

FOG-CLOUD NETWORKS

Computing with the elements

IEEE Commun. Lett. [https://doi.org/10.1109/](https://doi.org/10.1109/LCOMM.2018.2866145)

LCOMM.2018.2866145 (2018)

Cloud computing involves the communication and processing of data far from where the data was collected.

Fog computing, in contrast, aims to process data as close as possible to the source of data, thereby eliminating the step of data communication. Computing closer to the data source (known as edge computing) is expected to lead to more responsive and power-efficient electronics. Existing edge devices, however, tend to possess limited computing resources and offer low energy efficiencies. Thus, in the near term, a combination of processing data locally (in the fog) and sending data to be processed off-site (in the cloud) could be a reasonable compromise.

A key challenge for cooperative fog-cloud computing, however, is balancing the workload between fog and cloud to avoid overloading the fog nodes, thereby reducing operational outages. Supeng Leng and colleagues at the University of Electronic Science and Technology of China, Chengdu have now developed a model to study the interplay between communications and computing in fog-cloud computing frameworks. Monte Carlo simulations reveal that by introducing full-duplex communication — the ability to transfer data back and forth between two nodes at the same time (in this case between fog and cloud nodes) — a lower operational outage probability than conventional fog-computing approaches can be achieved.

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Published online: 12 October 2018

<https://doi.org/10.1038/s41928-018-0158-1>