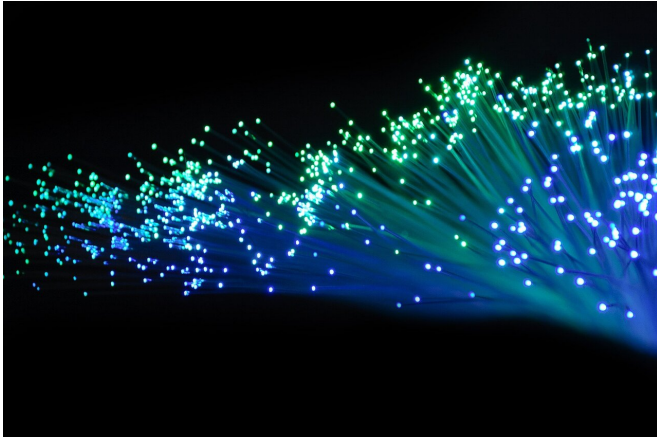


A fiber optic monitoring system for 5G light-powered networks

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The Universidad Carlos III de Madrid (UC3M), together with the Universidad Politécnica de Valencia (UPV), has patented a multicore fiber optic monitoring system for future use in 5G networks. This system will optimize energy consumption, preserving data transmission capacity.

The system, developed by the UC3M's Photonic Displays and Applications research group, has been able to light-power a system for controlling turning antennas on and off using a fiber optic infrastructure. "What we are going to achieve is a parallel system that will monitor the node's energy needs at all times. In other words, if there is no user in the cell, which is the physical area covered by a particular antenna, we will turn it off so that it is not consuming energy," says Carmen Vázquez, professor at the Department of Electronic Technology.

In addition to this, by receiving a single optical signal, the system can also monitor temperature changes in the fiber core, energy distribution using optical means at different network points, and the

state of the communication channel used within the fiber. "If lots of energy is sent, the temperature inside the fiber might increase and, therefore, could be damaged. This system helps us know how much energy we are sending and make sure that the infrastructure we are using to send that energy is in good condition and we are not damaging it," notes Vázquez.

The system can also be integrated into the communications channel itself, with minimal insertion losses and monitoring on a different control channel to the channel being used to send [energy](#). Currently, there is no commercial system that integrates this type of technique, according to the research team.

This patent has been created in collaboration with the ITEAM-UPV's Photonics Research Labs, who manufactured the semi-reflective mirrors embedded in the optical fibers. "Fiber-manufactured devices monitor the power reaching the nodes in real time, while indicating the temperature, without affecting the power of the data being transmitted. This is the basis for the technique developed by the UC3M group," notes Salvador Sales, professor and researcher at the ITEAM-UPV.

The results of research published recently in the *Journal of Lightwave Technology* [scientific journal](#), which is co-edited by the Optical Society of America (OSA) and the IEEE Photonics Society, show some of the applications that the developed invention may have.

This patent has been developed within the framework of a wider line of research, which has obtained a set of results. BlueSPACE (5G PPP BlueSpace Project Grant 762055) is a three-year European research project, led by Eindhoven University of Technology, that aims to develop next-generation wireless technologies. BlueSpace aims to contribute technologies to increase the speed of the current network, while seeking to reduce [energy](#)

[consumption](#) by using centralized technologies and multicore fibers. The UC3M's contributions to remote light-power have been evaluated in order to be part of the innovative technologies funded by the European Union and of Innovation Radar, an initiative from the European Commission.

More information: Fahad M.A. Al-Zubaidi et al, Optically Powered Radio-over-Fiber Systems in Support of 5G Cellular Networks and IoT, *Journal of Lightwave Technology* (2021). [DOI: 10.1109/JLT.2021.3074193](#)

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