Wired and wireless seamless networks for public transportation infrastructure

Wired and wireless seamless networks consisting of optical fibers and broadband radio systems would be useful for ensure safety in public transportation systems. For example, a radar system consisting of many small millimeter-wave radar units connected by optical fibers can detect small foreign-object-debris (FOD) in a liner shape area of a few kilometers length. This presentation focuses on millimeter-wave radio systems consisting of linearly located antenna units, in order to provide linear shape coverages. Such configuration is called “linear cell,” which can be used for high-speed radio transmission as well *T. Kawanishi et al.* (2018). While conventional mobile communication systems collect the location information of the users through handshake procedures between the base stations and the user terminals. For users in high-speed trains, a number of handover processes would occur simultaneously in a particular cell. Thus, the overhead due to handover would be very large. By activating the cell where is the train location, we can offer a handover free wireless transmission, where the activated cell follows the train. For example, Fig. 1 shows a train communication network (TCN) consisting of an optical network connecting node base stations (NBS), and an operation direction center (ODC) managing train location information (TLI). Optical carrier stations (OCS) aggregate and distribute signals to node base stations (NBS). The NBS generates RoF (radio-over-fiber) signal and transports it to track-side radio access units (TS-RAU), which transmit and receive radio signals from/to the transceivers on the trains, where signal flows from the NBS to the TS-RAU can be controlled by using the TLI.