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## Lab 4: noMac

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# 1 Introduction

The WARP networking lab is intended to introduce the tools required for MAC development on WARP. In previous labs, code on the PowerPC was used to drive cores running in the FPGA fabric. We will make extensive use of the WARPMAC framework (<http://warp.rice.edu/trac/wiki/WARPMAC>). The framework handles the hardware interaction, and we will program a basic MAC.

In this particular lab, we will implement the simplest MAC: no MAC at all. We will use the functions of WARPMAC to create a true bridge between Ethernet and the wireless PHY. Any packet that is received on one medium will be forwarded to the other medium as-is; there will be no addressing, no retransmissions, and hence no algorithm. This behavior is shown in Figure 1.

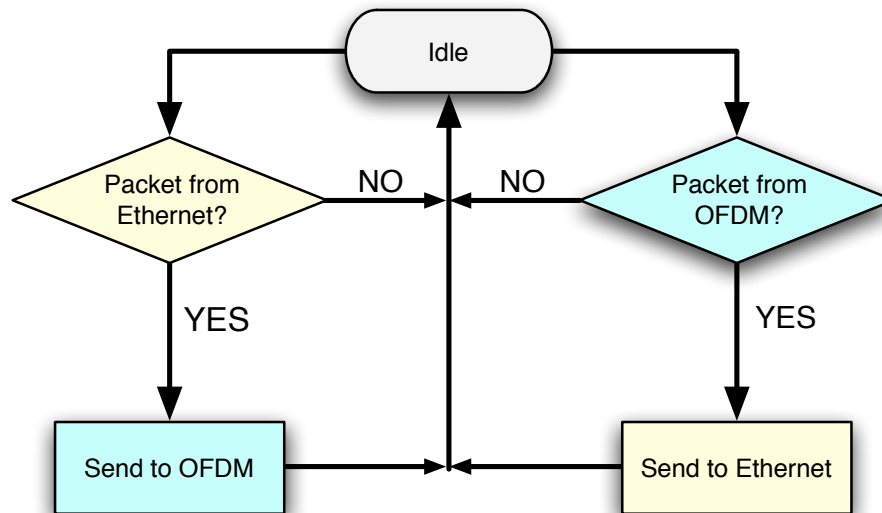


Figure 1: Ethernet MAC - Wireless PHY Hub algorithm

The WARPMAC\_API will be required throughout this lab exercise. The full API documentation is available online (<http://warp.rice.edu/trac/wiki/WARPMAC>). Skeleton code is provided which compiles without any modification. This code monitors the PHY for good and bad packets. It blinks LEDs on the FPGA board to indicate reception of both. Within the given code are comments describing the code that needs to be written.

## 2 Instructions

1. Open the *system.xmp* in `c:\workshop\Lab4\warpmac_noMac`
2. Because we will only be dealing with the software project in this lab, we can ignore everything in the “System Assembly View.” Click on the “Applications” tab as shown in Figure 2

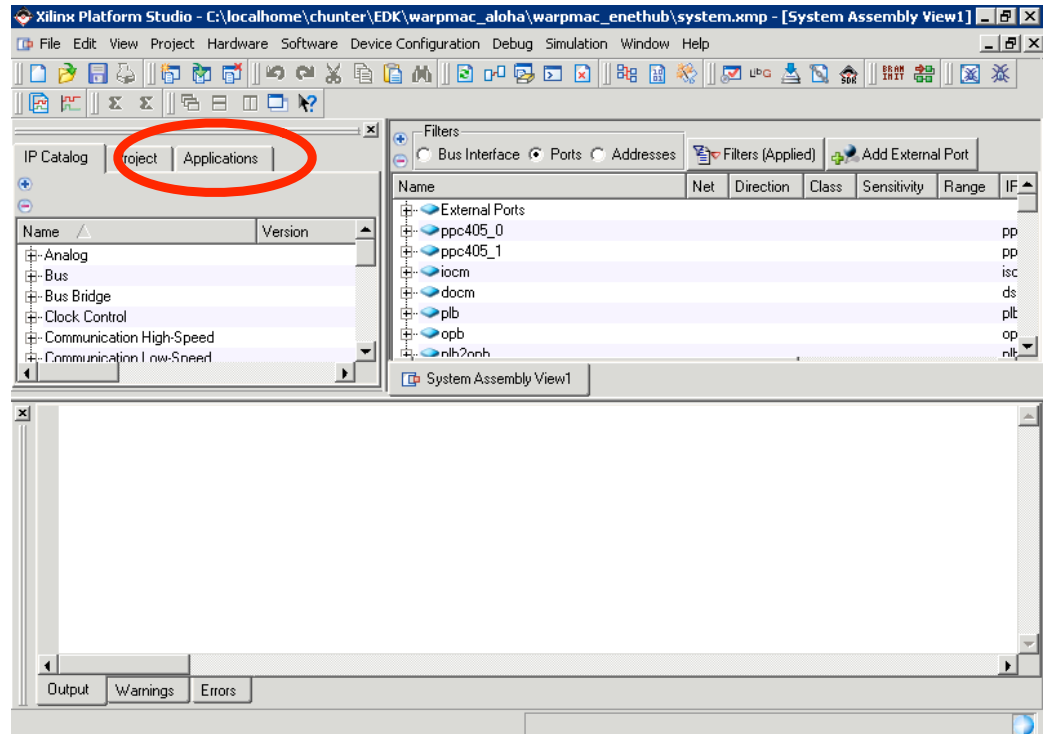


Figure 2: Application Tab

3. Within the “Sources” and “Headers” hierarchies, you will be greeted by a number of files required for the project to build:
  - *noMac.c* - This file is the where all of the user’s modifications will take place.
  - *warpmac.c* and *warpmac.h* - These file contains all of the MAC development framework. They give the user high-level functions for abstracting hardware interactions.
4. Open the *noMac.c* file and modify the skeleton code to implement the functionality specified in the comments.

## 3 Testing your MAC

If the MAC works as expected, the wireless network in the room should be equivalent to a wired Ethernet hub connecting every computer. To make sure this is the case, try this experiment:

- Use the *ping* command from a terminal to see the effective round-trip times over the wireless network. A machine with IP address 192.168.1.20 is available to respond to pings.

Notice the performance of the link as a function of other groups completing the assignment. As more groups finish, the wireless medium will become more contended. The MAC we have built has no means of dealing with this contention, so performance will be quite poor. We will see the gains of a true MAC in the next lab.