

# DTI Rocket Telemetry Data Management

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**Abstract**—Reliable tracking system is crucial for the development of long range ground-to-ground missile. The commercial system is too expensive to implement during research and development phase. For a less complicated system, we develop an in-house prototype for data collection unit(DCU) and a base unit to manage transmitted rocket data. The DCU acts both as a wireless receiver and data storage. It can also transmit data upon request. A base unit sends a command to control DCUs during data retrieval process. Putting DCUs at an appropriate distance, we can successfully receive all transmitted data. It is evident with high reception percentage that the DCU is best located at 2.5 km apart.

**Index Terms**—Telemetry, Ground Station, Wireless transceiver, Wireless data collection

## I. INTRODUCTION

Wireless data transmission from an airborne rocket to ground stations is reliable within limited distance. To increase for longer range, a rocket telemetry system has to use higher transmission power. It, thus, results in bigger unit and becomes obstacles for design and installation inside the rocket. An alternative approach is to use high quality tracking receiver at ground station. However, a commercial ground receiver system is extremely expensive. To track rocket for longer distance, several ground station units are necessarily employed.

Due to limitations on component availability, project budget, and signal and bandwidth compatibility, engineers from the Operation of Control and Communication (OCC), Defence Technology Institute (DTI) have developed a simple and effective ground station system to record flight paths of DTI rockets. This system consists of multiple data collecting unit (DCU) and a base station. Each DCU functions as a wireless receiver and a data recorder. A base station controls DCU functional modes via a

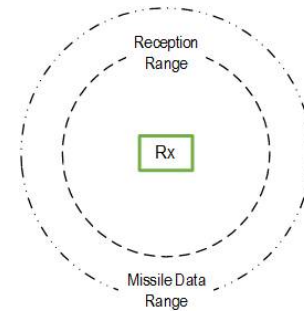


Fig. 1: Single wireless receiver range

wireless command, either to record missile's flight path or to transmit recorded data from its memory.

This paper is organized into parts as follows. The system architecture is outlined in Section II. The implementation and test scenarios are described in Section III, while Section IV provides experimental results and discussion. Finally, the conclusion is presented in Section V.

## II. SYSTEM ARCHITECTURE

### A. Overview

For missile tracking applications, a single wireless receiver is not sufficient due to its shorter reception range than missile data range, as shown in Figure 1. A series or network of wireless receivers are theoretically necessary to track long range missile. As shown in Figure 2, multiple receivers at appropriate locations could have a combined reception range covering the entire missile's path. This multiple receiver's approach is suited for our DTI missile project because it can be made from several simple wireless receivers, reducing cost and complexity of overall system. Furthermore, the coverage range can easily be extended by adding more receiver units.

Our engineers develop a rocket ground station based on wireless transmission and reception. This