IEEE P802.11
Wireless Access Method and Physical Layer Specifications

Title: Network Layer Requirements

Authors: Charles E. Perkins (IETF Member)
Room J1-J25
IBM T. J. Watson Research Center
30 Saw Mill River Rd.
Hawthorne N.Y. 10532
Tel: (914)-784-7350
Fax: (914)-784-7007
E-mail: perk@watson.ibm.com

Francois Y. Simon
IBM
C70/B673
P.O Box 12195
Research Triangle Park
N.C. 27709
Tel: (919)-254-4584
Fax: (919)-254-5410
E-mail: fygs@vnet.ibm.com

INTRODUCTION

This paper address the initial requirements of a Network Layer entity associated with an IEEE 802.11 protocol stack to provide a complete 'mobility' solution within an 802.11 extended Service Set (ESS). The Internet Engineering Task Force (IETF) Mobile -IP Working Group is currently addressing those requirements.

Related Issue: 16.9 [1] - What are the requirements of the following functions related to Station Mobility?:
- Coordination in ESS
- Security
- Management
- Location

GENERAL

The Internet Engineering Task Force (IETF), Mobile-IP Working Group is working on possible standardization of protocols and requirements for supporting seamless network connectivity for mobile computers. The work centers its attention on identifying those features which should be present in the Network Layer protocol (for IETF-Mobile-IP, Internet Protocol (IP)). The working group has also identified requirements for Layer 2 level protocols. While the main interest of this working group lies in the establishment of standard ways of supporting mobility within IP Network Layer, it recognizes also the existence of alternate Network Layers (e.g. AppleTalk, CLNP and others). It is believed that the requirements specified below are also applicable for alternate Network Layers.

This working group would like the members of the IEEE 802.11 committee to consider their requirements for inclusion in the IEEE 802.11 standard. The members of the Mobile-IP group believe that the requirements placed on the 802.11 protocol stack are quite minimal.

REQUIREMENTS

There are two basic requirements:

- The Network Layer protocol running in the Mobile Station should be able to obtain the MAC Layer address of any Base Station from which the mobile station is currently accepting service, if that MAC layer address is available to the MAC layer protocol.

- The Network Layer should be notified whenever the Mobile Station experiences either an Association event, or a De-association event, with respect to the Base Station.

With these two provisions, the protocol above Layer 2 can more effectively take the appropriate measures to insure continuous network connectivity.

JUSTIFICATION

Having stated the two requirements, perhaps their necessity can be shown by briefly explaining the model of operation, which is likely to be quite prevalent for the near and medium term. It is expected that the Mobile Stations will wish to establish connections to existing data resources by interacting with Base Stations which advertise connectivity to those resources. It is assumed that the Mobile Stations will include wireless data communications entities which are used to establish connections to the Base Stations. The wireless connections to the Base Stations would then be utilized to obtain further access to the desired data resources. the word 'connection' here does not imply the need for any "connection-oriented" Network Layer services; indeed, IP is itself a "connectionless" protocol. Instead, "connection" is used here merely to indicate that the Mobile Station and the Base Station are somehow enabled to exchange data packets.

Thus, in the Model of Operation, the Mobile Station will enter the service area of a Base Station and thereafter use the newly feasible physical data path to communicate with the existing resources. The desire is to seamlessly maintain connections to those resources as the Mobile Computer moves from Base Station to Base Station. It is believed that this can best be accomplished by updating routing or bridging information. It is proposed that such routing information be maintained and updated by agents effectively operating at the Network Layer. Thus, the requirement that the Network Layer be notified upon any change in 'location' (i.e, accepting re-association with a new Base Station). Clearly, this location update will somehow be keyed on the MAC Layer address of the Base Station.

CONCLUSION

It is the opinion of the authors that in order to provide a mobility solution to a Mobile Station connected to a wireless LAN, a minimum exchange of information (see requirements above) between the Network Layer and the lower layer must take place (e.g. via Management plane at the MAC level). It is very important that the 802.11 MAC group addresses these requirements as soon as possible.

To this goal, it is also suggested that an informal liaison between IETF/ Mobil-IP Working Group and IEEE 802.11 be established.

REFERENCE

[1] IEEE 802.11 P802.11-92/64 - IEEE P802.11 Issues Document