Experimental demonstrations of THz communications based on photonics for future 6G indoor network

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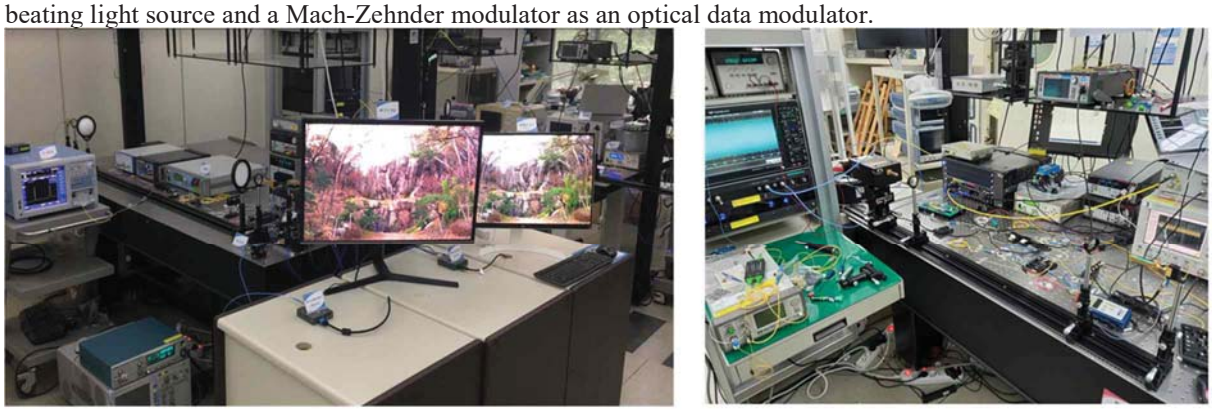
Recently, as 6G technology has attracted much attention, discussions on the sub-THz band as a candidate frequency resource for implementing 6G technology has been actively begun [1]. Research on various types of technologies for ultra-broadband/low-latency communication in the sub-THz band is currently underway at this time. Among them, the THz communication using photonics technology provides the advantage of enabling very wider bandwidth utilization and high-speed data transmission, which is an advantage of optical communication. In addition, since it is possible to seamlessly combine with existing optical networks, delays due to signal format/type conversion can be avoided, and high-speed data transmission can be provided seamlessly in wired and wireless sections. With the evolution of mobile communication technology, as the requirements for transmission speed increase and delay performance become more stringent, the cell coverage gradually decreases. In addition, as the allowable frequency resources increase from millimeter wave to sub-terahertz in consideration of broadband transmission, the cell coverage will further decrease. Under indoor environments, photonics technology is utilized to eliminate radio wave shadowing areas, guarantee quality of services, and efficiently merge with existing wireless networks. So, it is expected that the technical necessity for an indoor network using the THz communication based on photonics will gradually increase [2].
In this abstract, we would like to introduce some experimental demonstrations of THz communication based on photonics for the future 6G indoor network. Figure 1(a) shows an experimental setup for THz wireless link with 25 Gbps data rate using directly modulated DFB-LDs as a beating light source and data modulator. Figure 1(b) shows an experimental setup for THz wireless link with 100 Gbps data rate using a free running laser as a beating light source and a Mach-Zehnder modulator as an optical data modulator.



(a) (b)

Figure 1. Photograph of experimental setup for THz wireless link (a) with 25 Gbps data rate using directly modulated DFB-LDs as a beating light source and a data modulator, (b) with 100 Gbps data rate using free running lasers as beating light sources and an Mach-Zehnder modulator as an optical data modulator.

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References

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