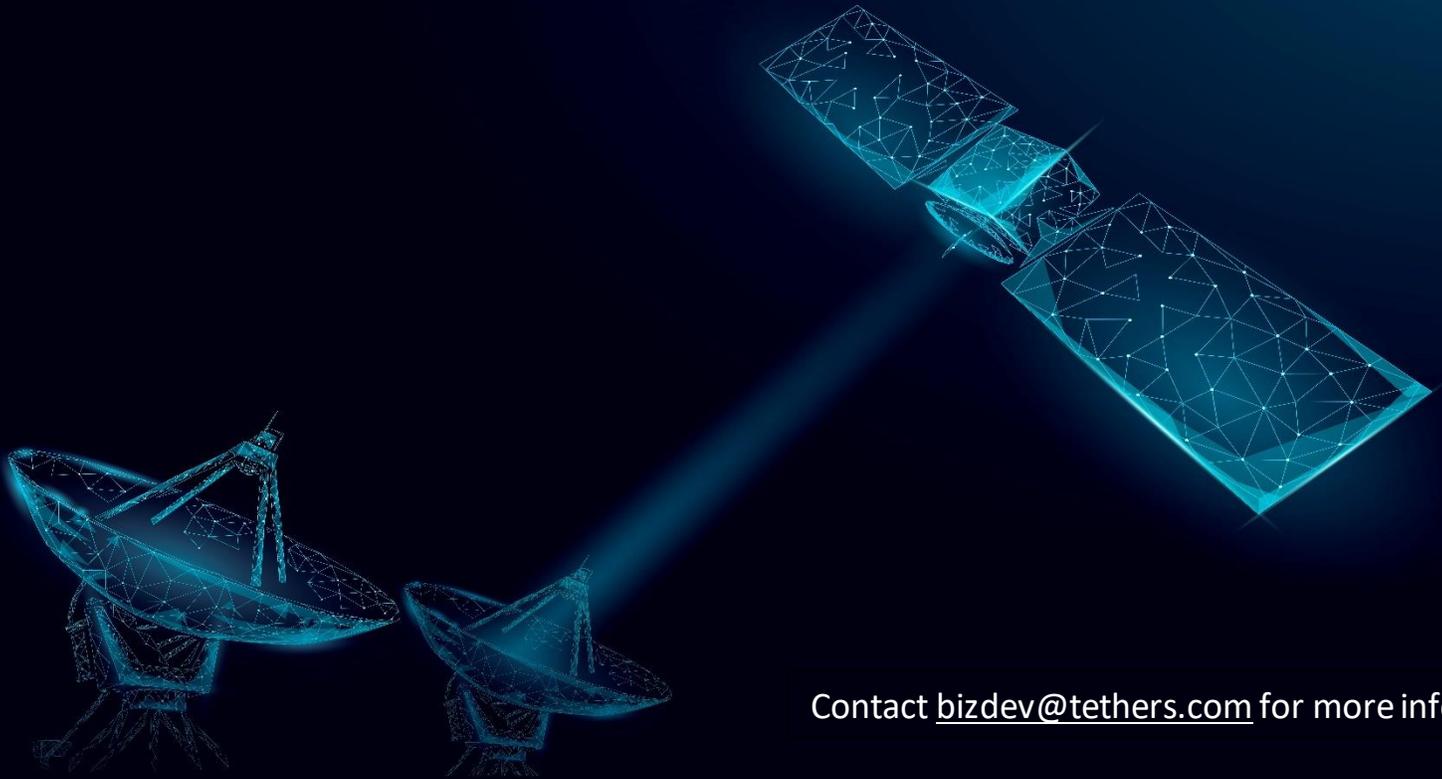


# White Paper

## RAVEN Software Defined Radio



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## Executive Summary

### The Problem

- Available SDR's are generally high-SWAP and single channel with limited post launch reconfigurability.
- Limited processing capability, and small, instantaneous bandwidths often reduce the usage to a single function.
- Restrictive converter architectures constrain mission operations to a narrow operating band.

### The Solution

- TUI'S RAVEN Software Defined Radio.

### Benefits

- Low SWaP and fully configurable on-orbit.
- High speed, wide bandwidth, and independent, multi-channel options.
- Best value alternative with high configurability, high data throughput, and operational flexibility.

## Problem Definition

Traditional software defined radio designs are typically large with one independent channel and have slow data processing. These design choices lead to high mass, low modularity, and low flexibility. Traditional SDR's also have limited frequency range which limits operational utility and flexibility.

Software defined radios operating under these constraints have limited value with their large size and limited channel options. Since there are fewer channels, narrower bands, and lower throughput, these SDR's limit an operator's ability to meet mission needs. This also limits communication options and reduces the ability to adapt to evolving requirements or environments. Operating under these conditions can become unsettling for important missions that need a dependable SDR. Tethers Unlimited Inc. has created a solution that solves these common issues with traditional SDRs.

## High Level Solution

Tethers Unlimited Inc. has developed the RAVEN software defined radio, a highly flexible, modular, and adaptable system. RAVEN solves many of the recurring problems with the current software defined radios. For instance, RAVEN has a ~1.5U footprint, up to 1 Gbps transmit and receive speeds, and wide frequency range options (2 GHz to 44 GHz), with on-orbit re-programmability, which provides unparalleled capability and flexibility to users.

With the RAVEN's two-channel option (2x full duplex), it can operate simultaneously in multiple bands. This capability provides flexibility and agility to the user. Along with multiple channels, the RAVEN can meet high data throughput requirements, all while being small in size! The RAVEN also has very wide bandwidth options, allowing operations in L, S, C, X and Ku, or operation in K and Ka-bands. This unlocks the potential for significant operational flexibility over other radios that have limited bandwidth or must be configured prior to launch.

The RAVEN has two processing cores. One core is used for RAVEN system monitoring and control; the other can be dedicated to run custom algorithms or waveforms developed by the customer. The RAVEN offers an optional GNU radio, Redhawk, and custom waveform support to provide options for a multitude of missions. With its support of advanced coding, modulation schemes, and commercial encryption, the RAVEN can be easily tailored for a range of missions.

Along with wide range of frequency, coding and modulation options, the RAVEN also provides security and advanced networking capabilities. RAVEN can include embedded commercial AES256 encryption, Zero Trust Blockchain solutions, or be paired with external NSA encryptors. RAVEN can also include TUI's flight-proven SWIFT-LINQ mesh-network capability to support cluster or constellation-level communication.

## Business Benefits

Compared to other radios, RAVEN is the best value, low SWaP alternative. With its flexibility in supporting multiple frequency ranges, multiple channels, and on-orbit selectable modulation/coding combinations, RAVEN's capabilities make this SDR unique.

TUI's design of the RAVEN represents the next generation of SDRs. With incredible throughput, speed, and flexibility, the business benefits for the RAVEN can support a wide range of a company's needs.



## Summary

RAVEN is the future of communication products. Its high speeds combined with multi-channel, wideband capability, provides a significant capability to the customer. RAVEN can readily accept third party applications, work with multiple encryption options, and support satellite networks, all configurable after the radio is on-orbit.

The RAVEN is a highly customizable product that can suit a multitude of missions! We want to offer you this adaptable and implementable solution for your next mission. Contact [bizdev@tethers.com](mailto:bizdev@tethers.com) to use RAVEN for your important communication needs.