



CHRONO
LOGIC



CHRONO LOGIC

FIRST PROOF-OF-TIME TOKEN

Introducing the DAY Token, the first
Ethereum asset pegged to time

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PREFACE

TIME, VALUE & THE BLOCKCHAIN

Time is immutable and irreversible. Time exists, it is value. Time is equally used in nature and artifice; however, its distribution among humans' life is unknown and unequal. Its total supply is unknown.

Throughout the history of mankind, man has assigned value to a variety of objects and concepts including food, shelter, resources, gold, fiat money & even cryptocurrencies. The value of each often fluctuating depending on fundamental & psychological factors.

Traditional currencies have been pegged to gold, other currencies or even nothing. The first generation of cryptocurrencies have been based on the concepts of mining & staking.

In reality, true value is time. Unlike other resources that can be gained & lost including all of the above objects & concepts, time is the only asset which cannot be regained. Once lost it is lost forever. It cannot be gamed and although the exact supply of time is ultimately unknown it is the scarcest resource of all.

ChronoLogic considers time as value. Rather than proof-of-work or proof-of-stake mechanisms, ChronoLogic works on proof-of-time. In its first use-case ChronoLogic pegs time to a store of value token named DAY based on the Ethereum blockchain. This cryptocurrency enables future value to be independent of third party assets that can be harvested such as electricity & processing power in the case of traditional cryptocurrency mining. The only way additional DAY can be produced is via the passage of time.

The blockchain offers the right means to implement more of the features of Time. ChronoLogic expands the possibilities of using time in blockchain projects in industries such as finance, transportation & eCommerce.

“TIME IS THE COIN OF YOUR LIFE. IT IS THE
ONLY COIN YOU HAVE, AND ONLY YOU
CAN DETERMINE HOW IT WILL BE SPENT.”

— CARL SANDBURG —



TIME, VALUE & THE BLOCKCHAIN



ChronoLogic - project introducing the concept of Proof-of-Time for blockchain technologies initially with the launch of the DAY Token and ultimately through its own protocol



DAY Token - first Proof-of-Time ERC20 token integrating the concept of TimeMints, which mint additional DAY based on the predefined MintingAlgorithm ; DAY will be used as payment to launch future third party Proof-of-Time projects on the Chronos platform while contributions to these projects during any token sale periods will be via DAY



TimeMint - One of 3,333 minting addresses with the power to produce additional day depending on the MintingAlgorithm; the first TimeMint is denoted as TimeMint0001 with the last denoted as TimeMint3333



MintingAlgorithm - The halving of a TimeMint's ChronoPower; halving occurs every 88 days



ChronoEra - 88 day periods during which the daily ChronoPower of a TimeMint stays the same; at the end of each ChronoEra halving of the ChronoPower occurs; for example, ChronoEra II would be days Days 89 to 176 after the birth of the DAY Token



ChronoPower - The minting power of a specific TimeMint; each of the 3,333 TimeMints has a different ChronoPower ranging from 0.5% to 1% additional DAY tokens minted per day



DayZero - The birth of the ChronoLogic smart contract at which point ChronoPower starts producing additional DAY in each TimeMint on a daily basis



Chronos - the future Proof-of-Time Platform on which additional Proof-of-Time tokens & projects will be launched



TimeTx - the TimeMint transfer process

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THE BACKGROUND OF CHRONOLOGIC

WHAT IS CHRONOLOGIC?

ChronoLogic is the vision of time merging with the blockchain. It's an introduction of the concept of Proof-of-Time for blockchain technologies & practical applications.

The first phase of the ChronoLogic project is the DAY token after which the concept will be expanded to allow practical implementation of Proof-of-Time by other projects & entities.

WHAT IS THE DAY TOKEN?

The DAY Token is ChronoLogic's implementation of the Proof-of-Time concept on the Ethereum blockchain.

The day token is an ERC20 token based on the Ethereum Blockchain. In the next stage of the project, ChronoLogic will have its own platform --Chronos-- which will allow the launching of additional Proof-of-Time tokens. DAY tokens will be transferable in the case that another token is launched on a separate blockchain developed by ChronoLogic & additionally DAY tokens will be used to launch Proof-of-Time Blockchain projects such as the ones described in the Use Case section.

RELATIONSHIP BETWEEN CHRONOLOGIC & THE DAY TOKEN

ChronoLogic's first implementation of the Proof-of-Time concept is the DAY Token with future use cases expanding to Proof-of-Time concepts implemented by corporations and other third parties.

The DAY token is an ERC20 wallet compliant token based on the Ethereum blockchain. It is the first phase of the ChronoLogic project and the first implementation of Proof-of-Time on the blockchain.

The DAY Tokens will be used 2-fold first as a store of value, pegged to time, that over time mints additional DAY tokens in the respective TimeMints and second spent by companies & individuals to launch their own Proof-of-Time token once ChronoLogic's future Chronos Platform is released. The supply of DAY is limited and like time once the ICO is over it is immutable.



THE BLOCKCHAIN'S “TIME” PROBLEM

Time is the most valuable “asset” for humans yet most of mankind measures an individual’s wealth by the amount of resources the person has been able to accumulate often ignoring the amount of time sacrificed in exchange for these transient resources.

For example, even with most cryptocurrencies the concept of mining is based on the amount of resources such as electricity & processing power an individual or pool can accumulate when determining who to reward.

ChronoLogic introduces a new way to peg time to assets. For example, in the future, ChronoLogic will create reward & punishment systems, model investment growth & implement this concept in other real world scenarios all based on time.

In the same way that mankind uses Gold and Fiat as items of value, ChronoLogic will implement the use of time & its value into blockchain technologies.

ALL THAT REALLY BELONGS TO
US IS TIME; EVEN HE WHO HAS
NOTHING ELSE HAS THAT.

— BALTASAR GRACIAN —

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PROOF-OF-TIME & THE BLOCKCHAIN

MINTING LOGIC, TIMEMINTS & TOKEN SUPPLY

The DAY smart contract has advanced minting capabilities and a halving mechanism to limit the total supply of DAY in the future.

Every contributor in any phase of the token contribution period will receive a minting address called a TimeMint with a specific minting power called ChronoPower.

ChronoPower ranges from 1% to 0.5% minting additional DAY in the respective TimeMint based on the TimeMint's current balance of DAY. ChronoPower decays linearly among contributors based on their contribution order. The first contributor receives TimeMint0001 with the highest ChronoPower of 1% & the last TimeMint receives the lowest ChronoPower of 0.5%.

The original ChronoPower, $Mo(i)$, assigned to TimeMint $A(i)$, with the TimeMint number equal to i is:

$$Mo(i) = Max - \frac{(i - 1)(Max - Min)}{TotalTimeMints - 1}$$

Where:

- Max is the maximum ChronoPower, which equals 0.01
- Min is the minimum ChronoPower, which equals 0.005
- TotalTimeMints equals 3,333

This can be reduced further to:

$$Mo(i) = 0.01 - \frac{0.005(i - 1)}{3332}$$

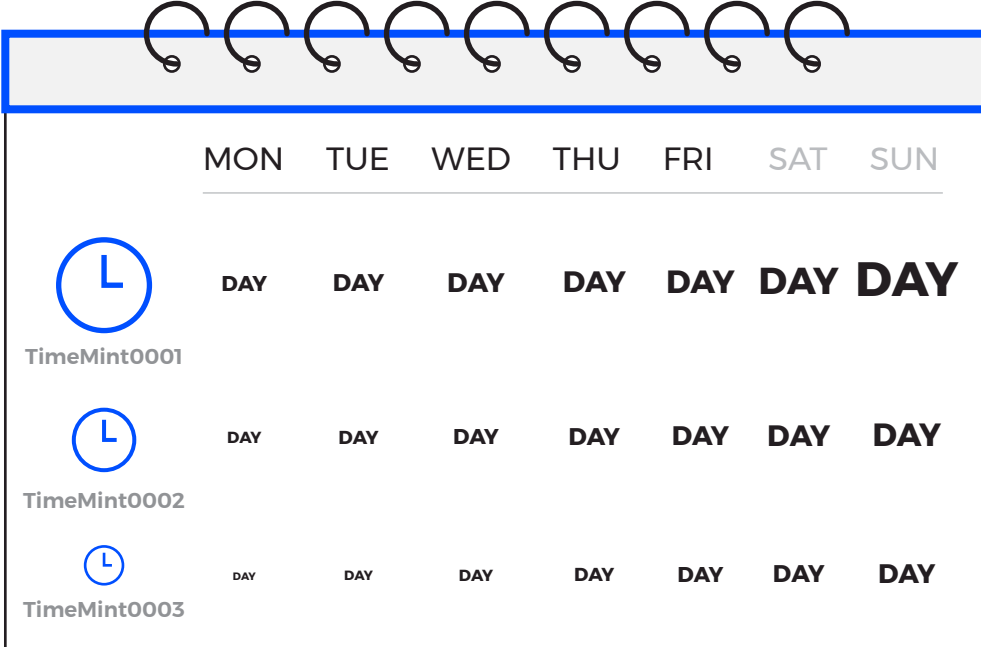
ChronoPower of X% means that the TimeMint is able to produce X% of its balance and add it to the current balance at the end of the day.




The formula used to calculate the balance of a TimeMint on day d , is:

$$B(i, d) = B(i, d - 1) \times (1 + Mc(i, d))$$

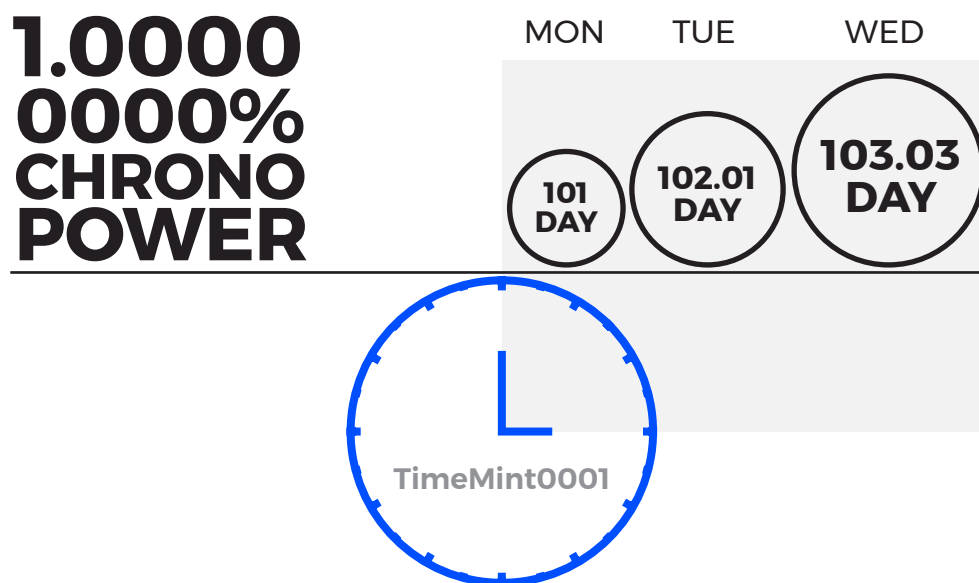
Where:

- $B(i, d-1)$ is the balance of TimeMint A(i) on the previous day
- $Mc(i, d)$ is the ChronoPower of TimeMint A(i) on day d
- d is counted from DayZero where $d = 0$ on DayZero



	MON	TUE	WED	THU	FRI	SAT	SUN
	DAY	DAY	DAY	DAY	DAY	DAY	DAY
TimeMint0001							
	DAY	DAY	DAY	DAY	DAY	DAY	DAY
TimeMint0002							
	DAY	DAY	DAY	DAY	DAY	DAY	DAY
TimeMint0003							

For example, if a TimeMint has 1% as its ChronoPower & 100 DAY as its balance, then on the first day the TimeMint will mint 1 DAY token, which will be added to the TimeMint's balance resulting in 101 DAY. On the second day the TimeMint will mint 1% of its 101 DAY tokens totaling 1.01 DAY resulting in a balance of 102.01 and so on.



There are also different ChronoEras, which have halving periods after which the ChronoPower of the each TimeMint is reduced by half of its current ChronoPower.

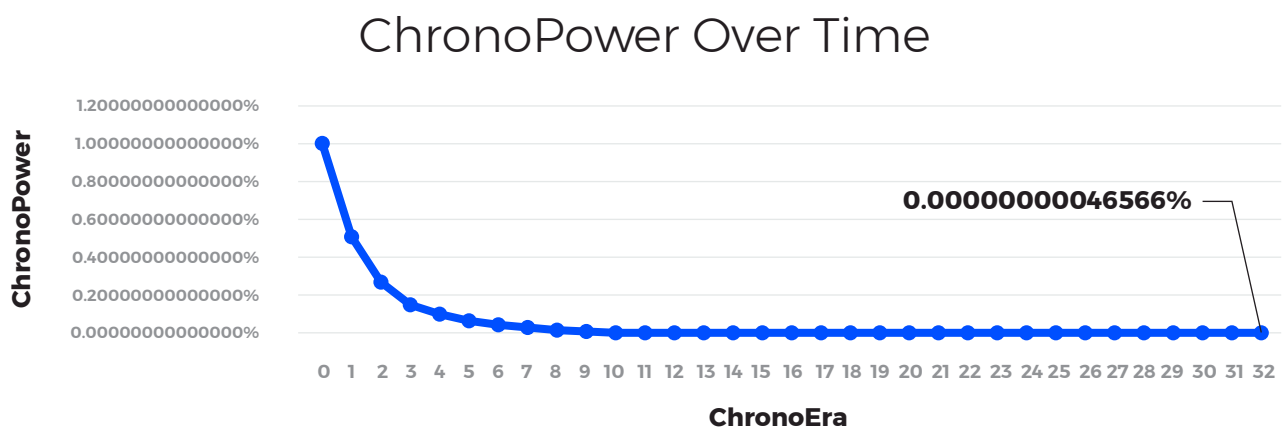
The ChronoPower of TimeMint $A(i)$ on day d with halving occurring every Q days is given by:

$$Mc(i, d) = \frac{Mo(i)}{2^{\text{floor}(\frac{d}{Q})}}$$

Where:

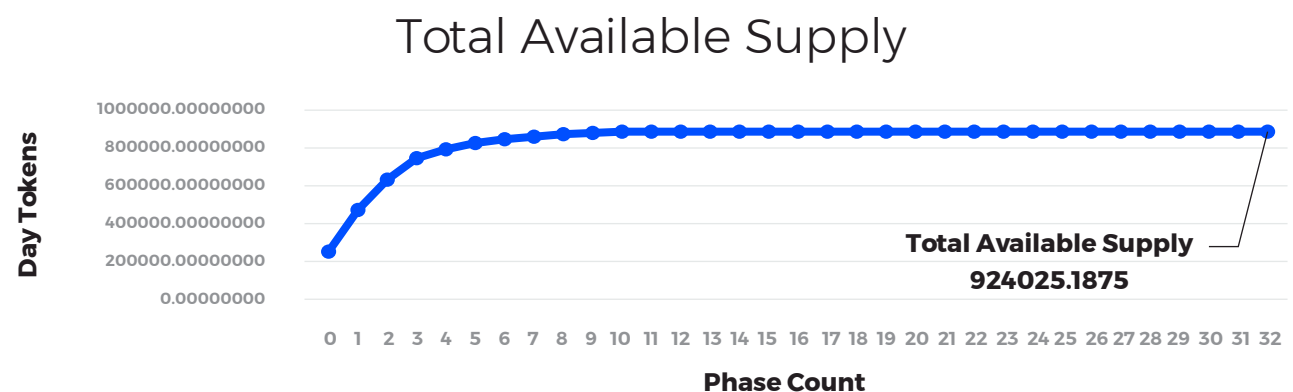
- $Mo(i)$ is the original ChronPower of a TimeMint with ID i .
- Q is the duration of the ChronoEra (halving cycle of 88 days)
- Basically, $\text{floor}(d/Q)$ represents the ChronoEra.

The ChronoPower of TimeMints holding DAY tokens is halved every 88 days. See how the ChronoPower of TimeMint0001 decreases over time in the below diagram:



Total tokens created on DayZero depend on the amount of ETH contributed in each phase; however, there is a hard cap of 38,383 ETH during the Regular Contribution Period, which will result in the Regular Contribution Period closing even if all of the 3,333 TimeMints have not been assigned.

An example of total token supply in the entire ecosystem can be calculated as follows. The below diagram shows the total token supply after each ChronoEra. If every contribution to each TimeMint is 3 ETH then hypothetically the total supply results in the following number of DAY tokens:



After the crowdsale closes & all non-reserved TimeMints are assigned, the TimeMints will start minting DAY tokens.



TIMETX - TIMEMINT TRANSFER & ACQUISITION POST-ICO

TimeMint holders may sell their TimeMint to a buyer. ChronoLogic has a process called TimeTx that allows the sale/transfer of TimeMints to a buyer/receiver. This construct is separate and unrelated to the auction function.

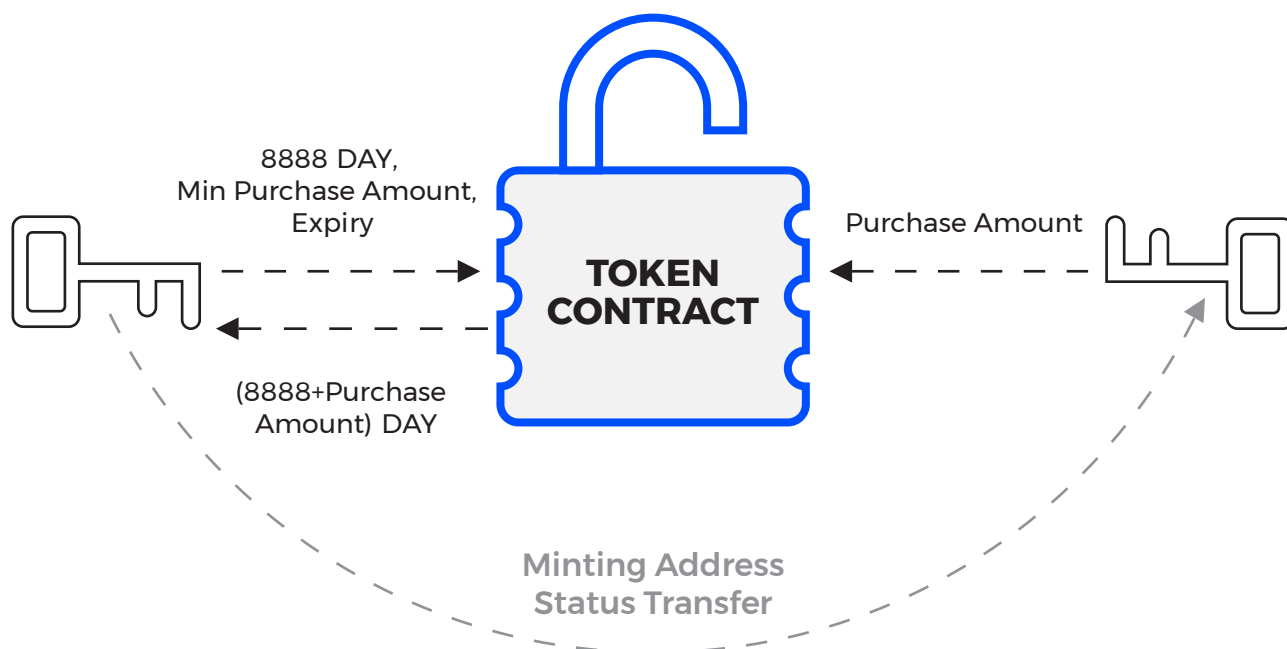
To initiate TimeTx, the seller needs a minimum balance of 8,888 DAY tokens in their TimeMint. The seller then specifies the minimum bid in DAY tokens & the expiry block number to start TimeTx. During the TimeTx process the seller's 8,888 DAY tokens are locked and not accessible until the sale is over or the expiry block number is reached.

During TimeTx, a buyer can send the requested price to the TimeTxContract to acquire the TimeMint. Any transactions lower than the seller's price are automatically rejected & receive a refund of their DAY tokens. The first one who has transferred the requested amount of DAY tokens or more will acquire the TimeMint from the seller.

Once a buyer sends the correct amount of DAY, the buyer acquires the TimeMint. The total tokens involved in the transaction including the seller's 8,888 DAY tokens plus the buyer's amount are then be transferred to the seller's wallet.

The TimeTx flow can be seen below:

1. Seller sends 8,888 DAY to the TimeTxContract specifying the minimum reserve price denominated in DAY & an expiration time resulting in the unlocking of the seller's TimeMint.
2. Buyer sends DAY to the TimeTxContract which equals or exceeds the reserve price.
3. Buyer acquires the TimeMint converting his address into a TimeMint.
4. All DAY tokens including the original 8,888 DAY are transferred to the seller.
5. If no buyer surfaces then the 8,888 DAY is returned to the seller after the expiry block number is reached.



TimeMintAuctions

This is a possible functionality that will be released in the future with advanced capabilities implementing various Time constructs into these auctions. ChronoLogic is reserving 88 TimeMints for release in the future via different auctions.



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CHRONOLOGIC & THE REAL WORLD

CHRONOLOGIC'S GOALS

ChronoLogic will ultimately launch a platform, which will allow other users to launch their own Proof-of-Time tokens. The use cases for Proof-of-Time tokens are varied and will grow as additional projects are launched.

The goal of the crowdsale is to launch additional Proof-of-Time blockchain projects implementing ChronoLogic's technology.

PROOF-OF-TIME BLOCKCHAIN PROJECTS & IMPLEMENTATION GOALS

ChronoLogic 2017 Goals:

- Develop a Proof-of-Time mechanism for the finance space.
- Beta test the implementation of a finance Proof-of-Time use case with ChronoLogic's crypto private equity partner Wired Investors.
- Develop an auction functionality for a decentralized exchange of DAY tokens & DAY TimeMints.
- Finalize development roadmap for the future Proof-of-Time Chronos Platform.
- Partner, support & launch 6 Proof-of-Time blockchain projects.

ChronoLogic's 2018 Goals:

- Deploy the finance Proof-of-Time use case for the public.
- Work with other partners to beta test additional Proof-of-Time use cases.
- Develop the open Proof-of-Time Chronos Platform to enable the launch of Proof-of-Time tokens by third parties.
- Partner, support & launch 18 Proof-of-Time blockchain projects.

USE CASES

Proof-of-Time blockchain projects & use cases that will be supported from contributions may include implementations on the future Proof-of-Time Blockchain such as the following.

Finance Use Case

In finance, many securities including debt securities are heavily dependent on time.

For example, a debt instrument with a 5 year term paying 12% is effectively a smart contract that can be housed on the future Proof-of-Time Blockchain.

To define the roles:

- Company: Issuer of the debt
- Investor: Subscriber of the debt
- Debt Raise Goal: 10,000 DAY
- Interest Rate: 12%
- Terms: Balloon payment after 5 years
- COM: Company's token
- 1 DAY = 5 COM

The Company launches their Proof-of-Time token to help raise & pay their crypto debt via the issuance of a smart contract. When an Investor sends DAY to the specific receiving address the Investor in return receives the Company's token COM. Investor A sends 200 DAY and receives 1,000 COM.

Chronologic's Proof-of-Time technology automatically identifies the sending address as a TimeMint and additional COM tokens are produced as interest accrues. In order to pay the debt back the Company needs to send back the respective amount of DAY borrowed plus the additional amount accrued.

Interest payments can also happen automatically by the receiving address automatically sending from its DAY balance the respective interest payment to any addresses holding COM. Because of the interconnectedness of the blockchain, investors can trade COM between each other and repayment then happens across the network depending on who holds COM.

TRANSPORTATION USE CASE

When checking in for a train one supplies their address. If the train is delayed the smart contract is activated. If the train is delayed then for every minute or 10 minutes that it is delayed the customer receives the company's Proof-of-Time token. This token can then be redeemed later for cash or used in order to buy additional tickets from the Company depending on the company's policy, which is modeled in their smart contract.

A MAN WHO DARES TO WASTE
ONE HOUR OF TIME HAS NOT
DISCOVERED THE VALUE OF LIFE.

— CHARLES DARWIN —

CONCLUSION

Proof-of-Time and the various concepts presented in this whitepaper are necessary for the evolution of blockchain technologies & the application of the blockchain to real world challenges.

Support of these projects is vital for the long-term implementation of the above concepts & ChronoLogic will lead these projects. The Time is now to merge Time with the Blockchain.



LEGAL DISCLAIMER

NOT AN OFFER TO SOLICIT SECURITIES & RISKS ASSOCIATED WITH CHRONOLOGIC & DAY

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- (i) reliance on any information contained in this document,
- (ii) any error, omission or inaccuracy in any such information or
- (iii) any action resulting therefrom.

The ChronoLogic DAY token, or “DAY”, is a cryptographic token. DAY is not a cryptocurrency. At the time of this writing,

- (i) DAY cannot be exchanged for goods or services,
- (ii) DAY has no known uses, and
- (iii) DAY cannot be traded on any known exchanges. DAY is not an investment.

There is no guarantee – indeed there is no reason to believe – that the DAY you purchase will increase in value. It may – and probably will at some point – decrease in value. DAY is not evidence of ownership or right to control. Controlling DAY does not grant its controller ownership or equity. DAY does not grant any right to participate in the control, direction or decision making of ChronoLogic.



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