

Putting underused smart devices to work

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Researchers at IMDEA Networks are exploring this opportunity at our technological fingertips with the development of the novel «DisCoEdge» system, which aims to transform our conception of device ownership to improve current utilities and create new services. Credit: IMDEA Networks Institute

There are currently millions of heavily underutilized devices in the world. The storage, networking, sensing and computational power of laptops, smartphones, routers and base stations grows with each new version and product release. Why not put all those extra gigabytes of memory and those powerful processing units to work collaboratively and expand the services available to all of us?

According to Moore's Law, which states that computer power doubles every two years at the same cost, products keep getting ever better and more useful. For most of us, that means going for exponential growth in speed and storage capacity, but the reality is that the capabilities of these devices go largely underused. Researchers at IMDEA Networks are exploring this opportunity with the development of the novel DisCoEdge system, which aims to transform the conception of device ownership to improve current utilities and create new services.

DisCoEdge aims to spread heavy computational tasks and large storage over many simple devices

at the edge of the internet (e.g. using your home router) or by using people's hand-held or portable smart devices. This groundbreaking idea opens the possibility of a new marketplace of private and business users similar to a social network marketplace, where it will be possible to buy or sell the partial use of personal or industry devices to store information, run programs, mine data, etc. This may enable novel applications such as commuters working cooperatively to download and share entertainment content on the go, corporate storage systems (similar to Dropbox or Google Drive) that use workers' smartphones and laptops, or home devices that share disk space for caching videos and music.

"The system aims for energy and cost efficiency. There will be no need to access a cellular network or use WiFi for the system to operate, since people's devices could also talk to each other using device-to-device communications now commonly available in smartphones, such as Bluetooth," explains Vincenzo Mancuso, one of the two investigators leading the project. "However there is a need for an entity to coordinate and make secure sharing possible among a set of not-necessarily trustable machines. Here is where blockchain technology comes into play, as this technology will allow us to build a distributed, transparent and cooperative infrastructure to track transactions between users."

The most important challenge addressed by this initiative is that devices belonging to either people or companies must dynamically and securely share and access computational resources available in their vicinity (e.g., WiFi islands, home network deployments, trusted devices forming a personal or community cloud and even 5G-and-beyond mobile radio networks). This requires developing a polyvalent interface and new secure protocols to account for the presence of free riders or even malicious users that could hinder the performance of the system or try to steal valuable personal and business information.

"We know that for participation in this revolutionary market to appear worthwhile to businesses and private owners, we must put in place a system of incentives and rewards," adds Antonio Fernández Anta. "The key idea behind DiSCoEdge is not to generate a market of free agents, but rather a platform that acts as a market broker, an intermediary, and provides guarantees. In our vision, the broker makes transactions transparent and traceable thanks to the adoption of innovative [blockchain](#) concepts."

In this collaborative scenario, people can fully exploit investments in powerful, usually expensive, technological equipment, while [smart home devices](#) (including smart TVs and appliances) able to run edge and fog computing applications will see their usability enhanced. DiSCoEdge will also offer network operators another market opportunity in the sale of the capability of their expensive telecommunication systems in a flexible way that encompasses not only communication but also generic storage and [computational power](#).

More information: Per-Olov Östberg, James Byrne, Paolo Casari, Philip Eardley, Antonio Fernández Anta, Johan Forsman, John Kennedy, Thang Le Duc, Manuel Noya Mariño, Loomba Radhika, Miguel Ángel López Peña, José López Veiga, Theo Lynn, Vincenzo Mancuso, Sergej Svorobej, Anders Torneus, Stefan Wesner, Peter Willis, Jörg Domaschka (Junio 2017) Reliable Capacity Provisioning for Distributed Cloud/Edge/Fog Computing Applications [PDF] In: The 26th European Conference on Networks and Communications (EuCNC 2017), 12-15 June 2017, Oulu, Finland.

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