

## ABSTRACT

Communication in the world is growing very rapidly , not only voice but also communication data. Many techniques have been used to support multimedia services . While wireless communication services are forced to limit its power , the load required communication buffer that can only be overcome by physical media communications . The main reason is more favored physical media is very little attenuation compared with radio communications at a considerable distance , especially the media using an optical fiber having attenuation 0.2 dB / km . Laying on a radio frequency signal to an optical fiber wavelength domain , or better known as RoF technology can be applied .

In this study, two -way data transmission using single mode optical fiber -based WDM ( Wavelength Division Multiplexing ) and RoF combined with the OADM ( Optical Add Drop Multiplexing ) is simulated using software Optisystem . RoF is simulated by a 2.3 GHz RF signal is superimposed into the light spectrum . Data rate of 622 Mbps are used . Four wavelength of 155.52 nm , 1551.72 nm , 1550.92 nm and 1550.12 nm WDM channels are transmitted at the same representation in a single mode optical fiber . In OADM one wavelength scaled ( drop ) as the downlink signal and one wavelength being added ( add ) as the uplink signal . Two OADM devices are used and each is placed at a distance of 20 km and 40 km with different wavelengths .

At the farthest distance is 60 km long fourth performance of the transmitted wave has the lowest received power level is -19 953 dBm and it above receiver sensitivity . BER values obtained at four wavelengths under  $10^{-10}$  which indicates the system can be applied to multimedia services.

Key words : *Radio over Fiber, Wavelength Division Multiplexing, Optical Add Drop Multiplexing.*