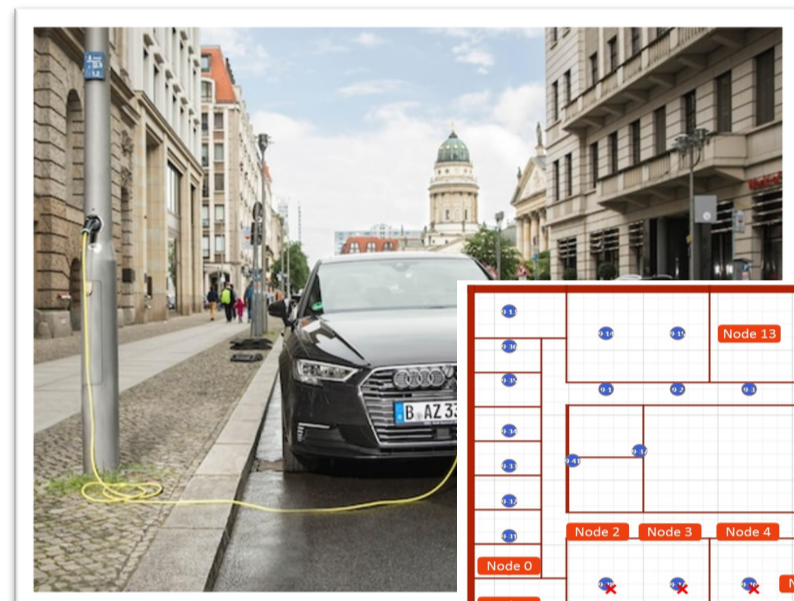


GOALS

- Development of a completely decentralized self-organizing energy management system
- Combination of wireless and mobile peer-to-peer network technologies with our new blockchain solution and smart energy services
- Stability, performance and security improvements

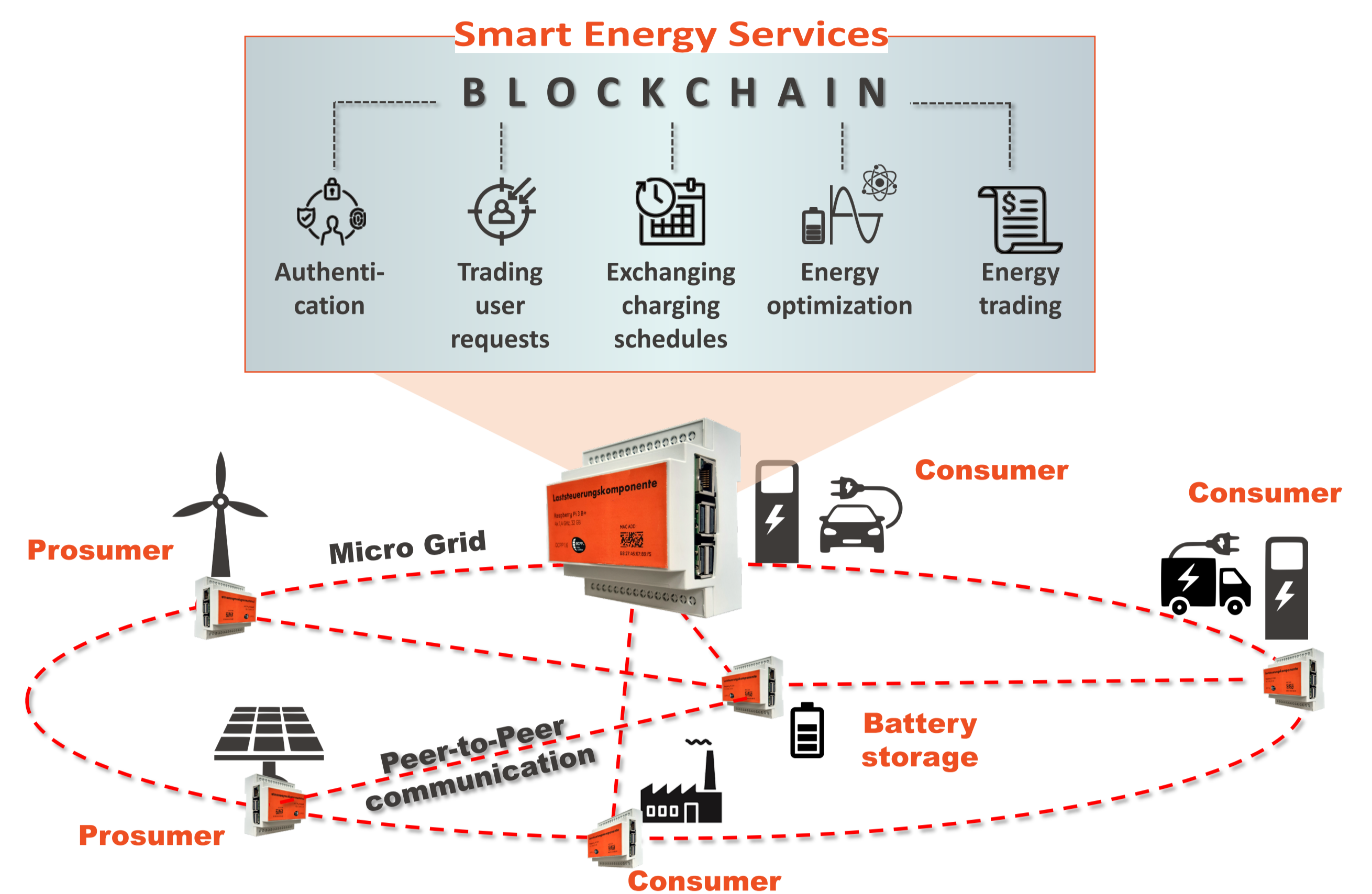
DEMO SETUP

- Simulation of different charging infrastructure topologies (scenarios) in the Fed4FIRE+ imec w-iLab.1 testbed



CHALLENGES

- Test and optimize the interaction between the blockchain based smart energy services and the mobile ad-hoc peer-to-peer network in order to reach a reliable, tamperproof and scalable communication layer



- Finding the optimal block size, transmission interval, blockchain size and distribution interval for the blockchain
- Developing a blockchain simulator to simulate the network traffic and dynamics and porting it to the testbed environment nodes

RESULTS

- The optimal size of a block is 2 Mbyte, this equates 300 charging plans
- We measured average transfer times between 3,2 and 4,2 seconds in each scenario
- In 90% of all cases, a 2 MByte block can be distributed across the whole network in less than 5 seconds
- The optimal transmission interval for a 2 Mbyte block is 5 seconds
- The higher the transmission interval, the more nodes can transmit simultaneously in the mesh network
- From an interval of 10 seconds, 20 nodes can transmit in parallel without losing performance
- Individual charging schedules with a size of 6 Kbytes can be distributed in the entire network in under a second
- The optimal size of the whole blockchain is 20 Mbytes
- The whole blockchain can be transmitted during the initialisation phase of the charging stations

CONCLUSIONS

- The experiment showed the strengths and weaknesses of our communication approach and helps us to fine-tune the blockchain configuration
- We received valuable reference parameters for various network topologies
- Results will be incorporated into our product development
- Quality and reliability improvements for our decentralized energy management system

POST MORTEM

- Fed4FIRE+ is a very useful environment for experiments
- “Hardware as a service” is very convenient, the Fed4FIRE+ experiment saved us a lot of time and money to setup our own laboratory environment
- Fed4FIRE+ offers excellent support and documentation
- DSI would like to continue using Fed4FIRE+ facilities in the future