

## ABSTRACT

Dispersion is one of the factors that degrade the performance of fiber optic communication. Chromatic dispersions are dispersions caused by changes in the propagation of certain frequency components contained in optical pulses that cause optical pulse width [6]. To overcome the dispersion, one solution is to use dispersion compensator. One of the most commonly used compensators is Dispersion Compensating Fiber (DCF). This DCF usage research has been done by some researchers one of them is by using DCF Pre Compensation and post compensation scheme which produce excellent BER [4]. In the previous study, the distance used only used a distance variation of no more than 250 km with 10 Gbps bit rate without multiplexing. In this study using distance up to 1000 km using bit rate 10 Gbps and 40 Gbps and use multiplexing DWDM.

The use of DCF in this research becomes the solution of dispersion handling on optical link. Sample distance and bit rate 10 Gbps and 40 Gbps. The DCF scheme used is Mix-compensation which is 2 DCF as its dispersion compensator and uses EDFA optical power amplifier.

The final result of this research is optimization of optical link with distance of 150 km with 10 Gbps bit rate optical link performance is feasible without using dispersion compensator with average  $Q = \text{factor} = 11.717374$ , while at bit rate 40 Gbps with DCF compensator happened The increase in performance of the optical link is the average  $Q\text{-factor} = 6.6431275$ . 500 km distance with 10 Gbps bit rate with DCF compensator increase optical link performance from average  $Q\text{-factor} = 2,2341275$  to  $= 9,8901175$ . At the 40 Gbps bit rate the optical link performance of the average  $Q\text{-factor} = 1.022676$  becomes  $= 3.3668025$ . And for a distance of 1000 km before and after using DCF dispersion compensators all channels with either 10 Gbps or 40 Gbps bit rate resulted in  $Q\text{-factor} = 0$ . The optimal  $Q\text{-factor}$  value at 10 Gbps bit rate is max 500 km, while at bit rate 40 Gbps maximum 80 km.

**Keyword: DCF, BER, Q-factor, DWDM, Bitrate, Distance**