

# UC/OS을 사용하여 IEEE 802.11 무선 맥 프로토콜 에뮬레이션의 설계 및 개발

## The Design and Development of IEEE 802.11 Wireless MAC Protocol Emulation Using UC/OS System

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### Abstract

본 논문에서는 UC/OS 시스템을 사용하는 IEEE802.11 무선 MAC프로토콜의 처리과정중탐색, 인증, 결합 과정을 이더넷으로 동작하는 하드웨어 위에 에뮬레이션하였다. 에뮬레이션 환경은ADSV1.2을 사용하고, RTOS는UC / OS를, 사용언어는 C언어를 활용하였다. 검증과정으로는 이더넷으로 구동되는AP와 단말 하드웨어에 각각PC를 하이퍼 터미널으로 접속하여 탐색, 인증, 결합 과정에 해당하는 절차를 수행하였다.

■ 중심어 : UC/OS 시스템; ADSv1.2; IEEE802.11 MAC 프레임; 인증

## I. Introduction

In present days with the flying development of mobile communication technology and SOHO (Small Home, Home office) wireless Communication technology, the WLAN (Wireless Local Area Networks) has become increasingly prevalent. As you know the IEEE802.11 is one of the centers of interests in the IT industry, and the chip manufacturing technology has been very mature, which are applied to communication, information and electrical system, medical instrumentation affairs and etc. But the example of emulate IEEE802.11 protocol by using Ethernet environment through the UC/OC system cannot be found at all.

In this paper, we use the RTOS (Real Time Operating System) which based on the Ethernet environment for use as protocol training equipment. Although it has a number of TCP/IP Demo programs for training, it can not be training in a WLAN environment. That's the reason for present this thesis. so this thesis presents an emulation of the process that doing Prober, Authentication, and Association of IEEE802.11 wireless MAC protocol with Ethernet hardware. Lastly, we will use the emulated WLAN authentication process, which based on 2 computers

with Ethernet to demonstrate the feasibility of this paper.

## II. System Design

Before any communication can take place between a station and the network, the station needs to authenticate to become associated with the network which did like MLME. WEP supports two types of authentication: Open System authentication and Shared Key authentication. The Open System authentication is actually a null authentication algorithm which means that any station can authenticate if the AP is set to Open System Authentication. The process of authentication is the main body of design; and it will be emulated at all. The process may describe as(Figure1).

ADS1.2 consists of the command line development kit, the ARM real-time library, the GUI development environment (Code Warrior & AXD), and the support software. The UC/OS276 Kernel is used for the demo program and it has bundled the basis head files which are Include Folder file, Include Source file, and Source Folder file, But it is impossible for drive this Demo as an 802.11MAC protocol. So finally according to the design of network the updated program structure may express like (figure 3).

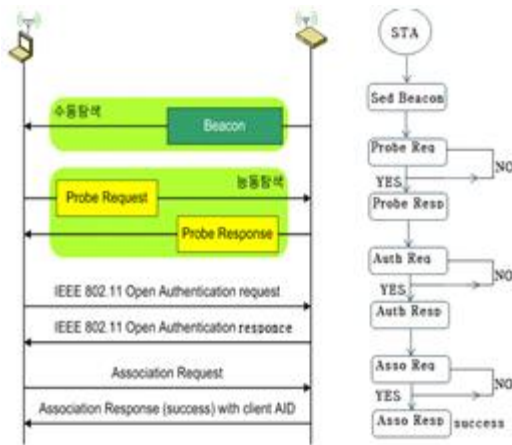


Figure 1: Open System Authentication

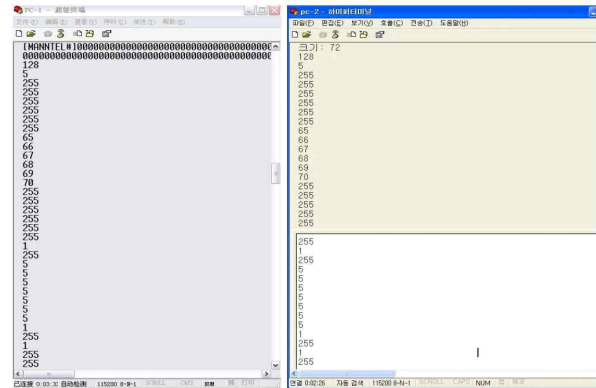


Figure 3: Emulation Result

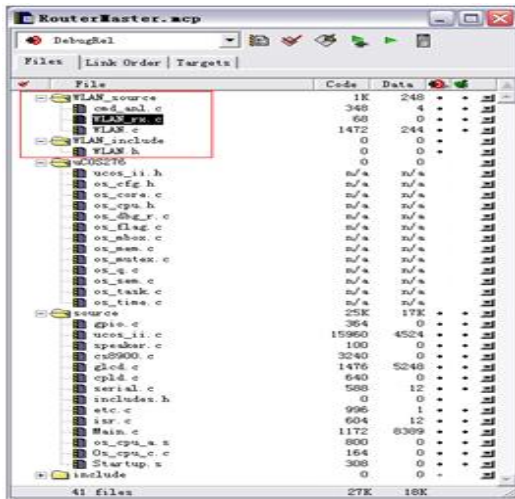


Figure 2 : Program Structure

“WLAN.C”: This file does a compiling work for the 802.11 MAC frame, such like Frame control, Duration/ID, Address, Sequence control, and Frame body, etc.

“WLAN\_RX.C”: This file is used for compiling the receive functions of UART ports and frame packets.

“cmd\_anl.c”: This is a command file that doing a reset functions between UC/OS board and Hyper-Terminal, and also does an authentication action.

“WLAN.h”: This a head file for declare all functions that been used by WLAN\_source files.

According to the results of the final test, the process of authentication has been emulated successful at all as (figure 4).

### III. Conclusion

As a recently fashionable development platform, the protocol development has been very general in embedded system. This paper introduced the 802.11 MAC protocol, and according to the open system authentication function presented the basic process of development of 802.11 MAC protocol based on UC/OS system. After this we will continue the development of PHY part of 802.11 protocols, moreover we will transplant the protocol to the embedded platform which include the wireless communication module, to achieve the real sense of wireless communication.

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