

Multi Premises Network Based on Spectral Amplitude Coding Optical CDMA Systems

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Abstract— The aim of this article is to introduce multi downstream passive optical network based on optical code division multiple access (OCDMA) technique, which is considered as a next-generation optical access network. Hence, incorporating this technique with passive optical network (PON) will enable the system to support higher bandwidth compared to the standard PON. The decoder is configured based on spectral coding because of its good noise suppression properties. Since the most important aspect of PON architecture is its simplicity, a multi PON access network, each PON comprises 9 users encoded by modified quadratic congruence (MQC) codes at the C band for downstream signals with channel spacing 25/50 GHz is simulated. In this article low error rate transmission at high data rate for distances up to 28 km is demonstrated. Variation in the results was studied when varied fiber length, data rate and different effective power were applied. It has been shown that OCDMA is capable of providing gigabit-per-second for each user. The receiver sensitivity is affected by the multi premises system, where the best system performance can only be achieved when the effective power is -1dBm. Nevertheless, the results have indicated that the proposed PON based on spectral amplitude coding OCDMA technique is capable to support multi premises network.

Keyword— Modified quadratic congruence (MQC) codes, Optical code division multiple access (OCDMA) system, passive optical network (PON).



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