

## ABSTRACT

Radio over fiber is a process of sending radio signals over fiber optic cables. By using fiber optic cables, the quality of the voice signal is transmitted remains excellent, or it can be said interference arising during the transmission is small, so the signal carries still good. In addition, by using a fiber-optic cable can save costs and increase performance for high speed fiber. Seeing the development of communication in the world very rapidly, Radio over Fiber can be applied to support multimedia services.

In order to support multimedia services means Radio over Fiber should support for long-distance communication. For that the analysis of the Radio over Fiber combined with the technique of WDM (Wavelength Division Multiplexing) and combined with the OADM (Optical Add Drop Multiplexer). Radio over Fiber is simulated by a 2.5 GHz radio frequency signal is carried into a wavelength. The rate of data used for 1 Gbps. Using four-channel WDM with each wavelength of 1555 nm, 1556 nm, 1557 nm and 1558 nm simultaneously transmitted in a single mode optical fiber. To reach the receiver at long distances before, the signal will be strengthening by the form of Optical Amplifier EDFA (Erbium Doped Fiber Amplifier). In the OADM device will perform an add and drop wavelengths of 1558 nm. OADM device will be placed at a distance of 60 km from the block sender.

Radio over Fiber technology for longhaul communication is very vulnerable with high value of BER and high attenuation so that it takes a mature system design and specifications of the device are adequate. The performance obtained by the four wavelengths at the farthest distance is 155.5 km remained above the receiver sensitivity is -17 217 dBm. The fourth wavelength is also still achieve a minimum BER values for multimedia services is  $10^{-9}$ .

**Keyword : radio over fiber, *radio over fiber*, *optical add drop multiplexer*, *wavelength division multiplexing*, *long distance communication***