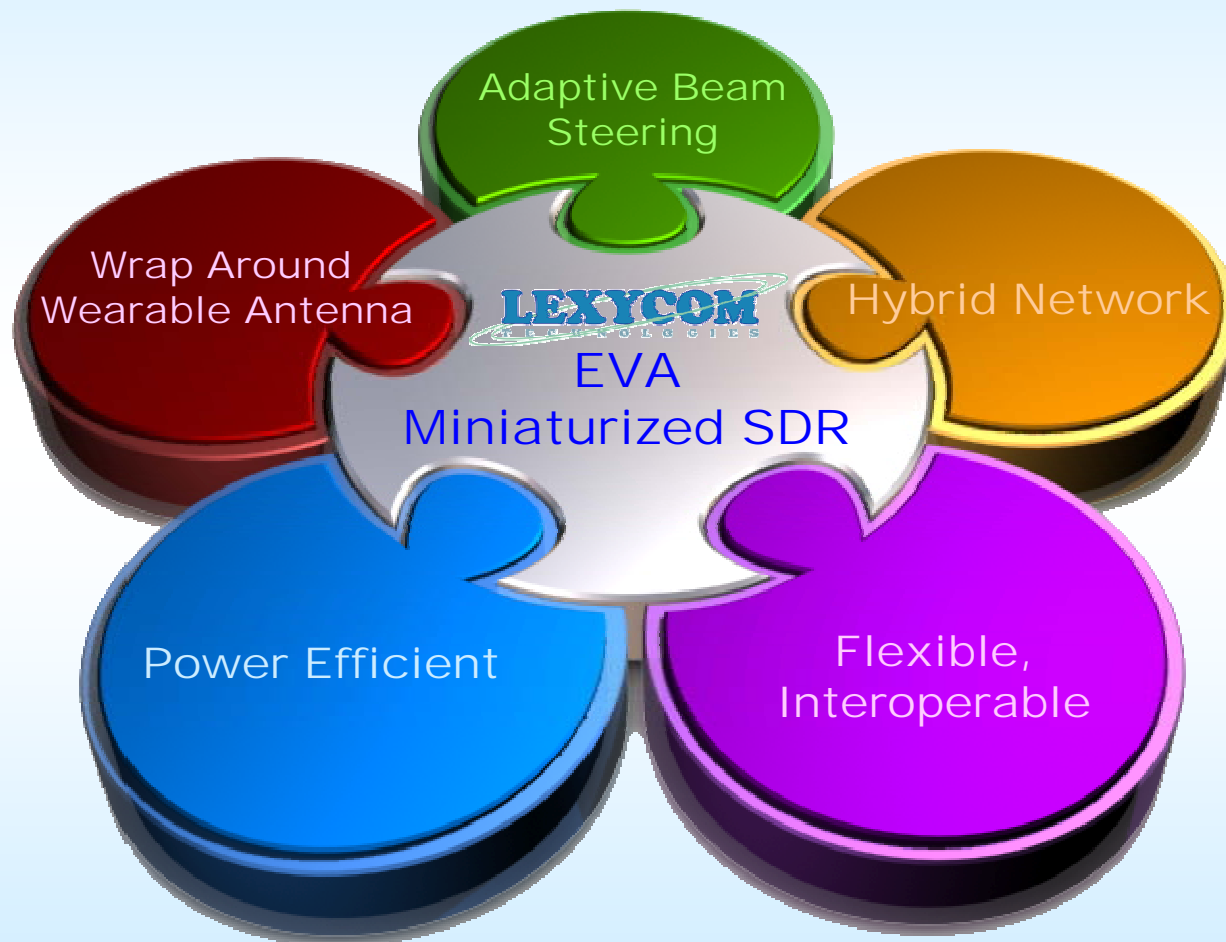


Self Structuring Antenna-Leaky Wave SSA And Software Defined Radio- SDR Technology



EVA SDR LEVERAGES SMART RECONFIGURABLE ANTENNAS

Antenna Parameters

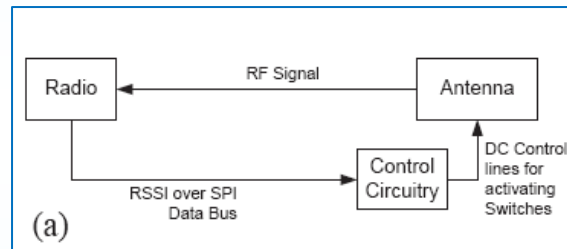
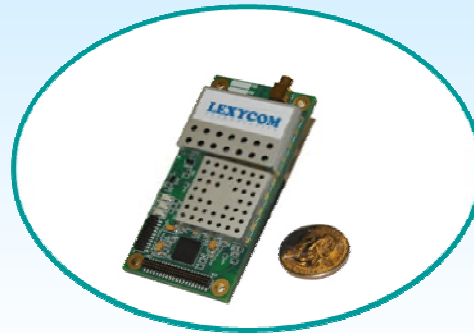
Smart Antenna maximizes link quality dynamically.

RSSI Feedback from the Radio over SPI data bus.

802.11s mesh compliant and configurable for other wireless standards.

Onboard Microcontroller-based Optimizer.

Able to learn and adapt to the RF environment.



SDR Parameters

2400-2483 MHz

Scalable

Standard NTSC, PAL

H.264 High Definition

Voice-contingency mode

Data Encryption

On-the fly reconfiguration

Hybrid Mesh Network

Scalable, 8 kbps-20 Mbps

Less than 3 Watts

Smart antenna

(a) Feedback-loop scheme where RSSI and node information is transmitted over an SPI bus to the control circuitry, which contains the control algorithm embedded in a micro-controller.

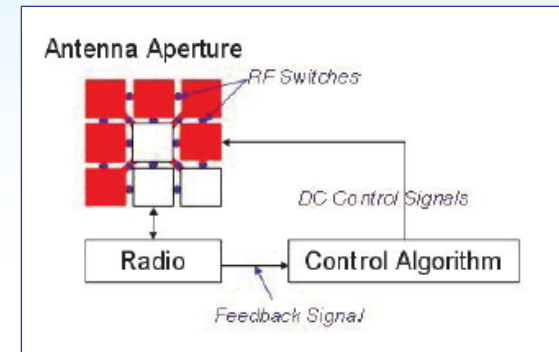
Self Structuring Antenna Technology

Leaky Wave SSA

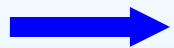
The wrap-around, multi-beam, wearable antenna is configured using 12 switches and it operates in the 2.4-2.5 GHz ISM band with 8 beams.

For each beam that the antenna produces, the antenna is tuned across the entire 2.4-2.5 GHz band (i.e., it maintains its frequency band regardless of the number of the active beams).

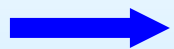
Large number of switches on the antenna aperture provide built-in redundancy against failure and/or antenna structural damage.



Frequency Tuning compensates for detuning by dynamically adjusting the frequency band



Impedance Matching minimizes signal loss -- accomplished without the need for separate impedance tuning circuitry



Beam Shaping maximizes gain by shaping the beam in the direction of the desired signal

Self Structuring Antenna Technology Leaky Wave SSA

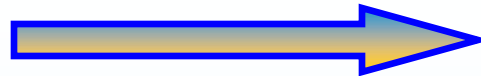
KEY BENEFITS

- Optimize RF Link
- Increase Range
- Self-Learning Algorithm
- Self-Healing Architecture
- Improve Throughput
- Power Efficient
- Package Flexibility
- Reduce Interference
- Dynamic Reconfiguration



SIMULTANEOUS TUNING

- Frequency
- Gain Pattern
- Input Impedance



SUBSTRATE FLEXIBILITY

- On-Glass
- On-Polymer
- On-Rogers
- On-Chip

Self Structuring Antenna Technology Leaky Wave SSA

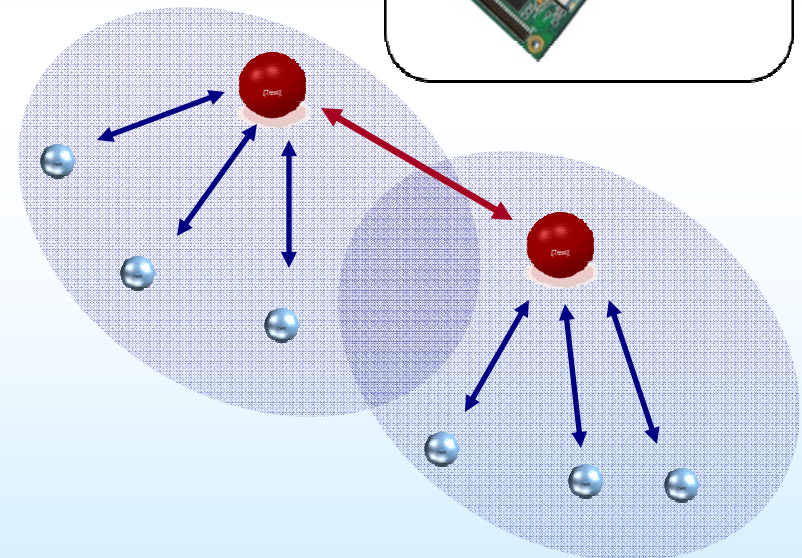
MESH NETWORK

The on-board control circuitry receives feedback from the radio via SPI bus transmitting information about the signal quality or RSSI. The microcontroller then redirects the antenna beam through control signals that are dynamically reconfiguring the states of the switches.

The antenna control algorithm is currently optimized to work with standard 802.11s-like mesh protocol and dynamically optimizes link margin for all active link. The algorithm allows for optimization and customization for any network type.

The antenna is designed for secure, reliable, high bandwidth voice, data, and video transmissions. Suitable applications include mobile wireless networks for vehicles, drones, robots, or unmanned device to device communications

EVA Multi-Service
Software Defined Radio,
Data, Video, and Voice



MOBILE MULTI-HOP MESH
NETWORK

Presented by



Phase 2 NASA SBIR EVA SDR Smart Antenna Collaborative Project

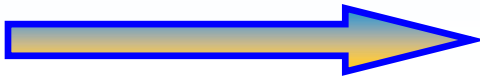


Self Structuring Antenna Technology Leaky Wave SSA

ANTENNA SOLUTIONS



3-inch diameter, self-structuring antenna, contains **2 SPST** solid-state switches which produce **four distinct beams** at 0, 90, 180, and 270 degrees.



6-inch diameter, self-structuring antenna, contains **12 SPST** solid-state switches which produce **eight distinct beams** at 0, 45, 90, 135, 180, 225, and 270 degrees.



3-inch diameter, self-structuring antenna, contains **20 SPST** solid-state switches which produce **eight distinct beams plus vertical beam steering**.

Self Structuring Antenna Technology Leaky Wave SSA

TECHNICAL PARAMETERS

Diameter:	6 in
Frequency :	2.400 - 2.482 GHz (ISM Band)
Thickness:	.08 in
Weight:	.66 lbs
Beams:	1 Omnidirectional (2dbi) Gain 8 Directional (6dBi) Gain
Redundancy:	100% recovery from 30% switch failure
RF Switches:	25 RF MEMS switches (1mm x 1mm)
Charge Pump:	Serial input (3.3 Volts) 16 parallel outputs (90V, 100microA)
Microcontroller:	SiLab C8051F320, 8-bit, 3.3V, 10mA, 24MHz, 16kB Flash
Ctrl Algorithm:	On microcontroller, 802.11s compliant
Radio I/F:	RSSI and node info over 4MHz SPI