

MPAR Symposium II

Underpinning for Service Improvements: Technology Innovation and Development—Industry Update

Mike Sarcione
Sr. Principal Engineering Fellow
mgsarcione@raytheon.com

Norman, OK
18 October 2009

MPAR Challenges Affecting Technology Innovation and Development

- n Success requires a balance between performance pull for weather and air traffic surveillance missions and technology push for affordability
 - Capabilities based requirements must avoid pushing the envelope of the technologies, e.g. consistent with best commercial manufacturing practices
- n MPAR's performance pull should be affordably architected to meet the needs of the Nation well into the future
 - Provide complete coverage for our borders and CONUS from <1000 to 100K ft. in altitude
 - Prioritized needs/capabilities and affordability that plans for modularity, scalability & growth
 - Improves observation missions beyond weather, e.g. natural and induced hazardous phenomena, enables new commercial markets for environmental monitoring and unmanned vehicles, etc.
 - Must meet the needs of a broad customer base well into the future, e.g. proactive on needs for multiple users, quality of service based, timely and accurate
- n MPAR's technology push should leverage high volume best commercial practices and innovation
 - Multiple suppliers, not pushing state-of-the-art component performance, etc.
 - Leverages “green technologies” where possible

Putting MPAR in Perspective by the Numbers

- n 350 MPARs are similar to producing
 - 16,000+ fighter radar apertures
 - 3,300+ SPY-1 radar apertures

- n Requires >250 MW of prime power and produces nearly the same amount of waste heat

Architectures, Technologies and MPAR

- n An affordable architecture
 - Leverages mature technologies/manufacturing processes and innovations of today via good engineering design/implementation
 - Minimizes inventions, yet evolves with the technologies and innovations of tomorrow
- n Most, if not all of the technologies, HW and SW exist, many in the commercial base that would enable an affordable and capable architecture
- n Defense and commercial industries provide much technology leverage
 - Lower cost silicon for most if not all the electronics, including RF devices/circuits
 - Existing technologies in networking, multi-level security, data management/distribution, resource management technologies have all been demonstrated in similar commercial and/or defense applications

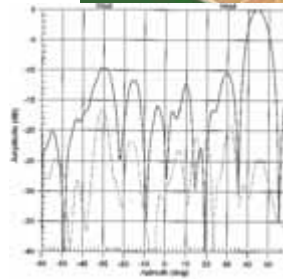
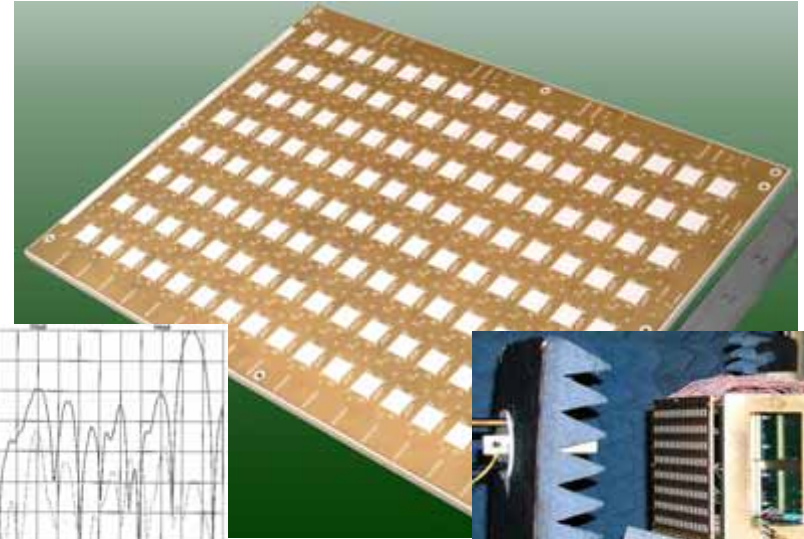
A Few Key Enabling Technology Trends

- n Commercial GaAs, RFCMOS and Silicon Germanium
- n Surface mount electronics, plastic package electronics
- n Modular and open HW and SW architectures, standards
- n Sensor netting and multi-statics, multi-spectral
- n Digital beamforming/waveform generation and signal/data processing
- n Knowledge/resource management, information assurance

What's Raytheon Doing to Enable MPAR?

n Demonstrated an X-band air cooled Array Panel build much like a “Computer-Board”

- Significant reduction in fabrication/assembly steps and components
- No leading edge technology
- Built in a commercial factory
- Concept is applicable to any microwave frequency



n Demonstrated sensor netting/fusion, resource & track management products

n Industry partner for the NSF Collaborative and Adaptive Sensing of the Atmosphere (CASA) Program

