

Axentro - Decentralised Applications Platform

K. Hendrickse, A. Bronow

December 2020



Table of contents

Abstract	3
Vision	4
Mission	4
Market Validation	5
Developer Platform	7
dApp Store	9
Integrated Wallet & Chat	10
Social Media Integration	12
Crypto Exchange	13
Payments Hub	14
Blockchain Explorer	15
The Core Blockchain	16
Smart Assets	19
Developer Fund	21
Road Map (2021)	22
Team Information	23
Coin Specification	26

Abstract

Bitcoin and subsequent cryptocurrencies have become very popular over the last few years for many reasons. However it is the underlying blockchain technology that Bitcoin is built on which provides huge potential to improve our future technology.

While cryptocurrencies provide the infrastructure for decentralised financial transactions there are other use cases emerging for blockchain that do not focus primarily on financial transactions. Platforms such as Ethereum have emerged which provide the ability to power blockchain based applications using smart contracts.

Our technology is constantly evolving and over recent years there has been an increasing trend of people using apps for all sorts of things both on their smartphones and computers. More and more people are looking to download the latest new and interesting apps and developers are catering for their needs by producing cross platform apps that solve all manner of problems.

With the rising popularity of both blockchain and apps the Axentro platform aims to provide a platform for developers to produce a new evolution of apps that are built on the blockchain.

Vision

To be the **go to platform** for building dApps quickly and cheaply for business and gaming.

Mission

By designing Axentro from core design principles, we are not constrained by existing restrictive design decisions so we are able to create a platform that is:

- Intuitive - to enable fast adoption by programmers and users
- Flexible - to enhance creativity in dApp design
- Scalable - to enable us to increase capacity as required

These principles enable us to develop a platform that is highly desirable for investors, commercial businesses requiring secure control of key processes, gaming companies and programmers.

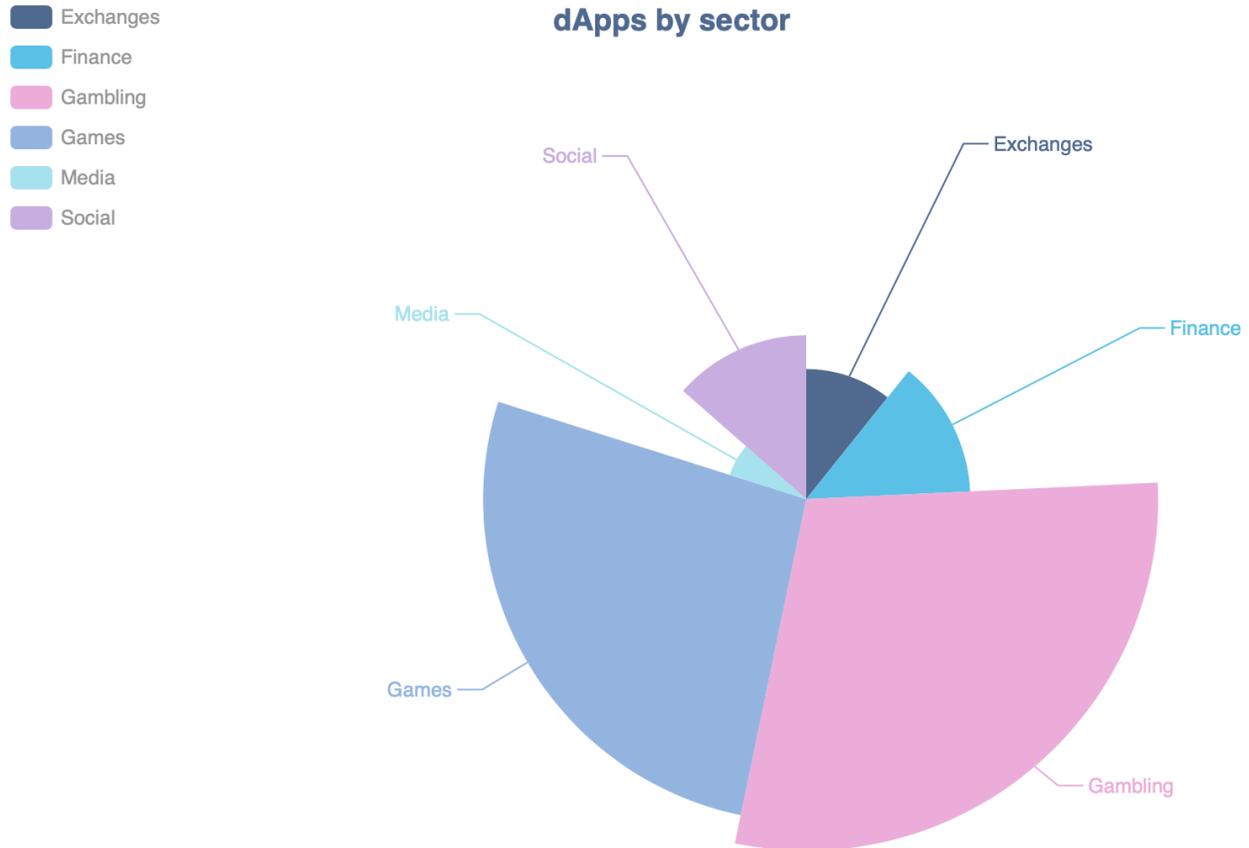
Specifically Axentro will address the following areas:

- Smart assets allowing autonomous logic restricted to non financial capabilities
- Plugin style architecture for nodes to maximise computing resources and control
- CPU only mining to promote broad scale fairness and protection from monopoly
- Distributed two factor authentication for enhanced security

Our developer portal and decentralised app store will provide access to users and developers to maximise the commercial potential of Axentro.

Market Validation

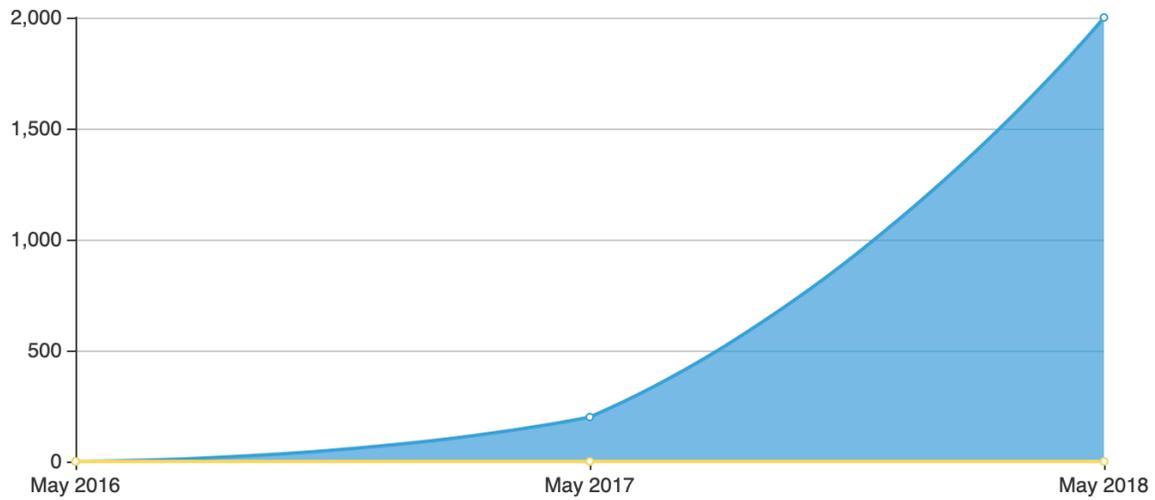
Decentralized app development has exploded since 2017. The feature set that Axentro has in the roadmap will support building decentralised apps in the most popular categories of games, gambling, social & finance as well as any other market sector.



This increasing interest in apps is huge when you take into account mobile platforms and all of the new devices coming into the market place such as voice controlled assistants, tablets, apple tv and others. Axentro will enable decentralised apps on all of these platforms.

The following chart shows the explosion of dApp development

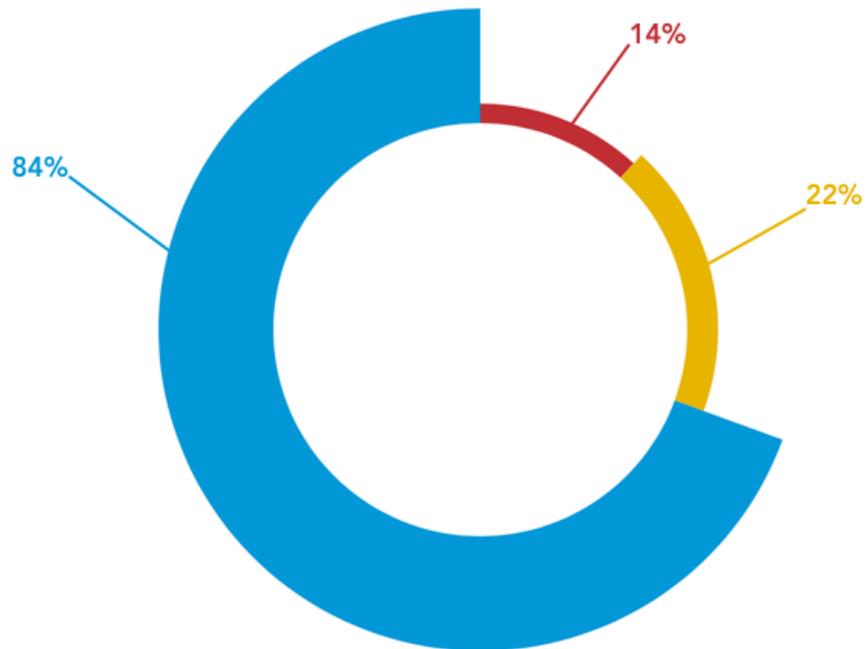
dApp development



- Steem
- Ethereum
- EOS

Market size by active daily users

for dApp users



Developer Platform

Axentro provides a plugin style architecture for building decentralised applications. This is achieved by running a local node and building the dApp by extending from a parent class in the node that provides access to functionality. The dApp infrastructure has hooks that fire when a block is pushed which gives access to the transactions contained within the block.

In addition a transaction contains a key field which is used to hold the name of the dApp. In this way dApp authors can listen for the name in the keyword field of a transaction and perform any logic based on this. Conversely dApps can be executed by sending a transaction containing a specific keyword that corresponds to an existing dApp.

When a node is started up it must be provided with a wallet. dApps only have access to the wallet of the node and therefore cannot operate on any other wallet except its own. This in turn means that dApps are very safe as they cannot perform autonomous functionality outside of the scope of the running node and the associated wallet.

A node can also be started in private mode which means it will not broadcast itself on the network and other nodes will not be able to see it. But the private node will still be connected to the network and be fully capable of executing dApps.

Since dApps are executed on the node there is no restriction to what can be built and there are no fees for executing dApps. This makes building and running dApps extremely cheap and scalability is achieved by starting up more nodes. A dApp can therefore consume other external APIs and execute any kind of code the author would like from local file operations, to third party integrations.

Axentro also has a full API so developers can also choose to build a dApp using the APIs instead of running in a node. This provides complete flexibility to build dApps in any programming language. The API has websocket hooks for notification of new blocks in a similar way to the node dApp infrastructure.

A dApp can access the full functionality of its wallet and so can for example listen for some event and then send tokens or data in accordance with some logic flow as determined by the event. A basic example would be a dApp that waits for a specific amount of token to be deposited in a specific wallet from a specific sender and then automatically sends a token or data transaction back to the originator or elsewhere.

We believe this style of off chain logic provides a huge amount of flexibility in writing dApps and is at the same time very safe and if required also very private. Axentro does not currently support on chain smart contracts but we have not ruled out adding such functionality in the future albeit probably in a very controlled and limited way.

We will be providing a Developer Platform containing tutorials, guides and help for developers wishing to build dApps on Axentro. This platform will also be accompanied by a range of tools and templates aimed at making the development and testing process as easy and effective as possible.

dApp Store

Axentro will feature a dApp store where dApp authors may list their dApp with a description and other appropriate details and information.

Listed dApps will be searchable, sortable and have both a rating system as well as a comments system. This will provide a mechanism by which to give dApp authors constructive feedback so they can take on board users opinions and experiences to better improve their dApps.

Initially all dApps can be listed with no restrictions but over time we will introduce some rules around minimum level of quality, age appropriation and content. We want to encourage a safe and secure ecosystem around dApps and will try to put in place safe guards around many of these areas over time.

Integrated Wallet & Chat

Axentro has full command line support for wallets and interactions with the blockchain. In addition to this we have an official cross platform light wallet which is a Mint app wrapped in an Electron application. The wallet allows you to add multiple wallets and you has full functionality to see balances of all tokens, send and receive tokens as well as purchasing human readable addresses.

When a new wallet is created it is in a secure manner forcing a user to create a password protected encrypted downloadable wallet file. There are several tools provided in the wallet to allow users to encrypt / decrypt wallets and find information about the wallet. The wallet in general does not expose the raw private key and at most exposes a WIF (Wallet Information File) inside the encrypted wallet file.

Building on the official Electron wallet we will also be providing an integrated chat system. The chat system will be capable of full wallet functionality right within the chat. Sending and receiving tokens, purchasing human readable addresses and executing dApps. Phase one of the chat system will be purely peer to peer fully encrypted communication. A later phase will introduce multi chat, chat rooms and various other levels of chat functionality.

Axentro currently has a built in peer-to-peer chat system at the most basic level and work will be carried out in this area to provide all the functionality mentioned. The integrated wallet & chat system will be available for the desktop, ios and android platforms.

A view of the desktop wallet:

The screenshot shows the Axentro Wallet desktop interface. At the top, there is a navigation bar with buttons for Home, Purchase, Send, Receive, Address, Tokens, Transactions, Tools, Settings, MainNet, kingsley-mainnet, and Logout. The main content area is divided into two sections:

Wallet Balances: Shows a balance of 39950.24297902 AXNT. Below this, there is a table with columns for TOKEN and AMOUNT, showing KINGS with a balance of 15000.

Recent Transactions: A table listing recent transactions with columns for Date, Id, Amount, Fee, Token, To, From, Data, Category, and Status. The transactions are all mining rewards, each for 8.96564191 AXNT, with a status of 'Completed'.

Date	Id	Amount	Fee	Token	To	From	Data	Category	Status
2020-12-11 16:52:18 UTC	d57e14d7	8.96564191	0	AXNT			0	Mining reward	Completed
2020-12-11 16:50:22 UTC	61c901e8	8.96564659	0	AXNT			0	Mining reward	Completed
2020-12-11 16:48:21 UTC	b8db3d44	8.96565126	0	AXNT			0	Mining reward	Completed
2020-12-11 16:46:21 UTC	b70d029d	8.96565594	0	AXNT			0	Mining reward	Completed
2020-12-11 16:43:38 UTC	28730039	8.96566062	0	AXNT			0	Mining reward	Completed
2020-12-11 16:41:34 UTC	e9d9a645	8.96566653	0	AXNT			0	Mining reward	Completed
2020-12-11 16:39:36 UTC	b8568f20	8.96566998	0	AXNT			0	Mining reward	Completed
2020-12-11 16:37:17 UTC	5fdf3064	8.96567466	0	AXNT			0	Mining reward	Completed
2020-12-11 16:35:09 UTC	65e963e9	8.96567934	0	AXNT			0	Mining reward	Completed

The screenshot shows the Axentro Wallet desktop interface with the 'Create Custom Token' form open. The navigation bar is the same as in the previous screenshot. The main content area is divided into two sections:

Wallet Balances: Shows a balance of 40013.00234144 AXNT. Below this, there is a table with columns for TOKEN and AMOUNT, showing KINGS with a balance of 15000.

Create Custom Token: A form with the following fields and options:

- Name of custom token:** A text input field labeled 'Token Name'.
- Amount to create:** A text input field labeled 'Amount to create'.
- I've double checked everything is correct!
- Create Token:** A purple button.

Below the 'Create Custom Token' form are three other forms:

- Increase Custom Token Amount:** A form with a 'Token' dropdown menu, an 'Add additional amount' text input field, and an 'Update Token' button.
- Lock Custom Token:** A form with a 'Token' dropdown menu, an 'I've double checked everything is correct!' checkbox, and a 'Lock Token' button.
- Burn Custom Token:** A form with a 'Token' dropdown menu, a 'Burn amount' text input field, and a 'Burn Token' button.

Social Media Integration

As well as our own brand of encrypted chat we will provide a more limited and restricted set of plugins to well known popular chat platforms such as Slack, Discord, Telegram, Facebook and Gitter. Plugins for these platforms will require a user to login into their wallet securely via an authentication dApp in a process similar to OAuth before gaining access to wallet functionality within the respective chat systems.

This will make it very easy to send and receive AXNT and custom tokens on all the major social media applications. This will also act as a gateway into the Axentro platform allowing integration between social media and dApps. Allowing social media focused dApps to evolve in a safe and secure way will offer many opportunities to innovate.

Crypto Exchange

Axentro allows developers to create their own custom tokens and send and receive these as well as use them in dApps. Therefore we would like to provide a means of exchanging these custom tokens with the default AXNT token.

We will create our own crypto exchange that focuses on giving a great user experience when trading both AXNT and custom tokens created on the Axentro platform. This will also make it very attractive for projects to create custom tokens on the Axentro platform and be able to list them without the huge listing fees that many existing exchanges currently charge.

It will also greatly simplify the process of creating and listing a custom token. The exchange will also be integrated into our wallet and chat applications running in ios, android and on the desktop. This will provide a very tailored experience for trading on the Axentro platform.

We plan to launch our cryptocurrency exchange in several phases:

1. Exchange custom tokens with AXNT
2. Exchange custom tokens with other custom tokens
3. Exchange custom tokens and AXNT with fiat
4. Buy AXNT and custom tokens with fiat

In this way users will have access to send each other AXNT and other custom tokens as well as buy, sell and trade right within the integrated chat and wallet system. A future evolution of the exchange would be to allow trading with other cryptocurrencies using AXNT as the base pair.

Payments Hub

Once the Axentro platform starts to evolve and developers start building dApps we would like to provide a way to pay for things online and within dApps. To do this we will build a payment gateway which will allow developers and tech savvy users to add shopping baskets, stores and simple payment plugins that support paying for things in AXNT and custom tokens.

As part of this work we will also define a stable token which can be used for payments as well as providing functionality that auto adjusts AXNT and other custom tokens within the payment gateway to a range of fiat prices.

Blockchain Explorer

We have a blockchain explorer with the basic features required for everyday usage. We will iteratively improve the explorer and add new features on a regular basis. Below are some of the latest screenshots:

Axentro Blockchain Explorer

- Total Transactions: 6060
- Latest Difficulty: 15
- Total Fast Blocks: 46
- Total Slow Blocks: 5948

Latest Blocks

BLOCK ID	KIND	AMOUNT
11894 3 minutes ago	SLOW	11.9628263 AXNT
11892 5 minutes ago	SLOW	11.9628304 AXNT
11890 7 minutes ago	SLOW	11.9628379 AXNT
11888 9 minutes ago	SLOW	11.9628403 AXNT
11886 12 minutes ago	SLOW	11.9628492 AXNT
11884 14 minutes ago	SLOW	11.9628551 AXNT
11882 17 minutes ago	SLOW	11.96286175 AXNT
11880 19 minutes ago	SLOW	11.9628799 AXNT
11878 21 minutes ago	SLOW	11.96287423 AXNT
11876 23 minutes ago	SLOW	11.96288048 AXNT

Latest Transactions

TRANSACTION ID	FROM / TO	AMOUNT
8c9ef3769ee314ee1534906d...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628263 AXNT
334e8e5dac229c04769a8a5b...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628304 AXNT
e8b9627c9e2183b9d1bf3cfd...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628379 AXNT
554d11fac000625451b7d5bc...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628403 AXNT
7bf5448db62e2acec11eab...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628492 AXNT
a51a0c1ef268206442e8c5...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628551 AXNT
301e81f251d113bb649bc0a...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.96286175 AXNT
b74cec12bfad50d36d6f8c...	To: TTAzNjNzgyNzA2MDU5NGY... TTAyZVlnZDFhNTAwOGNINZj...	11.9628799 AXNT

Axentro Blockchain Explorer

Search by Address / Txn Id / Block / Token / Hra

Transactions

TRANSACTION ID	BLOCK ID	AGE	FROM	TO	AMOUNT	FEE
23db83336b31a76da808bfc...	3336	3 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98956141 AXNT	0 AXNT
e107429c944227086cb45449...	49	3 minutes ago		TTA40TcyNjNmODFkMzMDZMw...	0.0001 AXNT	0 AXNT
ce3823bb28ba0c25ba95407...	49	3 minutes ago	TTAyZVlnZDFhNTAwOGNINZj...	TTAyZVlnZDFhNTAwOGNINZj...	1000 AXNT	0.0001 AXNT
9ebd2d84b73069c83f098732...	3334	5 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98956766 AXNT	0 AXNT
c24b1f01bbb18a345054b252...	3332	6 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98957392 AXNT	0 AXNT
c667c9899c47af8bdf612f...	3330	8 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98958017 AXNT	0 AXNT
68fa9240f40bba42cbef49a...	3328	10 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98958643 AXNT	0 AXNT
b76cfa77676d6da448276a6e...	3326	12 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98959248 AXNT	0 AXNT
fsa0d5fe02a2d7577779cb959...	3324	14 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98959894 AXNT	0 AXNT
b33cc9e9d4212bb025669f72...	3322	16 minutes ago		TTAaMGE2Mmi1ZTK0Nm1f0DZl... TTAyZVlnZDFhNTAwOGNINZj...	11.98960519 AXNT	0 AXNT

The Core Blockchain

Axentro is an original custom blockchain implementation. It is not a fork or clone of any current existing blockchain project. Axentro takes inspiration from Bitcoin and Ethereum and to some degree other existing blockchains. Axentro is implemented in the Crystal programming language.

Crystal was chosen because it has many similarities to the Ruby programming language and shares the same kind of language syntax but with the added benefit of the executions speeds to the C programming language. Crystal is also statically typed and has a vibrant community.

The main features of Axentro are:

1. An original blockchain with streamlined and simplified core components
2. A plugin style architecture for building decentralised applications with off chain logic
3. Full public REST API for building dApps in any programming language
4. Built in human readable addresses
5. Proof of Work consensus
6. CPU only mining using the award winning Argon2id hashing algorithm

There are 3 main command line programs which provide access to the Axentro platform:

1. `axe` - the command line client
2. `axen` - the command line node
3. `axem` - the command line miner

Users will mostly use the miner and the axen node client to interact with a node. Most users will connect with the mainnet nodes or mining pool nodes. There is also a cross platform Electron wallet which will become the main interface for interacting with the platform.

As previously discussed there will also be a range of other supporting clients and plugins for various social media integrations that will provide a gateway into the platforms functionality.

The Blockchain platform itself has a plugin style architecture and the internal components are implemented in a similar way as user defined external components which we call dApps.

Axentro implements the core blockchain concepts such as:

1. An immutable ledger which is stored on disk in a sqlite3 in-memory database.
2. Cryptography based on the ED25519 elliptic curve
3. Monocypher EDDSA based wallet with private and public key pairs with address
4. Encrypted wallets using blowfish encryption
5. Peer to peer networking for nodes using the Chord networking pattern
6. Merkle tree hashing of blocks and transactions
7. Transactions and transaction and block validation
8. Built in default token AXNT and the ability to create custom tokens for use in dApps
9. Rejected transaction handling
10. Transaction fees system
11. Human readable addresses
12. Real time peer to peer communications system capable of token transfer and messaging

There are many additional features that will be added to the base platform such as support for asset management, hierarchical deterministic wallets and two factor authentication. See the coin specification below for more information about the default token AXNT.

As previously mentioned one of the main features of Axentro is that it is CPU only mining. Proof of work is still the most proven consensus mechanism but things have gotten a little crazy with specialised rigs, ASIC chips, GPU mining and massive mining operations.

Limiting mining to the CPU is the most eco-friendly form of proof of work mining since CPU's require much less energy. This also allows for a more equally distributed participation in the mining process since anyone with a CPU can get involved using regular consumer hardware and without the need to spend thousands on expensive hardware and mining rigs.

Axentro also features an unique double chain system. Which provides slow blocks every 2 minutes via mining and fast blocks from a fast node every 2 seconds. This is a lot faster than Bitcoins 10 minute block rate and the 4 minute block rate of Ethereum. Also with super low fees this makes Axentro very cheap and attractive for building dApps.

Axentro also has a limited supply of the default AXNT token which is set at 20 million and as such will help retain the coin's market value over time as the supply is reduced and the focus shifts to transaction fees and trading.

Smart Assets

Axentro will feature a smart assets system. Assets can be registered on the blockchain with a set of properties that can be used to define the asset. An asset can also optionally contain bytecode compiled from a special smart asset language.

In this way you can write smart asset code which can mutate the properties of the asset. Assets can be queried to retrieve their data at a node via an asset API. Asset code can be invoked via transaction calls which execute the public asset functions that have been coded into the asset.

A practical example is when storing game assets in the blockchain that have mutable characteristics such as storing a sword asset which has properties such as strength, attack, magic buffs etc which can be mutated through usage or upgrades. In this case an asset function could be called to increase the strength of the sword asset as it gets levelled up.

The asset code could also apply additional logic to enforce limits or trigger the mutation of other properties. Asset code will only be able to interact with the assets own properties and will not be able to operate on a wallet or send token transfer transactions of any kind. However assets will be allowed to query data from other assets and call functions on other assets.

The Taro language will include many easy to use constructs for working with assets and there will also be a supporting asset test framework to help with the development of smart assets.

Smart assets will cost a fee to execute. If the invoker runs out of AXNT the execution will stop.

The node will execute the smart asset code and charge the wallet supplied in the transaction that was used to invoke the asset. Of course the transaction will go through the same validity and signature checks as every other transaction to ensure security is maintained.

The smart asset bytecode is included in the transaction hash so once created cannot be changed. It can however be programmed to self destruct and also can have execution and visibility permissions set to specific wallets.

The full details of the Smart Asset system are still being explored so some the concepts here might change or be implemented differently.

Developer Fund

Axentro will operate on a developer fund of 10 million AXNT. A developer fund is very good for the development team so that they can use the coins to strengthen the community and pay for marketing, bounties, promotions as well as paying for related development such as graphic design, tools and hosting.

Below is an approximate guide to how the developer fund will be used. The lead developer team amount is intended to help the lead developers pay for costs that occur now and into the future. The lead developer team will also receive 50% of the block rewards from the mainnet nodes in order to support ongoing development.

The remaining 50% of the block rewards from the mainnet nodes will be held in reserve following regular planning sessions to decide what the coin should be used for. All decisions about the expenditure of the developer fund and mainnet nodes will be publicly documented and reviewed regularly.

Road Map (2021)

We are a community driven project and so the roadmap may change as the community influences the shape and future of Axentro. But these are the features we are currently focused on shipping



In addition to the feature roadmap above we also have ongoing marketing and promotions and community events.

Team Information

Kingsley Hendrickse



Founder & Lead developer

Founder & lead developer. Highly skilled with decades of experience. Expert in blockchain technology.

Aaron Bronow



Core developer

Well rounded versatile developer. Team leader, coach and mentor. Invaluable when working across many complex technologies.

Krystelle Galano



Marketing & Community

A highly effective blockchain & crypto marketing specialist with years of experience. Expert in social media management and community building.

Christian Kakesa



Core developer

Christian is a system developer, back-end and devops. He likes distributed systems and studying programming language paradigms. The open source world and the Blockchain have forged his knowledge.

Manuel Berja



Multimedia expert

Creative artist and expert in 2D graphics. Skilled in Animation, Design, and Multimedia with years of experience.

Bar Hofesh



Security advisor

A cyber security veteran with more than a decade of experience acting as a Security Officer, Researcher, Hacker, Developer and Software architect.

Coin Specification

Category	Specification
Coin name	AXNT
Coin ticker	AXNT
Consensus	CDPow
Block reward	12 AXNT (decreasing)
Miner reward	pro-rated
PoW mining algorithm	Argon2id
PoW Block spacing	120 seconds
PoW Spacing algorithm	DCGW
Fast Block Spacing	2 seconds
Maturity	7 blocks
Minimum txn fee	0.0001
Total mineable supply	20,000,000 AXNT
Total non-mineable supply	15,000,000 AXNT
Developer fund	10,000,000 AXNT
Mining Port	80/443

Some acronyms explained:

- CDPoW is Conditional Distributed Proof of Work
- DCGW is Dark Crystal Gravity Wave spacing algorithm
- Fast blocks are generated by a fast node

Each miner that is mining against a node anywhere on the network receives shared rewards with a prorated amount of AXNT based on their contribution to finding hashes. The total block reward starts at 12 AXNT from which miners and the node itself receive their rewards and decreases over time as more blocks are mined.

The block spacing is determined using a custom algorithm called *Dark Crystal Gravity Wave* that ensures a new block is minted at around 2 minutes. The fast block spacing is 2 seconds.