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Microwave Photonic MPS Systems Inc.

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Tactical RF Photonic Communications: Increased Separation Distances Between Personnel and Deployed Antenna Assets

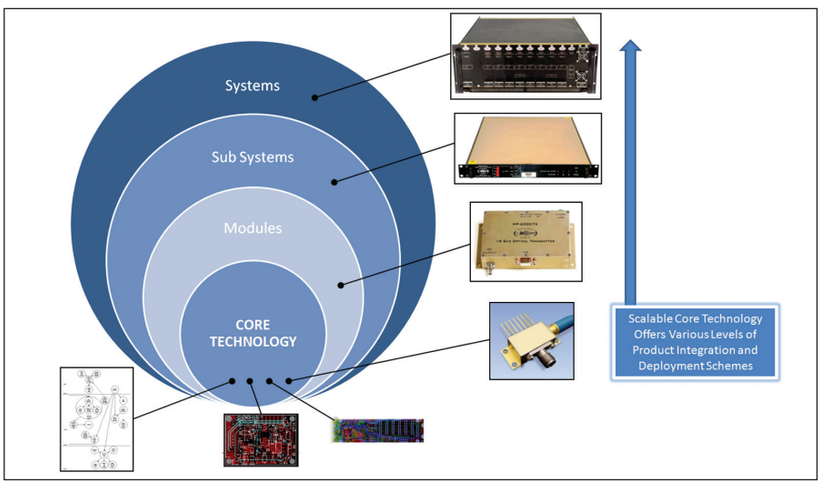
Microwave Photonic Systems Inc. - Richard J. Stewart & Joshua L. Korson

Microwave Photonic Systems, Inc. (MPS) core expertise is in the area of RF Photonics with a specific focus in Defence SATCOM antenna remoting, Electronic Warfare, Terrestrial RF Communications, and GPS Navigation & Timing Synchronization. MPS has provided RF Photonic subsystems, modules, components, and embedded software in support of various mission critical Defence programs. Our products are currently in service with many Defence programs including the Global Broadcast System, Wideband Global Satellite Communications Network, F-22 Fighter, Naval Towed Sonar Array, UHF SATCOM Ground Station, Shipboard GPS Antenna Link, Shipboard Fiber Optic Data Multiplexing System (FODMS), and Department of Energy Laboratories.

Our commercial products build on our experience with High Reliability and Mission Critical systems to provide products for RF radio in-building network communications, Metropolitan Wireless Access and Tetra Communications.

Innovative Scalable Technology

MPS recognizes the need for innovative designs and advanced technology development. Our continuing investment into research and product development has produced a wealth of core technologies which support our vertically integrated system solutions which take our customers from initial concept to successful field deployment. MPS offers mature scalable technology that is supported by a history of successfully deployed systems. These technology solutions have been applied to numerous architectural topologies and



Innovative Scalable Technology

design schemes in our product portfolio, providing MPS with full design and product capabilities in the identification and implementation of system design optimization.

MPS's ongoing investment in critical core technologies and professional staff supports our ability to recognize essential customer requirements and to provide the development, manufacture, test and deployment of a customer specific solution, ranging from a single system to a "system of systems". MPS's programmatic expertise in project management and execution produces cost-wise solutions that remain within the desired technical, cost, and schedule trade-space of our Customers.

Conventional Copper Based Communication Disadvantages

Legacy communication systems present a series of disadvantages to the field deployed operator:

- Co-Location of Troops, Vehicle and Equipment Assets
- Coaxial Copper Cable Distance Limitations
- Infrastructure Costs for Repeaters
- Size, Weight and Power Burden
- Electromagnetic and Radio Frequency Interference Influences
- High Susceptibility to Field Damage

Fiber Optic Communication Advantages

Fiber Optic Interfacility Links (IFL) operational capabilities beyond that of conventional copper system solutions:

- Extends Analog RF Signals via Increased Cable Transmission Distance
- Increased Bandwidth, Low Noise, High Dynamic Range
- Immunity to High Altitude Electromagnetic Pulse (EMP) Disruption
- Immunity to Electromagnetic Interference (EMI)

- Broader Range of RF Transmission Frequencies: C-band, S-Band, L-band, X-Band and Ku-Band
- Size, Weight and Power Reductions

Product Spotlight: Tactical RF Photonic Fiber Optic Communication

The OFW-2320-TRX-SYS, Fiber Optic Interfacility Link (IFL), is a Commercial Off-the-Shelf (COTS) RF Photonic Antenna Link designed to perform optical signal conversion and long haul (up to 50km) transport of RF signals. The OFW-2320-TRX-SYS transports radio Transceiver Uplink and Downlink signals (LOS or SATCOM) for the purpose of providing a remote antenna capability that is beyond the limits of conventional coaxial cable. The OFW-2320-TRX-SYS architecture incorporates a suite of Line Replaceable Units (LRUs) that provide the capability to bi-directionally transport Fiber Optic Channels between the radio and antenna.

The Local Subassembly, positioned at the Fixed Operations Group / Command Post consists of one LRU:

- OFW 2320-TRX-L, Fiber Optic Transceiver, Local Unit, 1U Rack Chassis

The Remote Subassembly, positioned at the Antenna Group / Hilltop consists of three LRUs:

- OFW-2320-TRX-R, Fiber Optic Transceiver, Remote Unit, 1U Rack Chassis
- MP-2322-TRX-R, RF Switching\ Distribution, Remote Unit, 1U Rack Chassis
- MP-2322-TRX-HPA, RF Uplink High Power Amplifier (HPA), 2U Rack Chassis

Operational Benefits

The OFW-2320-TRX-SYS subsystem provides a platform for extending analog RF signals. The characteristics of the fiber optic IFL have been designed to seamlessly replace a copper coaxial interconnect to take advantage of the extremely low-loss transmission characteristics of fiber optic cable. The signals are transported using mil-spec, multi-strand, single mode fiber optic interfacility cable terminated with harsh environment optical interconnects. The system provides expanded connectivity between a secure fixed site location and the forward deployed antennas transmit/receive location. An additional benefit provided by this increased separation distance is the reduction of risk to personnel who are no longer collocated within range of an active emitting antenna which could be targeted by an opposing threat weapon. This risk reduction is a high value benefit of such a system architecture. Finally, the optical cabling is a non-metallic signal conductor and hence inherently immune to the effects of Radio Frequency Interference, Electromagnetic Interference, and Lightening Strikes.

Configuration Options

The OFW-2320-TRX-SYS can be configured in a number of arrangements to support antennae remoting applications and to overcome terrain obstacles for Line of Sight (LOS) transmission. The OFW-2320-TRX-SYS suite of products can support units such as the AN/PRC-117, ARC-210, USC-61, URC-200, as well as other Military and Civilian Tactical Radio Sets. Additionally, the OFW-2320-TRX-SYS can be configured to support antenna remoting at L-Band Frequencies.

The OFW-2320-TRX-SYS-A IFL was specifically designed to accept ARC-210 Radio Transceiver RF communications traffic spanning the operational frequency range of 30 to 512 MHz. The OFW-2320-TRX-SYS FO IFL Subsystem compliment of LRUs provides the User with the capability to monitor the health status of each LRU through an external RS-232 serial interface.

Optional configurations are available which house the complete system in two ruggedized pack up kits for worldwide deployment. Ruggedized kits are shock mounted, stackable, and available in black, olive drab and desert tan. ■

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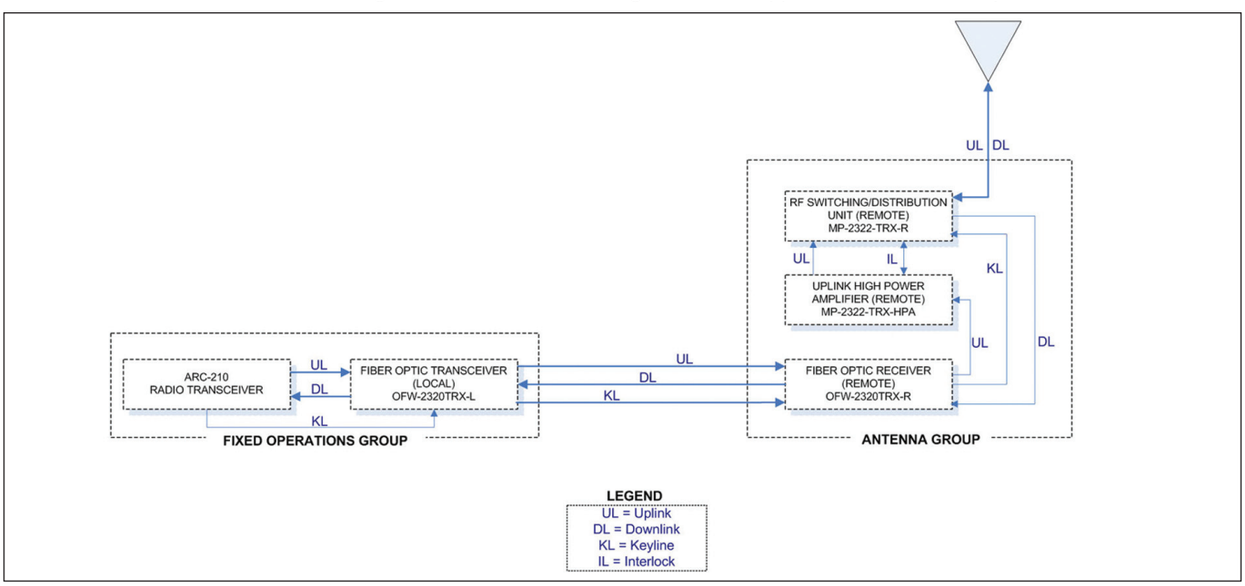

Tactical Radio Deployment - Function Block Diagram