

Bosch Research

Economy of Things – Contributions to the Community

New “Direct State Transfer” open source project aims to make DLT applications scalable

Bosch and partners are conducting research into enabling networked things in the future to interact autonomously with one another in secure ecosystems and complete contracts. Distributed Ledger Technologies (DLT), such as Blockchain, could become a key technology in an “Economy of Things”. Prototype applications already exist, but the technical framework for establishing viable business models, such as for achieving scalability, is not yet in place. “Scalability is one of the major challenges in DLT, as it ideally requires tens of thousands of transactions to be processed per second in real time. This consumes extremely high levels of storage and energy,” explains Daniel Kunz, one of the associates working on the strategic advance engineering project “Economy of Things” at Bosch.

The Bosch research team has set up an open source project aimed at implementing the second layer protocol “Perun” called “Direct State Transfer” (DST), published under Apache-2.0 license on [GitHub](#). The Perun protocol resulted from research work conducted at TU Darmstadt and the University of Warsaw, and TU Darmstadt is now helping the Bosch research team develop the smart contracts for DST. DST has the potential to mature into a new basic distributed ledger technology that fulfills the promise of a decentralized, secure and simultaneously scalable solution.

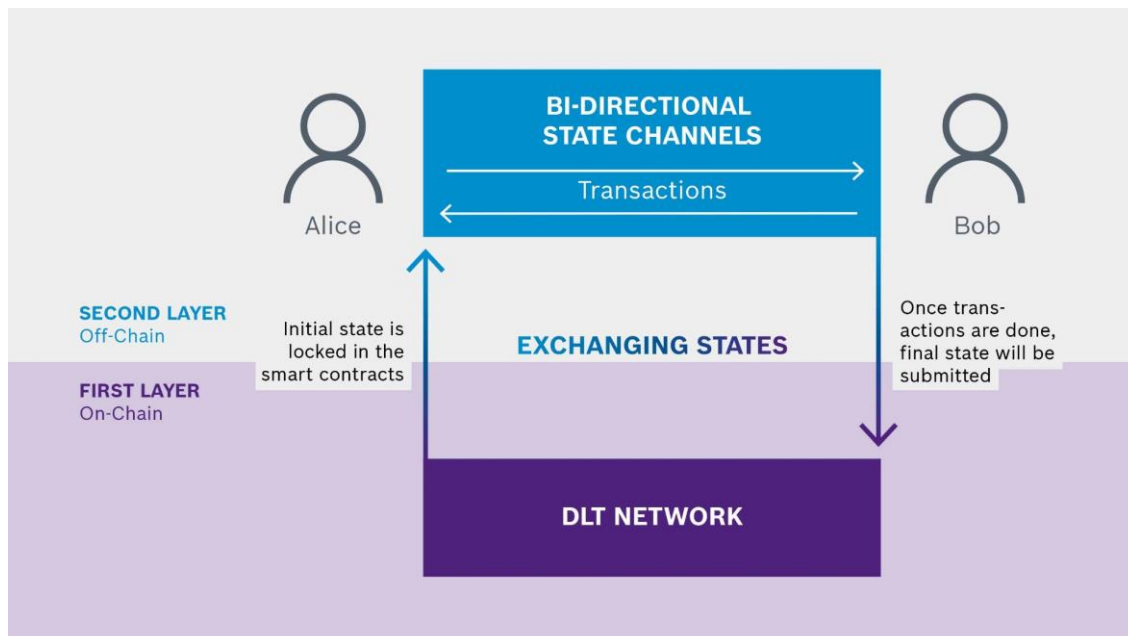


Diagram of how state channels function

A second layer for the blockchain system

Second layer protocols attempt to bypass the resource-intensive processes involved when things conduct business decentrally and securely with one another via smart contracts. “This meant adding a second layer that only rarely communicates with the slow – but at the same time highly complex and extremely secure – first (basic) layer, i.e. with the blockchain system itself. The basic layer can be considered to represent a framework contract that always applies. Where requirements are flexible and not every single transaction needs to be stored indefinitely, for example, certain individual processes can run on a second system – or ‘layer’. This enables a greater number of transactions to be conducted and makes them more cost-effective,” Kunz explains.

Potential practical applications – e.g. mobility

One example of a practical application might be enabling simple automated payments to be made directly between electric vehicles and charging stations. Second layer protocols would enable microtransactions, fine-granular payments within seconds. Another conceivable application might arise in transporting people or goods from A to B, for the purpose of precisely and immediately charging and paying for journeys both autonomously and transparently.

What next?

“As things currently stand, the software is not yet ready to be used productively, nor has the entire Perun protocol been put in place,” Kunz explains, adding: “It’s therefore all the more important that other players come on board and try out the basic features.” TU Darmstadt is currently working on the additional aspect of optimizing the efficiency of the smart contracts used, before integrating them into the DST project.