

S3-P9

Cascaded wideband RoF links with LWA for enabling mobile 5G base stations

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Vast increase in number of mobile devices which involves inevitable internet applications emerged the need of wider bandwidth with enhanced coverage. Especially, higher data rates are demanded for train journeys since passengers desire to access internet including high quality streaming services.

Often, railway communications suffers from connection interruptions due to hard handover process between base transceiver stations (BTS) or simply because of poor coverage. In order to overcome these issues, we propose mounting the BTS on the train and providing backhaul connectivity using a cascaded RoF and Leaky-Wave Antenna (LWA) system (Figure 1). In this approach, the RF signals are modulated onto optical signals using an Electro-absorption Modulated Laser (EML) and then the modulated RF signals are transmitted over optical fiber (RoF) which are deployed along the railway track. Subsequently, RF signals are recovered using a photodiode (PD) and radiated to the train via a low-cost LWA. For V-band operation, fabricated LWA yield a steering angle of 40° in the H-plane [1]. The concept of a planar LWA monolithically integrated with a PD is illustrated in Figure 2. Optical switches are utilized to enable the necessary node which requires tracking of the train. As already demonstrated, LWAs are also capable of tracking objects in a joint communication-sensing (JCS) approach [2]. For 3D localization, two linearly polarized LWAs for azimuth and elevation are used [2].

In conclusion, a joint communication-localization system consisting of subsequent RoF sections with LWA is proposed to enable 5G access to trains.

REFERENCES

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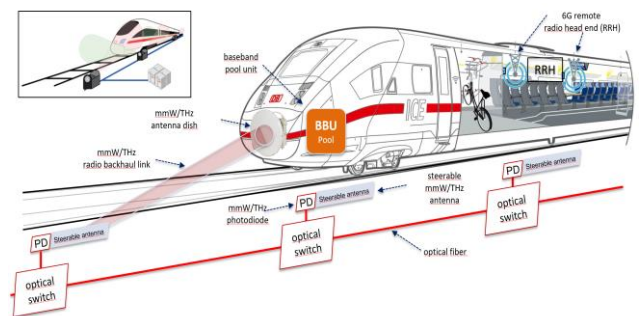


Figure 1: Proposed Xhaul system for mobile base station located on a high-speed-train.

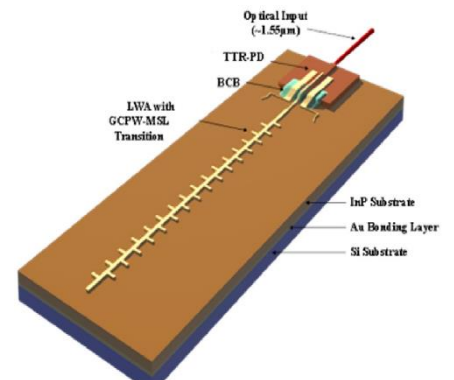


Figure 2: Concept of monolithic integration [3]

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