DARMA
CAPITAL

Digital Asset Research Report: Ethereum 2.0

The Smart Contracts Protocol Layer of Web 3.0

The Case for Ethereum 2.0

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Introduction

DARMA seeks to optimize investments in the largest, most regulatory-defined and liquid digital assets associated with the dominant protocol layers of Web 3.0. DARMA's thorough and multifaceted research process identifies digital assets with the strongest case for investment. DARMA equally evaluates the risks associated with those digital assets to determine which digital assets warrant a core holding.

For the Smart Contracts Protocol Layer, Ethereum has a first mover advantage and is the platform on which a majority of decentralized applications are being built. As Ethereum becomes the modern infrastructure for Web 3.0 and mobile applications, the market demand for Ethereum continues to increase.

Ethereum 2.0 will mark the next phase in the evolution of the Ethereum ecosystem. Ethereum 2.0 benefits from improved security, scalability, performance, and decentralization. Participants in the maintenance of the Ethereum 2.0 network must lock up their crypto-asset on the network.

Background: Blockchain Technology and the Evolution of Web 3.0

Blockchain technology offers solutions and efficiencies society never imagined would be possible.

When the Internet was created decades ago, no one could fathom what store of value data would hold, whether it be personal, corporate, or government information. Nor could be foreseen the many challenges of online data protection, availability, and delivery. The original Internet protocols (TCP/IP and HTTP) defined how computers communicate to deliver data, not how it is stored.

Today we live in a digital economy where our most important personal information is controlled by private companies. Application goliaths, including **Facebook, Amazon, Netflix and Google**, developed programs that capture and store all of the structured and unstructured data that users produce. These large centralized institutions have created private networks which they control and profit from user data.

For this reason, today, **value is captured mostly from the Application Layer in Web 2.0.**

Value Capture Today and in the Future

In the decentralized, protocol-based framework of Web 3.0, the most significant digital asset investment opportunity, or 'Value Captured' lies in the Protocol Layers.

We trust giant corporations to intermediate almost every move we make online, and this concentration of control over data is a core flaw in today's Internet. The original Internet protocols do not provide end-to-end security. Centralized data hubs are primary targets for cyber theft and hacking. In addition to their vulnerability, the antiquated, centralized structure of data 'intermediaries' is limited and restrictive. This limitation is addressed by blockchain technology.

There are obvious regulatory and incumbent hurdles to overcome, yet blockchain technology has the potential to transform the Internet by creating greater efficiencies for data validation, delivery and security. As a decentralized and distributed infrastructure, blockchain offers a complete restructuring of the world's recordkeeping paradigm.

In the evolving Blockchain Web, or 'Web 3.0', no single entity controls all records of data. Not only does the distributed architecture of blockchain offer more data protection, it also presents endless possibilities and new solutions for tracking data flow.

In Web 3.0, the protocol layer is 'peer-to-peer' (P2P), meaning each computer on the network becomes a file server as well as a client. The individual benefits and the decentralized protocol layer has value by supporting the network.

For this reason, in the evolving blockchain web, **value will be captured mostly from the Protocol Layers in Web 3.0.**

The Importance of Blockchain Protocols and their Monetization

Consensus protocols are one of the most important and revolutionary aspects of blockchain technology. They dictate how all people, governments, businesses and computers exchange value with each other.

Before Web 3.0, the underlying protocol layer did not generate economic value for itself or its creators. Now, Blockchain technology and 'cryptographic tokens' allow the protocol layer to be monetized and 'aware' of the value it is creating.

This monetization of protocol layers is a key driver for the paradigm shift from today's Web 2.0 to Web 3.0 and the basis for DARMA's investment thesis.

Think of blockchain protocols as a railway system: Blockchain applications are the train-service companies that run on that system. The applications have to 'pay' to use the system on which they operate.

Bitcoin and Ethereum are protocols, and various decentralized applications (DApps) are built upon them. The value of these protocols is expected to increase as their adoption and usage grows. Protocol tokens or coins are cryptographic tokens that are required to access the service that the underlying protocol provides, the cost to use the system.

This is causing the shift in Web 3.0 from formerly 'thin' protocol layers, which used to have little economic value, to 'fat' protocol layers poised to capture the lion's share of value.

The 6 Primary Protocol Layers of Web 3.0 in Development

1. **Computation** - The ability to lend and borrow computational resources to perform complex computations and tasks such as computer generated imagery (CGI) rendering, machine learning (ML), and natural language processing (NLP).

2. **File Storage** - A network designed to create a content-addressable, peer-to-peer method of storing and sharing hypermedia in a distributed file system. Filecoin is a leading file storage, management, and sharing platform.

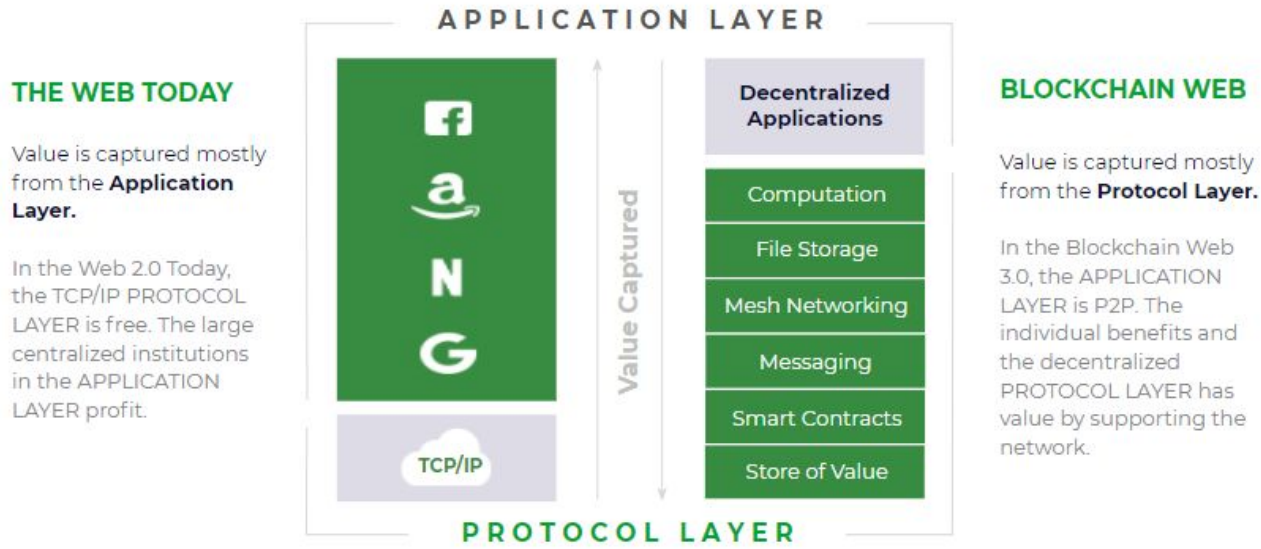
3. **Mesh Networking** - Routes data to and from clients using infrastructure nodes that communicate with each other.

4. **Messaging** - Setting rules, formats and functions for exchanging messages between the components of a messaging system.

5. **Smart Contracts** - Enables parties to conduct transactions and exchange value amongst themselves. Ethereum is a leading smart contract platform.

6. **Store of Value** - Digital assets that retain purchasing power over time.

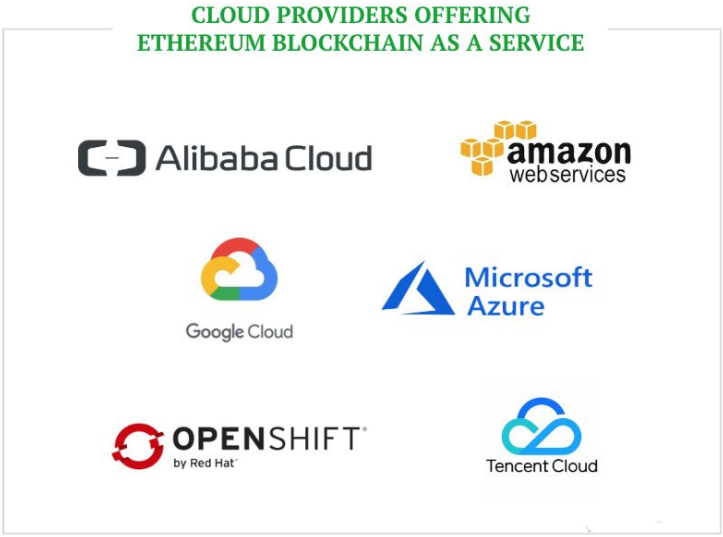
For each protocol Layer, there may be a few digital assets that comprise a specific layer.



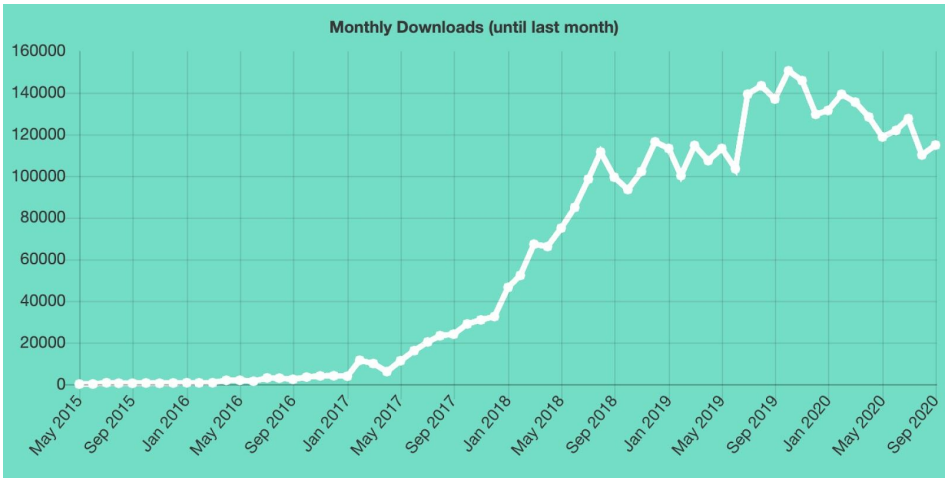
Why Ethereum for the Smart Contracts Protocol Layer?

1. Ethereum Developer Adoption Is Accelerating

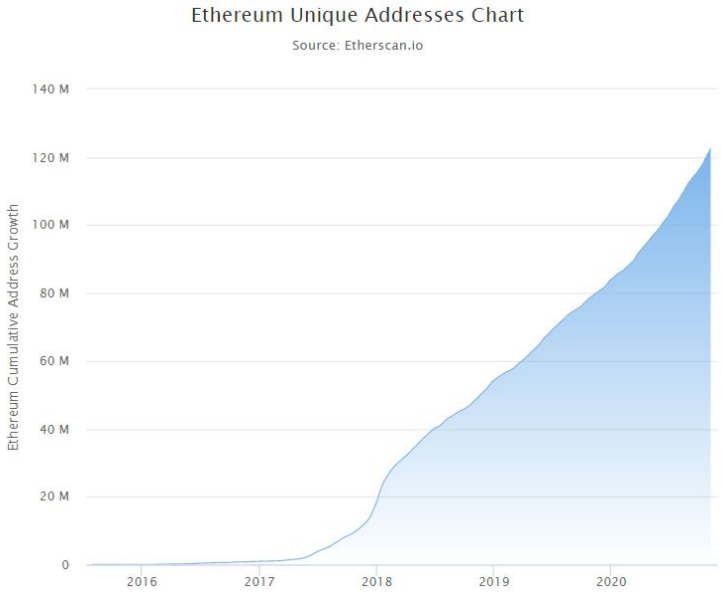
Developer adoption for Ethereum is steadily increasing and this directly impacts demand for ETH. All major cloud providers, including Amazon, Google and Microsoft, offer Ethereum as a service.



The chart below is a graph charting the amount of downloads of Truffle, the most commonly used Ethereum Integrated Developer Environment (IDE). There are an estimated 350,000 Ethereum developers globally, and an estimated 30,000 new developers each month. There are nearly 3,000 Ethereum-based decentralized applications in production, and 95% of new tokens are launched on top of Ethereum.



A blockchain address is a secure identifier, usually represented by a public/private key pair used to receive and send transactions on a blockchain network. Similar to a bank account number, a SWIFT code or a website URL, a blockchain address is anonymous and identifies a destination or recipient. Since Ethereum's launch, over 120 million unique addresses have been created on the public mainnet.



2. Increasing Blockchain Demand & Enterprise Adoption

The expanse of blockchain's capabilities is encouraging people to rethink entire industries, processes and how value is created and distributed.

Organizations, industries, and governments worldwide are exploring the possibilities of the Ethereum blockchain.

Dozens of private sector Ethereum projects are live, in the works, and scheduled to come online soon:

accenture	amazon	CME Group	Hewlett Packard Enterprise	CREDIT SUISSE	mastercard
Leading Innovation	*Blockchain AWS Blockchain*	*Ether Reference Rate*	*Blockchain Cloud Service*	*US Equities Settlement*	*Patents, CBDC, Supply Chain*
REUTERS	J.P.Morgan	Bank of America	bp	BRITISH AIRWAYS	CISCO
Document Automation	*Blockchain-Based Banking*	*External Data Validation*	*Energy Trading*	*Trial Data Sync*	*Cisco Blockchain*
Microsoft	UnitedHealth Group	ups	Walmart	WELLS FARGO	ROTHSCHILD
Blockchain on Azure	*Pilot for Data Sharing*	*Seeking to Evolve*	*6 days to 2 seconds*	*Protecting Sensitive Data*	*Purchasing Bitcoin Exposure*
Square	Fidelity INVESTMENTS	Deutsche Bank	PayPal	FedEx	IBM
Crypto Investing	*Testing New Cryptocurrency*	*Digital Cash for Banks*	*Central Crypto payments*	*Adopt or Be Disrupted*	*Cross-Border Supply Chain*

The Enterprise Ethereum Alliance (EEA) represents the depth and breadth of interest and support for the Ethereum blockchain. With its goal of customizing Ethereum for large corporate use, the EEA is the largest open-source blockchain initiative in the world. The EEA has over 500 members, including globally recognized organizations like Deloitte, Microsoft, Mastercard, Shell and others. Significant industry collaborations such as the EEA will accelerate and enhance Ethereum's road to widespread adoption.

WORKING GROUPS

- Advertising/Media
- Artificial Intelligence
- Blockchain Airspace
- Communications Protocols
- Digital Identity
- Energy
- Financial Services
- Healthcare
- Insurance
- Interoperability
- Real estate
- Security
- Supply Chain
- Telecommunications

3. Technical Evidence Supporting Ethereum: Scalability & Privacy Roadmap Towards Ethereum 2.0, Named "Serenity"

As shown, Ethereum has an extensive global network of developer support. Ethereum's developer community is perpetually researching and educating each other in order to produce the next generation of decentralized applications and further the evolution of Web 3.0. Developers contributing to Ethereum Research are continuously defining the pathway or 'roadmap' to advance and scale the Ethereum protocol.

On October 31st, 2018 at Ethereum's annual developer conference, Vitalik Buterin, Ethereum's Chief Scientist, revealed Ethereum's roadmap to Ethereum 2.0, which contains specific technical upgrades and solutions designed to improve the user friendliness, efficiency and security of the platform, while allowing Ethereum to scale.

Since the announcement in 2018, the Ethereum community of developers and development teams have been finalizing out the specifications for the first phase of Ethereum 2.0 and building supporting tools and services for the launch. In addition to Buterin and the Ethereum Foundation, some of these Ethereum 2.0 leaders include developers such as Ben Edgington,

researchers such as Danny Ryan and Justin Drake, client teams such as Teku and Prysm, staking services like Bison Trails, Codefi, Figment and many more.

These ecosystem leaders have been ensuring Ethereum 2.0 includes the transition to proof of stake (Casper), Sharding, evolving the Ethereum Virtual Machine to Web Assembly, and further incorporation of zero knowledge proofs.

Privacy / Confidentiality

Ethereum is incorporating best-in-class privacy functionality. Innovative solutions enable privacy-preserving computation in blockchain runtimes.

Zero-knowledge ('zk') proofs verify information while preserving privacy on the Ethereum blockchain. A zk proof allows statements to be made about confidential values without revealing anything other than those statements.

Privacy Protocols

zk-SNARKs and zk-STARKs fundamentally change how data is shared and protected. zk-SNARKs (zero-knowledge succinct **non-interactive** argument of knowledge) and zk-STARKs (zero-knowledge succinct **transparent** argument of knowledge) are two cryptographic protocols, or zero-knowledge proof methods, designed to protect personal information from security breaches.

Building upon zk-SNARK technology, zk-STARK technology is newer and designed to provide faster computation and smaller proofs than zk-SNARKs.

Both proofs allow blockchain companies to build smarter, automated systems that can attest to certain facts without revealing the data behind those facts.

zk Range Proofs (ZKRPs) prove that a number lies within a certain range. ZKRPs are significantly more efficient than zero-knowledge proofs.

A ZKRP could verify that a person's salary is sufficient to rent a house, or obtain a mortgage, without revealing the exact number. A ZKRP could prove that a payment amount is within a limit, but it does not show the exact amount or that a person is located within a country, without revealing the exact location.

These advances in privacy and security significantly improve the scalability of the Ethereum blockchain.

Scalability Roadmap

Ethereum's roadmap is to dramatically increase transactional throughput per second. Ethereum also intends to support as many users as it can while remaining decentralized. To advance its scalability while preserving transaction accuracy and security, Ethereum uses a combination of technical methods: Sharding, Proof of Stake, State Channels, and Plasma.

Optimizing Transaction Verification with Sharding

Sharding is a scaling solution that uses shards, or micro-chains, to process separate types of transactions on the Ethereum blockchain.

Ethereum depends on a network of 'nodes', each of which stores the entire ethereum transaction history and the current 'state' of account balances, contracts and storage. Sharding removes the need for the entire network of nodes to process every individual transaction.

Sharding is a method of splitting and storing a single dataset into partitions called 'shards' that contain their own independent piece of state and transaction history. In sharding, certain nodes would process transactions only for certain shards.

In this way, each node effectively stores a subset of data and only verifies those transactions. By splitting the blockchain into smaller partitions, Sharding optimizes the process of verifying transactions and smart contracts.

Increasing Computational Efficiency using Proof of Stake (PoS)

Ethereum is transitioning from Proof of Work (PoW) to a Proof of Stake (PoS) consensus formation algorithm.

Under PoW, 'miners' compete to verify the integrity of a specific block by solving cryptographic puzzles. The first miner to solve those puzzles receives a monetary reward and announces the solution to the network. This method is based on competition and computational output.

Under PoS, 'validators' must first submit a deposit of Ether into a smart contract before they are allowed to propose and validate blocks. A set of validators take turns proposing and voting on a block, and the weight of each validator's vote depends on the size of its deposit, or stake. A validator must stake at least 32 ETH to be compliant, but most will likely stake more to earn ETH rewards and validate multiple shards.

Additional advantages of the PoS system include security, reduced risk of centralization, and energy efficiency. In addition, PoS can significantly increase transaction speed. We discuss PoS further in this report, given the impending transition most likely occurring year.

Increasing Transactional Throughput with State Channels

Ethereum is considered a 'stateful' network, meaning within each block on the Ethereum blockchain there is information regarding its state, including all account balances, contract storage, contract code, etc. In a stateful network, transactions take up space on the blockchain.

State channels are pathways opened between users that want to communicate with each other in the form of transactions. These channels are 'off-chain' and private, known only to its participants. They allow for instant and anonymous transactions, and they have a limited lifespan which is predetermined based on time or amount of transactions carried out.

Once a channel closes, the transaction history within can be uploaded to the blockchain and its 'state' is thereby updated. In this way, the blockchain is spared from including the back and forward transactions in the channel that led to the final outcome. In legacy finance, this would be the equivalent of transactional batching.

Increasing Transactions Throughput with Optimistic Rollups

Optimistic rollups are another scaling solution for the Ethereum network. Optimistic rollups are similar to Plasma in that they move transactions off chain onto layer 2 in order to increase overall network throughput.

With optimistic rollups, network actors known as 'aggregators' collect transactions submitted and paid for by users and process them on the sidechain (i.e. the transactions are "rolled up" to the sidechain). Aggregators then commit the sidechain state root that contains the record of collected transactions back to the Ethereum mainchain.

If any network user sees an aggregator attempting to commit an invalid state root to the Ethereum mainchain, they can contest the transaction and ensure incorrect transaction history is not confirmed.

By moving collections of transactions off chain for processing and confirmation, optimistic rollups relieve the Ethereum mainchain from the burden of processing individual consecutive transactions and enable higher network throughput overall.

4. US Regulatory Clarification - “ETH is not a security”

Regulatory clarification is important as it provides a clear message to the investment community. Ethereum, like Bitcoin, is not considered a security, according to remarks made by SEC director William Hinman in 2018.

SEC Director Hinman said:
“…putting aside the fundraising that accompanied the creation of Ether, based on my understanding of the present state of Ether, the Ethereum network and its decentralized structure, current offers and sales of Ether are not securities transactions. And, as with Bitcoin, applying the disclosure regime of the federal securities laws to current transactions in Ether would seem to add little value.”

Since 2018, other regulatory guidance has emerged affirming cryptocurrency’s and ETH’s classification among financial assets.

In October 2019, CFTC chairman Heath Tabert stated his view “that ether is a commodity.” Tabert’s statement came on the heels of CFTC commissioner Brian Quintenz’s comments in March that he anticipated that ether derivatives would soon be available. In July 2020, the Office of the Comptroller of the Currency (OCC) published a letter clarifying that national banks and federal savings associations could custody cryptocurrencies on behalf of their customers. In September 2020, the OCC released specific guidance for stablecoins, saying those same institutions could hold reserve funds on behalf of customers with stablecoins. xxx. As of October 2020, the New York Department of Financial Services had greenlit 10 cryptocurrencies with which business entities could conduct business, including ether.

Regulatory clarity that ETH is not a security allows investors to view ETH as a utility and not just another cryptocurrency. Regulatory clarity should have a positive impact on reducing ETH price volatility and attract liquidity as additional investors can participate. The impact has already been seen by announcements of derivative products from CME and the ICE as well as custody offerings from Fidelity and Nomura.

5. Development of Blockchain Standards

Ethereum developers are creating standards in conjunction with the Enterprise Ethereum Alliance (EEA). The development of standards helps to facilitate Ethereum's scalability.

Standards play an important role by:

- facilitating developer and enterprise interaction
- enabling developers to comply with objectives
- speeding up the introduction of technology deployment
- providing interoperability between new and existing Ethereum technologies

Standards also disseminate knowledge in industries where processes from different providers must interact with one another. Standardization represents cooperation among developers, industry officials, public authorities, researchers and other interested parties for the development of technical specifications based on consensus.

ERC-20 is the preeminent technical standard, or set of rules, used for implementing tokens on the Ethereum blockchain. This standard helps developers to accurately predict interaction between tokens. These rules include how the tokens are transferred between addresses and how data within each token is accessed. Most tokens released through Ethereum based ICOs are ERC-20 compliant.

ERC stands for Ethereum Request for Comment, a proposal request-approval system to accept changes introduced by the Ethereum developer community. ERCs include technical guidelines for the buildout of the Ethereum network. Before an ERC becomes a standard, it must be revised, commented and accepted by the community through an EIP (Ethereum Improvement Proposal). Subsequent ERC's typically resolve outstanding issues or add new parameters not previously defined.

A token with ERC-20 compliance means it is fungible, or can be exchanged for other currencies. The issuer of the token retains complete control of their assets, however with ERC-20 standard it is possible to track who owns the token and how much at any given point of time.

ERC-721 defines standards for tokens that are unique and 'non fungible', or not interchangeable. While two ERC-20 based tokens can not be differentiated, ERC 721 proposes a concept by which token holders will be able to differentiate between the tokens they hold. Each ERC 721 token is totally different and each one can have a different value to different users.

ERC 725 is a standard for managing identity on the Ethereum blockchain.

These ERCs provide developers with a basis for mutual understanding, resource knowledge and support to further the scalability, security, and privacy demands of the Ethereum blockchain.

6. Support From Network-Effect Caretakers

The Ethereum blockchain has a vast network of support from global organizations providing research, education, and funding to further blockchain adoption, development and scalability.

ConsenSys is a 'caretaker' organization with more than 750 employees worldwide focused on development of the Ethereum ecosystem, growth of the network, and global integration of the benefits of blockchain and tokenization.

The Enterprise Ethereum Alliance (EEA) supports development of best practices, open standards, and open-source reference architectures. With members including Fortune 500 companies, innovative start-ups and cutting-edge research facilities, the EEA aims to enhance the privacy, security, and scalability of the Ethereum blockchain.

'Quorum' originally created by J.P. Morgan, and currently maintained by ConsenSys is the first Ethereum blockchain-based banking platform. Quorum aims to align financial regulator needs for access to financial information with private party needs for transaction privacy and identity confidentiality. Like other Ethereum 'caretakers', Quorum also supports the advancement of Ethereum's scalability and enterprise adoption.

Ethereum 2.0, Proof of Stake, and Liquidity

On November 4, 2020, the Ethereum Foundation announced that the Ethereum 2.0 deposit contract was live, marking the very beginning of the launch of the first phase of Ethereum 2.0
Ethereum 2.0 ("Eth2") is an upgrade to the Ethereum public blockchain. The upgrade has been planned since the earliest days of Ethereum's launch, and is designed to improve scalability, security, functionality, and decentralization. Eth2 will launch in phases, beginning with Phase 0 - most likely to go live in late 2020.

Phase 0 will launch what is known as the Beacon Chain, which will implement the Proof of Stake ("PoS") consensus algorithm. PoS is one of the most important and fundamental components of Eth2 because it changes the crypto-economic incentives that govern the day-to-day operation of the Ethereum blockchain. Proof of Stake runs on the process of staking, which means

participants (validators) submit their ETH (a stake) to a deposit contract to participate in validating transactions. In return for their participation, the validator will earn ETH as a reward.

The Proof of Stake Consensus Mechanism

Understanding Proof of Work

Right now, the Ethereum blockchain is run by a Proof of Work ("PoW") consensus algorithm. Stated simply, PoW blockchains rely on two components: miners and energy. Miners set up and run nodes on complex hardware and infrastructure builds. These nodes expend energy in the form of electricity to maintain the blockchain. As an incentive for spending resources to keep the blockchain running, these miners are rewarded with native crypto tokens (in the case of Ethereum, they are rewarded with ETH). The opportunity to earn ETH incentivizes more miners to join the network, thus resulting in more energy and resources being spent to maintain the network. The more nodes supporting a network, the more secure.

PoW has proven extremely reliable for some of the highest-profile blockchains in the world, including Ethereum and Bitcoin. It does, however, suffer from notable shortcomings, namely accessibility, centralization, and scalability.

PoW blockchains are not especially accessible. Miners must purchase, set up, and maintain expensive hardware to begin participating in a network. Additionally, the expenditure of electricity to earn rewards is only worthwhile if electricity and hardware depreciation is cheaper than the earned rewards. This creates an additional barrier to entry for would-be-miners who live in countries and regions with more expensive electricity costs or limited access to efficient hardware setups.

PoW blockchains run the risk of centralization. As PoW blockchains prove increasingly inaccessible due to costs and complexity, the number of people who are able to establish mining operations and maintain them profitably decreases. This creates centralization among a handful of major mining operations as smaller miners drop out of the network. Centralization of public blockchain networks is antithetical to the core stance of the community with regards to anti-censorship, resilience, and security. Centralization among network participants opens up the possibility of miners (or validators in the case of PoS) having enough influence to collude in the alteration of the blockchain's record.

PoW blockchains also struggle with scalability as smart contract platforms grow more complex and active. Ethereum in particular has received criticism during periods of immense network activity, when network fees and transaction times soar. Solving this throughput limitation will

enable much more functionality and accelerate innovation. With Eth2, Ethereum is adopting a mechanism to scale substantially and accommodate for future demand.

Understanding Proof of Stake

PoS is a different consensus algorithm that replaces the miners and energy of PoW with validators and stake. Like miners on PoW blockchains, validators run nodes. Instead of spending excessive amounts on electricity to maintain the blockchain, however, validators stake funds on the blockchain. On Eth2's PoS architecture, each validator pool will consist of 32 ETH and pools will be multiples of 32.

When a validator stakes 32 ETH, they may be randomly chosen to propose a block of transactions to the Eth2 blockchain. Other validators on the network then attest that the proposed block information is correct. After a threshold of validators have attested, the block is added as the most recent in the blockchain.

When each new block is added, both the validator that proposed and the validators that attested receive rewards in the form of ETH. If a validator fails to fulfill its responsibility of proposing or attesting a block because it goes offline, they will be penalized by their ETH being reduced. If a validator tries to attack, compromise, or alter the blockchain, a more severe penalty is enacted than if a validator just goes offline. The attacking validator will lose some or all of their staked ETH and be ejected from the network. The result is a direct and immediate monetary loss for anyone attempting to act maliciously on Eth2.

The PoS architecture of Eth2 is designed to alleviate the primary issues with Proof of Work mentioned in the previous section: accessibility, centralization, and scalability.

Eth2 is expected to be more accessible for validators and stakers by being cheaper, more energy efficient, and less capital-intensive. Instead of buying expensive hardware, PoS validators can run the required software on much lighter and less expensive computers. Moreover, Eth2 is a considerably more energy-efficient consensus solution; validators do not have to waste electricity or electricity costs to run the blockchain. Lastly, though a full validator node requires 32 ETH to be staked, services exist that allow people to stake less. These services will pool funds together in multiples of 32 to reach full validator node thresholds. Overall, the result is a reward ecosystem with considerably lower barriers to entry for participation.

PoS supports greater decentralization. With lower barriers to entry, the opportunity to run a validator node is expanded beyond large mining operations to anyone willing to stake ETH with an internet connection and a computer. Additionally, PoS architectures are less subject to

economies of scale. PoW systems tend to be centralized into a few big players because of the enormous capital requirements. Smaller miners are less efficient and therefore earn a smaller percentage of returns. On PoS blockchains, a validator's percentage yield remains proportional no matter if they stake 32, 64, or 32,000 ETH. This creates a more equitable playing field and promotes decentralization of validators by increasing the population base.

PoS is expected to help Ethereum scale to better meet current and future demand. PoS architecture enables a scaling mechanism known as sharding. Sharding involves dividing a blockchain into multiple chains ("shards") that run alongside each other. Each shard chain is able to process and verify blocks simultaneously. This is in contrast to a PoW blockchain, in which only one block can be mined at a time. On Eth2, sharding will create 64 separate shard chains, resulting in a system with a higher throughput and transaction capacity than the current Ethereum blockchain.

Liquidity for Ethereum 2.0 Staking

As mentioned above, validators who stake on Eth2 earn rewards in the form of ETH by helping maintain the network. Stakers can elect to run their own validator nodes or delegate their funds to a person or service that will stake on their behalf. Running one's own validator node, however, comes with three primary drawbacks.

First, not everyone wants to - or can - stake an exact multiple of 32 ETH.

Second, running one's own validator node requires considerable technical knowledge, and puts one at risk of not maximizing reward efficiency and potentially being penalized.

Last - and arguably most important - staking on Eth2 requires validators to send their ETH to a deposit contract that locks the ETH for a currently-unspecified amount of time (this release feature is not expected until a later phase of development, which is more likely more than 18 months). Locked ETH cannot be borrowed against or sold during this time through many of the centralized and decentralized lending platforms the Ethereum community currently use. ETH holders considering whether or not to stake on Eth2, however, must consider the upside of staking rewards against the downside of rendering their ETH illiquid for an undetermined amount of time.

DARMA Capital and LiquidStake[1] each help stakers more confidently stake on Eth2 by providing liquidity. DARMA helps ECP[2] institutions and LiquidStake helps individuals, in essence each allows a staker to borrow USDC by using their staked ETH as collateral.

Each facility collects ETH from clients and stakes it on their behalf through some of the world's largest and most prominent staking organizations, including Bison Trails, ConsenSys and Figment. While the ETH is locked and rewards are earned, a client dashboard tracks the progress of ETH rewards and collateral ratios.

DARMA Capital and LiquidStake provide:

- No ETH minimums required to stake.
- Full-service handling of technical staking procedures.
- Commitment to add ETH to smaller pools for efficiency.
- Diversification of aggregating pools instead of specific pool risk.
- Ability to provide liquidity using staked ETH as collateral.

Summary

The future success of the Ethereum network depends on its scalability as demand grows. Like any emerging platform (think of the internet in 1995) Ethereum will encounter development hurdles as it struggles to scale early on, but Ethereum is well-positioned to expand.

Ethereum's 'real world' use cases and network of global developer support allows the blockchain network to methodically develop solutions for each scalability challenge it encounters.

Ethereum is distinguished by having:

- the largest developer adoption
- global demand and support from major corporations and government entities
- emerging yet active exploration by banks and governments for its ability to support CBDCs
- regulatory clarity supporting institutional investment
- widely incorporated best practices and standards for functionality
- a robust technology with a strong scalability roadmap

Ethereum 2.0 will be the next phase of the Ethereum network and dramatically improve the state and performance of the network. Ethereum 2.0 requires protocol-layer participants to lock up funds in smart contracts. Given the innovation by LiquidStake and DARMA Capital, staking participants can access liquidity even while their assets are locked up.

DARMA's comprehensive technology research process indicates Ethereum holds the greatest potential investment opportunity for institutional investment in the smart contracts protocol layer of Web. 3.0.

Footnotes

[1] LiquidStake is a lending facility for individuals staking ETH. LiquidStake is not registered with the CFTC nor a member of the NFA. Its lending operations are covered under Uniform Commercial Code-1 and a money servicing umbrella.

[2] An entity that is classified by the Commodity Exchange Act (CEA) based on its regulated status or amount of assets. The definition of "Eligible Contract Participant" (ECP) is found in Section 1a(18) of the CEA (7 U.S.C. § 1a(18)). ECP classification permits these persons to engage in transactions (such as trading on a derivatives transaction execution facility) not generally available to non-eligible contract participants such as retail customers.

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DARMA IS A MEMBER OF THE NFA AND IS SUBJECT TO THE NFA'S REGULATORY OVERSIGHT AND EXAMINATIONS. HOWEVER, THE NFA DOES NOT HAVE REGULATORY OVERSIGHT AUTHORITY OVER UNDERLYING OR SPOT VIRTUAL CURRENCY PRODUCTS OR TRANSACTIONS OR VIRTUAL CURRENCY EXCHANGES, CUSTODIANS OR MARKETS, NOR HAS THE COMMISSION PASSED ON THE ADEQUACY OR ACCURACY OF THIS MARKETING PRESENTATION.

POTENTIAL INVESTORS SHOULD CAREFULLY CONSIDER WHETHER THEIR FINANCIAL CONDITION PERMITS THEM TO PARTICIPATE IN COMMODITY INTERESTS OR A COMMODITY POOL. IN SO DOING, INVESTORS SHOULD BE AWARE THAT COMMODITY INTEREST TRADING CAN QUICKLY LEAD TO LARGE

LOSSES AS WELL AS GAINS. SUCH TRADING LOSSES CAN SHARPLY REDUCE THE NET ASSET VALUE OF THE POOL AND CONSEQUENTLY THE VALUE OF THEIR INTEREST IN THE POOL. IN ADDITION, RESTRICTIONS ON REDEMPTIONS MAY AFFECT INVESTORS' ABILITY TO WITHDRAW THEIR PARTICIPATION IN THE POOL.

BY PURCHASING OR SELLING A COMMODITY OPTION, THE FUNDS MAY SUSTAIN A TOTAL LOSS OF THE INITIAL MARGIN FUNDS OR SECURITY DEPOSIT AND ANY ADDITIONAL FUNDS THAT ARE DEPOSITED WITH A BROKER TO ESTABLISH OR MAINTAIN A POSITION. IF THE MARKET MOVES AGAINST A POSITION, DARMA MAY BE CALLED UPON BY THE FUNDS' BROKER TO DEPOSIT A SUBSTANTIAL AMOUNT OF ADDITIONAL MARGIN FUNDS, ON SHORT NOTICE, IN ORDER TO MAINTAIN A POSITION. IF DARMA DOES NOT PROVIDE THE REQUESTED FUNDS WITHIN THE PRESCRIBED TIME, THE POSITION MAY BE LIQUIDATED AT A LOSS, AND THE FUNDS WILL BE LIABLE FOR ANY RESULTING DEFICIT.

IN SOME CASES, COMMODITY POOLS MAY BE SUBJECT TO SUBSTANTIAL CHARGES FOR MANAGEMENT, AND ADVISORY AND BROKERAGE FEES. IT MAY BE NECESSARY FOR THOSE POOLS THAT ARE SUBJECT TO THESE CHARGES TO MAKE SUBSTANTIAL TRADING PROFITS TO AVOID DEPLETION OR EXHAUSTION OF THEIR ASSETS.ALSO, BEFORE POTENTIAL INVESTORS DECIDE TO PARTICIPATE IN THIS POOL, IT SHOULD BE NOTED THAT THE POTENTIAL LIABILITY AS PARTICIPANTS IN THIS POOL FOR TRADING LOSSES AND OTHER EXPENSES OF THE POOL IS NOT LIMITED TO THE AMOUNT OF CONTRIBUTION FOR THE PURCHASE OF AN INTEREST IN THE POOL AND ANY PROFITS EARNED THEREON.

DEPENDING ON CONDITIONS AND TRENDS IN RELATED MARKETS, AND THE ECONOMY GENERALLY, DARMA MAY PURSUE OTHER OBJECTIVES OR EMPLOY OTHER TECHNIQUES IT CONSIDERS APPROPRIATE AND IN THE BEST INTEREST OF THE FUNDS.

AN INVESTMENT IN DARMA MAY NOT BE SUITABLE FOR ALL INVESTORS. AN INVESTMENT IN DARMA WILL BE SUITABLE ONLY FOR CERTAIN FINANCIALLY SOPHISTICATED INVESTORS WHO MEET CERTAIN ELIGIBILITY REQUIREMENTS, HAVE NO NEED FOR IMMEDIATE LIQUIDITY IN THEIR INVESTMENT, AND CAN BEAR THE RISK OF AN INVESTMENT IN DARMA FOR AN EXTENDED PERIOD OF TIME. INVESTING IN THE FINANCIAL MARKETS INVOLVES A SUBSTANTIAL DEGREE OF RISK. NO INVESTMENT STRATEGY OR RISK MANAGEMENT TECHNIQUE CAN GUARANTEE RETURNS OR ELIMINATE RISK IN ANY MARKET ENVIRONMENT.

THERE CAN BE NO ASSURANCE THAT THE INVESTMENT OBJECTIVES DESCRIBED HEREIN WILL BE ACHIEVED. NO GUARANTEE OR REPRESENTATION IS MADE THAT DARMA'S INVESTMENT STRATEGY, INCLUDING, WITHOUT LIMITATION, ITS INVESTMENT OBJECTIVES, DIVERSIFICATION METHODS, OR RISK MANAGEMENT PROGRAM, WILL BE SUCCESSFUL, AND INVESTMENT RESULTS MAY VARY SUBSTANTIALLY OVER TIME.

THESE MATERIALS CONTAIN CERTAIN FORWARD-LOOKING STATEMENTS WHICH CONSTITUTE DARMA'S VIEWS WITH RESPECT TO FUTURE EVENTS. THE STATEMENTS ARE MADE BASED UPON SUCH VIEWS AS THEY EXIST AS OF THE DATE OF THESE MATERIALS. THERE IS NO ASSURANCE THAT SUCH VIEWS ARE CORRECT OR WILL PROVE, WITH THE PASSAGE OF TIME, TO BE CORRECT. ACTUAL EVENTS, RESULTS OR PERFORMANCE MAY DIFFER MATERIALLY FROM THOSE REFLECTED OR CONTEMPLATED BY SUCH FORWARD-LOOKING STATEMENTS AS A RESULT OF FACTORS BEYOND DARMA'S CONTROL. DARMA DOES NOT REPRESENT THAT ANY SUCH INDEX IS AN APPROPRIATE BENCHMARK, AS THE VOLATILITY AND COMPOSITION OF THESE INDEXES MAY DIFFER MATERIALLY FROM THE FUNDS MANAGED BY DARMA.

THIS BRIEF STATEMENT CANNOT DISCLOSE ALL THE RISKS AND OTHER FACTORS NECESSARY TO EVALUATE YOUR PARTICIPATION IN THIS COMMODITY POOL. THEREFORE, BEFORE YOU DECIDE TO PARTICIPATE IN THIS COMMODITY POOL, YOU SHOULD CAREFULLY STUDY THE DISCLOSURE DOCUMENT, INCLUDING A DESCRIPTION OF THE PRINCIPAL RISK FACTORS OF THIS INVESTMENT.