

NebulaGrid

The Decentralized Computational Network
Blockchain-as-a-Service solutions built on the blockchain



Whitepaper

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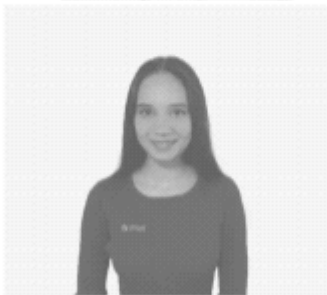
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Introduction



This paper provides an in-depth description of the NebulaGrid Ecosystem and its novel subcomponents which are released or pending future release. The NebulaGrid Team aims to make this paper accessible to everyone by providing non-technical summaries of the entire ecosystem. Individual technical papers for each project component are in-process and will be released as they become available.

Note: NebulaGrid started life as “Zelcash”, or simply “Zel”. This project was rebranded to the NebulaGrid nomenclature March 27th, 2021. There are possible places in code, literature, and publications that still reference “Zel”.

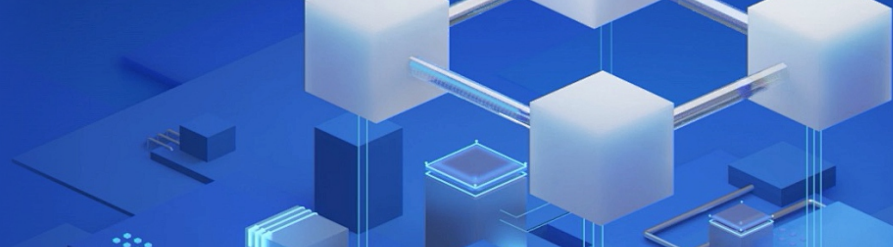
Executive Summary

The NebulaGrid Ecosystem is a suite of decentralized computing services and blockchain-as-a-service solutions which offer an interoperable, decentralized, AWS-like development environment. NebulaGrid utilizes a native POW (Proof-of-Work) coin to power this ecosystem, providing incentive for hardware hosters, governance on-chain, and bad actor mitigation via staking requirements for running hardware. The NebulaGrid operating system runs on top of Linux to provide the network with verified and benchmarked high-availability compute power and utilizes the blockchain to ensure transparency in governance operations. NebulaGrid node operators can choose from three tiers of hardware requirements to stand up after providing the necessary NebulaGrid capital soft-locked in their wallet. This allows anyone to be rewarded for providing hardware to the network, from anywhere in the World.

Unresolved Blockchain Needs

Ignoring the overwhelming number of blatant Bitcoin/currency and Dash/masternode projects that litter the space without contributing new features or ideas, there is still a huge number of projects aiming to solve a small handful of blockchain problems. Competition between projects to solve the same problem is always healthy, but this can negatively impact the speed of new emerging technologies being introduced to the world. The next generation of blockchain technology requires answers to these problems along with a set standard approach to implementing the technology and package its use into a digestible set of tools for current and future developers. NebulaGrid has built these necessary development tools to speed up the usage of blockchain solutions through creating real-world use cases and the underlying technologies necessary to build these products and platforms. The NebulaGrid Ecosystem has a plethora of current and future technologies to offer the world, and we are always working on adding more features to our offering through partnerships with other crypto projects in the space via strategic partnerships and our NebulaGridLabs incubator (see below). With these partnerships, we will help speed up delivery of usable blockchain products to the masses in easy-to-use applications

Introduction



and products. Projects that are currently working on single, large-scale blockchain problems can save time and resources by leveraging the NebulaGrid Network for scalable, decentralized enterprise-grade hardware resources to allow them to focus on their own projects. Partnerships will also help bring together the fractured crypto space to create an ecosystem of complementary products that work seamlessly together.

All blockchain teams and believers are in this together, building a new and exciting digital infrastructure to support the future.

Why blockchain needs the NebulaGrid Ecosystem?

We believe NebulaGrid is vital to the blockchain space as it provides critical infrastructure, development tools, and industry experience necessary to quicken the pace of blockchain solution rollouts.

There are many modules to the Ecosystem, which are detailed below, that offer novel and easy-to-use products for both developers and consumers. By building a complete portfolio of blockchain resources, new technologies can emerge faster with more real-world use cases and ad-

vanced features so that crypto can continue its growth towards mainstream usage. NebulaGrid allows us to build our own novel blockchain products, for strategic partners to leverage computing

power and services they require to thrive, and for independent blockchain developers to launch their ideas efficiently and effectively.

NebulaGrid is a native crypto asset with its own blockchain.

There are NebulaGrid “parallel assets” to allow the NebulaGrid governance coin to function on all DeFi protocols including Kadena, Binance Smart Chain, Ethereum, Tron, Solana and more, over time.



NebulaGrid Ecosystem & Core Modules

Governance POW coin & distributed ledger

Secure blockchain Parallel assets
Utility
Governance

NebulaGrid is a fair-mined, proof-of-work cryptocurrency that acts as a utility asset for onboarding to the Ecosystem and powering the transaction of information across the Ecosystem. The asset also acts as the main incentivization for operating a NebulaGridNode: enterprise-grade server hardware powering the Ecosystem. NebulaGrid can be attained via GPU mining, trading on available exchanges, and as rewards for operating nodes. Our Ecosystem is a community-based project with a foundation that represents the community's voice and protects the community's wishes for the project.

NebulaGrid is a fork of Zcash. Our team strives to implement the necessary security and performance improvements from Zcash to stay lock-step with the Zcash team as NebulaGrid continues to commit its own improvements to the codebase. The basic coin parameters for NebulaGrid are:

ainnet Launch	Jan 31st, 2018	Emissions [Halving]	2.5 Years
Block Reward	150 NebulaGrid [Launch] 75 NebulaGrid [Now]	Mining Algorithm	NebulaGridHash [Equihash 125.4]
Block Time [TTF]	120 seconds	Reward ratio [POW/Nodes]	50/50
Consensus Type	Proof-of-Work	RPC/P2P ports	16124/16125

Table 1: NebulaGrid chain parameters

Other major differences of NebulaGrid from Zcash is our commitment to remaining ASIC-resistant by continually changing the POW algorithm to stay ahead of ASIC/FPGA1 development and the addition of the NebulaGridNodes layer, outlined below.

The critical need for the NebulaGrid distributed ledger is to provide a complete and efficient asset that can operate seamlessly with every module in the Ecosystem. NebulaGrid gives the Ecosystem its own master

NebulaGrid Ecosystem & Core Modules



transparent ledger, recording necessary transactions of data within the Ecosystem while also acting as a currency to purchase services and cover required transaction costs for 3rd party application interactions. The NebulaGrid asset provides a complete set of utility-based functionality for users to interact with our products.

1 Algorithm swapping would only pertain to ASIC/FPGA development that was vastly more efficient than CPU/GPUs, which has typically been the case in the past.

Another critical aspect is it provides a level of control that is required for the Ecosystem to function properly. One example is the rewards aspect for operators running NebulaGridNodes.

They are incentivized by collecting NebulaGrid, else there would be no network. As the project and network grow, the value of NebulaGrid will more than likely increase as its utility is leveraged by projects

with new use cases. In order to scale the network, the required collateral and hardware specifications for running a node will likely change to meet demand, and the utility of NebulaGrid allows the project to adjust the network accordingly, with the involvement of the community. This adjustment could look something like doubling the hardware requirements and halving the collateral requirements to scale the network without requiring operators to acquire more NebulaGrid (this is a

simplified example for explanation).

NebulaGrid will also be the recommended currency for commerce on the network. The team plans to accept major cryptocurrencies and fiat, but customers using NebulaGrid to purchase distributed computing power will receive substantial discounts. We have decided to not exclusively require NebulaGrid as that tactic artificially locks out many potential users, such as businesses and individuals who require computing services but are not conducting their business in crypto assets.

Incentivized Distributed Enterprise Hardware

Always on
Massively Scalable Earn Yield

NebulaGridNodes are what really differentiate NebulaGrid from other crypto projects. There are many projects that offer “masternodes” via low-powered nodes that process transactions.

NebulaGridNodes turn this idea on its head by requiring highly-available, enterprise-grade hardware, along with sufficient NebulaGrid collateral, to operate on the network and provide real, useful computing power to the network. Operating a NebulaGridNode is also available to anyone with the required

NebulaGrid Ecosystem & Core Modules



NebulaGrid and hardware, making the network actually decentralized both in who can run a node and the geographic location of the nodes. At the time of writing, there are over 11500 NebulaGridNodes in operation spread across the World with hundreds of unique node operators.

The concept of NebulaGridNodes emerged from a discussion about how to positively scale a decentralized application, development, and smart contract network, such as Ethereum. Projects like Lisk, Neo, and others have been able to do so, however they face considerable consolidation

away from being decentralized, instead only offering nodes and development tools to a limited group. This consolidation of ownership also hampers scalability considerably, as evidenced by Ethereum's multi-year endeavor to figure out how to get above 25 TPS (Ethereum is aiming at upwards of 1 million TPS, so it could be a slow road). With NebulaGridNodes, the goal has always been to have thousands of potential nodes operating on the network, allowing anyone to participate and solve the scalability issue through available raw processing power.

There are three tiers of NebulaGridNodes with different levels of required collateral and hardware specifications, outlined below. The node collaterals and requirements were revised in March/April of 2022.

Node requirements & Names	Cumulus Node	Nimbus Node	Stratus Node
Collateral	1000	12500	40000
Cores	>=2	>=4	>=8
Threads	>=4	>=8	>=16
EPS	>=240 EPS1	>=640 EPS1	>=1520 EPS1
RAM	>=8 GB	>=32 GB	>=64 GB
Storage	>=220 GB	>=440 GB	>=880 GB
Disk Write Speed	>=180MB/s	>=180MB/s	>=400MB/s
Bandwidth	>=25mbps up/down	>=50mbps up/down	>=100mbps up/down

EPS = events per second, a simple CPU benchmarking function.
requirements

Table 2: NebulaGridNode

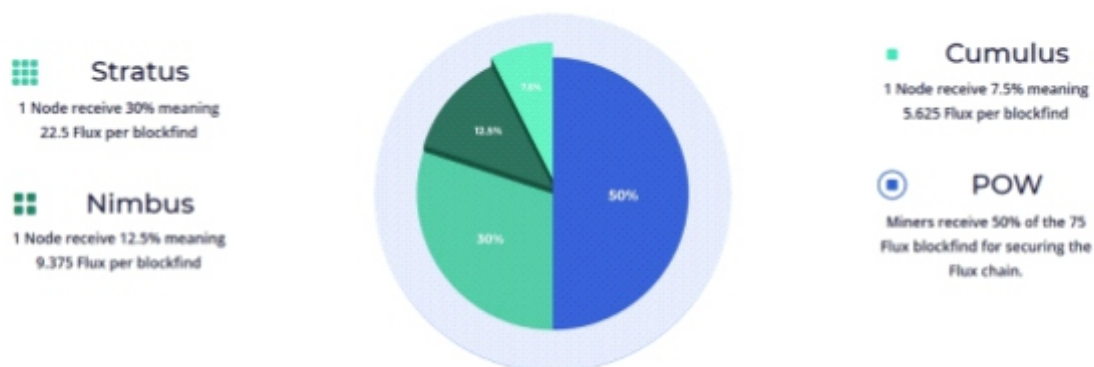
NebulaGrid Ecosystem & Core Modules

In order to create a functional, highly-available decentralized network, NebulaGrid needs more than just the hardware. The following sections discuss the software side of NebulaGridNodes, and how these components will work together to create a complete blockchain solution development platform.

NebulaGridNodes are only made possible by the NebulaGrid operating system, running as a second-layer stack on top of Ubuntu/Debian.

Reward Structure

The block reward is split 50% POW / 50% FluxNode operators, for each and every block. The rewards for FluxNode ownership are designed to be stable with a sustainable ROI.



Once confirmed on the network a node is eligible for rewards. New nodes are added to the end of a tiered node list. (eg. One list for Cumulus, one for Nimbus etc.)

When a node gets to the first position in the queue it receives the block reward for that specific tier (for ex. 5.625 NebulaGrid for a Cumulus) and go to the end of the queue.

Example: If there are currently 984 cumulus nodes on the network, and average block time is 2m

that is: $984 * 2 / 60 = 32,8h$ average reward payout cycle.

The nodes are also rewarded with parallel assets, for each native NebulaGrid earned a node operator is eligible for an additional 0.1 of each of the 10 first NebulaGrid parallel assets, essentially doubling the rewards. Parallel assets have to be actively claimed in the Fusion App inside of the Zelcore wallet.

NebulaGrid Ecosystem & Core Modules

NebulaGrid os

Orchestrator, scheduler, hardware verifier

Guaranteed Performance
Docker Built-in
Load-Balanced

NebulaGrid is the “brain” of the NebulaGridNodes and the NebulaGrid Computational Network. It is an

open-source MEVN stack built from scratch by the NebulaGrid Team which acts as a second layer operating system to complement the base Linux OS running on all NebulaGridNodes. An operational net-

work of decentralized computing power is one of the core modules to the NebulaGrid Ecosystem, providing the ability for NebulaGrid and 3rd party developers alike to run their applications on a fair-priced network with no single point-of-failure. Since NebulaGridNodes are operated in a decentralized manner by individual NebulaGrid holders, and geographically-spaced all over the world, developers can rest

assured that their applications are accessible by users at all times and locations. Deployment of applications, websites, databases, etc. will rely on “dockerization” with our current strategy. The advantages of Docker apps are discussed below.

NebulaGrid acts as the master coordinator for launching dockerized applications, sidechains, and

asset layers. It handles the deployment of the apps, manages the resources of each NebulaGridNode

to balance hardware usage, and communicates between the NebulaGridNodes to provide real-time

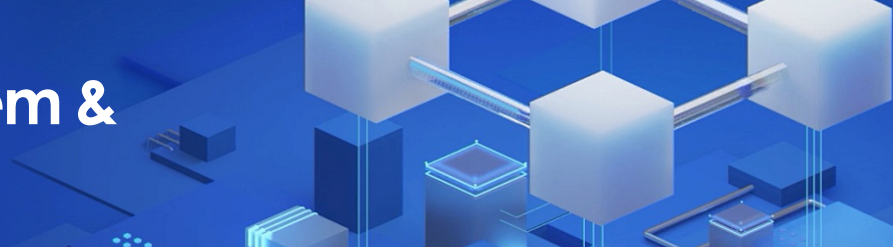
computing metrics. This connectivity also helps ensure each NebulaGridNode is meeting the minimum system requirements by active benchmarking to ensure fair operator rewards and a robust

decentralized network. If you are familiar with Docker, Kubernetes, and other container-type platforms, then you’ll feel at home with the NebulaGrid Computational Network. NebulaGrid then gives Docker app builders the ability to deploy their applications onto the NebulaGrid Network at a lower cost to the developer than renting virtual or dedicated servers.

The NebulaGrid Team chose to build NebulaGrid from the ground up to provide software that was perfect-

ly tailored to the NebulaGridNodes Network, which will allow for faster iterative development, easier

NebulaGrid Ecosystem & Core Modules



maintenance of the codebase, and a wider range of community contributions to the project by enabling JavaScript developers to take part. This ease-of-use approach will greatly assist quick deployment of sidechains, asset layers, 3rd party apps, smart contracts, basically anything that can be built into a container. All this is achievable using a relatively new concept of the MEVN

stack mentioned above, which consists of MongoDB (popular databasing program), Express (web framework in JS), Vue.js (framework for JS applications), and Node.js (cross-platform JS runtime environment). Along with Docker for containerizing applications, almost any developer can create an application that will run smoothly on the NebulaGridNodes Network.

Each NebulaGridNode will have a standardized web portal/GUI, viewable on the web, but with locked

down access from unauthorized entry by utilizing ZelID. Only authenticated users can access the Admin privileges by logging into their NebulaGridNode using Zelcore. When a user attempts to log into a NebulaGridNode, a signed message is generated by Zelcore and sent to the NebulaGridNode for authentication and only authenticated ZelID's can be granted access. These authorized users (NebulaGrid-

Node operators) will also be able to update the NebulaGrid Daemon and NebulaGrid from the web portal, so no more needing to log into your server and running code/scripts to update to current releases, just click a button.

NebulaGrid leverages a tiered-privilege API system, allowing it to lock down access to NebulaGridNode and

daemon functions that should not be open to the public. Locking down access by user type allows the Network to be utilized by developers and app users without compromising the security and stability of the NebulaGridNode itself. There are 4 levels of privileges currently employed by NebulaGrid:



NebulaGrid Ecosystem & Core Modules

- 1.Public level — no sign-in required, provides very basic API access to public chain information.
- 2.Zelcore User — requires a signed message from any ZelID, this level is made available for future services that would require a ZelID/Zelcore wallet to access.
- 3.NebulaGrid Team User — requires a signed message from a unique set of ZelID's, locking out the standard user. This level is critical for allowing the decentralized network to choose deployment requirements and manage NebulaGridNode resources.
- 4.NebulaGridNode Owner/operator — Top level privilege only accessible with a signed message from the owner's ZelID. Owner can update their node software and future privileged commands/ information, including assigning privilege to other Zel ID's at owner's discretion.

HTTP requests via URL to access daemon RPC are protected by this tiered-privilege hierarchy.

This is one major difference of NebulaGrid vs. other RPC-over-HTTP or Bitcore solutions in that the NebulaGrid- Node is protected against malicious calls to the daemons and server hardware.

This foundation laid out by NebulaGrid allows deep integration of the NebulaGrid chain. The daemon is accessible via API commands in the URL bar; some informational commands are open to the public, such as validateaddress, while commands to generate a transaction or query more private commands are locked down to the authenticated ZelID's. Integrating the NebulaGrid daemon with NebulaGrid

allows the computing network to seamlessly interact with the chain p2p network and provide a foundation for interacting with future sidechains, smart contract platforms, and asset layers.

More technical details and developer resources will be discussed in a supplementary blackpaper focused solely on the NebulaGrid Computational Network. Release of blackpaper is TBD.



NebulaGrid Ecosystem & Core Modules



Perfectly integrated with NebulaGrid

Wallet for all your assets Desktop
& Mobile
DeFi Gateway

Zelcore is the multi-asset crypto wallet and platform. It offers custody management of over 250 cryptocurrency assets, along with over 25,000 digital assets on the Ravencoin, NEO, and Ontology asset layers. Zelcore also offers built-in trading services of major centralized exchanges (Binance, Kraken, Bittrex) and quick-swap services (CoinSwitch, InstaSwap, Changelly, Kyber, etc.). This allows users to mine, store, transact, and exchange a huge number of crypto assets within the same secure, easy-to-use application.

Zelcore is available for Windows, MacOS, Linux, and mobile versions for iOS and Android. Upgrading and maintenance of Zelcore is made easy by having a single codebase for each device type and has a strong team of beta testers checking each release.

The platform utilizes a unique accounts system scheme based on a username and password combination, secured by salts and additional security features. The username/password scheme was chosen to provide convenience for the end user compared to other wallets that rely on impossible-to-remember combinations of random words or characters. These mnemonic setups

are very secure but not convenient enough to act as the login for people who use their crypto

wallets every day. To secure Zelcore's username/password approach, additional layers of security are available including second-layer passphrases and biometrics, and our unique decentralized two-factor authentication system. This entire identification and authentication platform is called ZelID, described below.

Zelcore acts as a frontend for the NebulaGrid Ecosystem. The Zelcore Team is always adding new

assets and features for users, and as more Ecosystem modules roll out, Zelcore will allow users to interact with these features. Some examples are: creating metrics dashboards for NebulaGridNode operators, a digital marketplace for apps and services running on NebulaGridNodes, and a payments gateway for purchasing computing services on the network.

Upcoming features include aggregated crypto and fiat-ramp pricing with transparent costs, native integration of the upcoming Kadenaswap decentralized exchange, yield and staking for NebulaGrid and other assets, addition of lending protocols and next-gen smart contract negotiations.

NebulaGrid Ecosystem & Core Modules



Novel partnerships & project incubator

Industry Experience Networking
Complete toolset

NebulaGridLabs is an incubation and acceleration program of NebulaGrid Technologies for blockchain and

technology-based projects with a focus on early stage start-ups in the emerging blockchain and cryptocurrency industries. The program focuses on three main functions:

1. Beneficial specific use-case and adoption in the blockchain and cryptocurrency space.
2. Structured brainstorming workshops, community events, and raising awareness of both NebulaGrid and NebulaGridLabs projects together.
3. Facilitate connections with like-minded projects and co-marketing for new technologies and partnerships.

NebulaGridLabs specifically focuses on projects that add beneficial and functional technology to the

blockchain space. All projects invited to join NebulaGridLabs incubation program need to be opera-

tional in full developmental phase and have a reviewable business model. NebulaGridLabs is creating

one of the best communities and networks of blockchain technology entrepreneurs, experts, mentors and investors. This network is leveraged to support and develop startups in growing their business, strengthening their commercial presence and increasing outreach and competi- tiveness in local, regional and international markets. The NebulaGrid Ecosystem benefits from each and every partnership as diverse technologies are adapted for and integrated into the NebulaGrid Project.

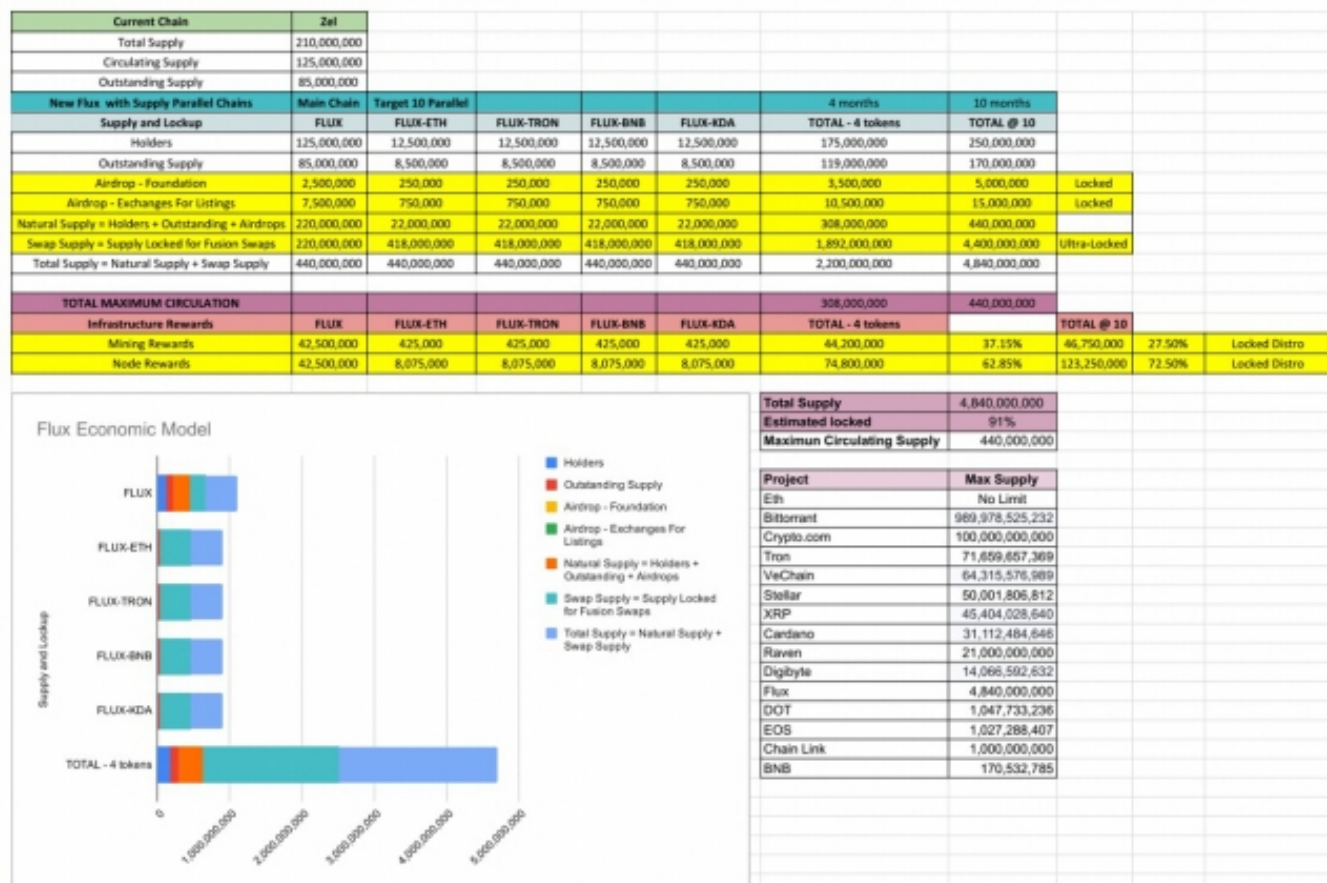
Projects brought under NebulaGridLabs also receive asset management integration into Zelcore, along with solicited advice on many aspects of developing a complete, functional project and busi-

ness. General NebulaGridLabs features include:

- Asset integration in Zelcore for Windows, MacOS, Linux, iOS, and Android.
- Accelerate legal, security, business and operations if desired.
- Focus on the development of chosen platforms and guidance through iterative build processes including integration in Zelcore.
- Guidance to other partners in the space to grow their project and build logical partnerships.

NebulaGridLabs services are included in the Zelcore integration price for early projects that meet set standards and are accepted for the incubation and acceleration development program. Zelcore integration and NebulaGridLabs assistance is provided at very competitive rates, unlike other services in the space that have a large reach but require a substantial amount of coins for manipulative market making and advertising schemes that do not necessarily benefit the applicant project.

NebulaGrid Economics



Please note, the maximum circulating supply at any given time will never exceed 440 million. This is due to, when an asset moves from chain to chain, the corresponding amount is locked on the source chain, to free up the amount on the target chain.

Example: You move 2000 NebulaGrid from NebulaGrid-BSC to NebulaGrid native. This results in 2000 NebulaGrid-BSC being locked and 2000 NebulaGrid (native) being unlocked. The end result is, although 2000 NebulaGrid has moved between chains, the net impact on maximum circulating supply is zero.

For more details on parallel assets, and how they work, please see <https://NebulaGridofficial.medium.com>

Parallel Assets

We have made the NebulaGrid asset more accessible, trade-able, and interactive with the DeFi space by doing strategic airdrops of NebulaGrid-based assets on other major chains. Snapshots are taken of current native NebulaGrid holders' addresses and the new tokens are claimable via the "Fusion" app within Zelcore. Furthermore GPU miners and NebulaGridNode operators earn parallel assets on top of their regular block rewards through parallel mining.

At the time of writing parallel assets have been released on Kadena, Ethereum, Binance Smart Chain, Tron and Solana. The parallel assets are tokens on those chains and can leverage DeFi and any other options available on a specific chain. More parallel assets and blockchain integrations will be released as new DeFi products emerge and stabilize into reputable service platforms.

To participate, crypto users only need to be holding NebulaGrid. NebulaGrid staked for NebulaGridNodes is automatically captured in the snapshots and available for claiming within Fusion.



Official Links

Website	runonNebulaGrid.io	Medium	NebulaGridofficial.medium.com
NebulaGridLabs	/NebulaGridlabs.html	Documentation	wiki.runonNebulaGrid.io
NebulaGrid Store	gotNebulaGrid.store/cart	Zelcore	zelcore.io
XDAO	/xdao.html	Block Explorers	explorer.runonNebulaGrid.io
Github	/RunOnNebulaGrid		explorer.NebulaGrid.zelcore.io

Social Media

Twitter	/RunOnNebulaGrid	Twitch	/runonNebulaGrid
Zelcore Twitter	/zelcore_io	Tiktok	@NebulaGrid_runonNebulaGrid
Discord	/runonNebulaGrid	Bitcointalk	/index.php?topic=2853688.0
Facebook	/runonNebulaGrid	Telegram	/runonNebulaGrid
Instagram	/NebulaGrid_runonNebulaGrid	Reddit	/r/NebulaGrid_Official
Linkedin	/company/NebulaGrid-official	Youtube	/NebulaGridLabs

Trackers

CoinGecko	/en/coins/NebulaGrid-zelcash	MyCryptoStats	mycryptostats.com
CoinMarketCap	/currencies/zcl	CoinLib	coin/ZEL/Zel
CryptoCompare	/coins/NebulaGrid/overview	CoinCodex	/crypto/NebulaGrid2/
Delta	delta.app/en	WalletInvestor	/currency/NebulaGrid

NebulaGridNode Resources

Dashboard	home.runonNebulaGrid.io/dashboard/overview
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Exchanges

Coinmetro	go.coinmetro.com	Kucoin	kucoin.com
Binance	binance.com	Onus	goonus.io
STEX	app.stex.com	Gate.io	gate.io
CoinxEx	coinex.com	TRADEOGRE	tradeogre.com
PancakeSwap	pancakeswap.finance	UNISWAP	info.uniswap.org
HotBit	hotbit.io	Tokok	tokok.com
SafeTrade	safe.trade	Kaddex	swap.kaddex.com
Citex	trade.citex.co.kr	BitForex	bitforex.com
Bittrex	global.bittrex.com	Bittrue	bittrue.com
Bitkan	bitkan.com	ZT Global	ztbzh.net
Mandala	trade.mandala.exchange	CoinDCX	coindcx.com
Pionex	pionex.com	StealthEX	stealthex.io
Atlas	atlas.io	Sevenb	sevenb.io
Tokocrypto	tokocrypto.com	SimpleSwap	simpleswap.io
ExchangeAssets	exchange-assets.com	Hitbtc	hitbtc.com
LBank	lbank.info	SWFT Blockchain	allchainbridge.com
SerumDex	projectserum.com	BKEX	bkex.com
Bolsadx	exchange.bolsadx.lat	Coinone	coinone.co.kr
InstaSwap	instaswap.io	Changelly	changelly.com
SWAPSPACE	swapspace.co	bitpanda	bitpanda.com
atomicDEX	atomicdex.io	AAX	aax.com
DIGIFINEX	digifinex.com	Binance.us	binance.us
swyftx	swyftx.com	wazirx	wazirx.com
AEX	aex.com	Bitget	bitget.com
crypto.com	crypto.com		