

Digital Predistortion Linearizer for a Realization of Automatic Calibration Unit

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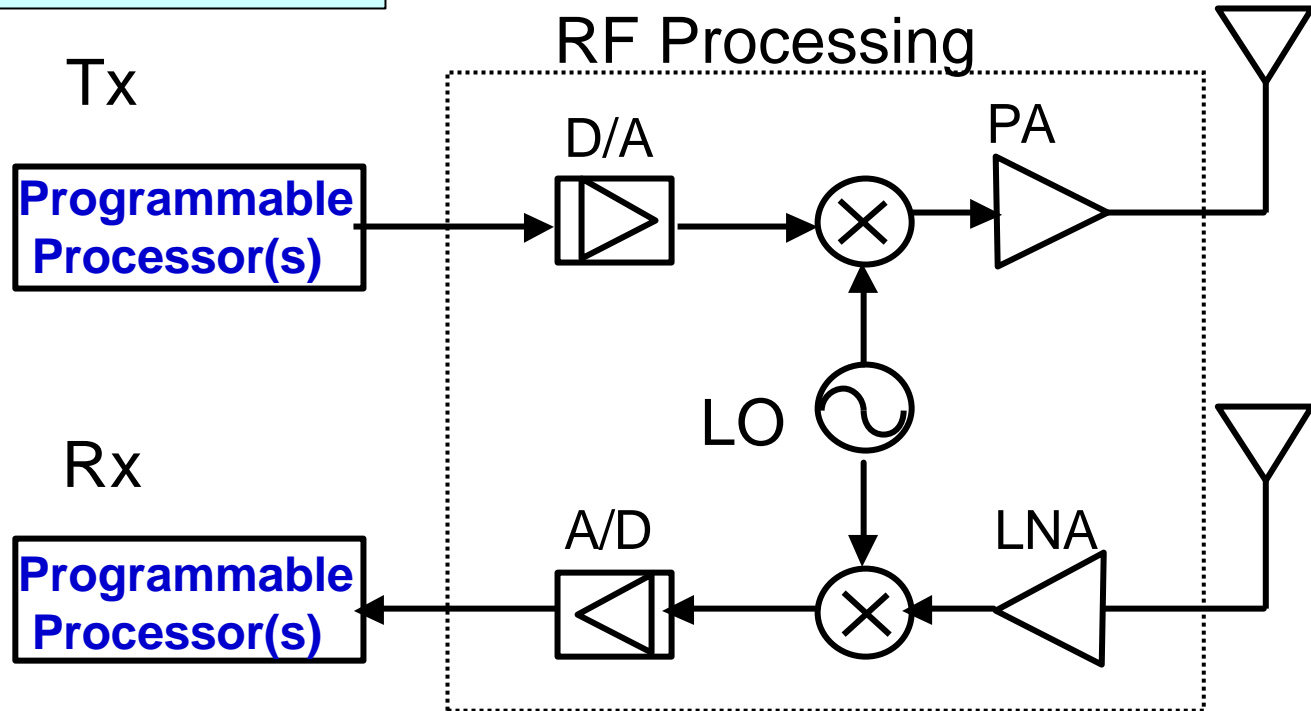


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Background

- Digitization and Processing of RF signal is still not possible because of the lack of ADC & DAC resolution
- The requisite analog RF components

SDR architecture:



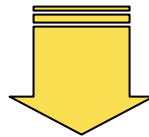
Motivation

Problems :

- Imperfection concern of analog RF components
 - Nonlinear distortion, Power efficiency
- Compliance concern when changing the operating mode
 - The emission of energy

Our Motivation :

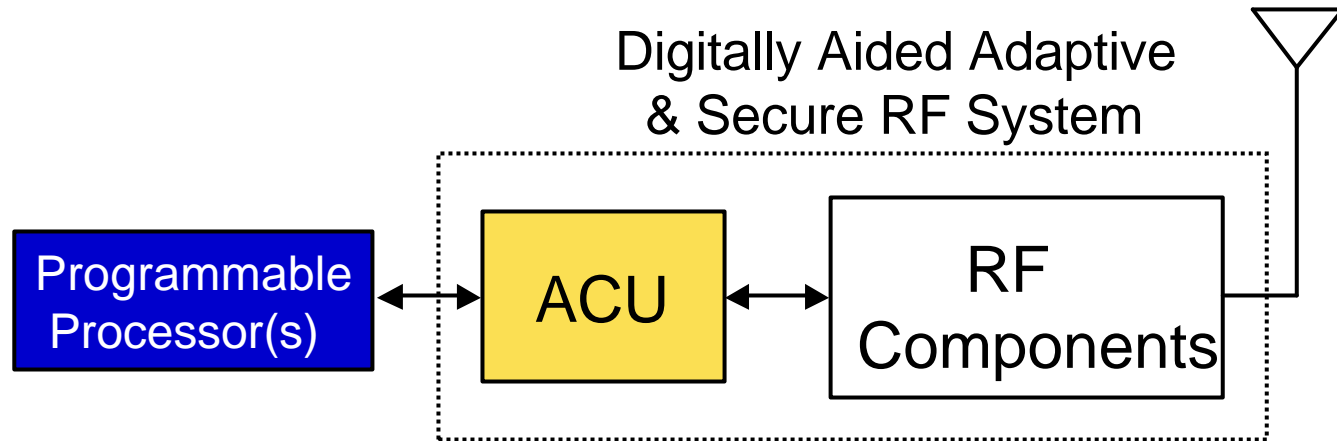
Providing more efficiency of RF components while protecting the public from harmful interference of SDR



ACU: Automatic Calibration & Certification Unit

What is ACU?

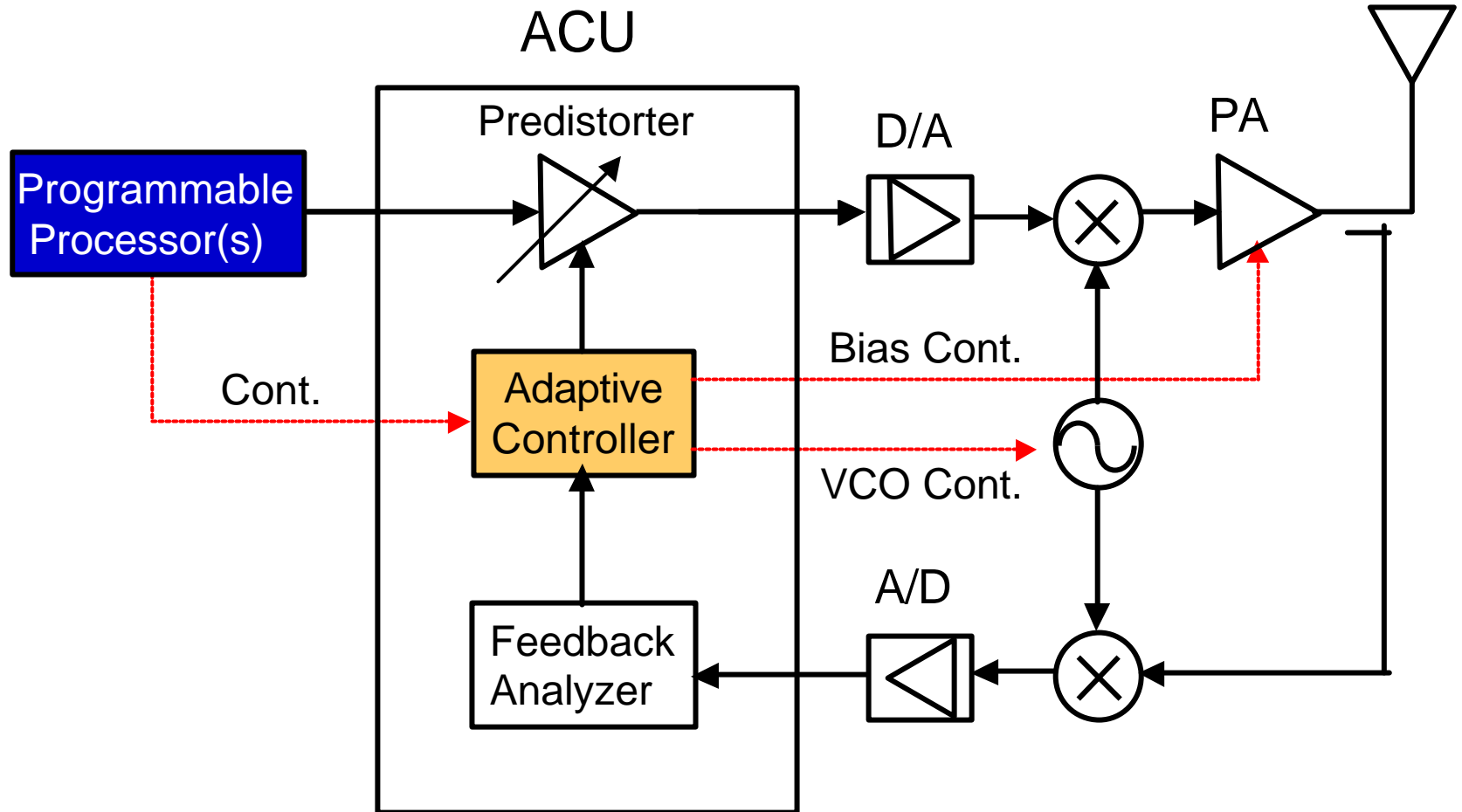
ACU is a hardware embedded module



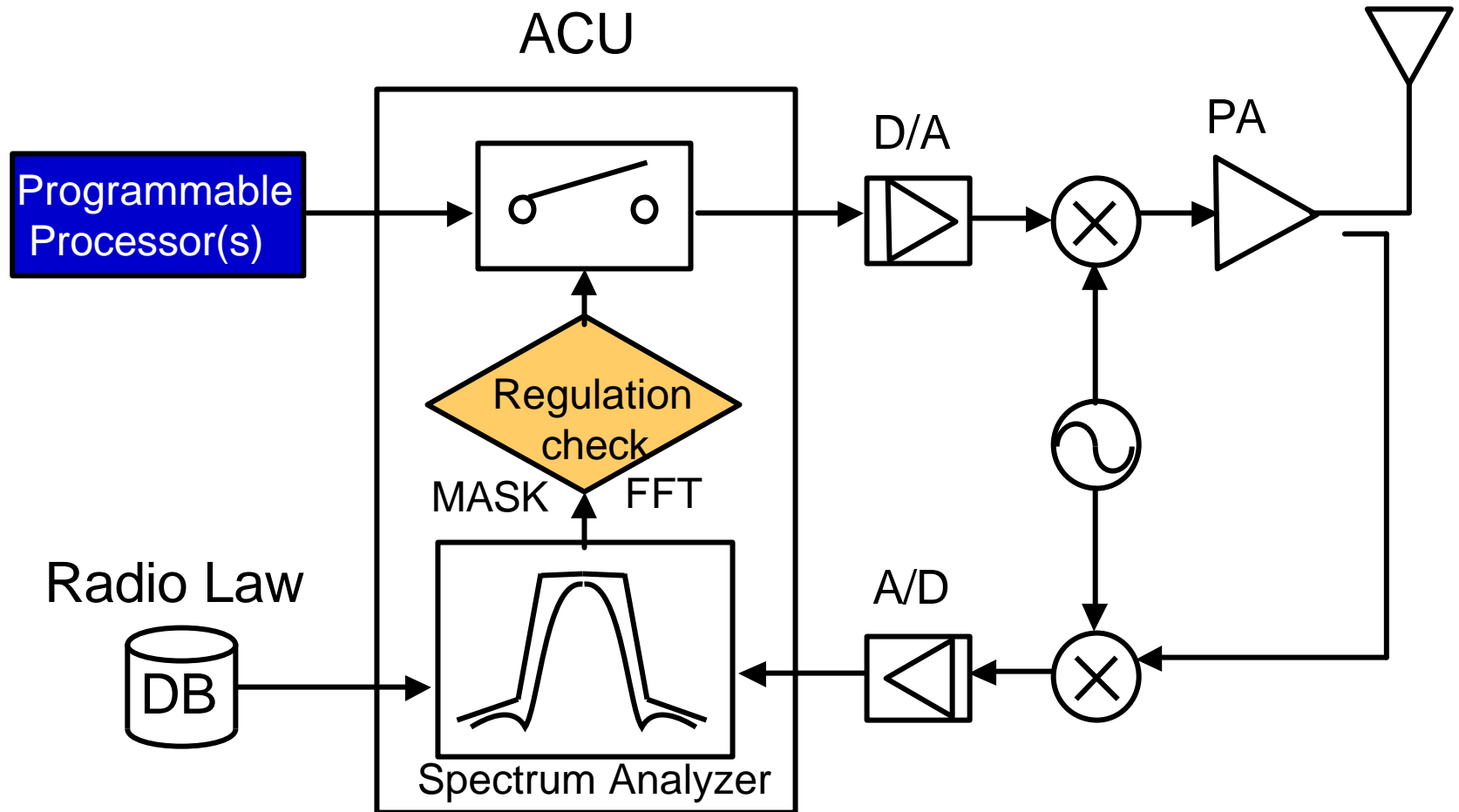
- Digitally aided Adaptive RF (DARF):
 - to **control** and **adjust** RF components :
(Predistortion, Power Amplifier bias control, ...)
- Digitally aided Secure RF (DSRF):
 - to ensure the compliance of the combination of HW & SW by **run-time check**

Digitally aided Adaptive RF

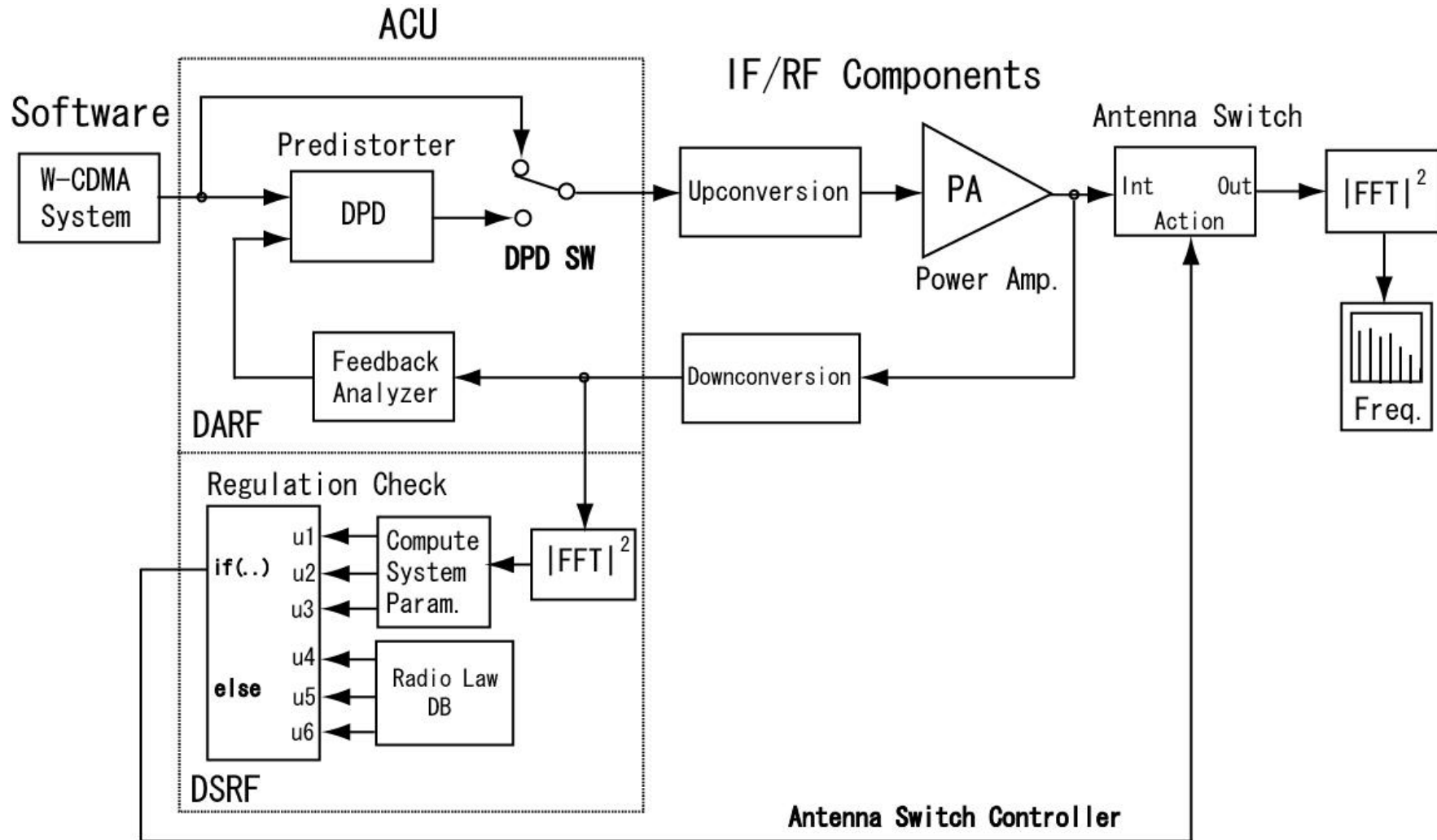
Example: Digital Predistorter



Digitally aided Secure RF



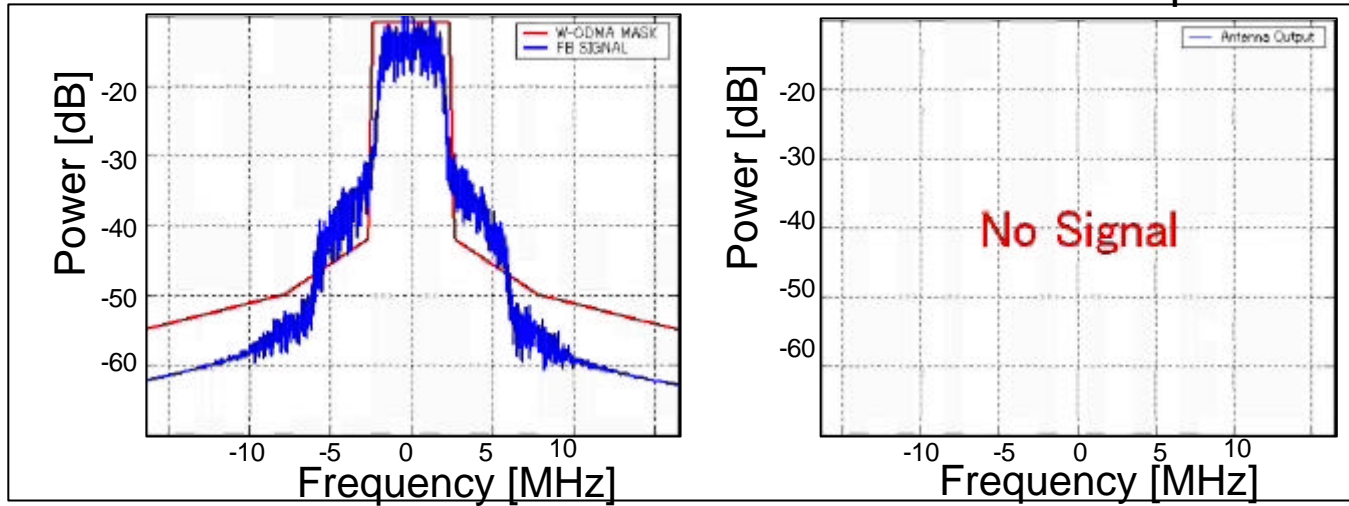
ACU Simulink Model



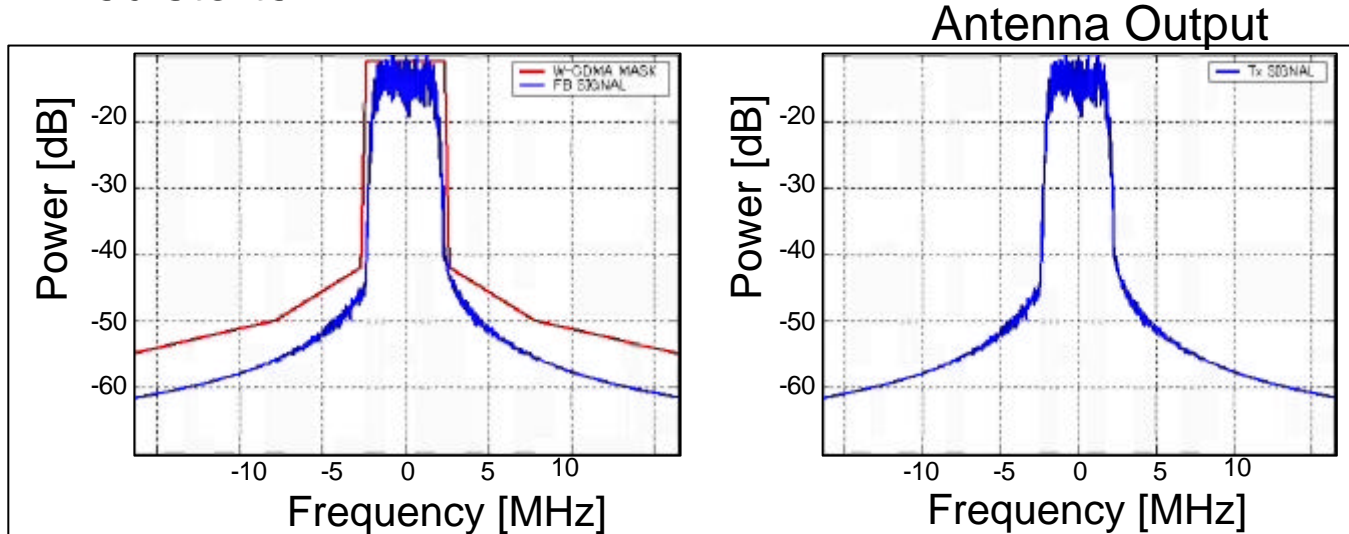
W-CDMA system with ACU module (Simulink model)

ACU Demonstration

- Without Predistorter:



- With Predistorter:



Features of ACU

- DARF :
 - Better efficiency of RF components
- DSRF :
 - More secure SDR architecture with run-time regulation check



- Providing a new authorization procedure that can approve HW and SW separately

AMAP: ACU eMployed Authorization Procedure

How does AMAP work?

AMAP: ACU eMployed Authorization Procedure

AMAP: to approve HW & SW separately

HW Approval

Authorize
HW only (with ACU)

SW Approval

Authorize
SW only

HW+SW

ACU checks run-time
parameters when HW & SW
are functioning together

Summary and Future Work

- ACU

- Digitally aided Adaptive RF
- Digitally aided Secure RF

- AMAP

- Separating HW & SW Authorization Procedure
- Improving SDR Flexibility

- Future Work:

- Prototype ACU implementation
- More detail structure of AMAP