國 立 交 通 大 學
光 電 工 程 研 究 所

碩士論文

無色散間隔器的光迴路實驗以及在雙向傳輸系統中的應用

Loop testing for a dispersion-compensating interleaver and its application in bidirectional transmission system

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無色散間隔器的光迴路實驗以及在雙向傳輸系統中的應用

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摘要

可重新配置的交換節點可以為都會網路提供更高的靈活度和通訊功能，為了減少置入損耗我們提出了以一個無色散的間隔器對為基礎的新節點架構，另外雙向傳輸系統可以減半都會網路中鋪設光纖光纜的數目，在此我們也提出一個間隔器在雙向傳輸系統中的應用。

在本論文中，先研究間隔器的相關原理和數學模型的建立，並且附上實際元件量測加以對照，接下來實際利用間隔器去架構一個光迴路系統來測試間隔器在都會系統中的的串聯特性，在這個實驗中，我們發現色散互相補償間隔器對比起為色散補償的連接方式可容許更大的頻率偏移。最後使用間隔器來架構雙向傳輸系統中的雙向放大器，此種雙向放大器可提供２３dB 的增益和 5.6dB 的 Noise figure。

Loop testing for a dispersion-compensating interleaver and its application in bidirectional transmission system

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Abstract

Reconfigurable add/drop nodes will enhance metro network flexibility and be able to provide the much needed functionalities. In order to reduce the insertion loss, we proposed a novel node structure based on the dispersion-free interleaver pairs. Besides, bidirectional transmission system could reduce the number of fiber needed in the network by the factor of two. So we also proposed an application in the bidirectional transmission system by using the interleaver.

In this thesis, the corresponding principle and mathematical model of the interleaver are surveyed first and the practical measurement of interleaver is included to compare with the model as well. And next, we setup a re-circulating loop to testing the cascadability of the interleaver pairs to simulate the corresponding system characteristics in the metro system. In this experiment, we found that there's more tolerance for frequency offset of the transmitters for the compensating connection than the uncompensating connection. At last, we setup an bidirectional transmission system by using interleaver for the application of bidirectional amplifier. As a result, We can achieve 23 dB gain and 5.6 dB noise figure for this kind of amplifier..

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