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The Riksbank's e-krona pilot

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Summary

The recent sharp decrease in the use of cash in Sweden has made it more difficult to use cash in certain parts of Swedish society. Cash has so far been the only possibility for the general public to hold and pay with central bank-issued money. The Riksbank sees potential problems with the marginalisation of cash and has therefore initiated a pilot project to develop a proposal for a technical solution for a central bank digital currency, an e-krona that can work as a complement to cash. The aim of the project is to show in a test environment how an e-krona could be used by the general public. This technical solution will be based on Distributed Ledger technology (DLT), often referred to as block-chain technology. The main aim of the pilot is for the Riksbank to increase its knowledge of a central bank-issued digital krona. There is currently no decision on issuing an e-krona, how an e-krona might be designed or what technology might be used.

Why an e-krona?

The Riksbank is reviewing the possibility of issuing a digital complement to cash, an 'e-krona', and whether it could support the Riksbank in the task of promoting a safe and efficient payment system. The main reason that an e-krona has become so relevant is the sharp decrease in cash usage seen over the last decade. Digital developments, with convenient and simple payment services, has resulted in it becoming impossible to pay in cash in many places today. There is no digital state money available to the general public, however, and the digital money and payment methods that are available are provided by private market players. The digital money is therefore a claim on a private player in contrast to cash which is a claim on the state. An e-krona would offer the general public continued access to central bank money, as cash has done, but in digital form. Offering an e-krona which is available to everyone will also reduce the risk of the krona's position being weakened by competing private currency alternatives. An e-krona would also contribute to a payment market with continued competition, innovation and where the integrity of transaction data is safeguarded. It would also make society less vulnerable in the event of problems with the existing payment system.

The precise role and the potential effects on the Swedish economy of an e-krona depend on how it is designed. Making an e-krona available to the general public is also ultimately a political decision. To be able to, at this stage, test how an e-krona might look and function, the Riksbank is running a pilot project with Accenture to construct a technical platform for the e-krona. The aim of the pilot is to create, in an isolated test environment, a digital krona that is simple and user-friendly and, at the same time, complies with critical requirements for security and performance. In the test environment, the test user shall be able to hold e-krona in a digital wallet. From this digital wallet, it will be possible via a mobile app to make deposits and transfers as well as make and receive payments. The user shall also be able to make payments via wearables, such as smart watches, and cards. The technology shall be user-friendly and inclusive. E-kronor shall be available 24/7/365 and payments shall be instant. The pilot will also examine the possibility of building a technology in which the e-krona can be used offline.

Accenture's assignment in the e-krona pilot will run until February 2021, at which point the abovementioned aims shall have been fulfilled. There is, however, an option to extend the assignment for continued further development with a maximum agreement period of seven years. The

procurement of technological supplier only concerns the pilot project and a new technical supplier procurement will have to be conducted if it is decided that the Riksbank is to start to provide an e-krona for use by the general public.

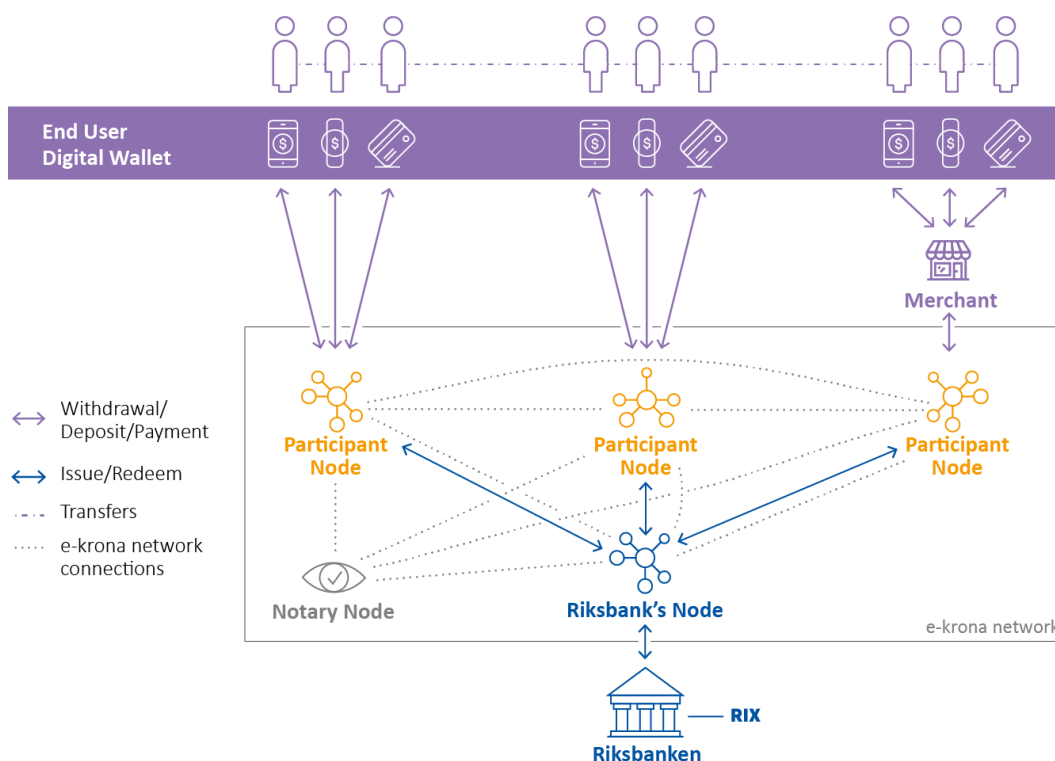
Technical solution for the e-krona pilot

The solution is based on the e-krona being distributed via participants in the e-krona network, for example banks, and offers a robust and parallel infrastructure to the existing payment system. The solution is based on digital tokens (e-kronor) that are portable, cannot be forged or copied (double-spent) and enable instantaneous, peer-to-peer payments as easily as sending a text.

DLT is a technology to keep databases operated by independent parties synchronised. The network ensures that only valid transactions are recorded. Each participant in the DLT network runs one or more nodes. In the e-krona network, the nodes store e-kronor and receive, validate and forward e-krona transactions.

The technical solution will be evaluated in a test environment, in which participants and interactions with the existing infrastructure and settlement systems will be simulated.

Figure 1: Conceptual architecture for the e-krona pilot



Source: Accenture

The test environment will be structured in two tiers. In the first tier, the Riksbank will issue e-kronor to participants in an e-krona network, such as banks. In the second tier, participants will distribute e-kronor to end users.

Similar to today's cash, only the Riksbank will be able to issue and redeem e-kronor. Participants in the network will be able to obtain/redeem e-kronor against the debiting or crediting of reserves held directly by the participants or via a representative in the Riksbank's settlement system, RIX. RIX is the central payment system at the Riksbank in which transfers between accounts in different banks are handled. The e-krona network will be supplied with liquidity by the participants, either as direct participants or as representatives for indirect participants, paying in reserves in RIX in exchange for the Riksbank providing the participant's node with the same amount of e-kronor.

Participants in the e-krona network distribute e-kronor to end-users and end users can then use various payment methods for e-krona. The consumer or merchant controls their e-kronor with a digital wallet installed as an app in, for example, a mobile phone or in the merchant's cash register (terminal). In addition to a mobile app, the pilot will also develop a digital wallet for use in smart watches and cards. In the future, digital wallets could be created for additional device types and integrated with a payment service provider's mobile app. To be able to use e-kronor for payments, the digital wallet must first be activated at a participant connected to the e-krona network. After activation, the user can, for example, receive e-kronor as payment from another user, pay a retailer with e-kronor, make transfers from their bank account to the digital wallet (and vice versa), and check their e-krona balance.

The e-krona network is private and only the Riksbank can approve and add new participants to the network. All transactions in the e-krona network occur separately from existing payment networks, which, as stand-alone systems provide added robustness in the event of problems with the existing payment infrastructure. Payments occurring in the e-krona network will take place without the involvement of RIX, but the supply or redemption of e-kronor will be done via RIX.

The technical platform that forms the foundation of the e-krona solution is based on the company R3's Corda DLT platform. Corda differs on a number of crucial points from cryptocurrencies, such as Bitcoin. For example, the e-krona's DLT network will be private and only accessible for participants approved by the Riksbank. Corda's solution for verifying transactions is not as energy-consuming as Bitcoin either, but is instead more comparable with existing payment systems. Corda also provides a high degree of robustness and scalability as only a few nodes, and the notary node that is a supporting component to prevent double spending of tokens, are involved in each transaction.

The following components are included in the e-krona solution:

- The e-krona network and its governance – The Riksbank controls this network as described above.
- Participant nodes, their databases and the e-krona contracts and flows. These contracts and flows (sometimes called Corda-distributed application) enforce the regulatory framework set by the Riksbank for the e-krona via both technical and legal rules. Examples of rules include: who has the right to distribute e-kronor, definition of the transaction flow between nodes, signing of transactions and storage of e-krona transactions.
- An integration layer (Application Programming Interfaces, API) for interacting with existing systems such as RIX and core banking systems.
- Digital wallets in all their forms (smart mobile apps, wearables, cards and terminals).
- Simulated existing systems, such as banking systems and RIX.

The e-krona network architecture is flexible and has an expandable design. If the e-krona pilot is extended, it is possible to examine additional services such as automatic deposits or automatic transfers, as examples of services that network participants might develop and offer in the future.



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