

Digital wavelength division multiplexing (DWDM) optical fiber transmission study for Tanzania telecommunication company limited's (TTCL's) long haul backbone network: a case study of the Dar es Salaam to Dodoma Backbone Link

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In this thesis, various mathematical models to characterize and forecast telecommunication traffic time series traffic have been applied, and the ranges of validity of the models were determined by comparing them with measured traffic data using the measurement errors criteria method which resulted into the superior model. Based on this model (the ARIMA (0,2, 1) model for smoothed data), the traffic forecast findings show that by the year 2006, the traffic demand will exceed the current installed capacity of 140 Mbps in the Tanzania Telecommunications Company Limited (TTCL) network along the major link between the Dar es Salaam and Dodoma backbone route. By 2005, forecast traffic demand will be above 622 Mbps. The traffic forecast findings necessitate the migration - from the current plesiochronous digital hierarchy (PDH) system to a digital wavelength division multiplexing (DWDM) system to meet the growing needs of telecommunication services on the route. By applying a cost benefit analysis model that encompasses the proposed DWDM system design, the economic benefits of the proposed system are significantly large to justify the investment in the DWDM transmission system and to generate a satisfactory return with a payback period of 8 years. The traffic forecasting techniques and the methodology for the quantitative investment analysis are portable and can be applied by other telecommunication network operators like the TTCL or by TTCL itself to other backbone links in its network.