

ABSTRACT

Optical Distribution Cabinet (ODC) is a crucial component in an optical network system that acts as a distribution point for fiber optic cables from the center to the customer. However, the placement of conventional ODCs on the ground has a number of drawbacks, such as vulnerability to vandalism, environmental damage, space limitations, and aesthetic and regulatory issues in urban areas. The main issue raised in this research is the weak security and efficiency aspects of conventional ODCs, which impact the reliability of Fiber to The Home (FTTH) services.

As a solution, a prototype underground ODC equipped with an RFID-based automatic lock system and a hydraulic actuator mechanism to automatically open the cabinet cover was designed. This design aims to improve physical security and technician accessibility, while maintaining space efficiency and environmental aesthetics. The system uses an Arduino microcontroller, RFID reader, LED and buzzer indicators, and hydraulic actuators customized for the prototype's needs. The system installation is done inside a wooden manhole that simulates the installation conditions below ground level.

The test results show that the ODC prototype system works optimally and is feasible to develop. The initial physical design used the existing prototype dimensions of 48.5 cm × 40.5 cm × 14 cm as a reference for performance evaluation. The security system was enhanced through the integration of microcontroller-based RFID and solenoid, which successfully authenticated 100% of valid cards and rejected all unregistered cards. LED indicators and buzzers provide immediate feedback, enhancing access security. The use of hydraulic actuators enables automatic opening of the ODC lid to 90° within 3 seconds, supporting the work efficiency of technicians in the field. Thus, this prototype ODC is considered feasible as a safer and more efficient alternative to conventional ODCs.

Keywords: *Arduino, Hydraulics, Security, Optical Distribution Cabinet, RFID*