HOW MICRO-PAYMENT TECHNOLOGY ENABLES THE CIRCULAR ECONOMY

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THE CIRCULAR ECONOMY

The best way to explain what a circular economy is, is to compare it to our current linear economy. In our current economic system, we extract resources from our planet at an ever-increasing pace, and turn them into a product that we mostly dispose after use. From the perspective of an individual or organization, that seems efficient. However, zooming out to a global level shows how unsustainable this approach is.

In order for those same individuals and organizations to thrive, we need an economic system that operates within our planetary boundaries. A circular economy is one that is waste-free and resilient by design. It is a new economic model that is ambitious as well as practical. Designing the economy in a way that is restorative of ecosystems, ambitious with its innovation, and impactful for society, is a bold challenge but one that we believe is achievable [1].

In this article we specifically look at the possibilities that micro-payment technology may offer in stimulating sharing and temporary use instead of owning and disposing. In commercial terms: pay-for-use instead of pay-to-own. In in other words: “don’t own, enjoy” [2, 3].

There are several benefits to such a model:

- less consumption of raw materials
- the tools and services that are shared will have a higher quality (compare the tools you can buy at the D.I.Y. shop with the tools you can rent over there)
    - shared products need to last much longer than 'consumption' versions
    - better quality also results also in a better user experience
- total cost of use is lower for the consumers

But currently a pay-per-use model is often not possible for micro-services of every-day appliances as the transaction costs or needed technology is too costly. As a result people keep buying low quality tools and services they rarely use.

PAYMENT TECHNOLOGY CHALLENGE

Imagine a manufacturer of high-end washing machines no longer selling the machines, but giving them away as a pay-per-use appliance. The washing machine will be ready to start the washing program after you do a micro payment, like a few cents at a time, directly to the washing machine (manufacturer).

Mobile payments are already possible, but they require banks or credit-card companies and point-of-sales devices with a phone or internet connection. Both requirements result in costs that ruin the business case for peer-to-appliance pay-per-use micro-transactions.

To solve this costs problem and to enable the full potential of the circular economy on all scales, a pay-per-use technology is needed that can provide extreme low-cost peer-to-appliance or appliance-to-appliance micro-payments with instant settlement. There are two challenges to solve:

1. the need for an extreme low-cost and efficient payment processing infrastructure
2. the need for low-cost appliance sided technology to accept payments (including non-connected appliances)

INTRODUCTION OF DIGITAL CASH

The first challenge can only be solved by side-stepping all existing payment infrastructures and unleashing a peer-to-peer digital cash payment system enabling instant mobile transactions. This new system needs to be robust, scalable, cheap, fast, open and extremely reliable. The needed digital cash technology fortunately already exists: a payment infrastructure based on decentralized blockchain technology.

This technology is best known for the bitcoin application, where the used proof-of-work implementation is however not very useful for instant micro payments. But by using alternative consensus and issuing mechanisms, the underlying blockchain technology can be adapted to process fiat currency transactions very efficiently on an open, but permissioned, infrastructure of blockchain nodes. Transaction fees can be one cent or less.

With such infrastructure anybody using a smart device can install a wallet app and start accepting and sending digital cash payments instantly, independent from bank or credit-card companies. On top of that, if the app is referenced with your bank account, the cash balance in the mobile wallet can also be funded or defunded directly with the bank. Like withdrawing cash from an ATM or depositing cash onto your bank account, but then anywhere - anytime. As the infrastructure can be used without a traditional bank accounts, it also enables the unbanked to participate in the circular economy [4].

PAY-PER-USE WITH YOUR MOBILE PHONE

The second challenge can be solved by defining a smart protocol that enables any appliance to safely communicate transaction data through the communication channel of your mobile phone. The appliance therefor does not need an internet connection itself, only a short-distance communication method like NFC or Bluetooth. As we assume the payment to the appliance is done with digital cash from the mobile wallet, an internet communication channel is available by definition.

The payment protocol is based on asymmetric encryption technology, enabling the appliance to safely communicate the transaction request and receive the transaction result through an untrusted communication channel [5]. The appliance can receive the payment details from the transaction service of the pay-per-use provider and activate the service (like starting the washing program of the washing machine).

The technology needed in the appliance can be very cost effective. The appliance payment protocol, transaction logics and communication can be integrated on a single chip. There are no variable costs per appliance as it has no need for an internet connection by itself. On the mobile device of the user the protocol can be supported by an independent app, or it can be integrated within the digital cash application. Because of the simplicity and low costs, the protocol technology can be implemented in almost any appliance to turn it into a service: from light-bulbs and phone chargers to bikes and public toilets.

CONCLUSION

The combination of two new financial technologies; blockchain based digital cash and the mobile appliance payment protocol, will enable pay-per-use functionality for micro-services. This can be used on any tool, device or appliance.

Service providers can provide whole new service offerings, creating sustainable revenue. They will be stimulated to deliver high quality and durable solutions. People don’t need to buy rarely used low quality tools and appliances. This will save money while increasing the comfort and quality of the service.

Payment technology for micro-services will play an important role in the future development of the circular economy, resulting in lower raw materials consumption and a reduced environmental footprint.

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