

# RoF-based Indoor WiMAX Transmission System

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**Abstract:** In this paper, we use the radio-over-fiber (RoF) technology to extend indoor WiMAX coverage. The RoF-based indoor WiMAX experimental platform can be divided into two kinds of basic architectures: point-to-point and point-to-multipoint. We discuss various setups and optimize the systems to ensure the transmission distance up to 15 meter and sustain 64-QAM modulation.

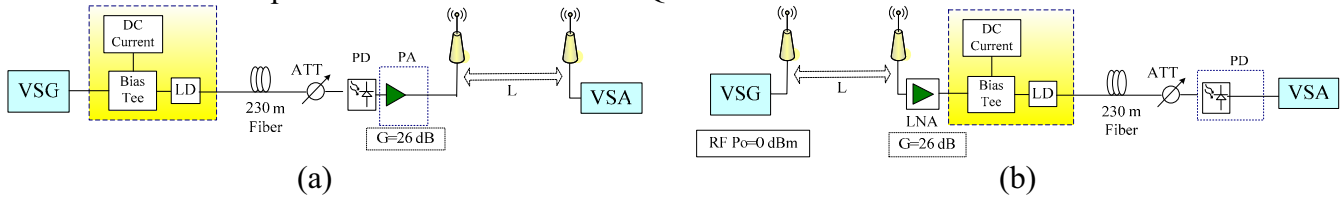


Fig.1 The RoF-based indoor WiMAX experimental platform: (a) downlink and (b) uplink setups.

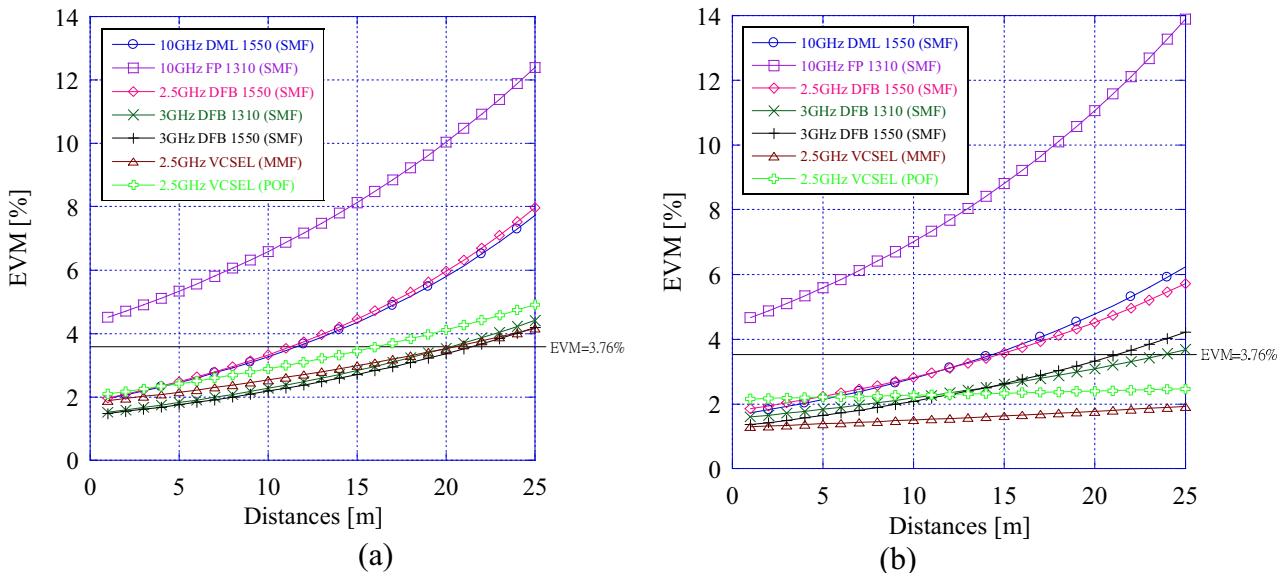


Fig. 2 The measured EVM results of (a) downlink and (b) uplink 64-QAM-2/3 WiMAX signals.

In Fig. 1 (a) and (b) the RoF-based indoor WiMAX experimental platform is divided into downlink and uplink setups, respectively. The fiber types in our experiments include 230-meter single-mode, multimode, and plastic optical fibers. We compare five kinds of commercially available lasers used in single-mode fiber and the vertical-cavity surface-emitting laser (VCSEL) used in multimode and plastic fibers. The Vector Signal Generator (VSG) is used to generate WiMAX signal and the Vector Signal Analysis (VSA) is used to analyze WiMAX signal with the Error Vector Magnitude (EVM). Measured results for the downlink and uplink setups are shown in Fig. 2 (a) and (b), respectively. In point-to-multipoint architecture (1x16), downlink and uplink WiMAX signals can be transmitted up to 20 meter at the EVM less than 3.76%. Single-mode fiber (SMF) with 3GHz 1310nm-Distributed Feedback (DFB) laser is the best choice. In point-to-point architecture, downlink and uplink WiMAX signals can be transmitted up to 15 meter and 25 meter at the EVM less than 3.76%, respectively. Multimode fiber (MMF) or plastic optical fiber (POF) with 2.5GHz 850nm-VCSEL is the best choice.

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