducing **Tron Gold's** negative balance, hence taking those credits out of circulation in exchange for server management.

2. For server management provided **indirectly** by the network of clients, it is paid in outside currencies (reserved for clients). When a client redeems their Proof-of-Service credits, they spend from

positive balance, reducing a Reserve Account's negative balance, taking those credits out of circulation.

Since the creditlimits on the system are directly connected to providing server management power (whether extended to clients or **Tron Gold**),and then redeemed against those negative balances, the system is backed by that asset.

No tokens. No coins.

Instead of being token-centric, which requires computational overhead invested in establishing consensus, **Tron Gold** is agent-centric. In an economic context, this upgrade leverages traditional double-entry accounting by using cryptographic signatures committed to immutable chains as accounts. In this method, instead of managing a global ledger of coins, each agent (or user, or account) manages its own local chain of transactions. This means that each person's balance is encoded on their own chain, so when two people transact, they only need to audit their counterpart's history to be sure they have the credits they're spending. One party's balance goes up, and the other party's balance goes down, in equal measure. **Everycredit has an offsetting debit.** They need neither permission nor consensus from anyone who is not party to the transaction.

Countersigned Transactions

The counterpart's signature locks the record from being edited afterwards, which also effectively makes all prior content in the chain immutable. This immutable history enables anyone to quickly calculate someone's balance and audit their history by replaying their transactions to confirm signatures and changes in balance.

As an example, Alice agrees to sell server management to Bob for some **Tron Gold**. They communicate with each other via node-to-node messaging to build a transaction for a two-phase commit process. Each entry in someone's local chain is connected by signed headers.

One party initiates the transaction, leaving blank the fields the counterparty must complete. Each agent exchanges the data required to validate the other's state. This involves each retrieving and auditing the other's chain to confirm that they are in a valid state to complete the transaction (for example, the buyer has the credits they're spending). The person receiving funds indicates their approval by building a pre-flight header for their chain and sending it to the buyer. When the sender responds with their header, they both commit it to their own source chains with the record of the counterpart's signature in the header they provided.

Note that BOTH parties actively participate in the transaction and must sign it to their chains. This is not the spending of a coin by a single keyholder, but a mutually agreed-upon transaction with the opportunity to validate the other party's state before transacting with them. All nodes have the same validation rules, so if Alice can't validate that Bob can spend the credits he's wanting to spend, then her app will reject the transaction. It doesn't matter if others before her colluded with Bob. Every non-colluding actor will reject illegal operations. Bad actors, in this sense, can have no effect on legitimate users nor on the currency or its supply.

Breathing Currency Supply

Since all valid transactions are double-entry accounting entries, **Tron Gold's** internal crypto-accounting functions just like a balance sheet[13] where every transaction keeps the sheet in balance. Every credit has an offsetting debit. Nobody ever gets to create something from nothing. There is no minting, mining, or burning of coins. This means the sum of all the positive balances is always equal to the sum of all the negative balances.

When no coins exist, and a matching debit for every credit is always required, managing the currency supply is fundamentally different. The simple reason for this is that ***thenet currency supply is always ZERO***.

There are two primary ways the currency supply breathes:

1. Through the many small credit limits (explained further, later in the document) of accounts providing the assets (server management power, app development, app provision) which back the value of the credits, and
2. Through a few larger credit limits of Reserve Accounts and the Infrastructure Provider.

Think of operating a value-stable cryptocurrency a bit like building and maintaining a bridge.

- The Reserve Accounts are the stanchions initially suspending the weight of perceived value.
- The Infrastructure Provider are the engineers and construction crew, they need capital for the materials and ongoing revenue for the maintenance.
- The key players in the app ecosystem (clients, app providers, and developers) are the road with their credit limits being the expansion joints in the sections of concrete.

You don't achieve stability without all these parts working together — and without flexibility designed into the right places, the whole thing is too brittle and it collapses. To achieve value stability of a currency you must establish feedback loops which keep supply and demand in dynamic balance.

Value Stable — Not Value Static

The most critical component in the value stability of **Tron Gold** is the fact that it is backed by a vital modern asset: computing power. Estimated 2017 revenue for cloud server management is $264 billion dollars[14] **Tron Gold's** credits are not cryptographic tokens divorced from any specific value, they are integral to the operation of a large-scale computing infrastructure.

Tron Gold tokens (TRXG) is priced in computingunits: processing time, bandwidth, and storage. It is available for purchase from **Tron Gold** as well as the whole community of clients. It is also redeemable across that whole community for computing power. Even though credits can also be used for general financial transactions, as the number of clients grows, that mass of their computing power stabilizes valuation. clients set their own prices for their computing power which will tend toward stability when averaged across a large ecosystem of servers distributed across the planet.

Another feedback loop stabilizing the price is the fact that **Tron Gold** server management is feasible on commodity hardware.[15] If the price of **Tron Gold** rises significantly, people are incentivized to connect more

[13] http://www .accountingexplanation.com/double_entry_system.htm
14 Gartner projection
15 We've tested running over 50 simultaneous instances of applications on a $35 Raspberry Pi

computing power to the network. And since trades on exchanges are not likely to deviate wildly from the prices for which people can buy computing power, this incentivization structure places a decentralized throttle on massive price pumps. This grounding in the delivery of a real world asset with practical value provides a substantial center of gravity for the price of **Tron Gold**.

Value-stable does not mean static — there is no external value reference to fix a price to. External currencies fluctuate in value too much for credits to be pegged to any one thing. Also, the value of credits is still dependent on real world factors like the cost of electricity, computing hardware, and Internet connectivity. Variations of account balances moving closer and further from their credit limits enable small changes in the supply to strengthen immunity to wild fluctuations and pump-and-dump manipulations.[16]

Participating with Tron Gold tokens (TRXG)

server management System — Roles and Responsibilities

Tron Gold tokens (TRXG) is designed to power distributed applications operated by a network of clients who provide computing power. Therefore, specific roles and responsibilities are defined within this system. Most of these roles can be stacked such that an agent (a node with private/public keys and the ability to interact with **Tron Gold** and its clienteed applications) may hold multiple roles. The exceptions to this rule are Reserve Accounts and the **Tron Gold** organization, which acts as an Infrastructure Provider.

End-User Participant

An end-user accesses crowd-clienteed applications via standard web browsers, so their defining characteristic is that they have not installed ***Tron Gold blockchain*** . **Tron Gold** is designed to help such end-users reach their applications, keep their data out of centralized services, and make it safe and easy to do crypto-transactions. Like all user roles, major rights and responsibilities involve following the rules encoded in the **Tron Gold** app DNA, which may include payment of transaction fees when they accumulate to the payment threshold. End-users are constrained in using credits in several ways:

- End-users cannot have a negative balance.
- End-users can participate without credits if clients or app providers do not require credits or the end-user provides enough server management for their own.
- Should the application require credits from an end-user they would acquire credits through the Reserve Account, or other non-affiliated sources. End-users can only spend credits which are part of their positive balance.
- End-users spend credits as described previously.

client

clients can set their own priorities and filters by app categories, price brackets, and usage demands. If a client doesn’t have much time or interest in such choices, they can enable an app selection autopilot. Autopilot is a good way for clients to increase their revenue by bringing capacities online as needed. clients who don’t want to pay much attention to pricing can also configure an auto-pricing

16 Described by the SEC here .

app. They can set basic priorities such as trying to serve the greatest demand, seeking the highest payers, or adjusting toward a middle-of-market zone to get server management volume that is optimal instead of overwhelming. clients can also set their own prices. Some may opt to client certain applications for free
— if, for example, a client is passionate about a public-interest project, like a P2P Wikipedia, SETI, or Genome Mapping project. Some people may choose higher thresholds than others, depending on their sensibilities for profit, risk, philanthropy, etc.

Once a client has three months of server management records they will receive a credit limit proportional to their server management revenue. The credit algorithm includes anti-gaming mechanisms to deter faking transactions intended to inflate one's credit limit. A client's credit may not be identical to their server management revenue, but it will be quite close. The credit limit is expanded based on the notion that earned server management revenue indicates future capacity to repay a negative balance.

- clients acquire credits in exchange for their processing and storage services, by buying them from the Reserve Account, or by providing non-affiliated services.
- clients are the only actors on the network able to redeem credits through the Reserve Account. Their ability to redeem is specific to credits earned through processing and storage services for the **Tron Gold** network, and is not available for credits acquired through other means.

Application Provider

App Providers are responsible for the maintenance and security of apps they publish on **Tron Gold** . They also agree to timely payment of Proof-of-Service invoices. Since unpaid invoices are visible to all, it is easy enough for a client to demonstrate a failure to pay. No central authority needs to intervene, and no smart-contract needs to enforce payment.

If an App Developer sets up subscription, product, or service payments to be received in **Tron Gold** , they will have access to a variant of the credit algorithm used by clients. Many apps may take payments in traditional currencies, and would not qualify for credit from such activity, but they can use that cash to purchase server management credits from **Tron Gold** Reserve Accounts, which would then be held on reserve for redemption by clients. Application Providers are constrained in using credits as follows:

- They acquire credits by purchasing them from **Tron Gold** Reserve Accounts.
- The Application Provider cannot redeem credits, only spend them for services on the network.

Application Developer

Developers can complete development bounties offered in **Tron Gold** , giving them access to a variant of the credit algorithm offered to clients. This will likely be only a small portion of the ecosystem.

- Application Developers also acquire credits by purchasing them from **Tron Gold** Reserve Accounts.
- Credits received for application development cannot be redeemed, only spent for services on the network.

Infrastructure Provider

The **Tron Gold** organization itself runs the **Tron Gold** Application Delivery Network to manage bridging from the
web to ***Tron Gold blockchain*** . With the support of Reserve Accounts, it also runs the asset-backed, mutual-credit currency and manages value flows between various parties (including allowing clients to convert **Tron Gold tokens (TRXG)** to other currencies).

- The Infrastructure Provider acquires credits through fees of no more than 1% taken from all **Tron Gold tokens (TRXG)** transactions.

Reserve Accounts

The **Tron Gold** organization is also a special class of user with an initial credit limit large enough to credit all the pre-sale purchases from their account. That limit is calculated from a valuation algorithm for the infrastructure services based on actual growth and demand (numbers of clients, applications, users, etc.). Transaction fees should cover most of the costs of operation and maintenance, so this line of credit is to capitalize system improvements. Therefore, any significant expansions of supply would also be correlated to enhancing the value and capacity of the network.

Tron Gold holds client earned credits under reserve so that there is liquidity to exit Tron Gold tokens (TRXG). Initially **Tron Gold**will be the only Reserve Account. To perform its role adequately the Reserve Account must be transparent and demonstrate proof of funds and ongoing receipt and disbursal of funds.

General Purpose Transfers and Transactions

Initially **Tron Gold**willonly support server management services and so support server management transactions only. Eventually **Tron Gold** needs to be able to support general purpose transfers and transactions that are not just server management transactions. Here are some basic examples of why:

- An App Provider has a few apps clienteed on **Tron Gold** . To maintain clear accounting records they maintain separate accounts for each app. App X is their main breadwinner which brings in lots of subscription revenue in **Tron Gold**. They make periodic transfers from App X to the accounts of App Y and App Z to cover the server management fees.
- A client has multiple devices with each one earning credits in that device's account. They would like to pool their credits into one account to make a large purchase.
- An App Provider needs to pay an App Developer for services.
- An App Developer needs to pay a subcontractor for development services.

We will work with local regulators to make sure we are operating in accordance with local laws before making the general purpose transactions possible. These transactions, as described above, are required for the server management ecosystem to run smoothly.

Selective Automation: Tron Gold Governance

Tron Gold provides the informational feedback loops needed for good decision-making rather than replacing people's freedom to choose. Automating things in a **Tron Gold** application is easy, and blending

automation with better information for making decisions is more resilient. **Tron Gold** provides information to facilitate the following in its internal server management market:

- clients can be selected by Application Providers based on quality information in their performance records.[17]
- clients can accept or reject Application Providers based on reputation for payment.
- Application Providers receive good information about the service provided by clients.

The most fundamental "terms and conditions" of the system are the code written into the **Tron Gold** app DNA. However, **Tron Gold** is also a clienteed commons with expected standards of behavior. The full complement of social agreements simply cannot be encoded into smart contracts. Instead, it can facilitate better collective intelligence and healthy feedback loops that enhance people's ability to choose who they trust, while detecting unexpected or unpredictable cheating and fraud.

All types of users are incentivized not to defraud others on the system with the understanding that when they are caught all privileges on **Tron Gold** may be revoked. Keep in mind that EVERY communication and data element is signed by its author to their immutable chain, or it cannot propagate. If someone acted badly, their actions would be published on a non-repudiable record of their actions, meaning that their digital fingerprints are all over the scene of the crime and their chain would be rejected in the next transaction.

This enables the **Tron Gold** ecosystem to have a high-functioning "immune system," because any node can create a "warrant" which flags fraudulent behaviors and provides the original signed records of the fraudster as proof. As new types of fraud are identified and able to be detected, it is easy to determine who has already done those things, then spread warrants as proof of fraud, so other nodes can opt to blacklist them.

Another agreement for all **Tron Gold** users is to not generate wasteful, automated, or artificial traffic (to boost one's own or a conspirator's server management fees). If a developer needs to test app scalability they
must do that on ***Tron Gold blockchain*** or on a distinct **Tron Gold** testing network where test nodes (likely supplied by app providers and developers) agree to provide each other free computing space purely for the purposes of testing their apps for vulnerabilities and scalability.

For a complex ecosystem of relationships, it is far superior to have safe settings for default behaviors, and then enable people to choose to replace those settings with their own thresholds or make their own special exceptions. Because of the scale of the system (both micro-transactions and large volume), automating certain functions is crucial. Thus there is a small set of roles and processes for interactions. The Currency White Paper provides elaborations of the types and operations of automatable processes: pre-authorization credits, Proof-of-Service invoices, and transaction fees (a special instance of the structure used for pre-authorization).

17 Peers on the DHT keep statistics about their neighbors so they know how to manage the neighborhood. The activity from the gossip protocols, to identify percent uptime, latency, and bandwidth/sync speeds. Tron Goldquery also reports sustained failures of a client to service Tron Gold requests so they can be lowered in the DNS rotation.
App providers do statistical analysis on service logs If a node is generating fraudulent billing or artificially inflating their charges, the app provider will flag this as a trust incident, and likely block that client (for that app only). Being blocked/flagged on apps could be an indicator a node may not be able to be trusted.

	Selective Governance	Smart Contracts
Evolvable	Yes (includes means for versioning)	No — fixed
Encoding	Hard-coding + feedback loops enabling better decisions	Hard-coded
Ownership	Participants	Creator
Scalability	High	Low (all nodes perform computation)

4. Business Model Innovation: Leveraging Excess Capacity Using Sharing Economy Principles

In much the same way that Airbnb leap-frogged hotel chains with minimal capital requirements by leveraging spare space in people's homes, **Tron Gold** can compete with existing cloud server management companies without significant physical infrastructure or capital investment. In the crypto space, when it comes to actually scaling distributed applications or reaching mainstream users with them, there is almost no competition yet.

The Larger Value Proposition

Tron Gold blockchain is a ***generalized*** crypto application engine. This means we can fulfill on the promises of many other major crypto projects. Between built-in functionality, applications already built, and applications that are in progress for near-term completion, we solve many of the most pressing problems in the crypto space including decentralized storage, scalable decentralized applications, and secure decentralized identity.

We believe that to efficiently deliver on these promises, at scale, a radical rethink is required. Our solution to this is ***Tron Gold blockchain*** and **Tron Gold** powered by the five innovations in this paper. Over $5 billion has gone toward other projects to provide largely a subset of the functionality we have already built or we expect to bring online in the 2018.

Project	Raised	General Capabilities	Available from Tron Gold[18]
EOS	$4,467M	Scalable decentralized applications	Already in Alpha 0
SONM	$42M	Fog computing	Already in Alpha 0
Tierion	$25M	Verification/Digital Notary	Already in Alpha 0
Ethereum	$18M	dApps & Smart Contracts on Decentralized Computing Architecture	Already in Alpha 0 (currency forthcoming)

18 Note: We are not claiming identical functionality, features, or user experience has been built, but rather that the core underlying problem related to the decentralized application integrity has been addressed and basic features have been implemented. Also note the total of initial funds raised is just over $1 billion, but EOS keeps raising funds, so we decided to bring the figures up to date with that fact.

Civic	$33M	Secure Decentralized identity	Already in DPKI App
Tezos	$212M	Integrated evolution of code/protocols	Alpha 1 in Nov 2017
Filecoin	$257M	Decentralized Storage	App in Dec 2017
Storj	$29M	Sharded P2P Cloud Storage	App in Dec 2017
Pillar	$21M	Personal Data Locker	App in Dec 2017
Status	$90M	Mobile light client	App in Jan 2018
Bancor	$153M	Liquidity for cryptocurrencies	In Tron Gold tokens (TRXG) March 2018
	$5,347M		

By keeping the focus on the security and scaling of a cryptographic application engine, ***Tron Gold blockchain***
can foster a massive ecosystem of distributed application projects much larger than anything seen in this space so far. When you add to that the ability of **Tron Gold** to make these applications available to mainstream users in their web browser, that creates an even greater multiplier on the reach and value for the whole ecosystem.

The Revenue Model for Tron Gold

To have a thriving crypto-economy on **Tron Gold** , the credits need to be actively circulating, not parked with everyone hoping for future market cap increase. Therefore, the revenue is tied to transaction fees, rather than outside trading value of a token. This incentivizes us to attract lots of applications, many clients, and to maintain a value stable currency to encourage the use of **Tron Gold** above and beyond server management.

Here are a few basic scenarios showing how this may play out:

1. **Something better beats us to market** andnone of this gets traction. While possible, this seems unlikely since we're already to Alpha on ***Tron Gold blockchain .*** In some domains, there are claims that certain functionality is impossible, yet we already have it working.
2. **We make it first to market, but have some critical bug/failure that negatively impacts the *Tron Gold blockchain* brand** andso we lose critical time and credibility while fixing the bugs. We believe, just like with DAO and Ethereum, as long as we are transparent and diligent in working towards a world where ***Tron Gold blockchain*** and **Tron Gold** exist we can overcome critical bugs/failures.
3. **We fail to deliver on the promises of the crowdfund or ICO** due to delays in boxes, not enough hackathon demand, or not enough demand for **Tron Gold** and so ***Tron Gold blockchain*** apps don't reach the mainstream.
4. **Tron Gold makes it to market, but users are actually afraid to jump from centralized to fast and scalable dApps.** This also seems unlikely as blockchain has primed the market for these solutions, but has not been able to scale. In this scenario, **Tron Gold** starves from inadequate transaction revenue and needs to restructure to generate other revenue sources.
5. **Tron Gold grows a thriving dApp ecosystem.** In this scenario we look toward the revenues and profitability of cloud server management — rapid growth, a market in the hundreds of billions. Given how easy it is to build crypto apps in our framework to solve significant challenges (see

   comparison chart of over $5B put into solving problems we already solve), this seems to be a viable path. Participants in our ecosystem are well rewarded for their work: **Tron Gold** transaction

revenue on a small corner of this market will be more than adequate for infrastructure maintenance, innovation, and growth, plus small trading volume on **Tron Gold** as a general use currency when it becomes open for this use.

6. **Tron Gold explodes into a massive crypto ecosystem for dApps and asset-backed currencies**.Not app server management or general trading, but more asset-backed currencies on the **Tron Gold** model
start operating on ***Tron Gold blockchain*** and running app extensions on **Tron Gold** to reach mainstream users. **Tron Gold** is widely used as a general purpose trading currency (akin to current Ethereum levels at $300M/day). We will work with local authorities before extending the capability of **Tron Gold**,and then our challenge will be what to do with too much transaction revenue, and how to best invest it for the health of the ecosystem. We will certainly use crowd direction of funds and may cap transaction fees.

We are Growing an Ecosystem

Within **Tron Gold** we are creating shared incentives for efficiency instead of inefficiency. **Tron Gold** grows
in value the more efficient the network gets. We are developing ***Tron Gold blockchain*** , building **Tron Gold** , building an app development community and building a client network at the same time so we can build a thriving ecosystem.

Why would application developers build and run on **Tron Gold** ?Because **Tron Gold** offers:

- RAD tools (Rapid Application Development) to get them started.
- Use of familiar programing languages (like JavaScript) for their apps.
- Their app leverages user assets, and they realize their users may still want to keep a copy (like social media, Wikipedia, blogging platforms, etc.).
- Interoperability with other crypto apps in the ecosystem.
- Side channels and off-chain computing for Ethereum that is still decentralized.
- Core modules and services they don't have to rebuild (Distributed PKI, key revocation and management, sovereign identity, indexing and search, content addressability, app store for distributing your app, backups, file sharing, etc.).
- Use of a server management infrastructure which automatically scales as the user base grows, and where a significant portion of your users may self-client.

By combining technical, currency, and dApp development into one ecosystem we are able to create a business that:

- Has a small central footprint (not many employees necessary) and lightweight infrastructure;
- Creates value (reputation, money) for clients, developers, and users rather than the network owner;
- Keeps server management fees and transaction fees to a small portion of all **Tron Gold** transacted;
- Allows for governance power to reside within the ecosystem, diminishing the need for out of touch boards and management teams to exert central control;
- Has agile boundaries between jobs for employees, contractors, and community;
- Ensures that fees go into future features and infrastructure expansion rather than profit taking.

Cloud server management Size and Growth

Tron Gold brings sharing, through this innovative business model, to server management. Initially, **Tron Gold** is a server management business which can continue to grow its capacities with negligible capital investment (like Airbnb became the biggest hotelier). We believe there is enormous opportunity within the cloud server management industry to benefit from predicted industry size and growth rates.

Table 1 IaaS Public Cloud Services Market Share, 2015–2016 (Millions of U.S. Dollars)

Company	2016 Revenue	2016 Market Share	2015 Revenue	2015 Market Share	2015 to 2016 Growth
Amazon	9,775	44.2%	6,698	39.8%	45.9%
Microsoft	1,579	7.1%	980	5.8%	61.1%
Alibaba	675	3.0%	298	1.8%	126.5%
Google	500	2.3%	250	1.5%	100.0%
Rackspace	484	2.2%	461	2.7%	5.0%
Others	9,147	41.2%	8,074	48.4%	13.2%
Total	**22,160**	**100%**	**16,861**	**100%**	**31.4%**

Note: 2015–2016 revenue for Alibaba has been adjusted from estimates previously published in “Market Share: IT Services, 2016” Source: Gartner (September 2017)

The cloud computing industry has one dominant player with a large number of smaller players. It is a market where customers are looking for solutions outside those Amazon Web Services provide, so there are opportunities to enter with a solution that meets currently unmet needs.

Amazon Web Services is growing revenue and profit quarter on quarter. We expect this to continue for the next two years.

Monthly Transaction Volume (Currency)

This chart shows some samples of monthly trading volumes in cryptocurrencies in comparable functional spaces as **Tron Gold** which range from $300 million/mo to over $13 billion.[19]

5. Funding Innovation: Bonding ICO with Crowdfunding

We are taking an innovative approach to funding **Tron Gold** , running separate crowdfunding and ICO campaigns.

Our ICO is a presale of server management credits. The server management will be provided by the boxes sold in our crowdfunding campaign. We need the crowd as stakeholders in the whole project and its future. People participating in the crowdfunding primarily as clients and developers become stakeholders along with pre-sale credit purchasers through the ICO. This is critical to creating a thriving ecosystem.

We intend to run a sale that is as inclusive as possible, meaning future **Tron Gold** clients and users will not be pushed out by a few rich people buying all available credits within minutes. We also intend to act responsibly by having a meaningful cap on the amount of credits we allow ourselves to sell, instead of just raising as much as possible.

In December 2017 and January 2018, **Tron Gold** will establish its infrastructure and services through a sale of hardware server management nodes, developer training, application development support, data server management, and data processing. This process will take place through a tripartite strategy aimed at reaching a broad number of users and clients, all the while ensuring access to the funds needed to deliver these products.

19 Source: https://coinmarketcap.com/

Crowdfunding Campaign

Tron Gold will offer training for building ***Tron Gold blockchain*** applications (through hackathons) and the necessary
hardware to run the ***Tron Gold blockchain*** protocol through a crowdsale on the IndieGoGo platform. The crowdsale will fund the manufacture of hardware nodes required for server management and processing data on the **Tron Gold** network by pre-selling these devices to future clients. Purchasers of these nodes will be able to earn **Tron Gold** network credits for performing the service of server management sharded data from distributed apps once the network launches. In addition to hardware nodes, the crowdfund will offer in-person
training services for ***Tron Gold blockchain*** development, application design consultation, and tool kits for jump-starting the app development process.

Private Sale

server management Credits Exclusive to clients and Developers — Not Transferable Before Launch of Tron Gold

Team members, friends, family, and **Tron Gold** users who have already established themselves as application developers or **Tron Gold** clients will have access to a limited pre-purchase of up to $1,000 per person of server management credits. They will receive a non-transferable digital receipt for their purchase, which will be credited to their account when **Tron Gold** launches in 2018. These sales are limited to $1M.

Qualified Investors

There will be an opportunity for qualified investors to have access to a limited pre-purchase of server management credits. They will receive a non-transferable digital receipt for their purchase, which will be credited to their account when **Tron Gold** launches in 2018.

ICO — Initial Community Offering

Transferable ERC20 Token Sale (Outside Restricted Countries)

Shortly after the launch of the Crowdfund. **Tron Gold** will offer a pre-sale of its services in the form of transferable ERC20 tokens on the Ethereum public blockchain. When the **Tron Gold** network goes live, these tokens can be exchanged for the corresponding credit balance on the **Tron Gold** network and destroyed upon exchange. The supply of tokens is set in relation to the demand proven by people's purchases from the crowdfund and of non-transferrable **Tron Gold**.

The initial token sale will open with a €2.5M supply that expands daily according to an equation that translates the amount of demonstrated demand from the crowdfund and private sales into a correspondingly increased ERC20 token supply. We only want to raise the capital needed to support the expected demand — so this is our gauge to predict how many people will need tech support, developer tools and trainings. This increased supply of new tokens will be released each day based on the cumulative total of the crowdfund and private sale activity. Participants in the transferable ERC20 token sale will pay in Ether and have access to their tokens within a week of the close of the ICO, far in advance of the launch of **Tron Gold** .

The design of this strategy is meant to establish a **Tron Gold** user base through multiple avenues, bring in the money needed to build and launch **Tron Gold**, and raise only the resources necessary to support expected demand.

Design of Solidity Smart Contracts

- We take a strategy of splitting the contracts into small-as-possible logical units and leverage code already written and tested by others.
- Contract addresses are injected after creation so that if single contracts are updated, others can be reconfigured to communicate to new contracts as needed.
- All our contracts are based on the zeppelin-solidity library. Where modifications were needed, we copy-pasted the zeppelin code and then made minor changes.
- We use SafeMath for all mathematical functions.
- All code is tested.
- The contracts have roles that allow certain actions (i.e. updater, minter, owner) that are usually updatable by the owner.
- We attend closely to the gas usage of our code and optimize where possible.

Sale Mechanics

Sales from the crowdfunding serve as predictive indicators of the first year demand for participation in **Tron Gold**.

- Each day's sales of server management boxes and developer events expand the supply of tokens according to a fixed formula which means the token supply is not a predetermined number. Once per day, the newly released amount of credits will be written to the blockchain enabling further credit/token sales. If all tokens are sold out, nobody can buy tokens until the next update releases more (which of course can be expanded by purchasing from the crowdfunding campaign).
- We don't allow any single wallet to buy more than 10% of the credit supply of each day.
- We log the amount of available credits and sold credits for each day of the sale period and will make these statistics visible on our credit sale webpage.
- After the sale period ends, we mint tokens for the team such that the team gets 25% of the total number of tokens in existence. Thus, during the sale only 75% of credits, calculated based on crowdfunding statistics, is made available for sale. The aim is to avoid artificially increasing the supply with tokens minted for the team.

ERC20 Token Distribution

If we raise less than €1M we will return the ETH to all participants and will fulfill the project through other funding strategies. Since 25% of the tokens are reserved for the organization, including founders, team, and prior investors, we will mint €3.3M worth of tokens on day one, in order to make €2.5M worth available for sale.

Daily Distribution

The fact that people will buy a token to speculate with does not mean there is a demand for the product or service. We are leveraging our crowdfunding campaign as an indicator of demand for our product and to gauge the size of our initial community of developers, clients, and users. Based on the sale of boxes and developer tools, new tokens are released by an algorithm connected to that project demand.

We chose to start with €2.5M because we see that as the base cost to build the software and initial infrastructure. However, the greater the demand, the more funds we will need to service that demand and support the community. We are targeting our ICO raise to cover the needs of our first year to support the community, the application developers, the end-user volume, the infrastructure, and the liquidity reserves behind credits. The larger that demand, the more capital we need to service it until transaction fees can cover operational costs.

The Future

Budget Allocation by amount raised

We are raising >€2.5M denominated in ETH. If we don't hit the €2.5M target we will allocate the amount raised, according to the €2.5M allocation, as follows.

Allocation	**2.5M**	**5M**	**10M**	**20M**
Tron Gold Development	30%	20%	20%	15%
Tron Gold blockchain Development	25%	15%	10%	10%
Currency Reserves	10%	30%	35%	40%
Infrastructure	10%	10%	10%	10%
Operations	10%	10%	10%	10%
Support of Developers, clients & App Providers	5%	5%	5%	5%
Marketing & Communications	5%	5%	5%	5%
Events & Programs (hackathons, training)	5%	5%	5%	5%

Tron Gold Development Roadmap and Timelines

	Tron Gold	**Tron Gold blockchain**	**Apps**
Q1 2018	Crowdfunding campaign and ICO to raise capital for Tron Gold, grow Tron Gold network, and attract initial developers..	More Alpha 0 releases First Alpha 1 release. New Features: publishing headers, transaction bundling, better debugging, gossip refactor, application bridging, performance benchmarking, upgrade error handling	Refactor Core Service Apps: Anchors, DPKI, Personas, Tron Golddex,App Store. Enhance Demo Apps: Clutter, Tron GoldChat, Coin Toss, Wiki, Chess, DAO/voting
Q2 2018	Tron Gold Alpha software testing release to Indiegogo early adopters.	Alpha 2 including new dev API Refactor in Rust & Web Assembly pluggable governance.	Integrate pluggable governance for easier app updates
Q3 2018	Indiegogo Tron GoldPort boxes shipped to clients. First test transaction on Tron Gold using Tron Gold tokens (TRXG). Reaching 2000 clients.	Alpha 3 includes security audit and the ability to adjust DHT parameters and behavior.	Core app services available: - Tron Gold blockchain Directory (as pkg mgr) - DPKI & Identity Services - Tron Gold blockchain Index - Smart Caching.
Q4 2018	100M test transactions per hour on Tron Gold using Tron Gold tokens (TRXG). Test net of Tron Gold running on 10,000 client device.	Tron Gold blockchain Beta Release. Commitment to backward compatibility and more security audits.	Tron Gold blockchain App Store / Package Manager is live 50+ Tron Gold blockchain based applications that have been created to date. Partnerships established for other asset-backed currencies (energy, food, housing, etc.).
Q1 2019	Tron Gold running on 20,000 client devices. Number of Tron Gold blockchain nodes has surpassed number of bitcoin nodes. Approaching production level sophistication.	Peer-to-Peer applications on Tron Gold blockchain reach 50 apps and 10,000 users (with apps that don't require paid server management to smooth out imbalanced production/consumption). Approaching production level sophistication.	Replacement for gmail / gdocs / collaboration tools app available as beta on Tron Gold blockchain.

Why Tron Gold's Strategy Will Work

Tron Gold takes us beyond the limitations of blockchain

Tron Gold tokens (TRXG) takes an agent-centric approach to cryptocurrency design rather than a data-centric approach. In doing so, the **Tron Gold** crypto-accounting system surpasses the efficiency limitations of similar systems built using blockchain or other consensus-based distributed computing

strategies. It is a tokenless crypto-accounting engine. Eliminating tokens makes crypto-accounting substantially

more efficient. It frees massive amounts of computing power and network traffic from consensus and synchronization of a global ledger of tokens.

We leverage principles from game theory and living systems feedback loops to establish an equilibrium for the value stability of currency units being accounted for. This approach, using ***Tron Gold blockchain***, transforms the computational efficiency from blockchains O(n) to O(log n), and also addresses common security issues for blockchain-based currencies.

Tron Gold is a decentralised server management ecosystem designed to work for you

Tron Gold provides normal, everyday web users access to decentralized applications without needing to install additional software. This new form of server management blends small consumer grade devices with other server management assets to provide an efficient, dynamic, and inclusive server management ecosystem.

Tron Gold is an ecosystem designed by currency experts not token designers

The **Tron Gold** team has vast experience over the last 15 years building alternative currencies. We have designed monetary currencies, reputation currencies, and cryptocurrencies, and alternate value flows to make communities work as intended. We are bringing this experience to build a **Tron Gold**currency that facilitates an active economy, and we think crypto-accounting is the way to do this rather than crypto tokens.

Asset-Backed Crypto Economy

If **Tron Gold** starts getting used as a more general purpose currency, server management will become a smaller portion of the economy. This enables more asset-backed currencies for electricity, food, transportation, lodging, and so on.

Tron Gold is driven by a team determined to make decentralized, community-powered applications work in many sectors

Tron Gold has been developed by the team that is developing ***Tron Gold blockchain*** as part of its larger commitment to realize, on a broad scale, the innovations of the Metacurrency project. The team views **Tron Gold** as the
first of many projects that will combine the ground-breaking ***Tron Gold blockchain*** technology, pre-existing physical infrastructure (in this case broadband internet), and transformative design principles for currency, governance, and agent-centric marketplaces. Our team believes in the power of large-scale, community-powered applications to change the world for the better, beginning with our alternative to cloud computing — crowd computing. We are building both community and technology. Our fundraising efforts along these lines aim to develop **Tron Gold** , bootstrap the **Tron Gold** community, and enhance the functionality of ***Tron Gold blockchain*** .

Tron Gold gives enormous upside for early adopters if we achieve our bold ambitions

The ERC20 token we are selling in the ICO is a credit for **Tron Gold** . It will be convertible into **Tron Gold fuel** at launch.

Tron Gold tokens (TRXG) is a currency for purchasing computing (processing, bandwidth, and storage), and thus can be thought of as denominated in compute power.

To establish the initial pricing of that compute power, i.e. the amount of computing you will get for one Tron Gold, we begin by establishing a benchmark of a known system, Ethereum. We will use a suite of real world compute tasks, both ones that others have run, and ones we run, on the Ethereum

blockchain, and use the observed cost in gas to denominate 1 compute unit. These tests will all be visible on the Ethereum blockchain for public reference, and the code shared for anyone to run themselves, if they wish.

The opening price of Tron Gold when the network goes live, will be 1/10,000 that price because we know that running similar computations on Tron Gold blockchain is at least that much more efficient, if not more so.

So if you send us 1 ETH, we will give the amount of credits that represents the efficiency multiple between ETH and Tron Gold credit established in our baseline tests. If our efficiency multiple when going live is better than the baseline results, then the compute power you can buy with your Tron Gold tokens (TRXG) will be greater.

We currently project that the cost of computation will stabilize closer to 10 million times the efficiency of Ethereum today.

Appendix: Criticisms and Objections

“You obviously don’t understand ‘Trustless’ currencies.”

Many in the crypto project space will probably perceive transaction fees being paid to an Infrastructure-provider as centralizing too much authority in one entity. However, paying maintenance fees to Tron Gold, doesn’t give it a lot of extra power. It primarily enables responsible funding so we don’t need to raise hundreds of millions of dollars to get off the ground. It also enables us to create value stability by having an asset-backed currency.

The main power Tron Gold has, in this context, is to update the software — the same centralized power that exists in most crypto projects. When a small group of people can launch a hard fork of Ethereum or Bitcoin, it is not really decentralized.[20] We already have both pluggable governance for versioning of applications and protocols, as well as individual autonomy to fork to versions of your own choosing. Just because Tron Gold launches an update, doesn’t mean you have to update, maybe you want to convince some people to run Tron Gold Classic!

In actuality, Tron Gold is ***less*** centralized. For example, Tron Gold doesn’t even hold a record of all transactions. The transactions can all be found on nodes in the DHT, but they are sharded across many clients. clients set their server management prices, buyers and sellers on exchanges still set their prices, we have some influence in setting prices for which Reserve Accounts sell server management. But this is significantly less

20 https://medium.com/metacurrency-project/cryptocurrencies-are-dead-d4223154d783

influence than can be exerted by the 95% of Bitcoin mined by only a handful of pools, and 95% of coins held by a handful of groups of accounts.

For the purists who are not satisfied by pluggable governance and a fully P2P underlying architecture that is much less centralized than mining class nodes, we say: “Great! Use Tron Gold blockchain without Tron Gold. It is completely P2P with zero centralization and no currency needed.” Just don’t expect it to provide DNS services to mainstream users to reach your applications.

“But you have to use consensus!”

What we must do is provide cryptographically-ensured data integrity on a distributed platform. For that we must also operate with Byzantine Fault Tolerance, which we do. Tron Gold blockchain has means for addressing corrupted communications, corrupted storage, masquerading, lost messages, mis-ordered messages, corrupt nodes, malicious nodes, etc.

There is a kind of implicit consensus built into Tron Gold blockchain which is when an entry is “***put*** ”to the DHT has saturated its destination neighborhood. If someone tries to put the same data to the DHT later, there will be a collision. Collisions don’t have to be a problem, sometimes it means we’re just storing copies of the same thing, so we can just attach an additional source with signatures to the entry.

However, in the small number of cases when it is rival data, like a username or a cryptocoin, then we need to resolve the conflict. If the neighborhood is already saturated, that’s easy, first one wins, but what happens when people try to “***put*** ”the same thing at almost the same time producing a collision before either could saturate? Well, one could hard-code a system of analyzing gossip of peers to determine an absolute timeline[21], but because this is a space for generalized apps, we let the app decide.

How about an auction to the highest bidder? Or the one with higher seniority? Or a better citizenship rating? Or you have them work it out with each other? Or whatever other approach you want to use to solve conflict in the context of the community using your application.

For the small percentage of times you are dealing with collisions of rival data, why would you want to adopt the computational overhead of consensus. Well, the answer would be if you only run one very simple app, and it is a data-centric view on tracking coins. Blockchain was designed for that one app. Tron Gold blockchain is designed for all the others.

Appendix: More on Tron Gold blockchain

Tron Gold blockchain is an application development framework that provides cryptographically secured data
integrity for decentralised peer-to-peer applications **withoutusing consensus**. We refer to a user of a ***Tron Gold blockchain*** application as an agent.

Tron Gold blockchain ensures data integrity for distributed applications through establishing provenance of data published from each agent’s local, immutable chain. Public entries are then shared to a content

21 http://www.swirlds.com/downloads/SWIRLDS-TR-2016-02.pdf

addressable distributed hash table (DHT), with cryptographic signatures, and enforcement of data schemas, and application logic[22] by randomly selected peers.

Therefore, ***Tron Gold blockchain*** establishes an agent-centric pattern for data production, sharing, and management, rather than a data-centric absolutist frame[23] (for which consensus is required). Once a developer learns to do this kind of inversion in their thinking (from data-centric to agent-centric), then building a distributed application on ***Tron Gold blockchain*** becomes much easier and many orders of magnitude more computationally efficient than applications built for scale on blockchain.

Tron Gold blockchain delivery roadmap

Deliverable	Description	Delivery Date
Alpha 0	Clutter: a working app to show the world	October 2017
Alpha 1	Working apps with presentable source and documentation	December 2017
Alpha 2	App dev framework upgrade and Pluggable governance	March 2018
Alpha 3	1st Security audit and DHT parameterization	May 2018
Beta	Commitment to backward compatibility, more security audits, invite/engage wider app dev community	July 2018

Appendix: Tron Gold blockchain Upgrades

Tron Gold blockchain currently provides most of the underlying componentry that we need for **Tron Gold** , but there are still some modifications and improvements needed in ***Tron Gold blockchain's*** core code before **Tron Gold** goes live.

Source Chain Segmentation

Separating the ability to author and sign new source chain entries to a chain from the ability to respond to other peers as a steward of someone's source chain is critical. clients will never have end-users' private keys, so any changes will need to be signed by a user to create new entries on their source chain. However, source chain headers and "public" entries will need to be stored with at least some clients in order to validate them when they are shared to the DHT.

23 Brock, Arthur: TheTwo Main Fallacies of Distributed Computing and Blockchain

Once private keys and source chain services are performing adequately we have outlined some deeper layers for segmenting source chains. These involve breaking entries into parts, which no single client holds, and are only reassembled en route to authorized requests.

Reputation Upgrades

Tron Gold blockchain already has basic infrastructure for nodes to reject data as fraudulent, and to report fraudulent behavior to the neighboring peers of a bad actor. Evidence is provided in the form of a "warrant" that includes the original fraudulent data signed by its author. The native immune system of ***Tron Gold blockchain*** can use the accumulation of these warrants as the basis for blacklisting corrupted nodes. Additional enhancements are planned for collecting better performance metrics of your neighborhood peers, and enabling the possibility of defining node service classes.

Pluggable Governance

Pluggable Governance modules that enable applications to manage forking of their DNA are planned for ***Tron Gold blockchain's*** Alpha 1 release. This will be helpful for application providers when managing new releases of their distributed software, enabling easy upgrades for their users. Within this governance process, upgraded apps can write a closing entry onto a user's old source chain that points to their new source chain in the updated app. The new source chain in the updated app will also have opening entries that point back to the old source chain. This provides continuity of function and identity with clean versioning of code and protocols.

Scalability, Security, and Optimization

Tron Gold blockchain will undergo increasingly stringent scalability testing, security vetting, and performance optimizations that will continue to mature the platform and ensure its reliability for mission critical applications.

Appendix: Security of Tron Gold tokens (TRXG)

For details of security considerations please review the **Tron Gold** Cryptocurrency white paper. These considerations are summarized below:

Anonymity

Tron Gold is not natively optimized for anonymity. Continuity of accountability is included by design — not a bug, but a feature. As such, the currency is not optimized for illegal, black market, or underground activities. **Tron Gold** is optimized to build a consistently reliable, peered network of server management providers. ***Tron Gold blockchain*** enables continuity of identity across application contexts with its DPKI app,[25] which can interface with decentralized identity service providers of your choosing.

clients will be required to register if they want to redeem credits for outside currencies through reserve accounts.

Consensus Attacks

Since **Tron Gold's** currency is not based on consensus as to what coins exist, but on individual accountability for one's transaction history, nobody ever needs to trust a consensus lottery. You can always audit your counterpart's chain to validate their state and know that they have the credits they're spending. You need trust nobody but yourself and your installation of the software. Therefore, attacks on consensus are not vulnerabilities for **Tron Gold** . This includes Majority (or 51%) Attacks, most Sybil Attacks, Attacker with High Computing Power, High Energy Consumption (for Proof-of-Work), Selective Dropping of Transactions, etc.

Attacks on Absolutism

Blockchain is a strategy for managing consensus on a single authoritative reality about data, and manufacturing a single authoritative reality about time.[26] On **Tron Gold** there are no coins to double-spend, and no absolute time-sequence to hack with clock drift, only the local sequence and immutable history of each agent's chain. Thus, **Tron Gold** is not vulnerable to attacks on a single authoritative data set nor attacks on a universal time sequence. This eliminates vulnerabilities to Double-Spend, Clock Drift, and most Segmentation and Scalability attacks.

The Finney Attack

An attempt to execute a fraudulent high value transaction with low confirmation is a special double-spending case called the Finney Attack. This attack merits more thorough coverage, because there is a potential **Tron Gold** variant, and we provide a detailed consideration in our white paper.

Malicious Nodes and Rival Code

If an agent hacks their code, anomalous outputs produced that fail to validate with random DHT peers storing those outputs will be flagged as fraudulent and won't propagate. Bad transactions can't spread and will result in a blacklisting of the committing agent by peers. This is similar to committing bad blocks on a blockchain that won't validate, except in ***Tron Gold blockchain*** a node only succeeds in forking itself into their own reality where nobody else acknowledges the validity of their chain. **Tron Gold** operates in a strong Nash Equilibrium[27] with all players incentivized to keep playing by the rules.

If you hack the code on your node, you could write invalid transactions to your local chain. But as soon as that data tries to propagate to the DHT in the shared ***public*** space, then the DHT peers will detect any invalid data that breaks the shared rules coded into the DNA.

If you could get some peers to collude with you and control your hash production to manage to have data land with selected peers (already pretty difficult and likely detectable), then when you try to transact with someone later who is not a corrupted node, they would still detect your corruption in auditing your chain. There's no consensus needed because you can check for yourself.

Spamming Transactions

A node cannot generate transactions with itself, the parties in a transaction have to be distinct identities. Two parties (or one person controlling two accounts) could rapidly transact back and forth, while paying transaction fees on each transfer. This pattern of behavior would mostly just bog down the two transacting nodes. Others would not be prevented from performing transactions, but this

[26] http://wiki .p2pfoundation.net/Arthur_Brock_Against_the_Consensus_on_Data_Consensus_in_the_Blockchain

27 John Nash "Equilibrium points in n-person games": http://www.pnas.org/content/36/1/48.full?ijkey=e322e2d8bd7f4202fc752d7b80b1efedaa637516&keytype2=tf_ipsecsha

would create a flurry of gossip traffic in the neighborhoods of those peers. This could result in getting, at least, temporarily blacklisted if their peers detected the behavior as a Denial-of-Service attack.

An example is a user trying to inflate their credit limit by making it look like they have a high trading volume, but ***Tron Gold blockchain's*** anti-gaming algorithms already detect this, so it won't work.

Illegal Content

Since **Tron Gold** is optimized for high volumes of micro-transactions, it does not carry much payload. So content (that it is illegal to be in possession of) cannot be stuffed into a transaction that you would be forced to hold. However, applications could certainly be built to hold such content, so clients should take care in the selection of applications they choose to run.

Some of the Same Issues as Blockchain

Tron Gold has not introduced a new breakthrough in cryptography nor figured out how to prevent network congestion and human errors, so we are still subject to some of the same basic vulnerabilities as blockchain.

Breaking the Cryptography

SHA-256 does not seem to be in any imminent danger of being cracked[28], but the crypto algorithms are configurable and can be replaced with new ones in later versions. We have not focused on Quantum-proof designs yet, and are happy to consider that for later releases as our community of cryptographers and developers grows.

DDOS

Tron Gold blockchain has implemented some initial mechanisms to reduce gossip storms and to blacklist Denial-of-Service attackers, but many of these optimizations will need to improve over time. A Distributed Denial-of-Service attack is still a challenge to detect and block if there are enough attackers. A DDOS attack would not likely bring down entire applications or the **Tron Gold** network as a whole, but if it targeted individual nodes on the network it could certainly disrupt their network services at least temporarily.

Human Error

People will still lose their keys, use weak passwords, get computer viruses, and sometimes they will abandon communities or even die, leaving inactive accounts behind. This is no different than things that happen with existing cryptocurrencies. ***Tron Gold blockchain's*** core DPKI app (Distributed Public Key Infrastructure) can provide assistance in managing keys, managing revocation methods, and reclaiming control of applications when keys or devices have become compromised.

[28] Matthew Amy et al. "Estimating the cost of generic quantum pre-image attacks on SHA-2 and SHA-3": https://arxiv.org/abs/1603.09383

Glossary

Agents	End-users, participants in the Tron Gold Ecosystem.
Boxes (or client Boxes)	Devices sold by Tron Gold to enable clients to “plug and play” the technology and begin earning Tron Gold-credits.
Ceptr	Redesigning for social organisms. Humanity is poised on the edge of a quantum leap in evolution, not at the level of individuals, but at the level of our collective social organisms like corporations, institutions and governments. In order to make this leap, we need the same kind of architectures of intelligence that make it possible for trillions of cells to work together in an organism. Large-scale collective intelligence requires communication to be virtually instantaneous (electronic), peered, decentralized, semantic and designed to evolve in response to rapidly changing needs. Effective collaboration on such a scale would obviate most of the power structures that underpin the social barriers to change and could make formerly intractable problems (such as climate change, species extinction, resource depletion, or poverty) quite readily solvable. Ceptr is designed to provide the building blocks of the kind of expressive capacity which embodies nature’s architectures of intelligence and enables an explosion of new patterns of collective intelligence on every scale.
Commons	Resources belonging to or affecting the whole of a community.
Computing units	The measures of value for Tron Gold tokens (TRXG) in terms of the server management services they provide: CPU clock cycles of processing, bandwidth of data transfer, and megabyte months of storage.
Credit limits	In a mutual credit currency, since the net supply is always ***zero*** ,the negative balances enabled by credit limits are what enables accounts to have positive balances of credits. In Tron Gold tokens (TRXG) there are two main types of credit limits which are only available for providing the asset-backing of the currency. 1. ***Large*** **:** Reserve Accounts and Infrastructure Provider have special algorithms for backing credits with outside currencies and capitalizing the infrastructure maintenance and growth. 2. ***Small*** **:** server management providers based on recent past months of server management earnings.
Crypto-accounting	To secure transactions of digital assets through the keeping of financial records.
Decentralized computing	***Decentralized computing*** is the allocation of resources, both hardware and software, to each individual space or office location. In contrast, ***centralized computing*** exists when the majority of functions are carried out, or obtained from a remote centralized location.

DHT	A distributed hash table (DHT) is a class of a decentralized distributed system that provides a lookup service similar to a hash table: (key, value) pairs are stored in a DHT, and any participating node can efficiently retrieve the value associated with a given key.
Double-entry accounting	A method of managing financial records such that every entry to an account requires a corresponding and opposite entry to a different account.
DPKI	Decentralized public key infrastructure.
Tron Gold	1) Organization acting as both infrastructure provider and primary reserve account for the Tron Gold Ecosystem. 2) The technology created to enable shared server management on top of Tron Gold blockchain, bringing it to mainstream participants. 3) The crypto-credit used to purchase server management in the shared Tron Gold Ecosystem
Tron Gold blockchain	Provides the underlying cryptographic fabric with data sharing and validation protocols that enable massive peer-to-peer applications. The agent-centric approach to computation[29] removes the need for consensus, eliminating synchronization bottlenecks. Rather than thinking of Tron Gold blockchain like blockchain, it may be better to think of it like git repositories for each agent which can be published, shared, synchronized or merged via a BitTorrent-like DHT (Distributed Hash Table). The provenance of all shared data is strictly enforced and the structure, content, and its compliance with shared application rules are validated by randomized peers.[30]
Tron Gold tokens (TRXG)	The unit of account in Tron Gold using value-stable double-entry accounting. The crypto-credit used to purchase server management in the shared Tron Gold Ecosystem.
Tron Gold clients (or clients)	Entities in the Tron Gold ecosystem providing server management services of P2P applications.
Nodes	Common term for a peer or machine on a distributed system. Nodes comprise the network, running the code, storing the data, and communicating with each other. If the network in question is a distributedsystem, the nodes are clients , servers or peers . A peer may sometimes serve as client, sometimes server. In a ***peer -to-peer*** or overlaynetwork, nodes that actively route data for the other networked devices as well as themselves are called supernodes .
RAD tools	RAD tools (Rapid Application Development)
Rapid Application Framework	More than an SDK which gives devs access, it also includes quickscaffolding tools that generate the framework for your application. There is some validation and application logic you need to put in, but we build all the directory structures and files for you. Most people don't know how to start building a decentralised application, we give you the whole framework.
Reserve accounts	Reserve Accounts are bound to outside currencies (such as dollars, euro,

29 Brock, Arthur: TheTwo Main Fallacies of Distributed Computing and Blockchain

Bitcoin, or Ether) with corresponding credit limits in Tron Gold for the deposits held in reserve. These enable people to purchase server management in Tron Gold tokens (TRXG) and enable clients to redeem the credits they earn for providing that server management for the outside currencies.

Validation Process by Peers on DHT All data published to the shared space (DHT) is validated by checking it is signed to the originating chain, and is produced according to the rules of the application. The validating nodes are neutral parties, selected by the randomization of the hashing process. This ensures all peers continue playing by the shared rules encoded in the application and that the DHT retains data integrity since only valid data can propagate.