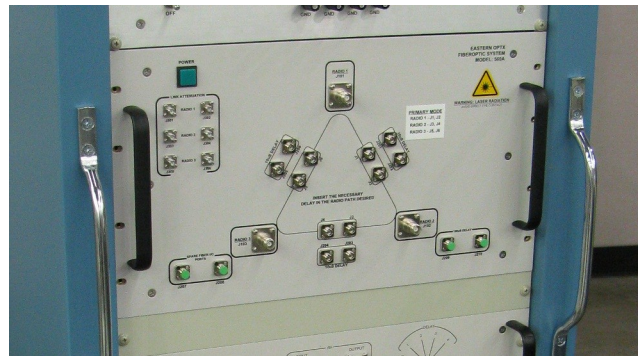




## Multi-Radio Channel Replicator (Air Interface)

*Bringing the Test Range to Your Test Bench*

### Product Summary



#### Introduction

The Eastern OptX Series 7000 System is a multi-radio test network which replicates the propagation path of real-world applications. The system allows the user to test a variety of Air Interfaces using the same system without modification and at the same time. This is not a signal emulator. The systems use low-loss fiber optic cable to create the propagation delay associated with radio transmissions from 1 to 5000 MHz. Multiple radios may be connected to the network which allows for full duplex operation. Each radio may operate using a different or identical Air Interface. The delays between radios may be fixed or variable and optional amplitude control provides the appropriate propagation loss. The Series 7000 creates a test range right in your lab. It can be used as a design aid and as a test tool for new modulation and encryption schemes prior to expensive field testing.

#### Standard System Features

- 2 –10 Radio Ports
- Radio to Radio distances from 1 to 50,000 m.
- Delay Configurations: Discrete, Progressive, or Combined Discrete and Progressive.
- Multipath Replicator Option
- Amplitude Control — Optical and/or RF
- Remote Control Interface
- Front Panel LCD Touch Screen Control
- External Delay Option for Future Expansion
- Octave Input Bandwidth (Multi-Octave systems available with automatic input frequency selector)
- Single or Multiple Air Interfaces may be tested simultaneously.
- Doppler Option (Moving Target)
- Interferer Injection (Jammer)

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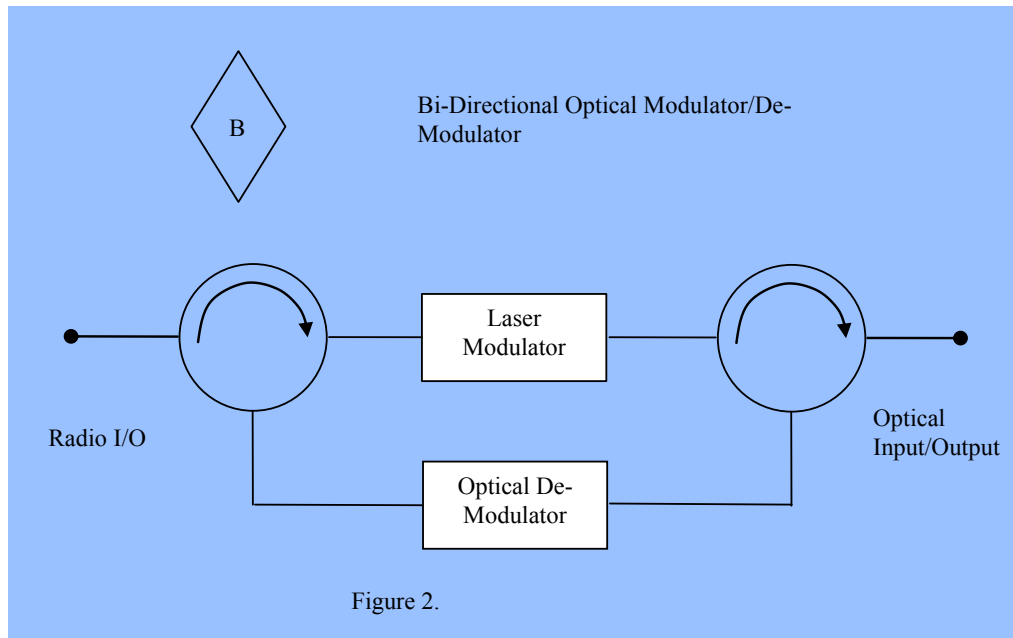
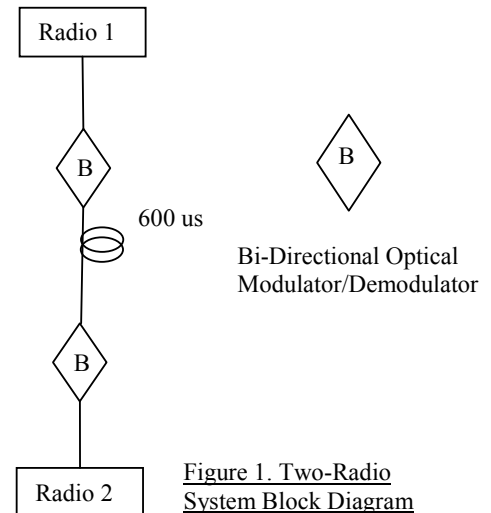
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## Multi-Radio Channel Replicator

### System Description

A simple, two-radio system with a 600 micro-second delay is shown in Figure 1. The system consists of two bi-directional optical modulator / demodulator and a fiber optic delay. The delay may be fixed or variable and a variable attenuator may be added to replicate propagation loss. A radio is connected to ether end of the system and may transmit and receive simultaneously. Figure 2 shows the modulator / demodulator detail. The optical system is broad band (up to 18 GHz). The system bandwidth is limited by the input circulator (Typically 1 octave)



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# Multi-Radio Channel Replicator

## Options

- Frequency Bands \* (3dB bandwidth):
  1. 225 - 450 MHz
  2. 960 - 1215 MHz
  3. 1350 - 1850 MHz
- \* Input RF Circulator BW. System BW: 0.1 to 3 GHz.
- Optical bandwidths are available up from 0.1 to 18 GHz. The RF input is limited to octave bandwidths by the input circulator. Eastern OptX offers a tri-band input circulator (Part Number 535B) which automatically detects and selects the proper input circulator to cover the input frequency range from 225 to 1850 MHz.
- Variable delays with Discrete or Progressive configurations (See Page 4)
- Multipath Option (Multipath channels may be added )
- Star and Series Node Connections (See page 6)
- Propagation Loss Option
- Google Maps Radio Location Entry



Multiple Transceivers

Full Duplex Operation

Voice and Data



Multi-Service Interoperability

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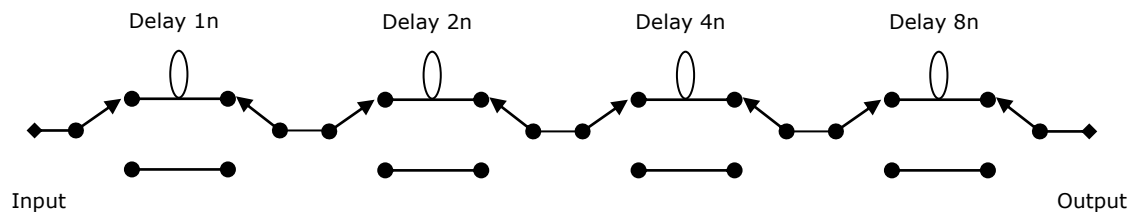
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Parameter	Specification	Notes
Instantaneous Bandwidth	1 GHz	(Limited by input circulator)
Accuracy	1 %	Optional 0.5%
Repeatability	0.01%	At constant temperature
System RF Gain	6 dB	Typical, 50 us delay @ 5 GHz
VSWR	2 : 1	Maximum
Spurious Free Dynamic Range	100 dB/Hz <sup>2/3</sup>	Minimum
1 dB Input Compression	-15 dBm	Minimum
Noise Figure	25 dB (13 dB Typ.)	Maximum (Lower NF optional)
Input/Output Impedance	50 Ω	Nominal
Dimensions	19" Rack Per EIA-310-D	2U—5U, 18" - 22" depending on design

### Delay Configuration Options:

#### Progressive Delay Configuration







# Multi-Radio Channel Replicator

Geographical Area Replication including multipath and moving target generation.



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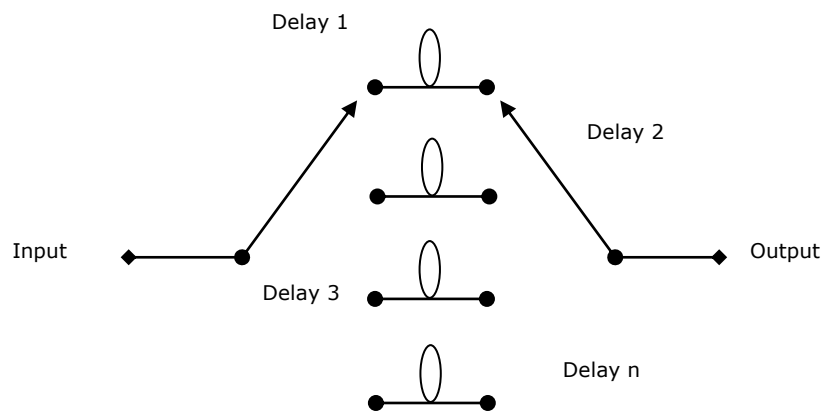
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## Multi-Radio Channel Replicator

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### Discrete Delay Configuration



#### Progressive:

- Best solution for equally spaced delay step sizes
- Numerous possible delay combinations (Binary: 1, 2, 4, 8 etc.)
- More delays in a smaller package
- 1% overall accuracy.

#### Discrete:

- Best solution for few delays or unequal delay steps sizes.
- One to eight delays typical
- Better than 0.1% accuracy possible.

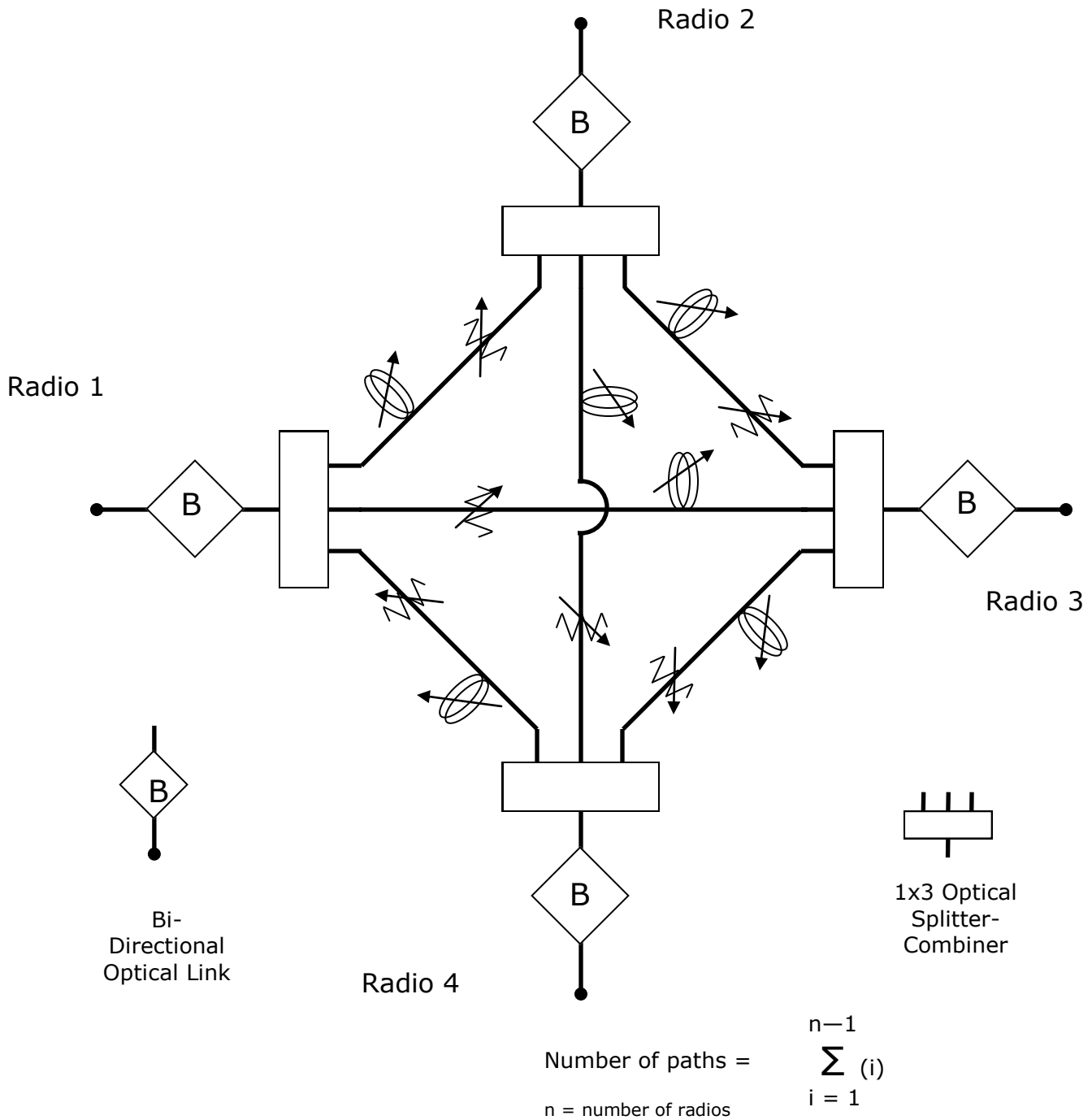
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# Multi-Radio Channel Replicator

## 4 Radio Modified Star Node Air Interface Tester



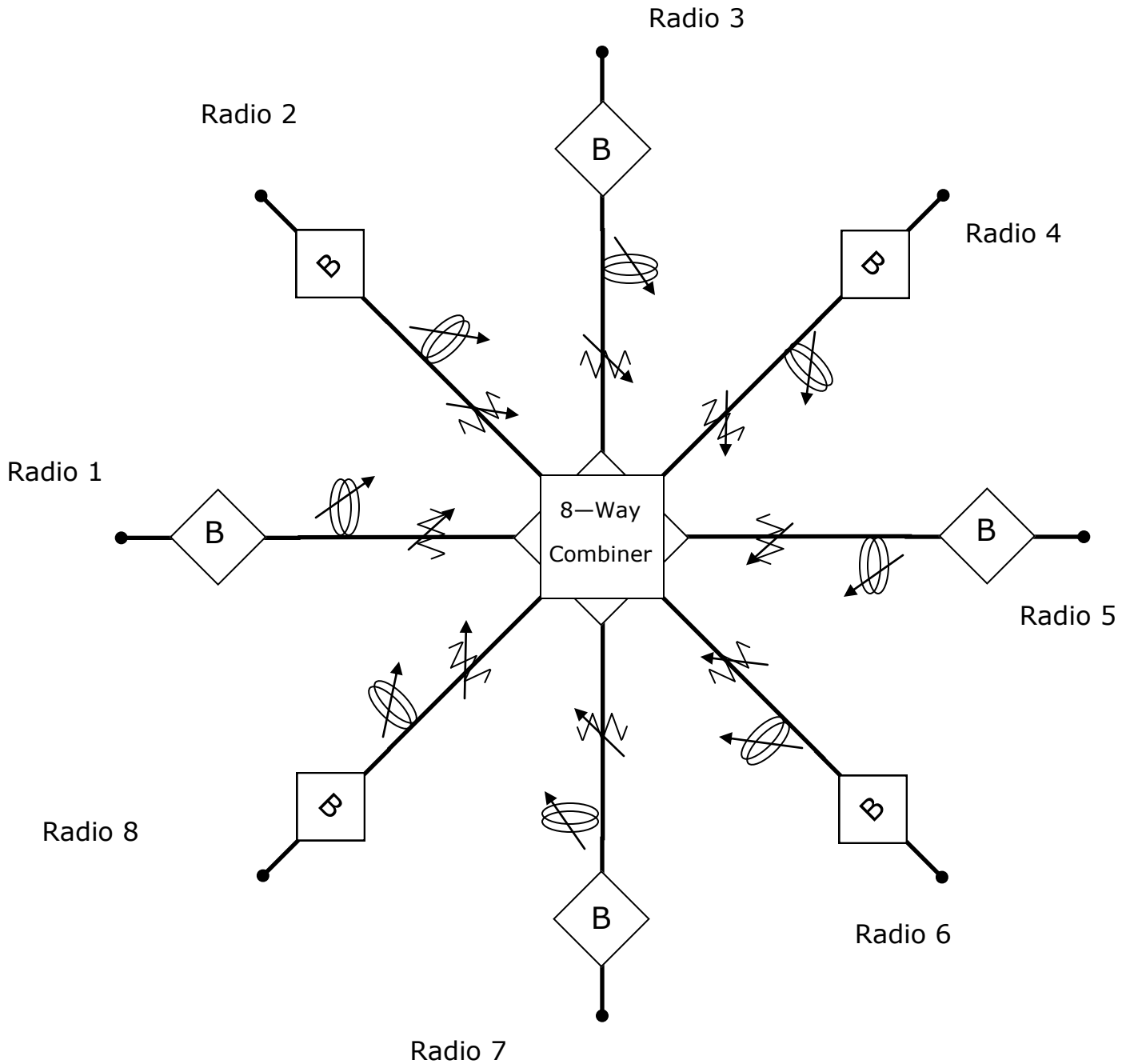
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# Multi-Radio Channel Replicator

## 8 Radio Star Node Air Interface Tester



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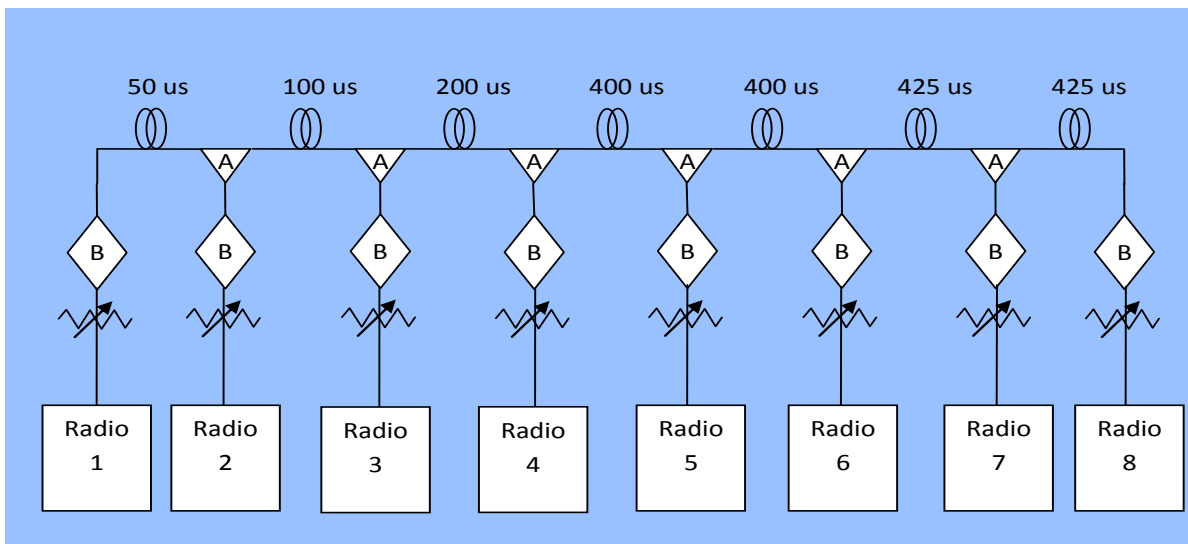
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# Multi-Radio Channel Replicator

## 8 Radio Series Node Air Interface Tester



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## Multi-Radio Channel Replicator

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### 8 Radio Channel Replicator 150 NM Delays



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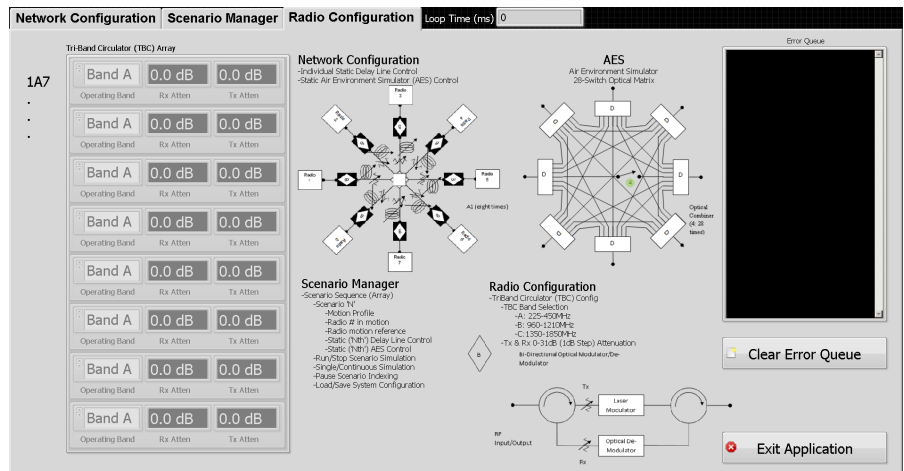
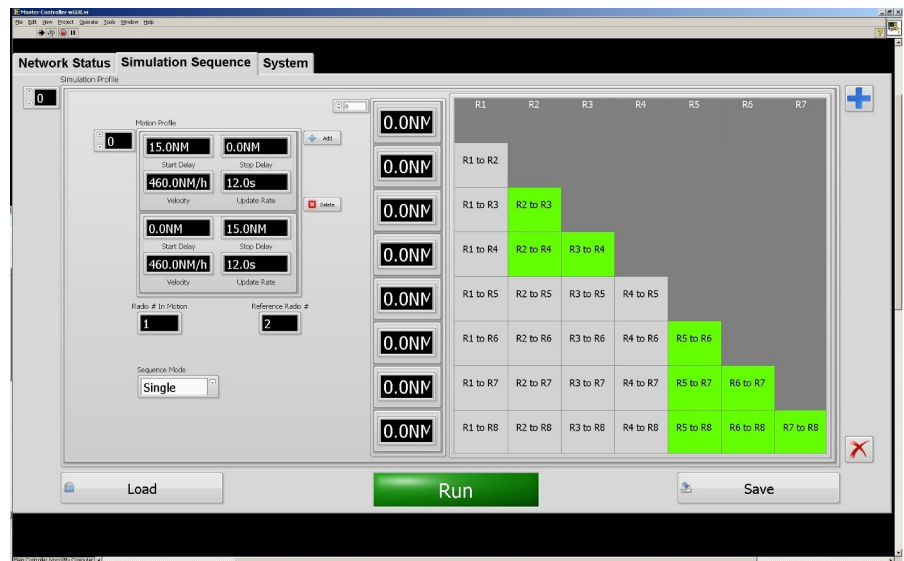
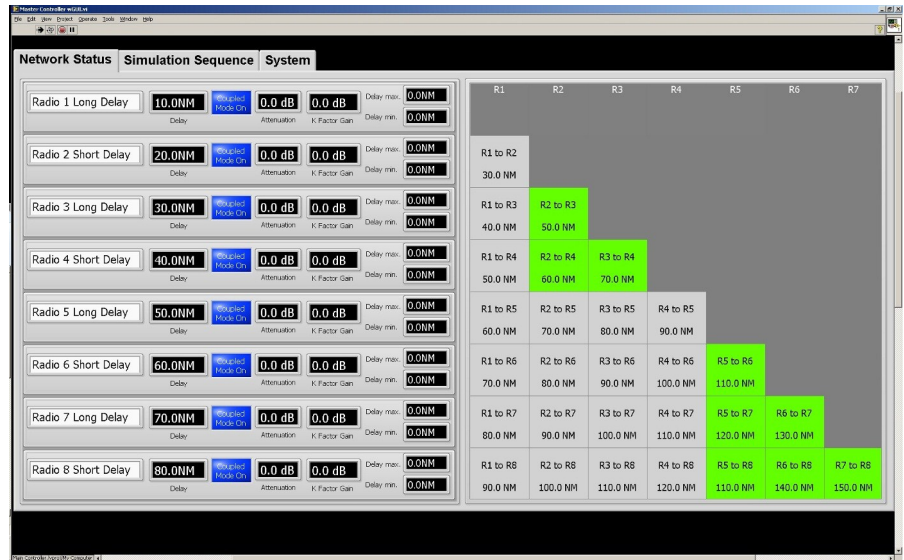
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# Multi-Radio Channel Replicator

## 8 Radio Channel Replicator 150 NM Delays

### GUI Features:

- Individual Radio grouping and isolation capability
- Moving Target Scenario Generator
- Scenario Stacking
- Individual Radio Distance Control
- Propagation Loss Replication
- Gain Control
- Band Selection



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