



Indoor 5G Wireless Transmission Over Powerlines

Background

To provide the best 5G service, wireless service providers deploy Centralized Radio Access Networks (C-RAN) in which digital baseband processor units (BBUs) and their associated remote radio units (RRUs) are detached from each other and are connected by a fronthaul transport fiber-optic link. 5G signal has limited indoor coverage due to its high frequency and therefore, multiple RRUs must be deployed in a building for indoor users. Providing indoor 5G access for apartments in a building where there are no fiber infrastructure in place is therefore a major challenge.

Description of the invention

Researchers at the University of Waterloo have developed a method and system for using power lines as the last hop of the C-RAN fronthaul to the indoor users, where unmodified time division multiplexed (TDM) Common Public Radio Interface (CPRI) hyper-frames are transported in between the outdoor distributed unit (DU) and the indoor radio unit (RU) transparently.

A specific gateway (CPRI-Powerline Communication Gateway or CPG) - has been designed to turn the hostile environment of power lines into a useful medium and to create a virtual CPRI link between the DU and RU. The proposed gateway meets the desired CPRI requirements in the presence of the noisy power line channel while remaining completely transparent to the CPRI protocol operation. CPG is plug-and-play (it plugs into the wall power outlet) that provides a suite of mechanisms incorporating with the Ethernet protocol to ensure the QoS requirements including delay, delay jitter, and effective rate along the power lines.

Advantages

The new method and system eliminate the need of fiber cabling infrastructure in buildings by providing a cost-effective 5G CPRI fronthauling system over powerlines. The proposed solution is:

- Simple
- Cost-effective
- Easy to use (Plug-and-Play)

Potential applications

The invention can be used in residential/commercial buildings, as the front-hauling system over powerlines for establishing 5G indoor coverage.

Reference

10175

Patent status

Issued U.S. patent 11,563,613

Stage of development

Proof of concept simulations
Ongoing research

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