# USE OF TDD INVERSION IN INTEGRATED BASE STATION/SUBSCRIBER REPEATERS

## Introduction

When a Mercury 16E Base Station and Subscriber pair is used as a collocated repeater, TDD Inversion can be enabled on the Base Station to prevent one radio from transmitting while the other receives. Repeater pairs throughout a system can also be alternated so that repeaters consisting of two Base Stations are located one over-the-air link away from repeaters consisting of a Base Station and Subscriber.

This document describes the usage of TDD Inversion, and explains how to properly configure Base Station/Base Station and Base Station/Subscriber repeater pairs in a system.

## Scope

This bulletin is intended for installers and end users who wish to create a system incorporating Base Station/Subscriber repeater pairs.

## TDD Options for Repeaters

Mercury radios are a TDD (Time Division Duplex)-based system. This means that Base Stations transmit while Subscribers receive, and vice versa.

## Collocated Base Station/Base Station Repeaters

Base Stations may use GPS for TDD synchronization. This ensures that Base Stations within a system transmit at the same time, as long as the same bandwidth is used. To enable this feature, navigate to the Frequency tab in the Radio Configuration Menu, and set TDD Sync Mode to **GPS Required.** Refer to Figure 1 below for an example of this screen. TDD synchronization should always be used for collocated repeaters.

**Figure 1. Proper TDD Sync Mode for Base Station/Base Station Repeaters**

## Collocated Base Station/Subscriber Repeaters

When deploying repeaters consisting of a collocated Base Station and Subscriber, additional configuration is necessary to ensure that the Base Station and Subscriber both transmit at the same time. To achieve this, navigate to the Frequency tab in the Radio Configuration Menu on the Base Station. Set TDD Sync Mode to **GPS Required**, and TDD Inversion to **Enabled**. See Figure 2 below. While TDD Inversion is enabled, the Downlink Percentage on the Base Station defaults to 50% and cannot be changed. This is necessary to ensure proper inversion of the TDD signal.



**Figure 2. Use of TDD Sync Mode and TDD Inversion for
Base Station/Subscriber Repeaters**

It is important to note that Base Stations utilizing TDD synchronization will not transmit without a GPS position fix. If the Base Station loses its fix, radio operation will stop until the fix is re-acquired.

### Using Both Repeater Modes in a System

When repeaters are daisy-chained within a system, alternate pairs of Base Station/Base Station and Base Station/Subscriber pairs are used to ensure that the first tier repeater pair transmits while the second tier receives. An example of this arrangement is shown in Figure 3 below.

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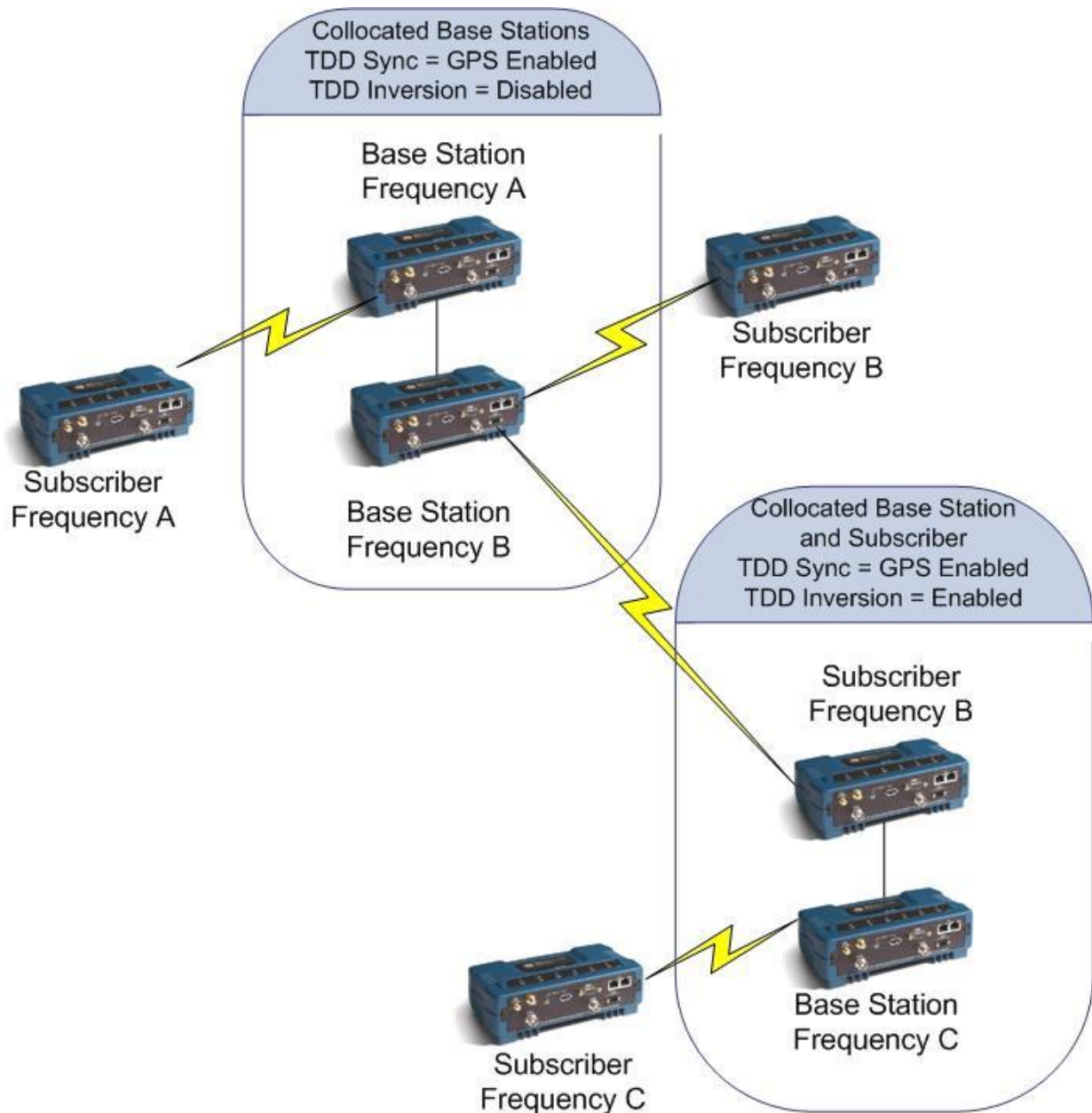
**Figure 3. Use of Daisy-Chained Repeaters in a System**

*End of application bulletin.*