

e-Crown

The IOTA Foundation and Faston are happy for the invitation to discuss the e-crown project and present our view and technical solution to support the issuance of an e-crown. We have followed the project since start and have spoken to cash handlers, retailers, the Swedish Post and Telecom Authority and County Administrative Boards to assess the stakeholders view of the cash market to find the ambition level and understand how we best can support the project and be part of the solution.

We would like to present the IOTA foundations version of a register based currency that can be configured either as a central register or a decentralized register in which either case the Riksbank would have full control over issuance, monitoring and steering of the e-crown.

In our view, a successful e-crown must be able to replicate some of the properties of cash and be as convenient to use as the most modern methods of payments used today. Our solution is not limited to function online only but supports off line transactions as well. Interoperability with other payments is key and the solution supports transactions between registered based e-crowns and value based e-crowns. During a transition period, ability to convert physical cash directly to e-crowns in order to maintain same credit quality will be interesting for the users. Our technique supports an interface between physical cash and e-crowns

As the physical cash is rapidly decreasing and risk becoming a supporting method of payment rather than basic method of payment, the cost of infrastructure to maintain the physical cash may soon supersede the cost of development of support for those who need cash the most. The cash users today may have disabilities or are not to confident using technical equipment. We aim to simplify interfaces, devices and ways to identify yourself through geometrical or numerical methods to meet their demands as well.

To implement a successful e-crown we have identified a range of key properties and want to highlight some of them to show you part of our ambition level;

- **Centrally controllable, managed** and issued by the Riksbank.
- **Scalability.** The solution must support a growing number of transactions without slowing down
- **Fee less.** The solution must support small payments and there cannot be any mining fees or other fees built into the mechanism of the e-crown as in common crypto currencies.
- **Regulatory compliant,** as AML f ex. Traceability but still allow for certain degree of anonymity. For regulatory purposes an audit trail must be in place for transactions that meet predefined properties as size and number over a period.
- **Interconnectivity** with other forms of Swedish crowns
 - Physical cash
 - Commercial crowns
 - Value based e-crowns
- **Off line capacity.** Ability to use other means of communication for transactions, NFC, Bluetooth
- **Enable technical solutions** as support for disabled people and to simplify payments in general.
- **Third party Interfaces** and support for developers of software and hardware
- **Convenience.** Retailers and customers are not interested in the transaction as such. A transaction or payment method must not be complicated or require to much administration. Any hurdles for the user must be minimized to gain maximum utility.
- **Interest rate component.** Configurable either at account level or within the e-crown itself. Where to balance the premium over commercial crown is up to the central bank to keep the values at par. Physical cash may as long as they exist, hinder interest rate at e-crown level.

In our view, a hybrid of decentralized and centralized ledger might be of best interest. The Riksbank may want to keep a central register of all accounts (from a KYC perspective) and a centralized or a decentralized ledger for the e-crown itself where the transactions take place. Regardless of ambition, our solutions supports both centralized or decentralized ledgers. Our solution would be compatible with a value-based e-crown taking care of the double spending problem that may arise when shifting platform and format.

There are many challenges for an functioning and well used e-crown and the greatest may very well be that the e-crown is just another electronic legal tender that would be competing over attention, awareness and space in people's wallets, devices and other means of payments. Convenience is a strong driver for becoming a preferred payment method.

Our Technical Solution - Distributed Ledger Technology

Distributed Ledger Technologies (DLT) has been heralded as perhaps the biggest breakthrough in financial technology since the Internet itself, of which the first mainstream incarnation was Blockchains. Blockchains are a special form of DLT which has gained a lot of attention in the last few years, but which is inherently limited in terms of scaling and costs, these issues lead to pioneers of the technology going beyond this architecture to invent a new one based on Directed Acyclic Graph called Tangle.

The Tangle differs from traditional blockchains architecture in that the validation of the transactions is an intrinsic property of issuing the transaction. This removes the decoupling and introduction of miners, as is the case in blockchain. The time of validation is reduced and as the number of transactions grows in conjunction with the activity on the ledger. I.E. the more activity, the more expedient validation occurs. This design makes the Tangle optimal as a platform for an e-crown. The Riksbank will manage its own version of the Tangle with a Riksbank issued SEK as tokens.

Besides being a cost efficient and scalable platform for an e-crown, the properties of the Tangle and the IOTA foundation enables several features that would make the e-crown meet the demands of a broad group of users.

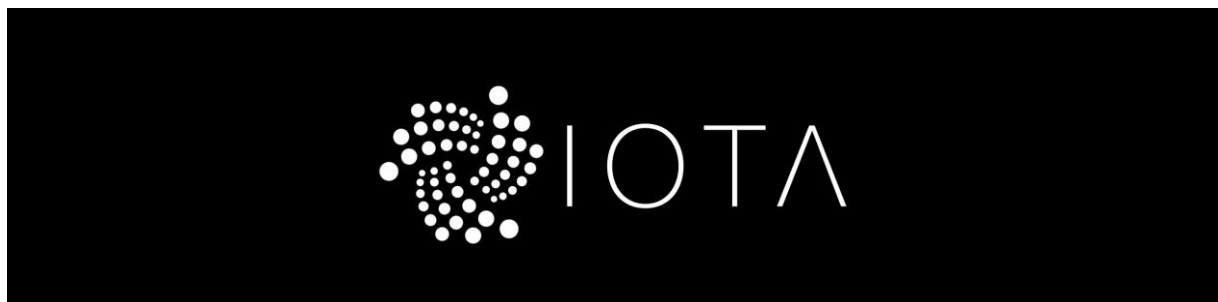
Payments over the Tangle are not limited to being on line on the internet as the Tangle supports offline payments as long as there is some means of communication between devices and supports connectivity to various hardware solutions by NFC and Bluetooth for example. In short this is because IOTA is Partition Tolerant from a CAP Theorem perspective. The IOTA foundation has also developed a payment channel technology named Flash that enables instant feeless transactions in peer-2-peer payments

The research and implementations made by the IOTA foundation on technique around the Tangle serves as a platform, or ecosystem, from which further expansion of connectivity and integration to other technological development, digital and physical, are enabled, offering the Riksbank great flexibility to add further features in the future.

IOTA technology supports and enables payments for physically impaired. By sound, voice and enhanced displays together with a wide range of methods for identification, transactions are made possible to a greater number of people than current payment methodologies.

The technology would support simplified devices to enable payments for people with lesser interest and knowledge of technical solutions. To enable identification the tangle supports biometric identification as well as numeric methods; Stand alone or in combination as a two-factor solution. Identification can be done by placing the palm of the hand on a reader or with the touch of a finger, or any other biometric solution.

IOTA Foundation - Beyond Blockchain technology



The technical solution is provided by IOTA, a non-profit organization registered in Berlin by a Scandinavian founder and a German resident. The team has been involved in Blockchain development since 2011. The IOTA foundation is at the forefront of technological development and works with large for-profit and non-profit organizations. Currently, they are in talks with other central banks about development of central bank issued digital currencies.

Besides involvement in development of sovereign money, they are involved in a broad range of implementations ranging from electric charging of vehicles and paid with cryptocurrency. Steering of smart homes where IoTs (Internet of Things) are negotiating power with each other. Transmissions of secure data between IoTs or negotiation of data traffic are another example they are involved in.

Payments and steering between IoT's are the main focus for IOTA and to enable that on such massive level of small transactions requires development of the highest efficiency of a payment system

IOTA are continuously pushing development forward currently developed off line high frequency payments named the Flash. Another project is Identity of Things, making it possible to monitor communication and identities IoT, finding any adverse behavior. The IOTA Foundation is already working with leading companies such as Bosch, Cisco, Microsoft, Dell, Commonwealth Bank, Volkswagen Group, Maersk and organizations such as UNOPS, Refunite and Digital Norway. IOTA is working on the cutting edge of fintech with Oliver T. Bussmann ex-CIO of UBS and SAP is on its fintech board.

www.iota.org

Faston Commodity and Business Advisor AB



Faston provide strategy work and facilitates change and development. Our focus is to implement solutions to improve efficiency whether that are in technology, organizations and processes and acts as an interface between technology developers and the users. We are currently providing services within the cash business in the Nordics and are participating in the discussions with the Swedish Post and Telecom Authority and County Administrative Boards about basic payment services and know the development, challenges and properties of the cash market very well. In parallel Faston are involved in developing strategies for future electronic payments and further digitalization of such services.

As we understand that this project have the form of a research project assessing properties and potential technical solutions for a e-crown, we are happy to take part in further discussions to present our organizations in more detail and describe the full capacity and capability of the Tangle form the core platform of an e-crown and support the realization of an e-crown in a broader context.

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