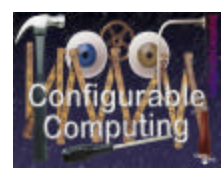
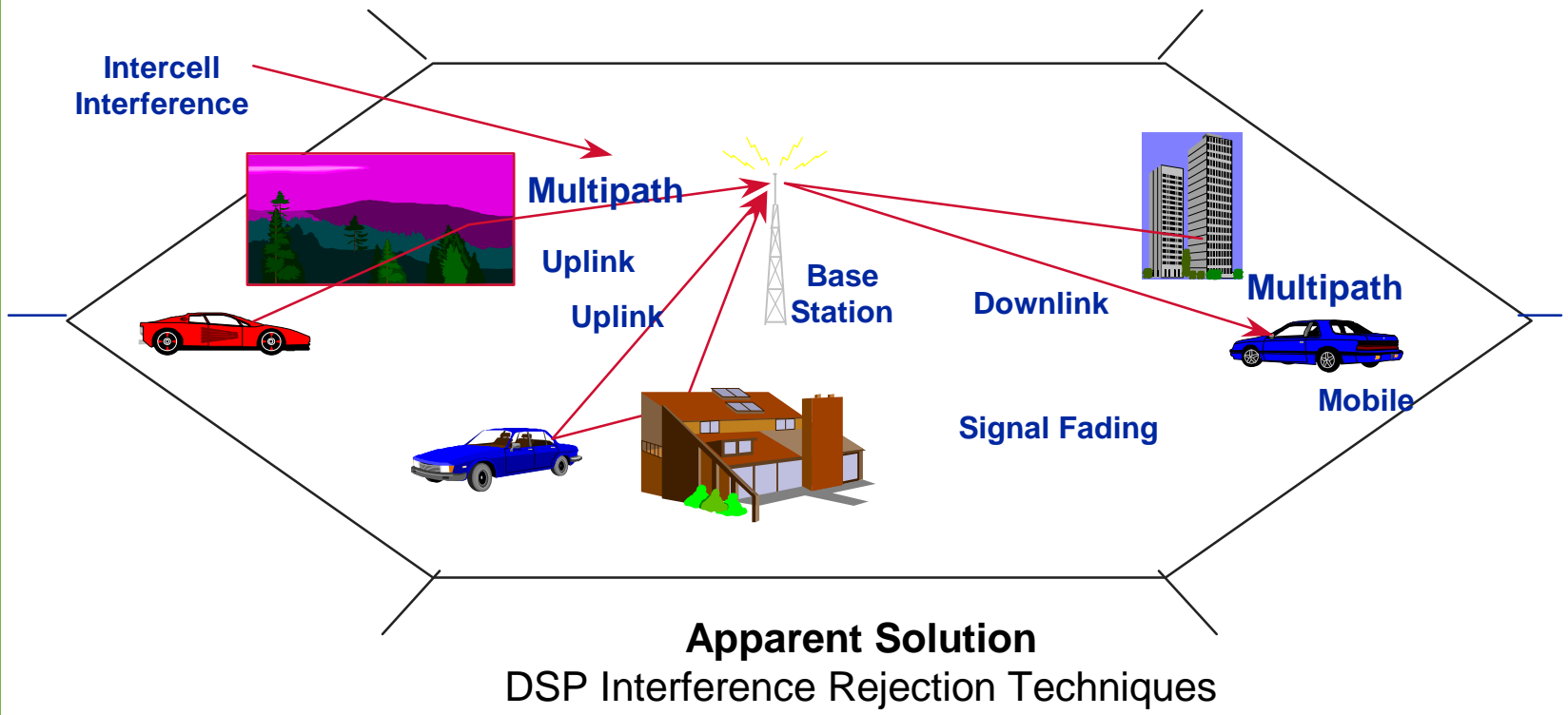




Smart Antenna Research Under the GloMo Program

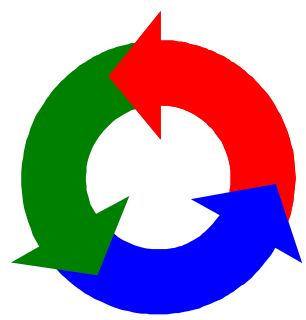


The Problem



Limitations on Capacity

- Co-channel interference
- Multiple access interference
- Adjacent channel interference
- Multipath, fading, and noise



Reality of the Solution

- High power consumption
- Excessive computing needed



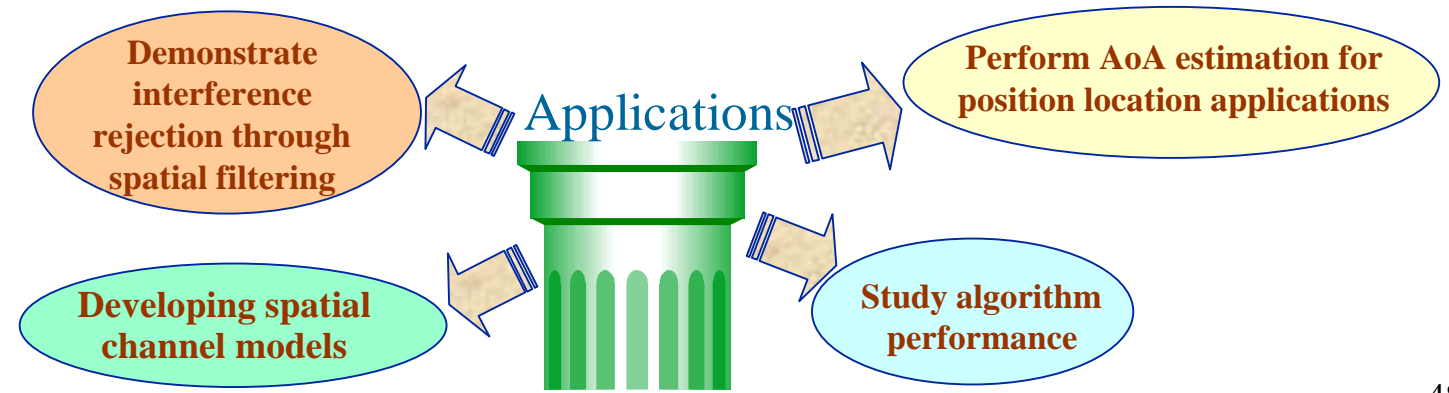
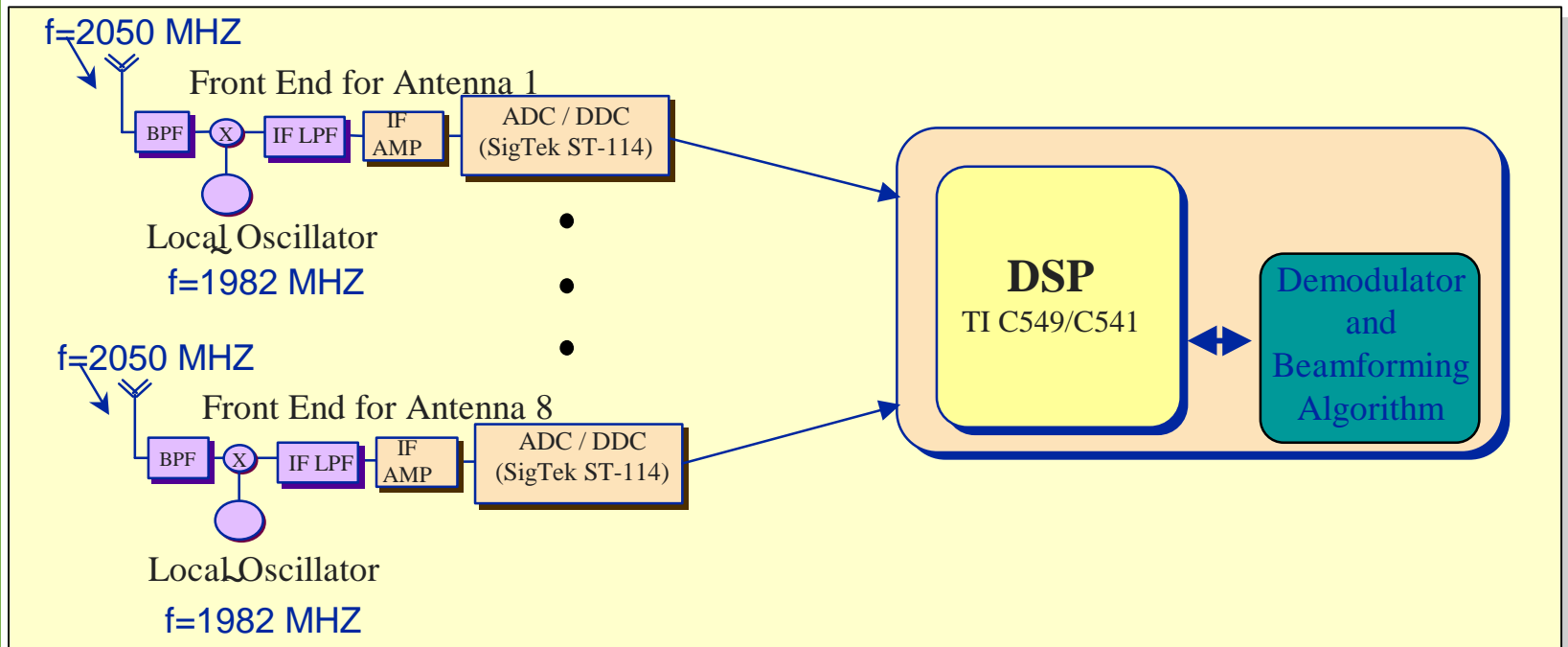
Research Areas

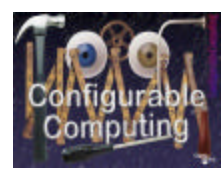
- Adaptive Antenna and Direction Finding Algorithms and Hardware
- Hand-Held Smart Antennas
- Vector Channel Modeling



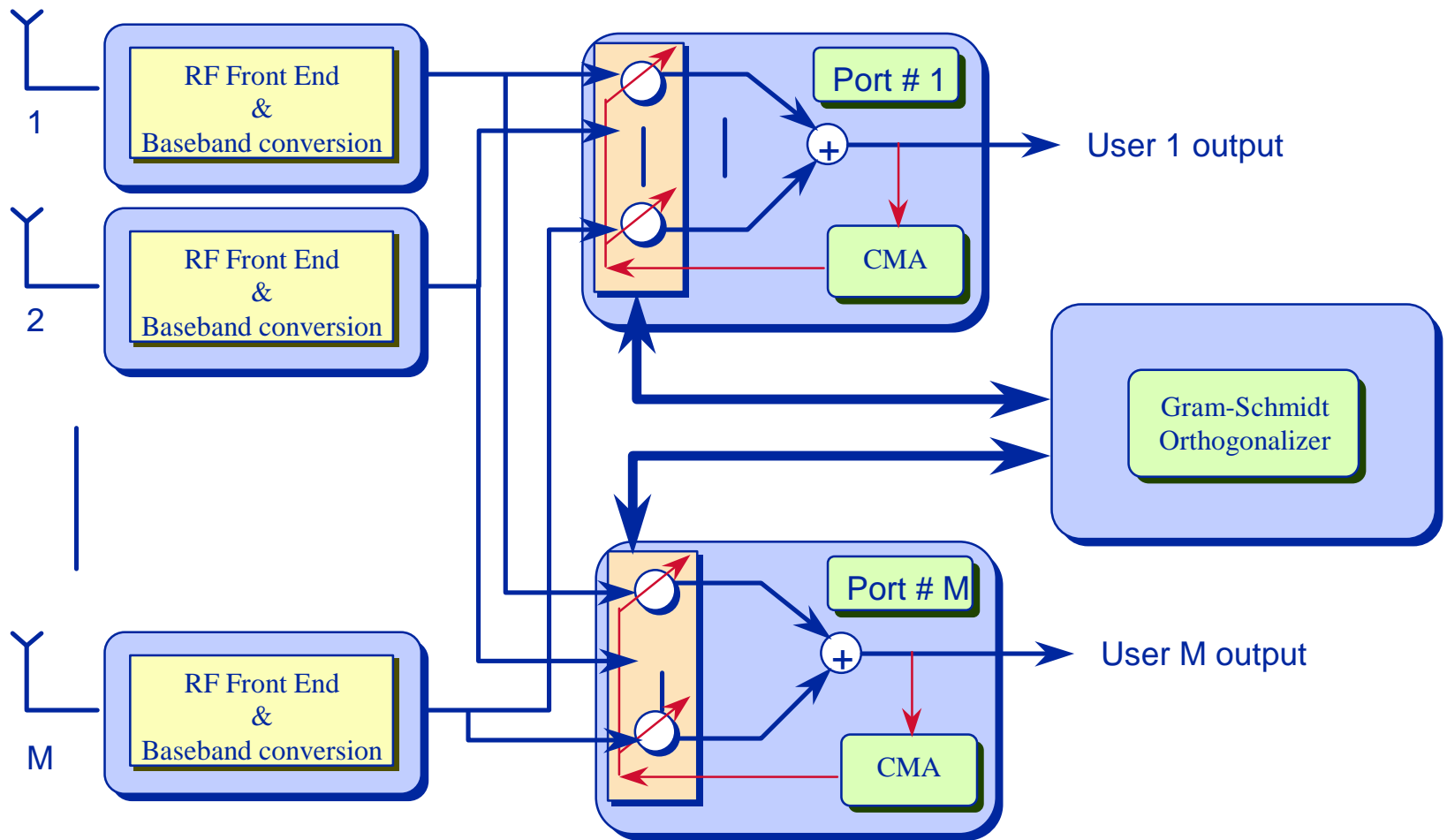
Adaptive Antenna and Direction Finding Algorithms and Hardware

Third Generation Array





Multi-Target CMA



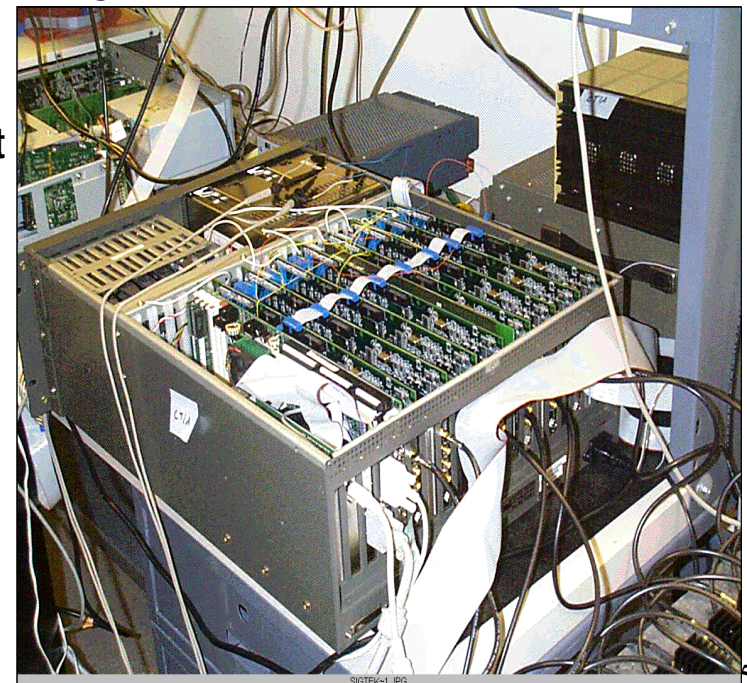
Accomplishments

- Smart Antennas at the Handset
 - Created and built 2 measurement systems to measure propagation characteristics as seen by the handset
 - Initial data collection shows an improvement of up to 17 dB in the link budget with adaptive combining and 7dB with diversity combining

Antenna Unit

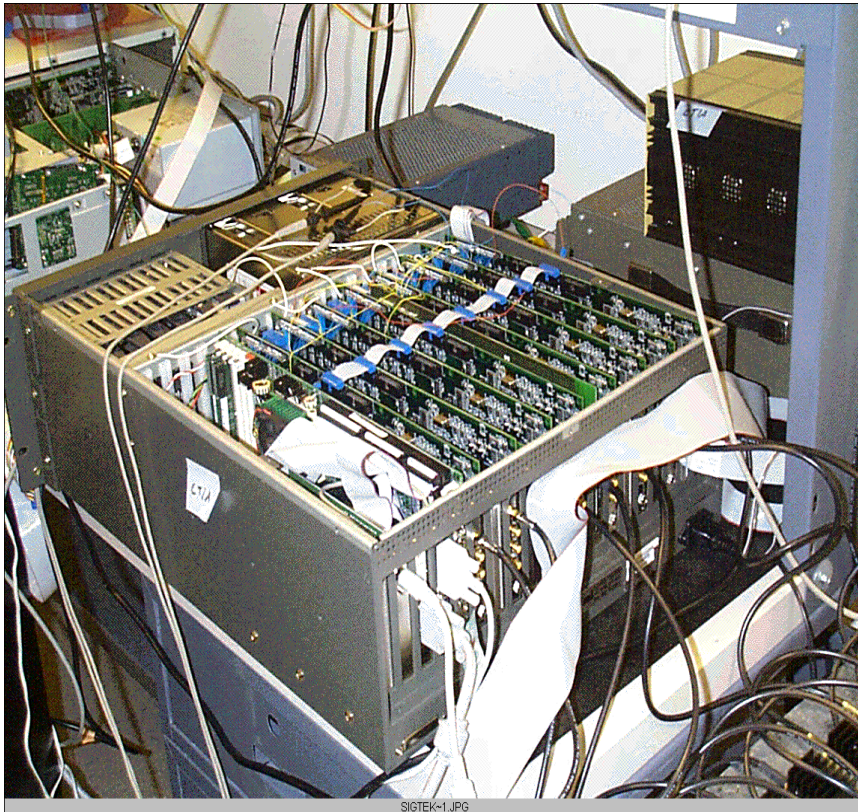


Vector
Channel
Measurement
System





MPRG Vector Measurement System



- Fully functional 8 elements, 1.25 MHz Bandwidth, 2.050 GHz center frequency
- Flexible for adapting various antenna/polarization inputs, carrier frequencies, bandwidths, real-time algorithms, or data collection scenarios
- Eight Harris 40214 Programmable Direct Digital Downconverters, eight C54x DSPs, one Analog Devices 21010
- New features being added
 - CDMA capability
 - Improved system executive processing

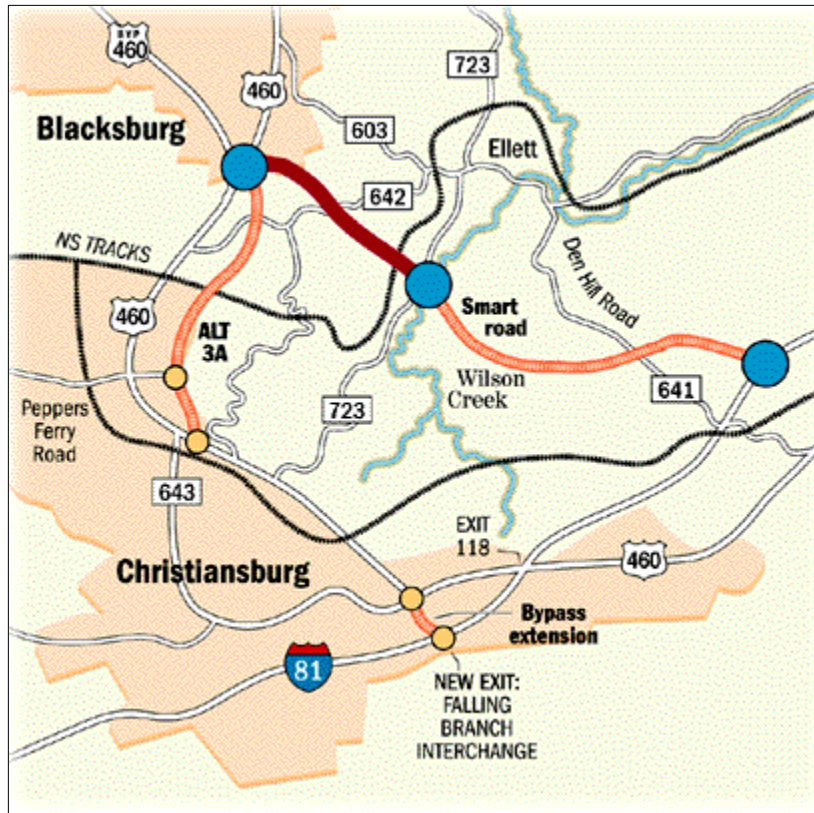


Research Issues

- Adaptive array algorithm performance in real situations
- Vector channel measurements
- Practical AOA algorithm and hardware development
- Adaptive array algorithm convergence issues



Future Work - Summer 98 Research



MPRG's vector measurement system will be located at a point along the Smart Road and will estimate the angle at which the signal arrives at the array. This angle defines the line of bearing.

Channel measurements will also be made to quantify the impact of the channel on measurement accuracy.