

IOTA (MIOTA)

Digital Assets Strategy

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 **IOTA TL;DR**

- IOTA's fee-less architecture is uniquely approaching data-based IoT dApp use cases
- Technology upgrade roadmap for offering a fully decentralized, scalable and secure network
- Testnet stats are encouraging
- **Risks:** Execution and market acceptance risks remain key

Key Statistics

Price	\$1.11
Range (52W)	\$0.08 / \$1.58
Market Cap	\$3.1B
Circulating Supply	2.8B MIOTA
Volume (24H)	\$142.3M

Source: Coinbase.com on 2/26/2021

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IOTA 2.0: Network Upgrade Holds Promise For Adoption & Growth

IOTA (MIOTA) is an alternative Distributed Ledger Technology (DLT) platform, which uses the “Tangle”, a Directed Acyclic Graph (DAG), to enable applications primarily for the Internet of Things (IoT). IOTA is scheduled to undergo a two-part protocol upgrade, IOTA 1.5 (Chrysalis) and IOTA 2.0 (Coordicide) ([Slide 2](#)), aimed at implementing a series of major DLT technology advancements to improve network functionality and achieve greater decentralization. If successful, the upgrade could move IOTA towards its long-term goal of becoming adopted as a standard for the IoT industry. Should IOTA be adopted as a standard, it could lead to \$700B+ in network economic activity from core IoT markets ([Primer Report](#)), which could translate to \$280B in token network value ([Slide 12](#)). Execution and market acceptance remain key risks to success.

- **IOTA is moving forward with its technical roadmap and expects critical releases in 2021.** Last year, IOTA released the Pollen testnet, which is the first phase of IOTA 2.0 on the network's path towards full technical decentralization. In the coming weeks, IOTA expects to release the Nectar testnet which the team believes will deliver a scalable, secure, decentralized network architecture without technical tradeoffs. Additionally, IOTA expects to release Phase 2 of Chrysalis (IOTA 1.5) this year which will introduce protocol enhancements that enable smart contract functionality, tokenized assets and stablecoins. These upgrades enhance network functionality and could enable new use cases for consumer and enterprise IoT applications.
- **IOTA 2.0's new architecture aims to achieve critical technical milestones.** IOTA believes fully serving new open infrastructure applications requires a network that's open sourced & permissionless, decentralized & securely governed, scalable & lightweight, modular & future proof with fee-less value & data transaction finality in seconds ([Slide 10](#)). Many networks offer such features but only with varying combinations and degrees. IOTA 2.0 is being designed with the plan of being the first network to deliver all these DLT features without tradeoffs ([Slide 4](#)).
- **Envisioning an open infrastructure layer for fast and fee-less data-based IoT dApps.** The Tangle is being built with the goal of connecting the digital and physical world by providing a data and value trust layer for enterprise IoT applications ([Slide 7](#)). This means, if successful, IOTA may emerge as a solution across mobility, supply chain, smart cities, energy grids and industrial IoT.
- **Focusing efforts on core development modules and enhanced user experience to increase adoption.** Last year, IOTA focused development efforts on three core modules they deemed crucial for real-world adoption by their enterprise partners. IOTA Access, Streams, and Identity enable production-ready IoT & supply chain use cases ([Slide 8](#)). As a result of these efforts, the IOTA Foundation (IF) has inked numerous enterprise partnership and customer deals ranging from retail e-commerce, smart city infrastructure, healthcare digital identity and other applications. IOTA will soon be releasing the Firefly wallet, which will be the primary gateway for users to access IOTA 2.0 ([Slide 9](#)). As designed, Firefly will have a sleek user interface and enable users to access all the network's new features as they launch.
- **IOTA 2.0 testnet has shown early but encouraging stats.** IOTA 2.0's early testnet stats offer encouraging glimpses of potential network improvements across security, scalability, and decentralization, that are nearly on par or comparable against peers based on several proxy measures ([Slide 11](#)). The IOTA team expects the network stats will continue to see improvement.
- **What could go wrong?** Upgrade may fail, not perform as expected, or not be deemed a major DLT advancement by the market. Attack-vectors or bugs may emerge. Alternative market evaluation models. Failure to gain product/market fit. Competing tech.

Bottom line: IOTA's fee-less architecture offers a differentiated approach for serving data-based IoT dApp use cases. Final technical questions and execution risks remain key, but IOTA 2.0 proposes real tech improvements that may improve IOTA's adoption and growth. We'll be watching how IOTA 2.0 module implementations are rolled out over the coming quarters for key signs of product-market fit and technology validation.

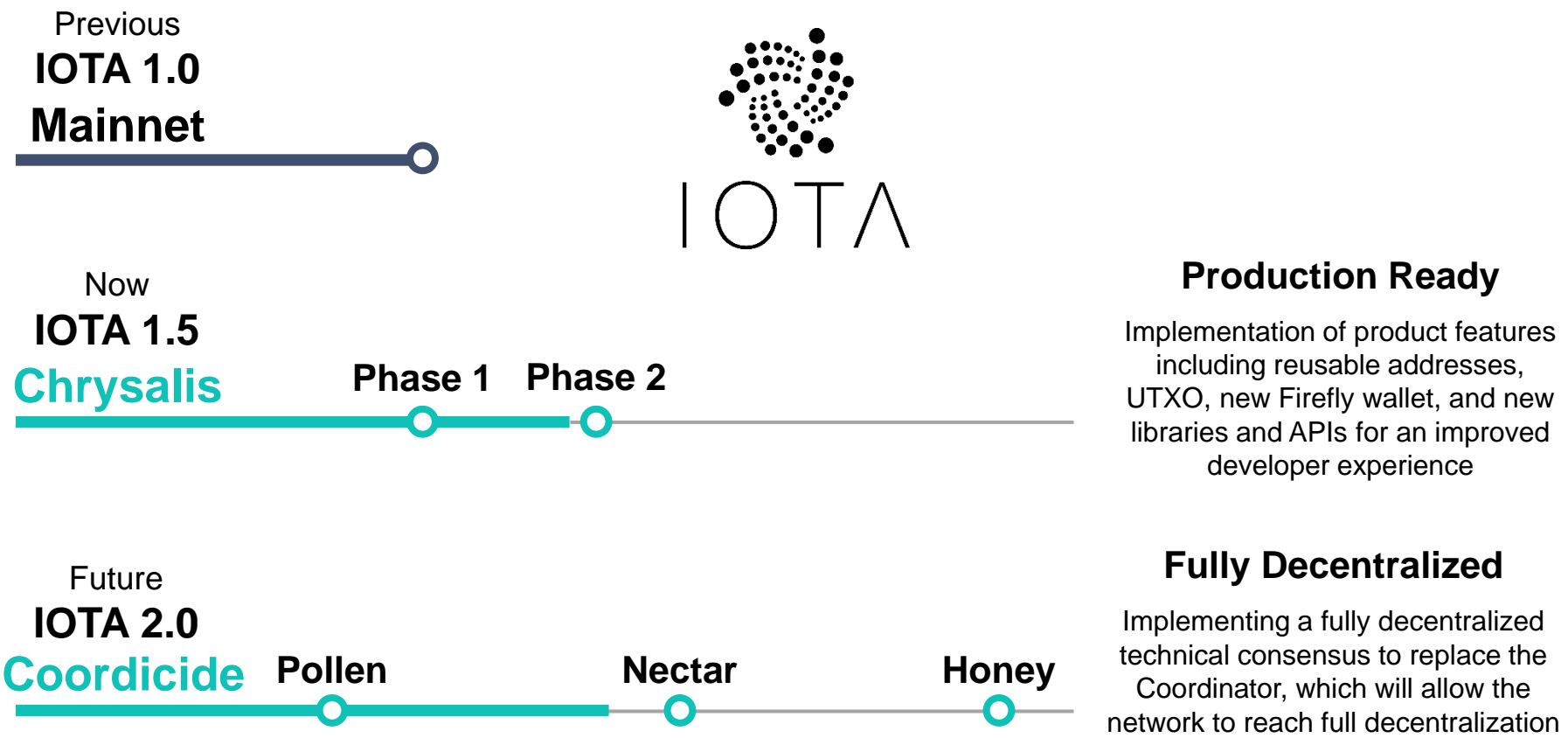


IOTA's Upgrade Roadmap Aims To Accelerate Adoption & Growth

2021 rollout focuses on production readiness & decentralization

- IOTA 1.5 (Chrysalis) introduces protocol enhancements that enable smart contract functionality, tokenized assets and stablecoins, which could enable new use cases for consumer and enterprise IoT applications.
- IOTA 2.0 (Coordicide) implements a new consensus mechanism that aims to improve IOTA's scalability, security, and decentralization by removing the centralized Coordinator node.

Figure: IOTA Technical Roadmap



Source: Fundstrat, IOTA



IOTA 2.0 Will Feature A Three-Part Upgrade Roadmap

Iterative approach includes two testnets followed by mainnet launch

- The live Pollen testnet was a big milestone for IOTA. It implemented fast probabilistic consensus, automated faucet and value transactions, the creation of ‘colored’ tokens to represent real-world assets, and fee-less dApps.
- Nectar’s incentivized testnet will focus on incentivizing participants to debug the network before the full launch of Honey, where it will be battle tested in a fully live IOTA 2.0 mainnet environment.

Figure: IOTA 2.0 Three-Part Roadmap



- **Currently live as of June 30th, 2020**
 - **Fast Probabilistic Consensus** – IOTA’s new consensus algorithm for a more fully decentralized network
 - **Value Transactions** – Implements an automated faucet to receive tokens and send transactions
 - **Tokenized Assets** – Tokens can be created with attributes representing real-world assets
 - **Fee-less dApps** – The development of fee-less dApps
- **Nectar Expected Release – April 2021**
 - Release planned to deliver the full implementation of IOTA 2.0 modules on an incentivized testnet
 - **Goal** – Test for any bugs or issues that need to be fixed before the final release of the mainnet
 - **Incentivization** – Participants on the testnet will be incentivized with progressively increasing rewards to find bugs or attack vectors
- **Honey Expected Release – 2H 2021**
 - Release can be considered the first live mainnet version of IOTA 2.0
 - **Goal** - By the time of its release, the IOTA team expects the network will have been battle-tested and secured through many hundreds of hours of testing with full audits of the node software, which will allow it to perform as expected in a mainnet environment

Source: Fundstrat, IOTA

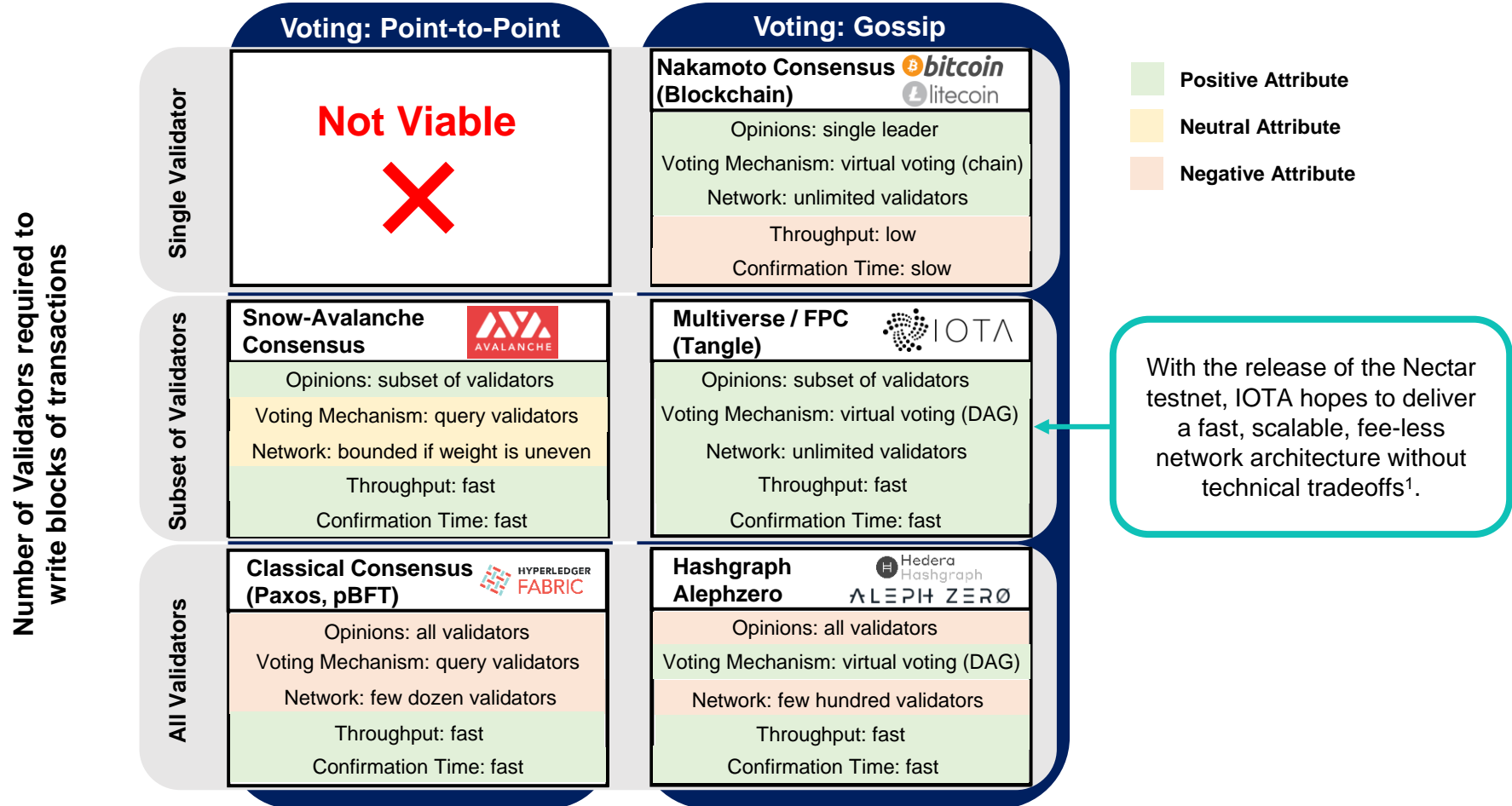


IOTA 2.0's New Consensus May Remove Technical Tradeoffs

Nectar testnet may be first consensus to solve the scalability trilemma

- Classical consensus was first developed in the 1970s to enable a set of machines to achieve agreement. Bitcoin built upon this innovation with Nakamoto Consensus, but this mechanism suffers from low speed and scalability.
- Many consensus mechanisms attempted to solve the scalability trilemma, but none have been able to do so. With the launch of Nectar, IOTA expects to deliver the first fully scalable, secure, decentralized crypto network this year.

Figure: Consensus Mechanism Technical Tradeoffs



Source: Fundstrat, IOTA, (1) diagram provided by IOTA, based on the expected technical features of IOTA 2.0's new consensus mechanism



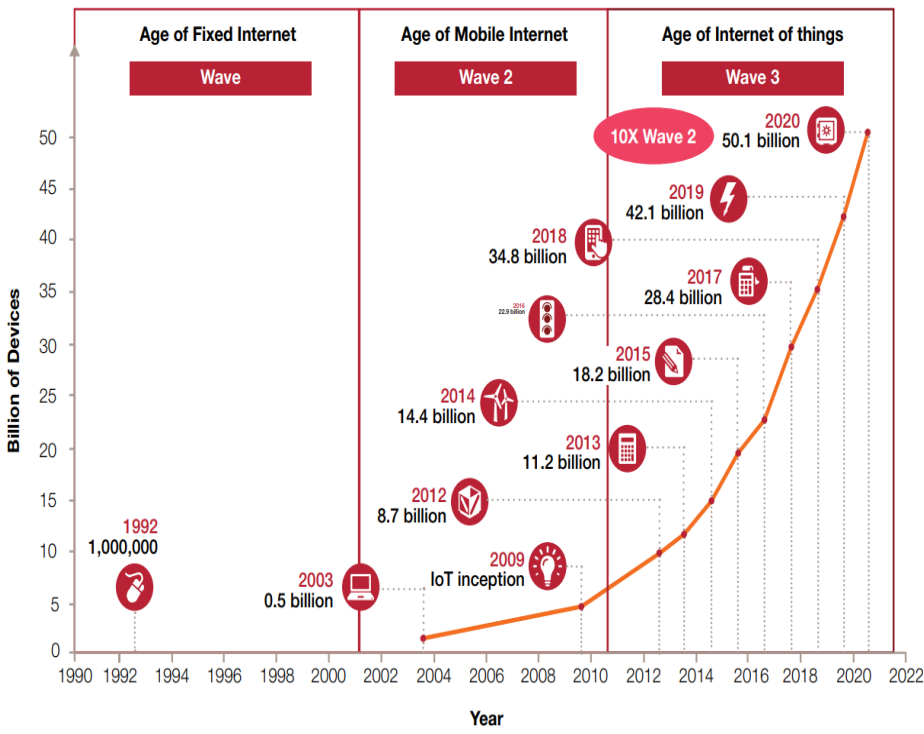
Designing The Tangle To Connect Billions Of IoT Devices

The age of IoT offers an \$11T market opportunity by 2025

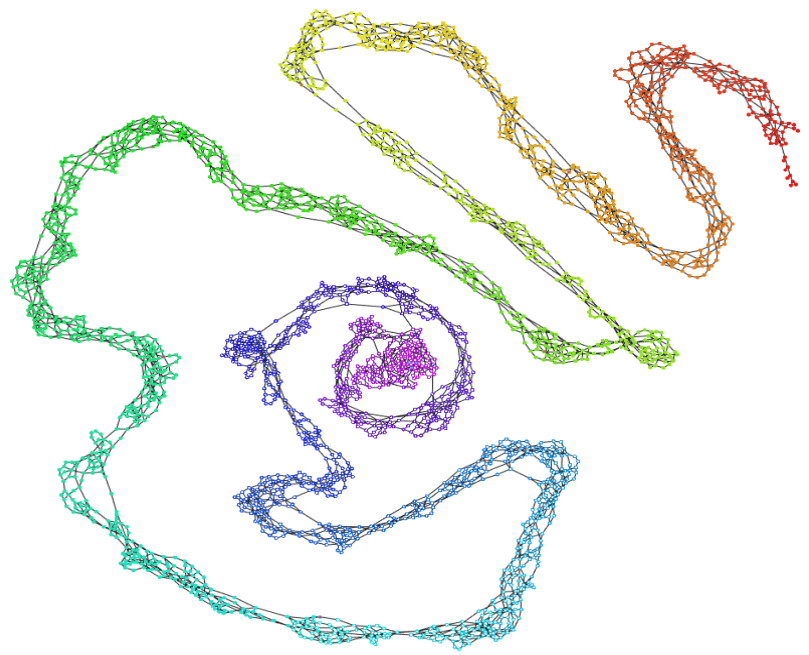
- It is anticipated that over 50 billion electronic devices will be connected to the “Internet of Things” this year to capture, monitor, and report information for the purpose of optimizing daily decisions and performance.
- The Tangle is the leading public crypto network by size that’s specifically being designed to offer IoT devices frictionless data transfers without network fees in order to enable enhanced connectivity and functionality.

Figure: IoT device connectivity growth and IOTA Tangle visualization

Device Connectivity 1990-2022



IOTA Tangle Transaction Visualization



Source: Fundstrat, IOTA, PwC, McKinsey

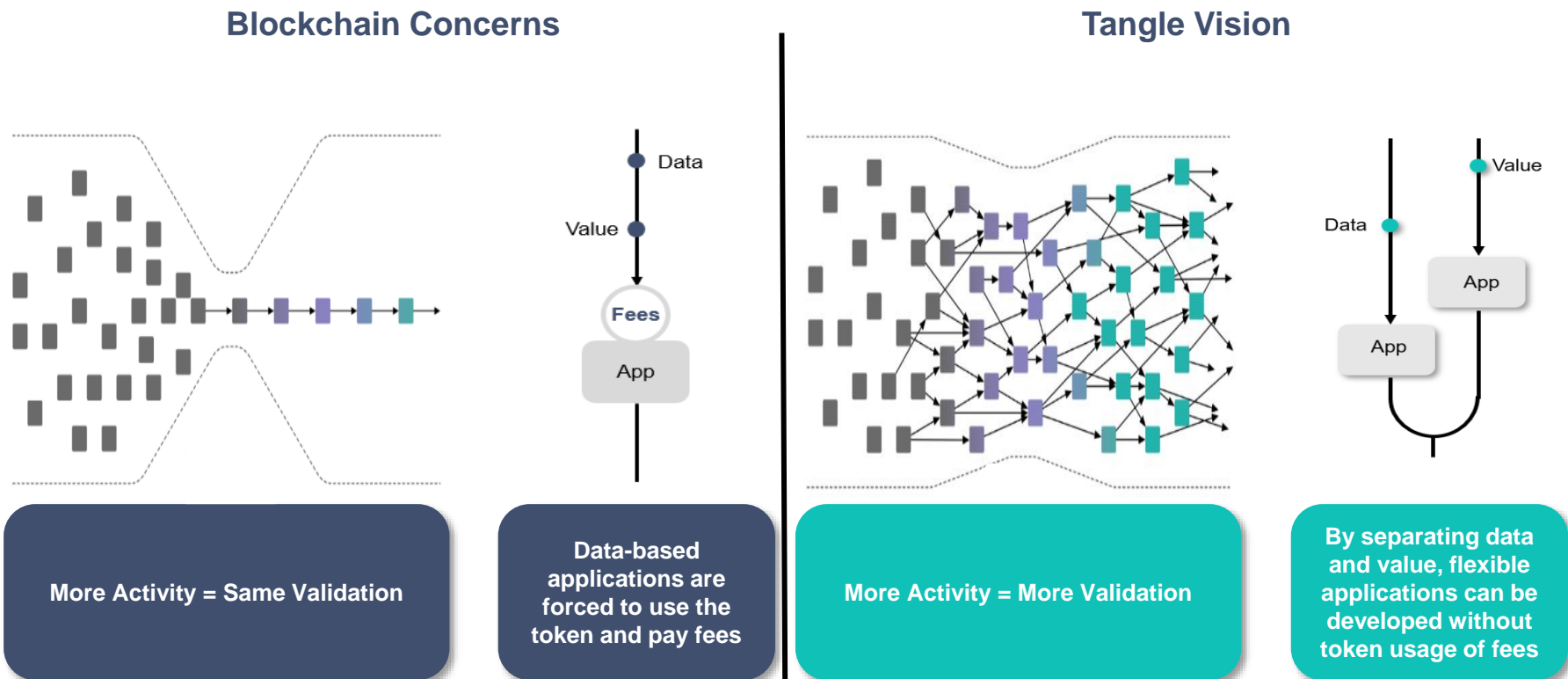


Engineering The Network For Scalable & Fee-less Applications

As envisioned, the Tangle may uniquely support IoT use cases

- As DLT adoption accelerates, scalability and low fees may be a necessary feature to support IoT applications. The approach blockchains take towards processing transaction, requiring mainchain transactions to be dependent on periodic miner validation, creates a concern that IOTA believes will lead to a scalability bottleneck.
- A key area where IOTA differentiates itself from other DLT's is its parallel architecture that separates data and value, seeking to enable new complex, flexible and fee-less use cases for data-based applications.

Figure: IOTA's vision of blockchain concerns and its Tangle architecture



Source: Fundstrat, IOTA

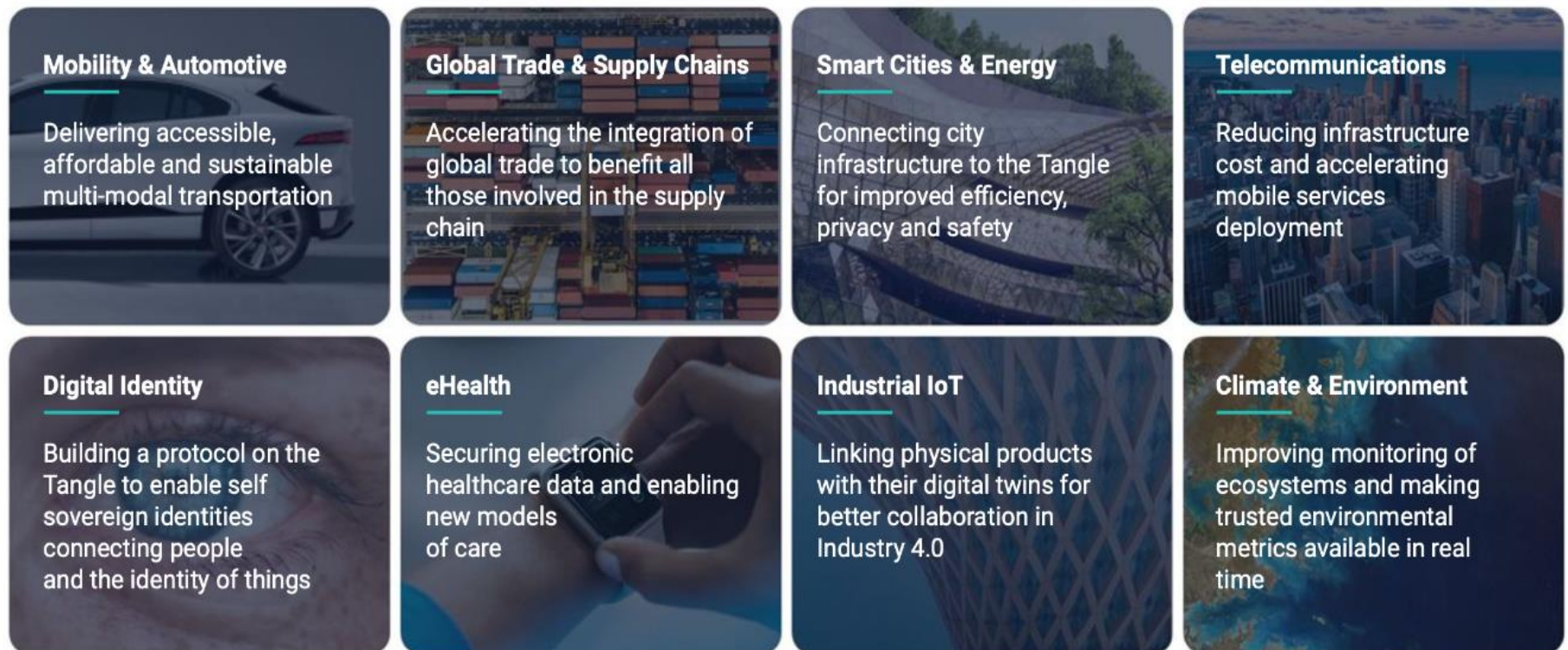


Offering An Open Infrastructure Layer For Enterprise Use Cases

IOTA plans offer an open infrastructure layer for the digital economy

- IOTA already has several PoC partnerships ongoing with leading enterprises and they hope to one day become the standard for real-world use-cases across mobility, supply chain, smart cities, energy grids and industrial IoT.
- In the future IOTA could become a new open infrastructure middleware solution providing a trust layer between humans and machines that connects the digital and physical world.

Figure: Example IOTA Use Case Verticals & Enterprise Partnerships



Source: Fundstrat, IOTA



Developing Products That Are The Building Blocks For Adoption

Oracles, Streams & Identity provide a framework for real-world dApps


- In 2020, the IF focused development efforts on three core modules they deemed crucial for real-world adoption by their enterprise partners. Oracles, Streams, and Identity enable production-ready IoT & supply chain use cases.
- As a result of these efforts, the IF has inked numerous enterprise partnership and customer deals ranging from retail e-commerce, smart city infrastructure development, healthcare digital identity and other applications.

Figure: IOTA Development Modules and Select Funded Projects




IOTA Oracles

Bringing off-chain data to dApps and smart contracts on the IOTA network



IOTA Streams

A cryptographic framework for secure data streams, enabling access by authorized parties




IOTA Identity

A Digital Identity protocol built on the Tangle

2020 Select Funded Projects & Partnerships



In partnership with Dell and Intel, Project Alverium aims to create the first Data Confidence Fabric to measure data trust, extending functionality of an oracle with a confidence score to create an industrial oracle.




Developing smart city infrastructure to create self-sustainable “positive” energy districts. Project will trial a decentralized energy trading marketplace, enabling P2P energy trading.



Adding AI & the IOTA Tangle to maintenance systems deployed in power & industrial plants and petrochemicals, NEDO aims to capture a share of the domestic social infrastructure conversation market.



Through its strategic partnership with the IF, TMEA plans to use the Tangle to improve data management & collaboration along trade corridors and increase global competitiveness of East African products.



Zebra Savanna now publicly offers the IOTA Track & Trace Ledger REST API, allowing developers to build and test novel track and trace solutions.



The automotive supplier partnered with the IF to bring a secure, highly-configurable, and permission-less access control framework to its smart devices.

Source: Fundstrat, IOTA









Firefly Aims To Set A New Standard For Crypto Wallets

Next generation wallet will be the user's primary gateway to IOTA 2.0





- Firefly V1 will optimize for functionality, security, and a sleek user experience. Its core feature set will be integrated with Chrysalis, including reusable addresses, 24-word recovery phrases and improved network performance.
- Built upon an expandable architecture, Firefly's next generation features will include the ability to hold tokenized assets, chat functionality, mana delegation, identity, and contact management all within one wallet application.

Figure: Firefly Wallet Overview

Version 1 Features

-  Integration of Chrysalis protocol
-  Utilization of Stronghold secure software
-  24-word mnemonic seeds
-  Multiple users on one private key
-  Physical Ledger support
-  Multiple sends from same account

Version 2 Features

-  **Chat functionality** – communicate with users prior to/during transactions
-  **Contact system** – creating the ability to keep a Rolodex of frequent contact
-  **Colored coins** – currency creation layered over IOTA tokens
-  **Tokenized assets** – representations of real-world assets as tokens

Customizable, with easy set-up and user-friendly interface
Offers users effortless transactions and seed encryption



Source: Fundstrat, IOTA



IOTA 2.0 Modules Are Designed To Deliver Real-World Utility

Upgrade specifications introduce modules to enhance functionality

- IOTA 2.0 promises to deliver a range of major improvements to IOTA’s DLT through implementing a series of modules around identity & reputation, autopeering, rate control, consensus & voting, and tip selection.
- IOTA expects the modules will make the Tangle future proof, permissionless & decentralized, open sourced & reliably governed, scalable & lightweight, and offer finality within seconds with fee-less value & data transactions.

Figure: IOTA 1.5 & 2.0 Modules, Descriptions, and Promised Benefits

Identities & MANA	<ul style="list-style-type: none"> • Nodes create identities and gain MANA tokens as reputation based on network contribution. Reputation is used in autopeering, rate control and consensus & voting modules for security. • Improves network security and allows for removal of the Coordinator node operated by IOTA.
Auto Peering	<ul style="list-style-type: none"> • Nodes automatically connect to randomly-chosen neighbors using MANA and distance-based selection. • Simplifies node operation and improves security by helping to prevent spam and eclipse attacks. • Simulations show a new node joining the network discovers and connects to neighbors in seconds. • Simulations demonstrate a fresh network of close to 200 nodes converge in less than 30 seconds.
Spam Protection	<ul style="list-style-type: none"> • Adaptively adjusts PoW difficulty required to submit transactions based on a node’s activity and MANA. • Avoids network congestion and spam attacks while preventing specialized hardware from gaining an advantage over low power IoT devices. • Simulations show IoT, laptop and FPG devices have reduced difference in transaction capacity.
Voting & Consensus	<ul style="list-style-type: none"> • Nodes request opinions of other nodes in order to decide which transactions should be included. • Nodes vote on credibility and ordering of transaction timestamps using a randomized gossip protocol. • Reach consensus in seconds, enable near-instant irreversible transactions and improves security. • Simulations show robustness against 33% & 50% attacks while reaching finality in 4 voting rounds.
Tip Selection	<ul style="list-style-type: none"> • Selects tips with help of a voting layer to identify the preferred part of the tangle for transactions. • Tip selection and mechanisms such as signature verification, solidification, integrity, and other mechanisms needed to exclude old and invalid transactions. • Improve confirmation times and ensure transaction confirmations.

Source: Fundstrat, IOTA

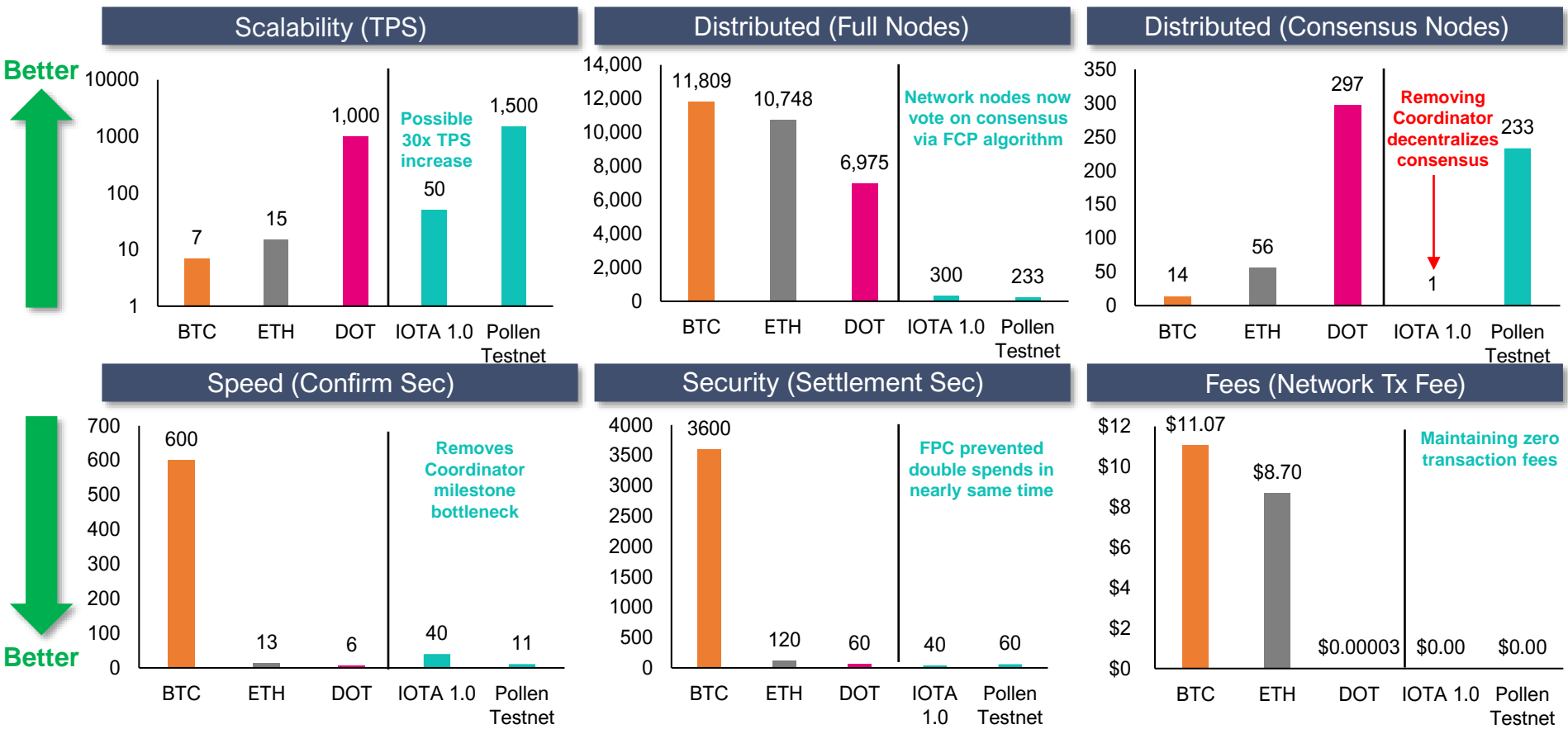


Gaining A Glimpse At IOTA 2.0 Potential From Testnet Stats

Preliminary data on the Pollen testnet offers early but informative view

- IOTA’s testnet has yielded competitive results relative to BTC, ETH, and DOT based on the admittedly imperfect but still useful proxy classification measures shown below which are further described in the appendix ([Slide 14](#)).
- Testnet data is inherently less informative than a live environment and the data shown is provided by the IOTA Foundation. The IF has stressed that these results might increase or decrease as development progresses.

Figure: IOTA 1.5 & 2.0 Modules, Descriptions, and Promised Benefits



Source: Fundstrat, IOTA, Ethernodes, Bitnodes, Ripple



Possible Model To Estimate IOTA's Future Value

Assumes IOTA becomes adopted as an IoT standard

- Our initial IOTA report examines how the network could accrue value should it become adopted as a standard ([Report Link](#)). The model estimated the future value based on: a) \$700B+ of economic activity on IOTA, if successful, b) An annual velocity of MIOTA of 2.5x, c) 2.8 billion MIOTAs outstanding, d) Implied future value would be \$280 billion or \$101 per MIOTA using MV=PQ.
- Clearly, future value is conditional on project team execution, adoption, and the assumed velocity of MIOTA.

Figure: IOTA Valuation Model
\$ billion

IOTA's goal is to become a standard for IoT the industry, possibly worth \$280B

		2035
Annual IOTA Ecosystem, US \$B	a	\$702
Total Miota in circulation, billions	b	2.78
Velocity of Miota, p.a.	c	2.5
Implied 2035 Market Cap, US \$B	d = a / c	\$281

		Economy Size											
		\$100	\$200	\$300	\$400	\$500	\$600	\$700	\$800	\$900	\$1,000	\$1,100	\$1,200
Velocity	0.50	\$200	\$400	\$600	\$800	\$1,000	\$1,200	\$1,400	\$1,600	\$1,800	\$2,000	\$2,200	\$2,400
	1.00	\$100	\$200	\$300	\$400	\$500	\$600	\$700	\$800	\$900	\$1,000	\$1,100	\$1,200
	1.50	\$67	\$133	\$200	\$267	\$333	\$400	\$467	\$533	\$600	\$667	\$733	\$800
	2.00	\$50	\$100	\$150	\$200	\$250	\$300	\$350	\$400	\$450	\$500	\$550	\$600
	2.50	\$40	\$80	\$120	\$160	\$200	\$240	\$280	\$320	\$360	\$400	\$440	\$480
	3.00	\$33	\$67	\$100	\$133	\$167	\$200	\$233	\$267	\$300	\$333	\$367	\$400
	3.50	\$29	\$57	\$86	\$114	\$143	\$171	\$200	\$229	\$257	\$286	\$314	\$343
	4.00	\$25	\$50	\$75	\$100	\$125	\$150	\$175	\$200	\$225	\$250	\$275	\$300
	4.50	\$22	\$44	\$67	\$89	\$111	\$133	\$156	\$178	\$200	\$222	\$244	\$267
	5.00	\$20	\$40	\$60	\$80	\$100	\$120	\$140	\$160	\$180	\$200	\$220	\$240

Source: Fundstrat, Coinmarketcap

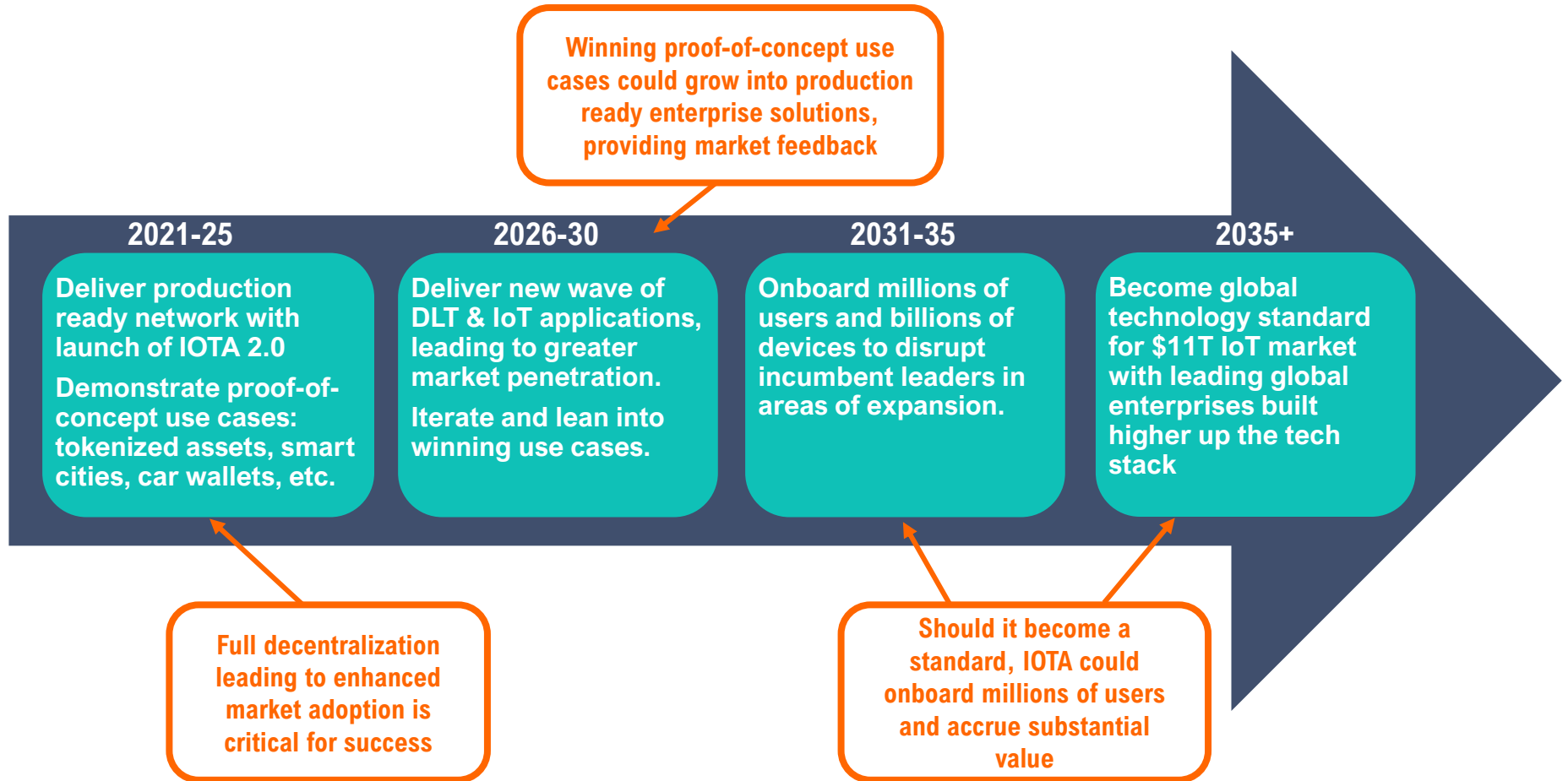


Adoption Is A Multi-Year Process With Milestones To Track

We believe the coming years will deliver crucial evidence of adoption

- As IOTA nears completion of its development roadmap this year, there are specific milestones we will be watching: number, breadth and success of concepts in key verticals and degree of integration into semiconductors and devices.
- Over the next 4-5 years, reference solutions, deployments and design wins hitting the market are key evidence of successful traction. These are items we will be tracking as the project team roles out new modules & upgrades.

Figure: Illustrative IOTA Roadmap to Adoption



Source: Fundstrat



Appendix - Comparison of network stats, category descriptions and sources

	Scalability (TPS)	Distributed (Full Nodes)	Distributed (Consensus Nodes)	Speed (Confirm)	Security (Settlement)	Fees (Paid)
BTC	7	11,809	14	600 Sec	3600 Sec	\$11.07
ETH	15	10,748	56	13 Sec	120 Sec	\$8.70
DOT	1,000	6,975	297	6 Sec	60 Sec	\$0.00003
IOTA 1.0	50	300	1	40 Sec	40 Sec	\$0.000
IOTA 2.0	1,500	233	233	11 Sec	60 Sec	\$0.000

	Description	Sources
Scalability	Throughput (transactions per second) capacity of the network	IOTA Foundation https://ripple.com/xrp/
Full Nodes	Lower bound of responsive listening nodes running the network protocol implementation software in last 24 hours. Number of Nominators for DOT (1/21/21)	IOTA Foundation https://polkadot.js.org/apps/#/staking https://www.ethernodes.org/ https://bitnodes.io/
Consensus Nodes	Number of nodes/miner entities primary affecting technical network consensus (issuing ledger changes) in the last 24 hours (1/21/21)	IOTA Foundation https://polkadot.subscan.io/validator https://www.etherchain.org/charts/topMiners https://www.blockchain.com/charts/pools
Speed	Number of seconds it takes for a transaction broadcasted to the network to be included accepted in a block/batch of transactions	IOTA Foundation https://etherscan.io/chart/blocktime https://bisontrails.co https://ripple.com/xrp/ https://bitinfocharts.com/comparison/bitcoin-confirmationtime.html
Security	Number of seconds before a transaction is expected to be considered secure against double spend attempts based on historical precedent of reversed transactions	IOTA Foundation https://ripple.com/xrp/
Fees	Average transaction fee on the network (1/21/21)	IOTA Foundation https://polkadot.subscan.io/tools/charts https://ethgasstation.info/ https://bitinfocharts.com/comparison/bitcoin-transactionfees.html

Source: Fundstrat, IOTA, Ethernodes, Bitnodes, Subscan, Ripple



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