# ABSTRACT

PT Jasa Marga (Persero). Tbk branch Purbaleunyi is a company engaged in the provision of services and toll roads in Indonesia. The company has a fiber optic backbone network services to support their operations, including the toll payment system at each toll gate, Closed Circuit Television (CCTV) to display current traffic conditions and accidents at a certain point and toll service, and VMS (Variable Message Sign). The existing network using the converter as a sender and receiver optics. However, for the operational needs of the service, each allocated an optical core.

In this final assignment, performance analysis will be performed on the existing link when applied CWDM technique to save an optical core usage, in order to empty the optical core can be used for the other needs. Previously, the network existing performance will be calculated for then analyzed whether in terms of performance, the application of CWDM will make its performance better.

PT Jasa Marga branch Purbaleunyi existing link, consists of 52 links for CCTV, 3 link for VMS, and 11 links for toll service. From the results of the calculations for the existing link at the farthest distance to all the services, the transmitter output power of -5 dBm, resulting in the lowest acceptance - 22.75 dBm, which is still greater than -35 dBm sensitivity of the device, with a rise time of less than 35% bit rate. As for planning to use CWDM, used wavelength 1471 nm, 1491 nm, and 1511 nm, with a *link power budget* calculation results are still greater than -35 dBm and rise time budget is less than 35% bitrate. BER on the farthest existing link is 6,24E-54, on link design is 1,27E-57, and on simulation with OptiSystem obtained a value of 1,27E-57 for existing link and 2,7E-85 for design link.

**Keyword** *: CWDM, OptiSystem, Link power budget, Rise Time Budget, converter, BER*