

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Dual-Mode Broadband and Wireless Network (DMBWN): a backward compatible system concept]

Date Submitted: [13 March, 2007]

Source: [Ching-Kuang Tzung, Ta-Sung Lee*, Jenn-Hwan Tarnng*, Yu-De Lin*, Fu-Chiang Chen*, and Tian-Wei Huang]

Company [Department of Electrical Engineering, National Taiwan University, * National Chiao Tung University, Hsin-Chu, Taiwan,]

Address [No.1, Sec. 4, Roosevelt Road, Taipei 10617, Taiwan, R.O.C.]

Voice:[+886 2 2363 3289], FAX: [+886 2 2368 3824], E-Mail:[cktzuang@cc.ee.ntu.edu.tw]

Re: []

Abstract: [Description of the concept of Dual-Mode Broadband and Wireless Network]

Purpose: [Contribution to TG3c at March 2007 meeting.]

Notice: This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

Release: The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.

Dual-Mode Broadband and Wireless Network (DMBWN): a backward compatible system concept

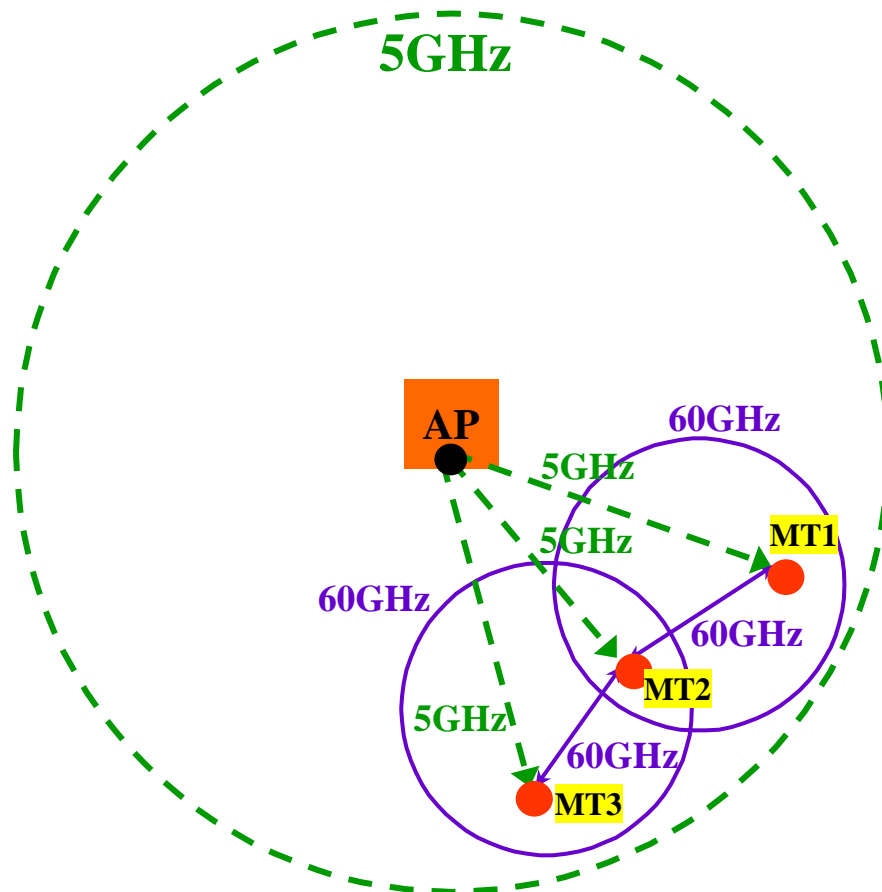
**Ching-Kuang Tzung, Ta-Sung Lee*, Jenn-Hwan Tarnng*,
Yu-De Lin*, Fu-Chiang Chen*, and Tian-Wei Huang,**

National Taiwan University

***National Chiao Tung University**

March 13, 2007

Dual-Mode Broadband and Wireless Network (DMBWN): a **backward compatible** system concept



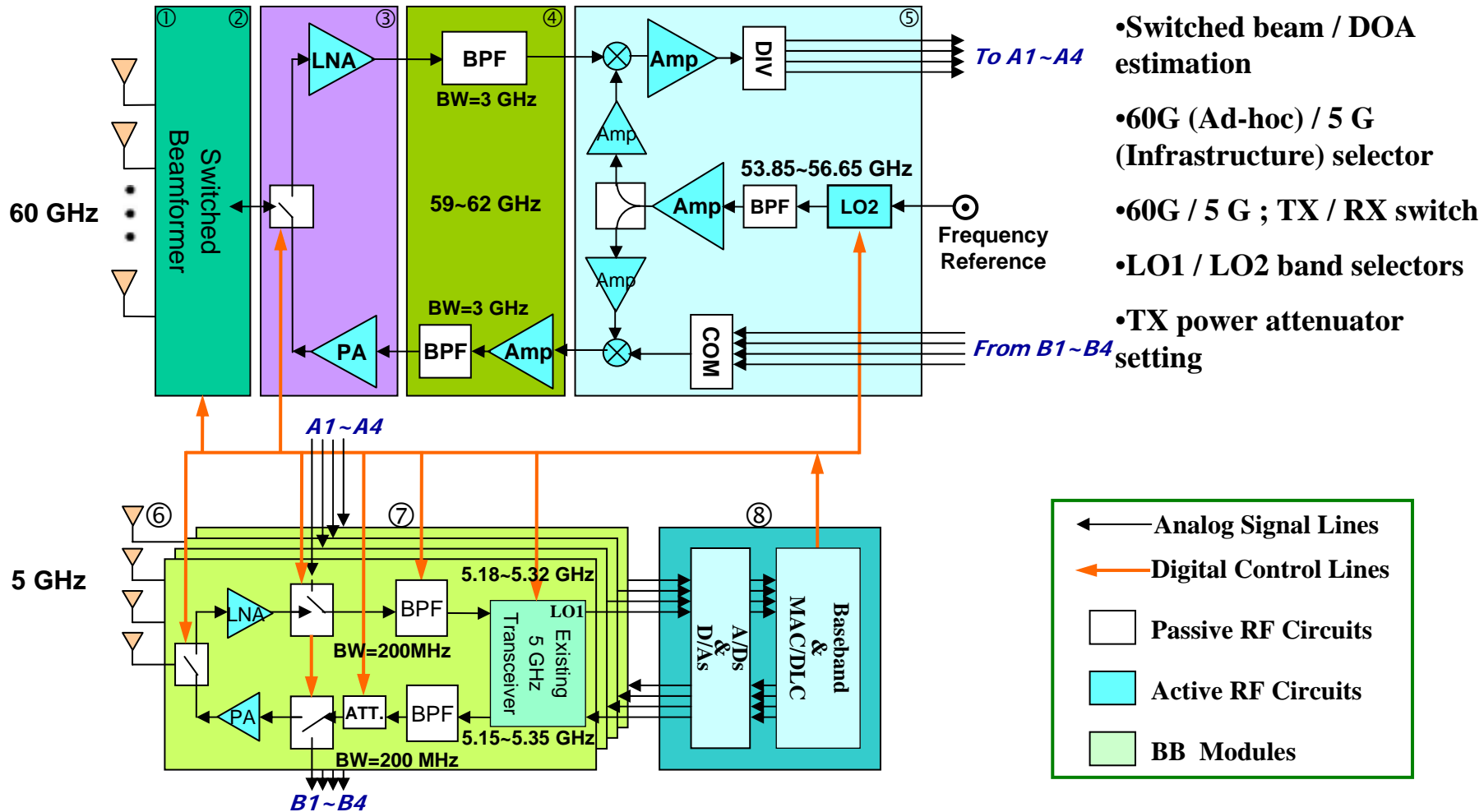
RF front-end architecture
for 5GHz / 60GHz RF signal
transmission/reception

Smart antenna array based
on switched beamforming

Motivation & Overview

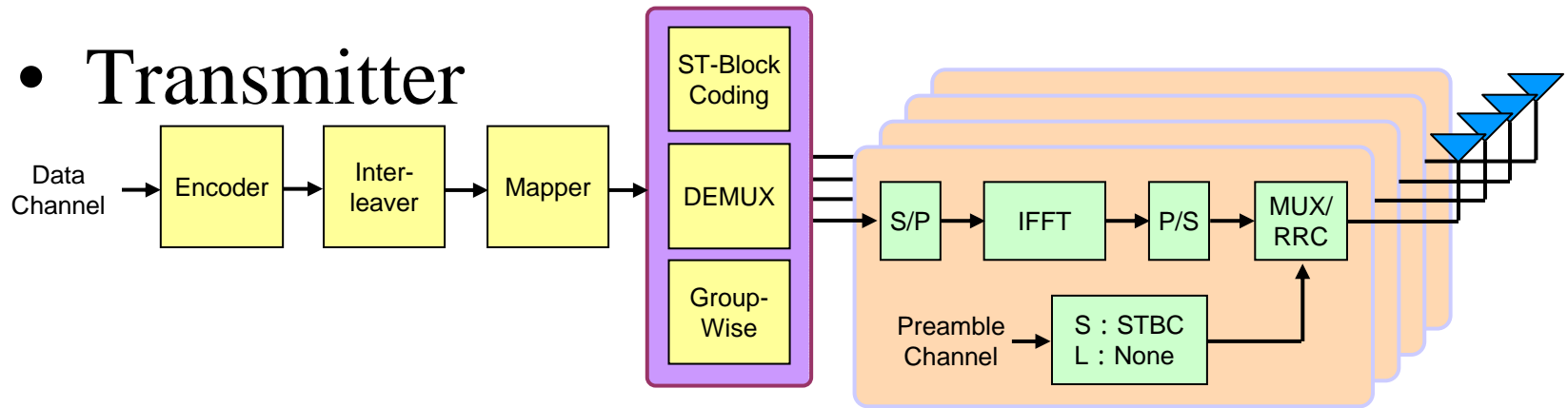
- **Long Range:** lower operation frequency for communicating long-distance terminals.
- **Backward Compatible System:** the baseband realization is highly compatible with the OFDM based IEEE 802.11a/n standard.
- **5-GHz band,**
 - Infrastructure mode
 - MIMO-OFDM technique is adopted to improve the performance
- **60-GHz band,**
 - ad-hoc mode
 - Single -Carrier with Frequency-Domain Equalization (SC-FDE) strategy combined with switched beamforming for interference suppressing

60/5 GHz Dual-Mode Wireless Network Station

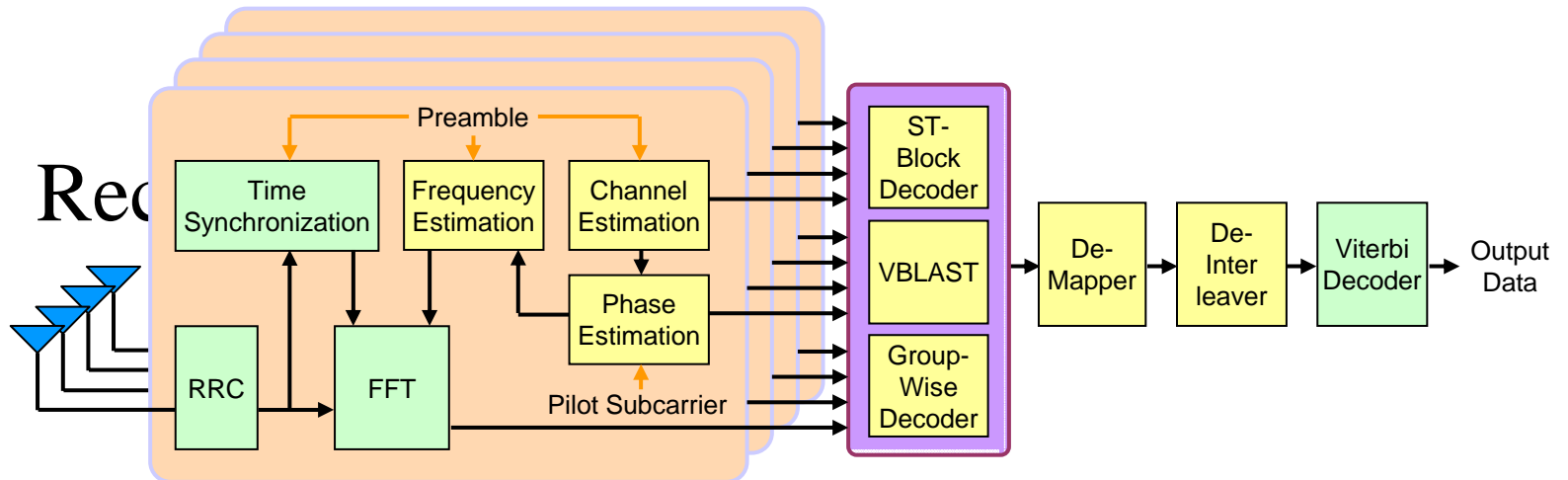


MIMO-OFDM Transceiver Architecture

• Transmitter

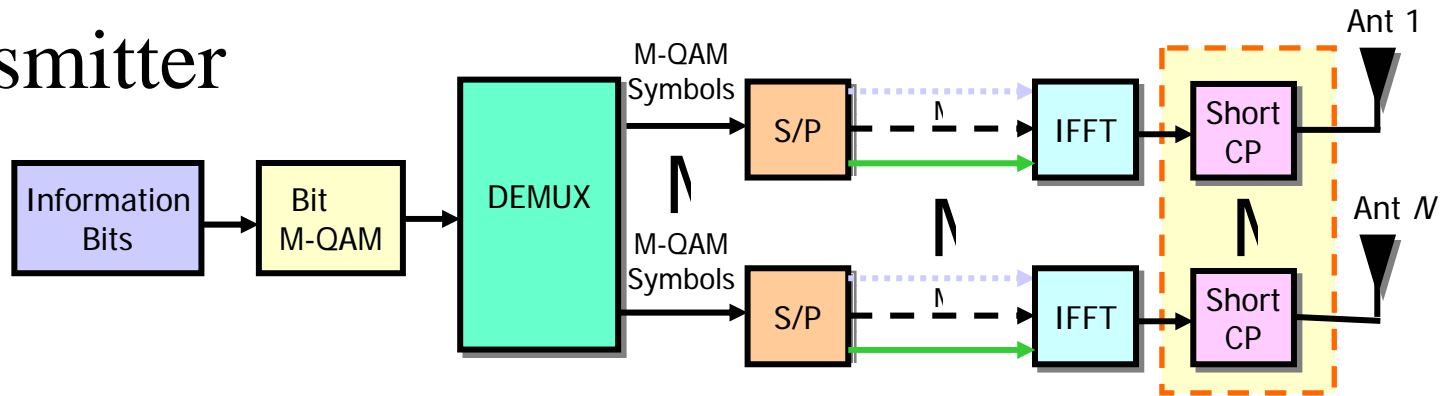


• Receiver

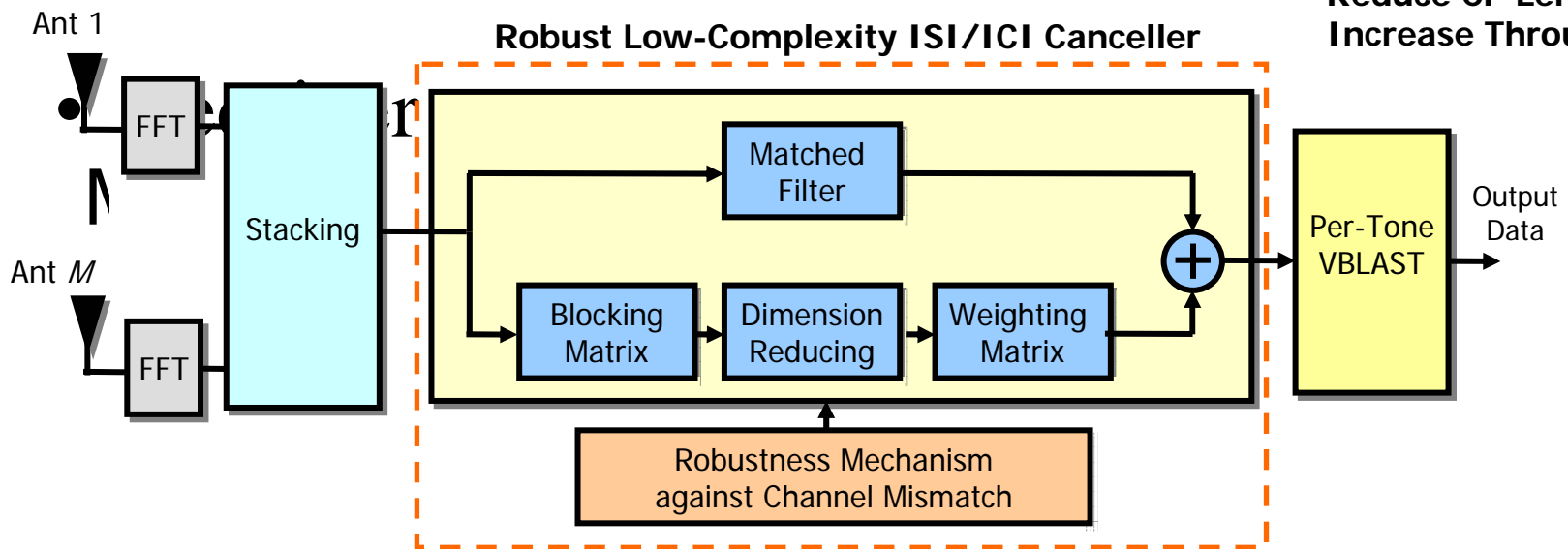


High Throughput MIMO-OFDM Technique

- Transmitter

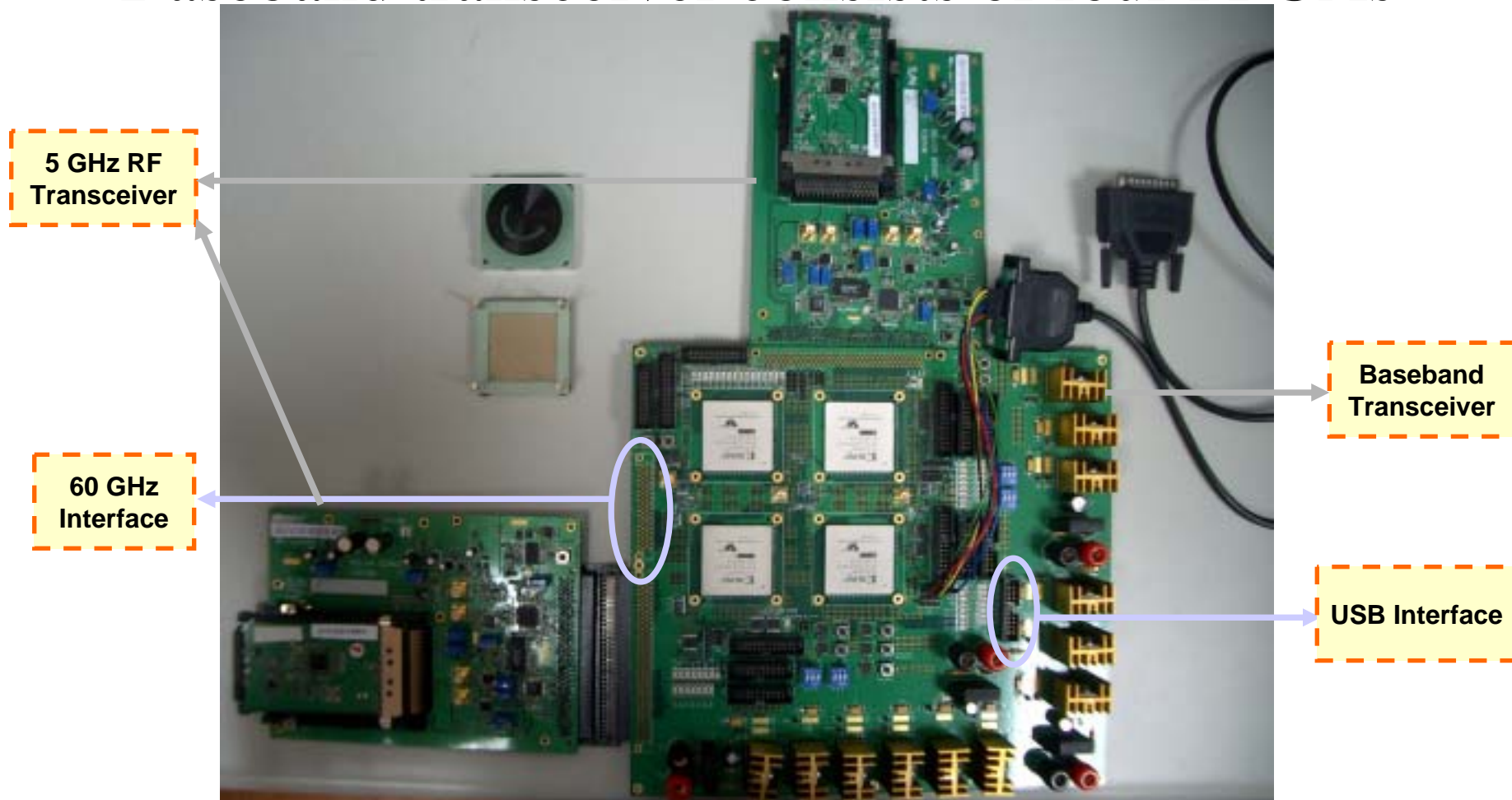


Reduce CP Length to Increase Throughput

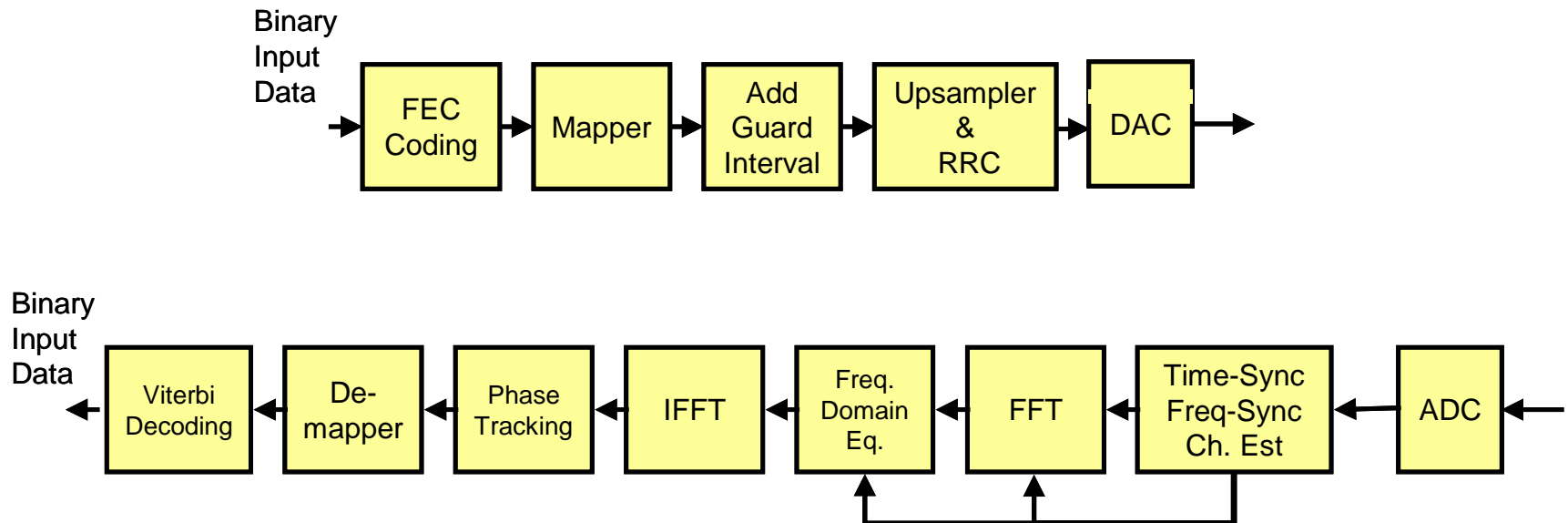


Commple Hardware Platform

- Baseband transceiver consists of four FPGAs

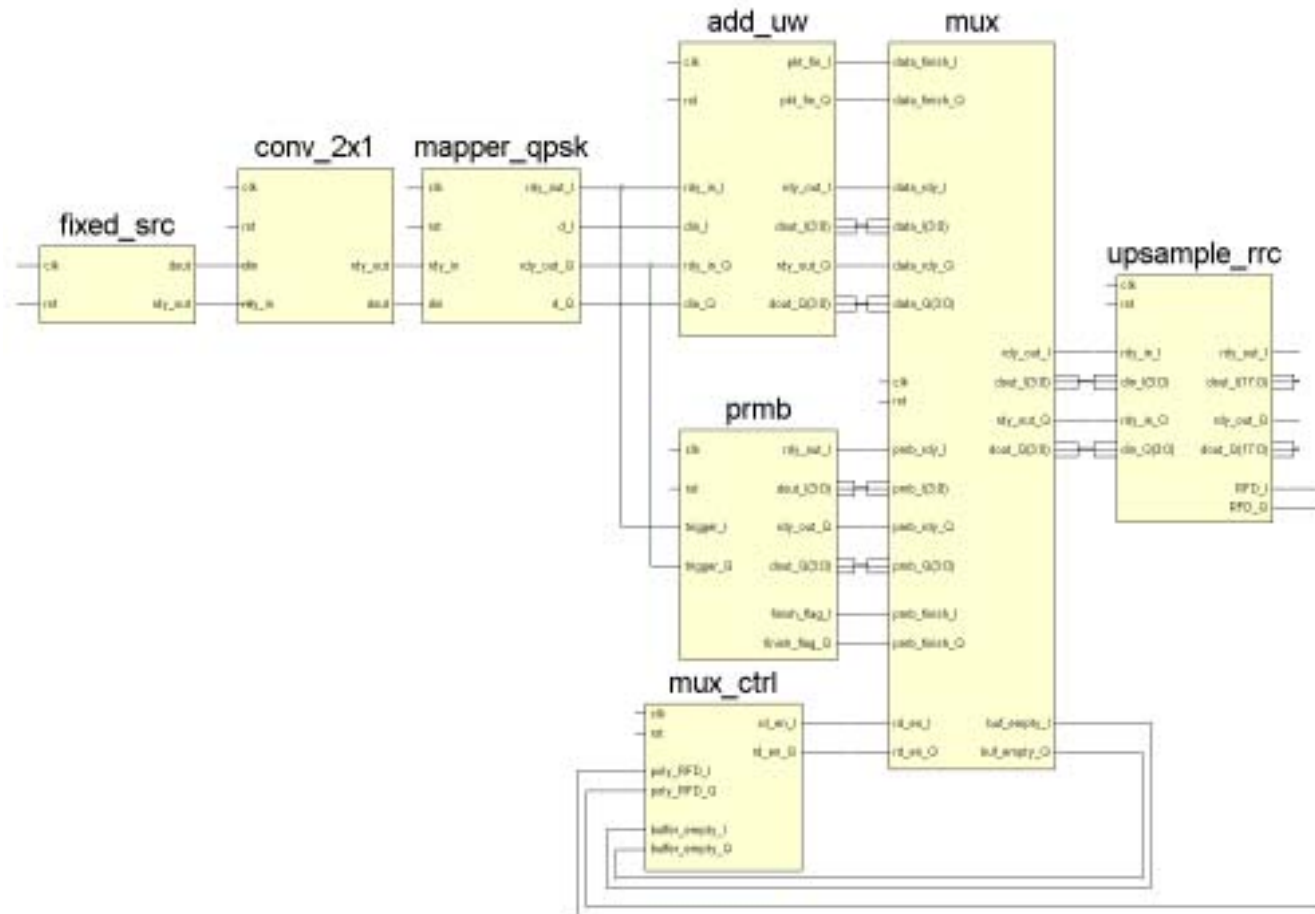


60-GHz Single Carrier Baseband (1)



Diagrammatical description of the SC-FDE system.

60-GHz Single Carrier Baseband (2)



Block diagram of the implemented 60 GHz SC-FDE transmitter.

Summary

- ❑ Presented the 60/5 Dual-Mode Broadband and Wireless Network (DMBWN) as a backward compatible system
- ❑ Future works will be devoted to realize the 60 GHz transceiver, and switched beamforming smart antenna, which can be integrated with the developed 5 GHz system.
- ❑ Academically, we will continuously make efforts to develop advanced signal processing algorithms, such as cross-layer signaling, channel estimation and interference cancellation methods, for the proposed dual-band WLAN system.

Thank you!