

4. Conclusion

We have proposed a cost-effective RoF system to generate multiband and multi-gigabit MMW signals based on frequency quintupling technique. Theoretical derivation and experimental demonstration are provided. In the CS, the multiband MMW signals at 56-GHz and 60-GHz are obtained with low-frequency (≤ 12 GHz) electronic devices and modulators, which reduce the system cost. At the receiver side, envelope detection has been used to down-convert the MMW signals to IF bands, eliminating high-speed RF synthesizer and critical phase control components. Besides, the IF clocks (8 GHz and 12 GHz) can be obtained from the received clock (48 GHz), enabling a clock-free user-terminal. Error-free performance is achieved for the 60-GHz signal with a 2.5-dB power penalty after 50-km SSMF and 10-ft wireless link transmissions. The experimental results validate our scheme as a desirable candidate for future RoF networks supporting multiband 60-GHz MMW-signal transmission.

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