Design of a Transoceanic Cable Protection System

Isaac Geisler, Felipe Cardenas, Dane Underwood, and Kumar Karra

George Mason University
Fairfax, Virginia

Corresponding author's Email: ggeisler@gmu.edu, fcarden2@gmu.edu, dunderw1@gmu.edu, skarra@gmu.edu

Author Note: All authors are seniors in the Systems Engineering and Operations Research program at George Mason University in Fairfax, Virginia.

Abstract: A s y s t e m of 343 cables fiber optic cables spans the world's oceans transmitting 99% of international communications. The network has experienced 36% annual growth over the last 7 years. These cables experience outages 150 times per year. This paper describes the design of a Transoceanic Cable Protection System (TCPS) to protect the cables. The TCPS includes three functions: (1) Threat Identification, (2) Damage Prevention, and (3) Cable Repair Coordination. The operation of the TCPS was simulated by a probabilistic Monte Carlo Simulation with distributions for threat generation, threat inter-arrival time, threat identification, damage prevention, and repair time. The results show a decrease in cable outage by 24%, 56%, and 44% due to each TCPS function The Mean Time Between Failure of the combined TCPS increases by 25%. The initial cost of the TCPS is $2.64 million with a pessimistic break-even time of 2 years and ROI of 232%.

Keywords: Infrastructure, simulation, communication