

# A SDR testbed architecture for ACM, MIMO and DSA in military applications

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# Outline

- Background
- Platform
- Architecture
- Applications
- Conclusion

# Background

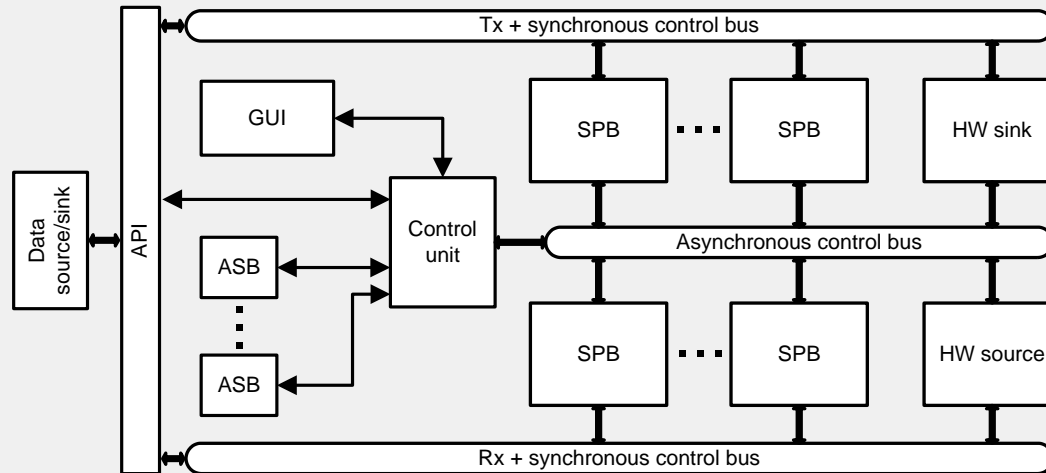
- Introduction of new services in military radio networks
  - Blue force tracking, streaming video etc.
- Increased requirements on link capacity, robustness
- Frequencies are a desirable resource
- Techniques for civilian communication system are interesting also for the military radio systems
  - MIMO – increase robustness or capacity
  - ACM – optimize throughput vs. robustness for a given SNR
  - DSA – utilize unoccupied frequencies, robust against jamming
- Requirements differ from civilian systems

# Target platform

- GNU Radio
  - Free software toolkit for software radio development
  - Over 100 signal processing block available
  - Signal processing implemented in C++
  - Flow graph glued together with Python
- USRP2
  - Sample clock: 100 MHz
  - Gigabit Ethernet interface
  - Theoretical maximum bandwidth: 25 MHz
  - Cost: \$1400



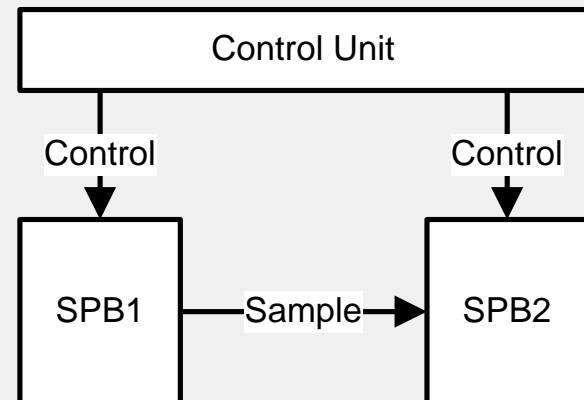
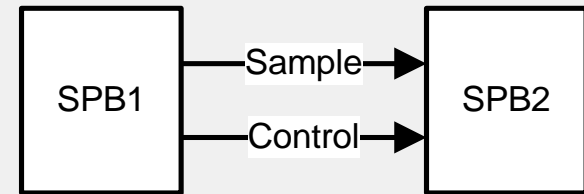
# Architecture



- Generalized
  - Signal processing blocks (SPB)
  - Application specific blocks (ASB)
  - Control unit

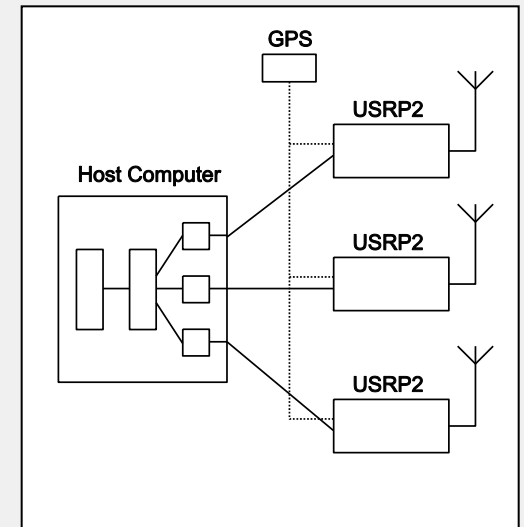
# Control signaling

- Synchronous
  - Synchronous on sample basis
  - Sample passing functionality used for parameters
  - Use of parameter table to minimize data load
- Asynchronous
  - Signaling when needed
  - Not aligned with sample flow



# Applications and design aspects

- MIMO
  - Multiple USRP2-units & eth-cards
  - Bottleneck in host computer
  - Synchronization of USRP2-units
- ACM
  - Asynchronous and synchronous control signaling needed
  - Extendibility
- DSA
  - Includes several different spectrum sensing methods



# Conclusion

- Proposed architecture, framework
- Application specific design issues discussed
- SDR platform
- Further work
  - Implementation of architecture (in progress)
  - Applications to be tested
    - DSA (in progress)
    - MIMO (to be started)
    - ACM



Thank you for your attention!

Questions?!

