Ducatus Global Pte. Ltd

Ducatus Coin - White Paper v2

*Produced in consultation with Trammell Ventures**

A. What Is Ducatus?

Ducatus provides the world's strongest combination of cryptocurrency infrastructure and a network marketing distribution system. Leveraging the distribution power of a carefully structured network marketing system with the scalability, security, and durability of a robustly designed cryptocurrency gives your Ducatus coins real and lasting value.

Ducatus members can buy and sell Ducatus mining credits and digital coins from the ducatus.network website. The coins can be securely stored in a digital wallet on a phone or desktop computer. When a member wants to make a purchase using their Ducatus coins, they make a simple transfer from the wallet of their choosing to the vendor. This will work not only for online shopping and access to online services, but eventually for compatible point-of-sale systems as well.

B. How It Works

Ducatus members will all use a Ducatus "wallet" to participate in the network. Wallets are mobile, desktop, and web-based applications that allow a member to securely keep track of their current account balance and to transfer funds. Each wallet provides access to its own balance of Ducatus coins - coins are not shared between a member's wallets if they choose to use more than one.

Ducatus relies on a distributed ledger called a "blockchain", which is the secret sauce that makes cryptocurrencies both secure and transparent. The blockchain is a distributed database of all transactions that have taken place involving its cryptocurrency. The name "blockchain" refers to the idea that the ledger is made up of a series of "blocks". Each block documents a set of transactions which took place over a short period of time. In the case of Ducatus, new blocks are issued on average every 60 seconds. This compares favourably with Bitcoin (10 minutes) and Litecoin (2.5 minutes). Applications that maintain a copy of the distributed blockchain are called "full nodes." Some wallets applications may also act as a full node.

New blocks are generated by Ducatus "miners". These are special nodes on the Ducatus network that compete with each other to solve a challenging cryptographic problem that is only defined once the preceding block is completed. When a miner thinks that it has solved the problem, it broadcasts its claim to the network, then other miners and full nodes work together to validate and confirm that the proposed solution is in fact accurate. Once enough nodes have confirmed the accuracy of that solution, the new block is validated along with the transactions which it contains, and it is added to each copy of the blockchain. This process is referred to as "mining" and uses our own Ducatus mining software which will be made shortly after the launch date once initial network performance assessment is complete. Ducatus mining software will be then be made available as open source.

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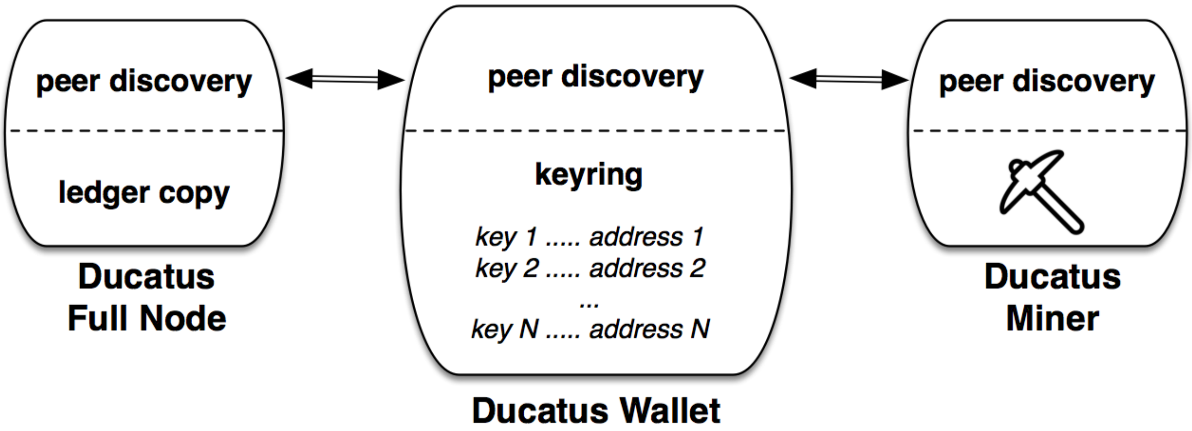
While the block is being mined, wallets continue to report transactions to the blockchain network. A transaction is a transfer of cryptocurrency coin from one wallet to another, based on their public addresses (see below). This transfer may simply be a gift from one wallet holder to another or it may represent the purchase of real world goods and services. Assuming that sufficient miners agree that a transaction is valid, it will be added to the ledger in the blockchain, at which point all wallets in the network recognize that the transfer of coins has taken place.

When miners participate in the mining operation, the one that first solved the problem will receive a reward for participation in the form of the transfer of the transaction fees for all the transactions in that latest block of the blockchain to that miner's wallet. Mobile wallets will not participate in mining as it would degrade the performance of the mobile device and use up significant amounts of battery power but a future version of desktop wallets may support this capability.

Wallets contain a set or "keyring" of public addresses that they use to publicly identify themselves in the ledger. For each public address, a wallet keeps a corresponding secret or "private" key to which only the member will have access. A wallet will typically generate multiple public addresses which can be used for different purposes, and the wallet will have a separate secret key for each of these public addresses. The use of multiple addresses is somewhat akin to the trailing digits in a bank account number that let you know whether a transaction is associated with your checking or savings account. If a Ducatus member wants to use wallets on different platforms, say, one on their iPhone and one on the website, they will need to create a wallet and public address/private key pairs for each platform. Then members will be able to easily transfer coins between these wallets using the Ducatus coin network.

Another function that applications on the Ducatus network provide is "peer discovery" which is what allows wallets, full nodes, and miners to identify each other (see below).

C. Ducatus Coin Network Components



Making a purchase with cryptocurrency is as easy as using a credit card but the way in which the blockchain ledger handles transactions means that the process works more like mail order where the buyer sends a check to the seller's address. Ducatus's partner vendors host their own wallets which accept Ducatus coins for purchases. When a club member wants to make a purchase from a store, the member will tell their wallet app to send the appropriate amount of coinage to the public address provided by the store, and the Ducatus coin network takes care of the rest of the transaction. So, instead of sending a vendor a code as you would with a credit card number, the vendor gives you a public address code to type into your wallet.

Since all of the wallets in the network work together to create a ledger without needing to connect to Ducatus.network, members are able to use their coins as long as there are wallets connected to the Internet. This means that any vendor that supports Ducatus coins can accept them forever. The ledger is distributed between all wallets, so any member can easily see all validated transactions that have been made on the Ducatus coin network and so you can be sure that any transaction verified by the network is valid and that you will receive the coins. There is no need to worry about a third-party tracking your club credit - it's all right there for everyone to see and is cryptographically and permanently secured.

D. Altcoin Technology

At Ducatus we use industry-standard cryptographic algorithms and blockchain technology in order to provide a secure and reliable experience. When creating a new cryptocurrency the industry best practice is to create a "fork" in an existing coin. A fork is a variation to a body of code that renders it distinct from previous versions. This allows us to include all of the best features of the cryptocurrency while making modifications to areas that may have issues or weaknesses.

The cryptocurrency that we have chosen to fork Ducatus from is Litecoin. Litecoin is itself a fork of Bitcoin that has been modified in order to make it easier for developers to create their own cryptocurrencies. Litecoin uses a cryptographic algorithm called "scrypt" that we feel will better meet the needs of Ducatus members and has coin network parameters that enable faster transaction processing. We have forked the source code of open source Litecoin mining and wallet software and modified the parameters of the network in order to create a new coin, the Ducatus coin.

One of the most important changes that we have made to standard Bitcoin parameters allows blocks to be mined more quickly, ensuring speedy transaction processing. Bitcoin blocks take on average 10 minutes to mine, which is fairly long for applications like e-commerce, not to mention selling items at a point of sale like a restaurant or a store (imagine that a shop assistant asked you to wait while they processed your credit card ... and it then took 10 or more minutes for them to get back to you!). The parameters also support a different maximum number of coins, namely a total of 7,778,742,049 coins, this being the 49th number in the Fibonacci Series.

Since the majority of the original tried and tested code is retained, choosing to fork existing source code is considerably more stable and secure than independently developing an entirely new (and thus untested) body of code for a new coin. The information security community has a saying, "don't roll your own crypto". In the vast majority of cases where a cryptographic product has been significantly compromised, it has been because that team did not seek independent testing and verification of the cryptographic algorithms used in their product. Using Bitcoin as a basis for our technology means that Ducatus benefits from all of the hard work and analysis that has already been done on the Bitcoin system. We have also engaged industry-leading experts in information security for additional independent penetration testing to ensure that our additional code is very secure but by forking Bitcoin-based code we have built on the world's most solid cryptocurrency foundation.

Another major benefit of a Litecoin fork is that partner vendors are able to much more easily support the Ducatus coin. There are many existing code libraries that allow e-commerce sites to support Litecoin on a plug-and-play basis, and since we are using a nearly identical API, web stores and cryptocurrency exchanges will be able to very easily adapt those resources for use with Ducatus. Where appropriate we will also work with vendors and the open source community in order to ensure that relevant libraries will continue to be compatible with Ducatus in the years to come.

1. Creating a Wallet

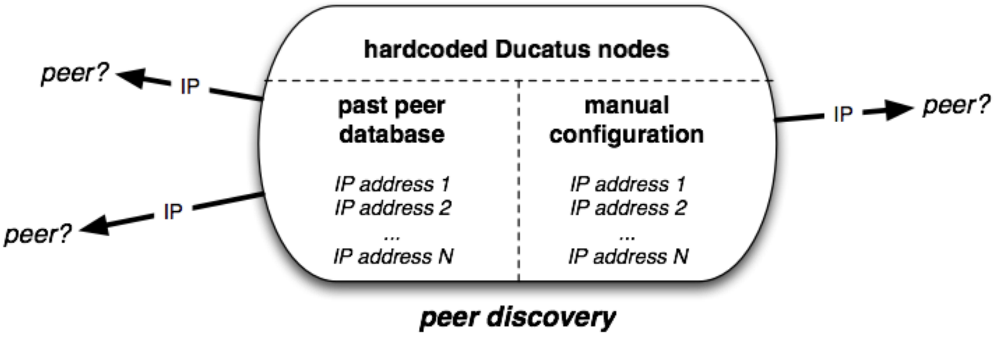
Ducatus.network will provide web-based wallets, which members can use to perform transactions with Ducatus coins via their web browser. For members who want the convenience of having a wallet at their fingertips, we will also offer mobile apps for iOS and Android. Members may also choose to use a desktop wallet, which we will offer for Windows, OS X, and Linux. Any of our wallets can join the Ducatus coin network and send and receive coins.

A member wishing to use a wallet app starts out simply by downloading it and setting it up on their device. When the wallet initializes itself, it will create a private key as well as a public address to receive coins at. The user can then add more key and address pairs to their wallet as desired. We strongly recommend all members to create multiple backups of their private keys. Please note that if you lose those keys, neither you, the Company nor anyone else will be able to access the contents of your wallet! This even includes the web wallet, which we host on your behalf but have no way of accessing directly. We therefore strongly recommend that all our members backup all of their private keys by creating multiple copies on USB sticks and also on paper. We recommend that these then be stored in separate locations such as in a home safe and a bank safety deposit box. These backups are extremely important because, once a member's wallet is set up, only the member will have access to any private keys, Ducatus doesn't have a "back door" into the wallets or any other way to recover coins that are in a wallet that has a lost key.

2. Connecting To The Network

Once the wallet is set up with keys and addresses, it's time to connect to the Ducatus coin network. This network is made up of all Ducatus wallets that are connected to the Internet - it can be seen as a virtual layer on top of the Internet. This technology is similar to that of the peer-to-peer networks that are used for applications like BitTorrent.

Wallets find each other through a process called "peer discovery". When a freshly created wallet is connecting to the internet for the first time, it will use the DNS system to look up a Ducatus wallet server that contains a list of active wallets. Each wallet maintains its own list of peers, and will share that peer list with other wallets. After a wallet has connected the first time, it will first refer to its own saved list of peer wallets that it has successfully connected to in the past. There is also the option to manually add wallet IP addresses into the Ducatus wallet in case neither of these approaches is successful.



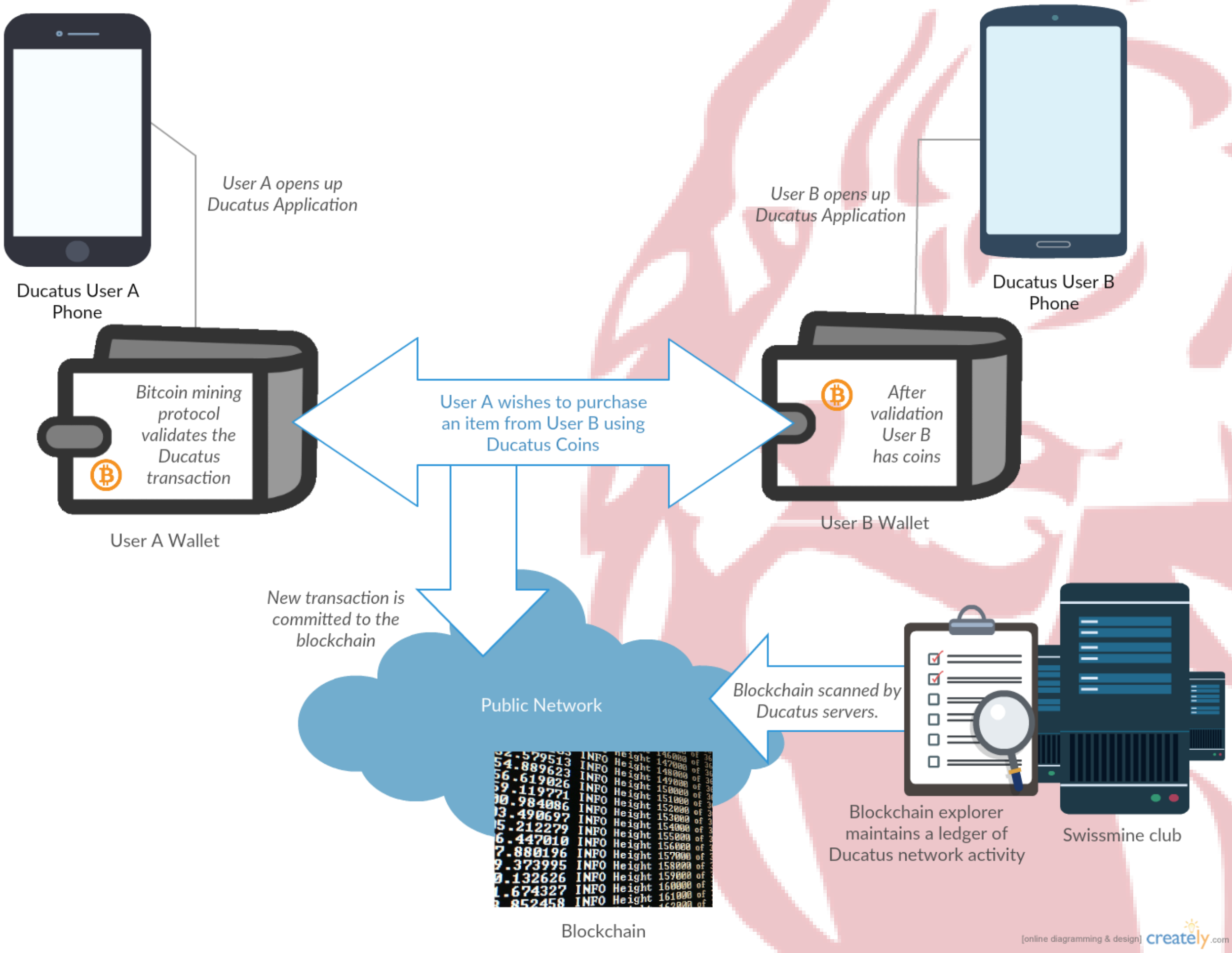
3. Your First Coins

As a Ducatus.network member you'll get your first coins from the Ducatus.network website through the purchase and subsequent conversion of mining credits. You can then associate a public wallet address with your membership profile on the website and this will then tell us where to send your coins each time they are released.

Once your wallet is set up, Ducatus will use its own wallet to initiate the transfer of any coins you are due through a transaction on the Ducatus blockchain. Wallet nodes on the network will mine a block, and then the transactions contained in that block will be added to the ledger and your wallet (and every other wallet) will then recognize that your Ducatus coins have been added to it.

4. Making a Transaction

At this point, your coins are yours and it's up to you what you want to do with them. You may want to make a purchase from one of our vendor partners. To do this you would use their online web shop like any other e-commerce site and when you checkout you simply select 'Ducatus' as your payment method. Also at any time you may of course use your accrued mining credits to either contribute to one of our Ducatus Charity projects or to access some of the excellent educational and training resources which will be made available through the Ducatus Academy.


Ducatus User A Phone
User A opens up Ducatus Application
User B opens up Ducatus Application
Ducatus User B Phone
Bitcoin mining protocol validates the Ducatus transaction
User A Wallet
User A wishes to purchase an item from User B using Ducatus Coins
After validation User B has coins
User B Wallet
New transaction is committed to the blockchain
Public Network
Blockchain
Blockchain scanned by Ducatus servers.
Blockchain explorer maintains a ledger of Ducatus network activity
Swissmine club

One point to remember is that vendor implementations can vary quite a lot from store to store but will typically be something along the following lines: first, they use their wallet to generate a unique public address for your transaction, then they share that public address with you and state the amount that they are going to ask you to pay and at this point, if you're using a desktop wallet, you can just copy-paste the address into your wallet and initiate the transaction by transferring the appropriate amount of Ducatus coins. Many vendors also will give you their wallet address as a QR code so that you can easily scan it with the wallet app on your mobile device without having to type it in by hand. This use of QR codes is very helpful in making sure coins are sent to the correct address.

After you initiate the payment process, the vendor will scan the Ducatus blockchain for the transaction. Once it's been posted to the ledger and validated by enough peers, the vendor will approve your payment and continue the process just as they would if you used any other payment method. At this point the high transaction speed of Ducatus will make a big difference as your transaction will be processed much faster than if you used Bitcoin or Litecoin!

5. Mining Blocks

Once your Ducatus mining application has established peer-to-peer connections with other miners, it's ready to help mine blocks and earn transaction fees. As a user you need to do very little to enable this. As long as your machine is on, connected, and you have started the mining application it will mine in the background with whatever extra computational resources that your machine has available.

What is mining, really? Each block in the Ducatus blockchain must be validated with a cryptographic hash. This hash is derived mathematically by combining all of the prior block hashes with all of the pending transactions that need to be validated. Creating a hash is a one-way operation, so it's cryptographically challenging to find what the new one is; *i.e.* you need to crunch through large numbers of complex computations in order to find the answer but very easy to check once a solution has been found. Miners all work by processing calculations to find the hash, and once one announces a solution, the rest quickly check and validate that solution without having to repeat the work that has already been done. With enough validations that block is then added to the distributed Ducatus blockchain. All Ducatus wallets will then recognize the new block and once the new block has been recognized, it cannot be changed. This puzzle-solving approach is used to validate all Ducatus transactions at a steady rate.

We initially considered using SHA256 as the algorithm for Ducatus, but, after further analysis, have chosen to to use scrypt (pronounced "s-crypt"). This selection was primarily made because we wanted to avoid situations where users with specialized ASIC or GPU hardware would have a significant advantage in mining over our regular members. SHA256 mining benefits from processing power while scrypt mining is primarily a memory-intensive approach. This means that more members should be able to participate in the Ducatus mining network on an even playing field basis.

6. Fund Recovery

As long as a member has created a paper or electronic backup of both their private and public keys they will always be able to access their coins on the Ducatus blockchain, no matter what happens to their wallet app, computer, or phone. This is because access to the coins doesn't depend on the wallet itself but rather the record of transactions which is recorded in the ledger on the blockchain. This means that if something goes wrong, all the member needs to do is download the wallet app and give it the private keys that they have safely stored. The new wallet will then check those keys against addresses in the blockchain and automatically calculate the number of Ducatus coins available to each key.

It is important to remember that, once coins have been issued to a member, they are 100% in that member's control. Ducatus is unable to access the contents of a member's wallet and cannot modify their wallet contents or the Ducatus blockchain in any way. This is part of what makes Ducatus secure for members but it also means that members should also be very careful with their wallet keys and must make multiple back-ups of their private keys to protect against the accidental loss of their coins.

7. Pre-Mining

Ducatus is unusual amongst altcoins because our cryptocurrency coins are all pre-mined. Historically, most coins have used block mining as a way to provide rewards for the mining of new blocks and the building of the blockchain. Using the Ducatus approach however, miners will still earn rewards in the form of transaction fees, but we will instead start with a known pool of Ducatus coins and distribute them to our members through our network marketing, the DucatusX programme and the associated compensation system to ensure rapid widespread adoption all around the world.

Pre-mining the coins means that rather than having to buy and operate expensive mining equipment or paying for the right to participate in a cloud-mining operation which may or may not exist, Ducatus members can simply buy coins from the Company. This gets coins into the hands of members in a faster and more transparent way, and also provides the Company with funds which it can then use to maintain and develop the Ducatus network and Crypto-Economy, as well as to develop relationships with external merchants and third-party exchanges. All of these things contribute to an increased circulation of the coins, and help fuel demand for the coins both from members as well as non-members - both of which are critical in terms of creating a real role for Ducatus in the global economy.

E. Stockpile Management

While we have made Ducatus as decentralized and distributed as possible, there are still some considerations with regard to managing the pre-mined coin stockpile. Fortunately, handling large wallets is a known (and therefore well-understood) challenge in the cryptocurrency industry and so the industry has evolved to support a fairly secure and robust process. Cryptocurrency exchanges face a similar problem as they have many members who buy coins from and sell coins to them. When a user has coins on an exchange to convert between currencies, the coins are temporarily held by the exchange's wallet. This makes the exchange a tempting target for adversaries.

Best-practices have evolved to ensure wallet security for exchanges and systems like Ducatus. The problem is not just a technical one but that of creating and adhering to a sound security policy. The greatest threat to any company that holds significant volumes of cryptocurrency is that an attacker will compromise their wallet security either by obtaining their private keys or by taking over the wallet software itself. We use a three-pronged approach to mitigate this threat:

1. Hot and Cold Wallets

The first approach to securing wallets is to simply not make them available to online attackers. It is impossible to do this for all wallets on an exchange or a system like Ducatus because they must be online at certain times in order to send coins to members. However that does not mean that Ducatus needs to keep its entire coin bank online at any given moment. This has led to the concept of “hot wallets” and “cold wallets”.

Recall that a wallet has two components - private keys and public addresses. The private keys are required to process blockchain ledger transactions on behalf of the wallet. Any wallet that has an Internet-connected component that knows its private keys is referred to as a “hot wallet” for these purposes. It’s live, online, and something that we don’t want an attacker to get at. The wallets used by Ducatus to transfer funds to members must be hot in order to send transactions to the blockchain. Ducatus hot wallets will be highly secured when operating and will be online only during a release of coins to the network or as otherwise required by their respective element of the Ducatus Crypto-Economy.

A “cold wallet” is a wallet that is not connected to the Internet. However, while a wallet that isn’t connected to the Internet and hence to the Ducatus coin network can’t send transactions, it can *receive* transactions. Cold wallets are any wallets that don’t have a live connection, but that we do know one or more public addresses for. The private keys might be in a safe deposit box, but the public addresses are known to the blockchain ledger. Therefore, a cold wallet can receive funds over the blockchain even though it is not actively connected and it can still act as a safe and secure repositary of coins. Our cold wallets will then be subject to very strict multi-signature protocols which introduce addtional, very significant barriers to unauthorised transfers of coins.

Industry best practice is “wallet splintering” which refers to the breaking up of the funds that are available to an exchange between a set of hot and cold wallets. This means that even if one wallet is successfully attacked the funds in the other wallets are still intact. Spreading items across many wallets decreases the value of any one wallet, making it far more difficult to obtain any items of significant value and thus much less attractive to an attacker. Cold wallet private keys are stored in a physically secure location off of the Internet, and hot wallets are configured to only have as much coin as is expected to be needed on a day-to-day basis. By using this approach we ensure that at any given time the incentive for an attacker, and thus our threat profile, is minimized.

2. Code Quality

Our security is only as good as our software, making the software used to connect the *ducatus.network* website to its hot wallets a key target for attackers; the hot wallets are where an electronic attacker could get directly at Ducatus coins. We have engaged with industry experts in information security to ensure that our process and technology is security-centric, especially when it comes to our hot wallets.

We use a combination of human review (both third-party audits as well as the use of an internal change management board whenever significant source changes are made) as well as electronic analysis tools that can help uncover potential issues such as command injection points and possible logic flaws. This is not something that we will do once - security is an ongoing concern and is built in to our process. Our security protocols will be live all day every day working hard to protect your network and your coins.

3. Immediate Distribution of Coins

Each time that coins are released to the member network, they will be immediately substituted for the members’ existing balance of mining credits, and those mining credits will be cancelled. This reduces the number of coins that are in the Ducatus hot wallet between coin releases to an absolute minimum and, when a release is upcoming, allows us to stock the hot wallet on as as required basis which will limit the potential attack window to a very short period of time which will make the Ducatus wallets a very difficult and thus much less appealing target for attackers. Members will then be able to take appropriate steps to protect their own coins safe in the knowledge that they, as an individual with a relatively small amount of coins, are much less likely to attract attention from an attacker.

F. The Ducatus Crypto-Economy

Bitcoin's development faced a number of challenges but the issue which took longest to solve, and arguably is still ongoing, was how to build acceptance and trust amongst the a significant global user base. Without user acceptance there are fewer users of the coins and thus lower demand which in turn slows the rate at which the coin penetrates the global market. Our goal is to achieve the same level of market penetration as Bitcoin within a much shorter period and in order to facilitate this we are establishing the Ducatus Crypto-Economy.

The Ducatus Crypto-Economy is a group of businesses which are or will be established under the auspices of the Ducatus Group, each either accepting Ducatus and/or other crypto-currencies in return for goods and services. These businesses are being rolled out in concert with the launching of our Ducatus coins and will enable holders of the coins to have confidence that the coins have real value outside the crypto community. We believe that this is a critical part of building Ducatus' global presence and will serve as an important anchor for Ducatus' acceptance globally.

Crypto-Economy businesses already launched include:

- Crypto-currency production
- Network marketing
- Charity projects

Additional businesses being considered for roll-out in the next 18 months include:

- E-commerce/Onlineshop
- DTCafé (crypto-cafe)
- Crypto-currency mining
- Travel agency
- Trading and crypto-exchange
- Real estate/property
- Crypto-banking

Further details of each of these ventures will be released through our websites at www.ducatusdigital.com, www.ducatus.network, and through management and company pages on facebook and other social media channels.

G. Progress

Ducatus development and coin pre-mining is already underway. Major accomplishments to date include:

1. Selection of Litecoin as a coin code base and Copay as a wallet code base.
2. Establishment of all coin parameters and initialization of the Ducatus blockchain.
3. Creation and utilization of a Linux-based Ducatus miner for pre-mining.
4. Creation of a prototype Ducatus mining network.

Upcoming accomplishments:

1. Selection of blockchain explorer and integration code bases.
2. Finalization of Ducatus mining network architecture.
3. Launch of Ducatus web wallet and block explorer, integrated with Ducatus.network.

4. Launch of Ducatus member desktop and mobile wallets.
5. Ducatus coin integration with the Ducatus shop and other Crypto-Economy businesses.
6. API for Ducatus integration with third-party vendors and shop POS systems.
7. API for Ducatus integration with third-party cryptocurrencies exchanges to allow independent trading and listing of Ducatus coins.

Key deliverables, in sequence, will be:

- Linux miner (done)
- Pre-mined Ducatus coins (in progress)
- Windows, OS X, Linux, Android, and iOS wallets (prototype complete)
- Web-based wallet and block explorer; integrated with Ducatus.network
- Third-party vendor integration instructions/examples/libraries.
- Internal Ducatus coin trading exchange
- Third-party exchange integration API

H. Conclusion

Ducatus is delivering a robust cryptocurrency solution for Ducatus.network members. We have devised a well-thought-out architecture based on industry best practices. This means that we can realise our vision for a best-in-class user experience and provide a secure and dependable crypto-currency which can take its place alongside bitcoin as one of the standard bearers of the crypto-currency revolution.

Summary Specifications: Ducatus Coin

Name	Ducatus Coin
Symbol	DTC
Forked from	LiteCoin -- https://litecoin.org/
Consensus approach	Proof of Work
Hashing algorithm	scrypt
Max_Coins (pre-mined)	7,778,742,049
Reward system	Mining paid for by transaction fees
Average Block Time	60 seconds
Genesis block date	January 04, 2017

Genesis nonce (pre-hash):

“Qvidam posuit unum par cuniculorum in quodam loco, qui erat undique pariete circundatus, ut sciret, quot ex eo paria germinarentur in uno anno: cum natura eorum sit per singulum mensem aliud par germinare; et in secundo mense ab eorum natiuitate germinant. Quia suprascriptum par in primo mense germinat, duplicabis ipsum, erunt paria duo in uno mense. Ex quibus unum, silicet primum, in secundo mense geminat; et sic sunt in secundo mense paria 3; ex quibus in uno mense duo pregnantur; et geminantur in tercio mense paria 2 coniculorum; et sic sunt paria 5 in ipso mense; ex quibus in ipso pregnantur paria 3; et sunt in quarto mense paria 8; ex quibus paria 5 geminant alia paria 5: quibus additis cum pariis 8, faciunt paria 13 in quinto mense; ex quibus paria 5, que geminata fuerunt in ipso mense, non concipiunt in ipso mense, sed alia 8 paria pregnantur; et sic sunt in sexto mense paria 21; cum quibus additis parijs 13, que geminantur in septimo, erunt in ipso paria 34, cum quibus additis parijs 21, que geminantur in octauo mense, erunt in ipso paria 55; cum quibus additis parijs 34, que geminantur in nono mense, erunt in ipso paria 89; cum quibus additis rursum parijs 55, que geminantur in decimo, erunt in ipso paria 144; cum quibus additis rursum parijs 89, que geminantur in undecimo mense, erunt in ipso paria 233. Cum quibus etiam additis parijs 144, que geminantur in ultimo mense, erunt paria 377, et tot paria peperit suprascriptum par in prefato loco in capite unius anni. Potes enim uidere in hac margine, qualiter hoc operati fuimus, scilicet quod iunximus primum numerum cum secundo, uidelicet 1 cum 2; et secundum cum tercio; et tercium cum quarto; et quartum cum quinto, et sic deinceps, donec iunximus decimum cum undecimo, uidelicet 144 cum 233; et habuimus suprascriptorum cuniculorum summam, uidelicet 377; et sic posses facere per ordinem de infinitis numeris mensibus.

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