ORCA

Orchestration and Reconfiguration Control Architecture

SHOWCASE 1

26 GHZ MM-WAVE COMMUNICATION FOR VIDEO STREAMING

GOALS

- Demonstrate the real-time beam tracking functionality for the 26 GHz mmWave antenna arrays of TUD.

- Demonstrate mmWave setup as an experimental support for the development of wireless communication systems in an industrial environment.

- Demonstrate the employment of TUD's multi-user system by allowing more than one sub 6 GHz link.

CHALLENGES

- Real-time beam tracking capability with mmWave frontend. It is necessary to perform the beam steering functionality on the FPGA, in order to guarantee fast beam tracking under the mobility scenario.

- The design of a control loop with low latency for beam tracking.

- The design of mmWave antenna that can be easily attached to any SDR platform.

- Design of a multi-user mechanism to coordinate the links with multiple users.

CONCEPT

We consider a remote-controlled robot moving around the factory hall with a camera attached to it for inspection purposes. The camera is constantly transmitting a live video stream to the AP through the mmWave link. Then, the base station forwards the video to a factory worker located remotely via a second mmWave link. Therefore, the mmWave solution is advantageous in two aspects:

- It uses a novel frequency band allowing more capacity of the network.

- The directivity feature of the electromagnetic waves makes it possible to use several links close to each other using the same time and frequency with very low interference level.

We take advantage of this aspect by employing a second mmWave link as backhaul, where the video is forwarded to the user who is not located in the base station.
In addition, the remote user can steer the robot using a sub 6 GHz link, which makes it possible to thoroughly inspect the production line remotely.