

## VOICES FROM THE PRACTICE

Insight from  
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IOTA is a secure data communication protocol and zero-fee microtransaction system utilizing distributed ledger technology. IOTA's key innovation is the Tangle, a system of nodes that confirms transactions and allows participants to transfer immutable data and value and achieve consensus on the data and value transactions in the network.

**Q:** What's IOTA and how does it work?

**A:** The Tangle provides a single source of truth and trust in data, with a goal of being the backbone of the Internet of (every) thing in a highly networked world. It can be used to generate machine-to-machine micropayments and share data across the ecosystem of devices, generating data, producing results and co-creating new business models. IOTA is developed open source with the full benefits of transparency and visibility into the code base, better reliability, security and freedom from becoming locked in by vendor or technology. IOTA is a protocol that is based on a Directed Acyclic Graph [DAG] and works without miners. It therefore does not introduce any hierarchies into the network. The network is permissionless and can be used by everyone without requiring the IOTA Token – everyone can access the IOTA protocol without having to worry about the regulatory implications of owning digital assets. This allows IOTA to be utilized in a range of industries and use cases, spanning mobility and automotive, global trade and supply chains, industrial IoT, smart cities, sustainability management and digital identity.

As of the latest development, IOTA has launched Pollen, the first test network that is completely decentralized and works without the so called coordinator that was previously needed to achieve finality in the DAG-based network. Furthermore, distributed ledger systems such as IOTA function without miners to confirm the transaction. With IOTA, anyone who wants to make a transaction on the network must confirm two previous transactions. Every node is repeatedly asked if they consider a transaction to be true. Since no monetary incentives are introduced to keep the network safe, other mathematical solutions were developed, most notably a voting scheme that is designed after extraordinary behaviour seen in nature. Bees “synchronize” their movement to defend themselves against predators.

They do this without any centralized entity, and only know when to “change their state” by observing the behaviour of their peers. Individual autonomous agents that act according to some predefined rules can be found in many systems in nature, such as bees, ants, schools of fish and even in some areas of physics. Very simple rules can create incredibly complex features that, over time, manifest as emergent properties of a system. IOTA’s consensus mechanism works in the same way. Instead of trying to reconstruct the opinion of every other node, it cares only about the opinions of a very small subset of nodes and lets consensus be formed organically as an emergent property of the network. While the development of a DAG-based network is much more complex than linear blockchain architectures, the advantages with regard to scalability, predictability, power consumption and governance become apparent as IOTA approaches production readiness in the coming months.

How does governance matter in your work at IOTA?

Governance is central to the development of the IOTA protocol from several perspectives. The research and engineering of the core protocol is led by the IOTA Foundation, with little predefined on-chain governance regarding the features of the protocol. This ensures a reliable and predictable development process that is in line with the expectations of established industry leaders and international regulation. It is the mission of the Foundation to balance the needs of public and private actors as well as a big open-source community and to make sure the protocol is fit for purpose across sectors and applications. The network and technology are openly accessible and can be used by anyone in order to shape the general purpose protocol to specific needs.

In our co-innovation activities with partners, we are always faced with governance as a central topic to successfully complement or replace legacy systems with decentralized ones. Questions of liability, accountability and privacy need to be solved in line with existing legislation. Furthermore, the IOTA Foundation believes in and fosters the potential of decentralized technology to improve governance processes in a wide range of applications such as environmental accounting, taxation or supply chain provenance to name a few.

Distributed Ledger Technology offers new tools for governments and policymakers to deliver public and government services, and the IOTA Foundation’s Regulatory Affairs team is engaging

actively with thought leaders from academia, civil society, business and government to inform dialogue and legislation as prerequisites for the real world adoption of permissionless distributed ledgers.

What regulatory and legal challenges have you faced for IOTA in general and in different use cases?

For the IOTA Foundation, it is important to bring the technology to the attention of the regulators in an open and honest dialogue. Especially the question on how to apply the European General Data Protection Regulation [GDPR] must be clarified with regard to the right to be forgotten. GDPR is a regulation of the European Union, which harmonizes the rules for processing personal data by most data processors, both private and public, throughout the EU. The implementation of our decentralized identity framework has taken great care in being GDPR-compliant. Any clear Personal Identifiable Information [PII] is never stored on the immutable ledger so as to adhere to the right to be forgotten. According to the standards for decentralized identity, public keys and an identifier must be stored on the ledger. We have added layers of protection for those, as these can be considered PII under specific circumstances. So are public keys hashed with a salt before they are put on the ledger and are the identifiers exposed in a very limited manner, preventing a correlation attack.

Governance issues vary largely depending on the sectoral application and specific national regulations. Our work strongly relies on the regulatory framework and requires as much legal certainty as possible. We sense, however, that there is a lot of support, both from the European Union as well as national governments for solving these questions collaboratively, and movement at the regulatory level is seen in almost all areas and sectors based on the evident potential of Distributed Ledger Technologies to support societal shifts towards transparency and sustainability.

Why did you register IOTA as a foundation in Germany?

It was a deliberate decision that the IOTA Foundation was registered as a not-for-profit foundation in Germany. We are the first foundation with a cryptocurrency endowment that was registered in the European Union. Although there were many regulatory challenges in the beginning, the choice for a strongly regulated jurisdiction such as Germany helps to create trust in the IOTA Foundation and is a prerequisite to interacting with governments, industry and standardization bodies across the globe. Widespread adoption of DLT will depend on credible, strongly regulated organizations and we strive for maximum transparency towards our regulators partners and community.