

Teamwork can make the 5G dream work: A collaborative system architecture for 5G networks

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In a new study, a research team, led by Prof Jeongho Kwak at Department of Information and Communication Engineering, DGIST, explain how a collaborative system architecture can make 5G applications easier Credit: DGIST

That many novel network- and cloud-dependent services will have become commonplace in the next few years is evident. This includes highly demanding technological feats like 8K video streaming, remote

virtual reality, and large-scale data processing. But, it is also likely that today's network infrastructures won't make the cut unless significant improvements are made to enable the advanced, 'killer' 5G applications expected in the imminent 5G era.

So, instead of having cloud [service](#) providers (CSPs) and mobile [network](#) operators (MNOs) like Google and like Verizon independently improve their systems, what if they actively collaborated to achieve common goals? In a recent paper published in *IEEE Network*, a team of scientists, including Prof Jeongho Kwak from Daegu Gyeongbuk Institute of Science and Technology in Korea, explored the benefits and challenges of implementing a system focused on MNO-CSP [collaboration](#).

In their study, the scientists propose an overarching system architecture in which both CSPs and MNOs share information and exert unified control over the available network, computing, and storage resources. Prof Kwak explains, "The proposed architecture includes vertical collaboration from end devices to centralized cloud systems and horizontal collaboration between cloud providers and network providers. Hence, via vertical-horizontal optimization of the architecture, we can experience holistic improvement in the services for both current and future killer applications of 5G." For example, by having MNOs share information about current traffic congestions and CSPs inform MNOs about their available computing resources, a collaborative system becomes more agile, flexible, and efficient.

Through simulations, the research team went on to demonstrate how CSP-MNO collaboration could bring about potential performance improvements. Moreover, they discussed the present challenges that need to be overcome before such a system can be implemented, including calculating the [financial incentives](#) for each party and certain compatibility issues during the transition to a collaborative system architecture.

Embracing collaboration between CSPs and MNOs might be necessary to unlock many of the features that were promised during the early development of 5G. Prof Kwak concludes, "We envision unconstrained use of augmented or virtual reality services and autonomous vehicles with almost zero latency. However, this ideal world will be possible only through the joint optimization of networking, processing, and storage resources."

One thing is clear: "teamwork," among various service providers, is essential if we are to keep up with the current Information Age.

More information: Jeongho Kwak et al, Collaboration of Network Operators and Cloud Providers in Software-Controlled Networks, *IEEE Network* (2020). [DOI: 10.1109/MNET.001.1800329](https://doi.org/10.1109/MNET.001.1800329)

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