IEEE 802.11
Wireless Access Method and Physical Layer Specifications

Title: **Review of Distributed Time Bounded Services**

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Abstract: **This paper reviews the way in which IEEE 802.11 will provide the ability to perform time critical data transfer. The Point Coordination Function method and the Distributed Priority method are considered.**

Introduction

The addition of an optional Point Coordination Function (PCF) to the basic MAC currently defines how IEEE 802.11 (reference [1]) will provide support for an extra class of data transfer, as well as ordinary asynchronous data transfer. In the draft standard, this single additional class of data has been classified as "Time Bounded". There is an alternative way to provide different classes of data transfer, which is to use priority, this technique could be called "Distributed Time Bounded Services".

Claimed Advantages of the PCF

The Point Coordination Function supports data transfer with a MAC layer connection. The Contention Free Period (CFP) in a super-frame being used in a manner similar to Time Division Multiple Access (TDMA). This gives a guarantee that data will be transferred with a large delay, but with a low variance.

The advantage of a low variance is somewhat unclear, realistically a MAC user wants a high probability that the transfer delay of a given time bounded data packet will not exceed a certain maximum value. This effect could just as well be achieved by having a low average transfer delay, with a larger variance.
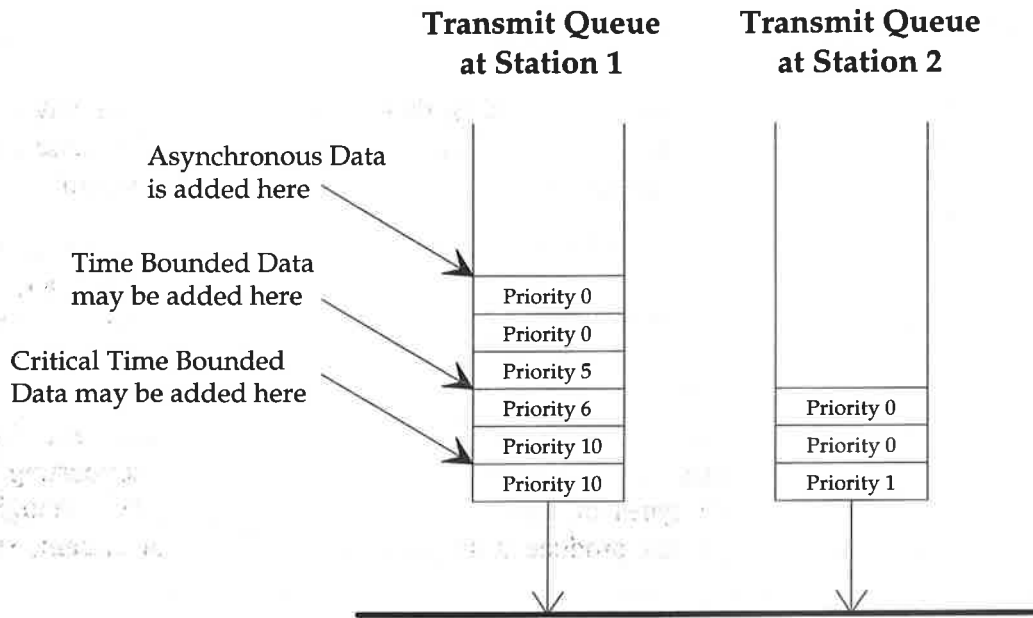
Figure 2: Prioritised Transmit Queue

The distributed method for time bounded services will send queued packets as soon as the medium is available, because of this they should arrive ahead of the time that they are actually needed by an application that wants isochronous data. If this is the case then it is not difficult for the creator of the application to re-time received data packets to fit the precise timing requirement.
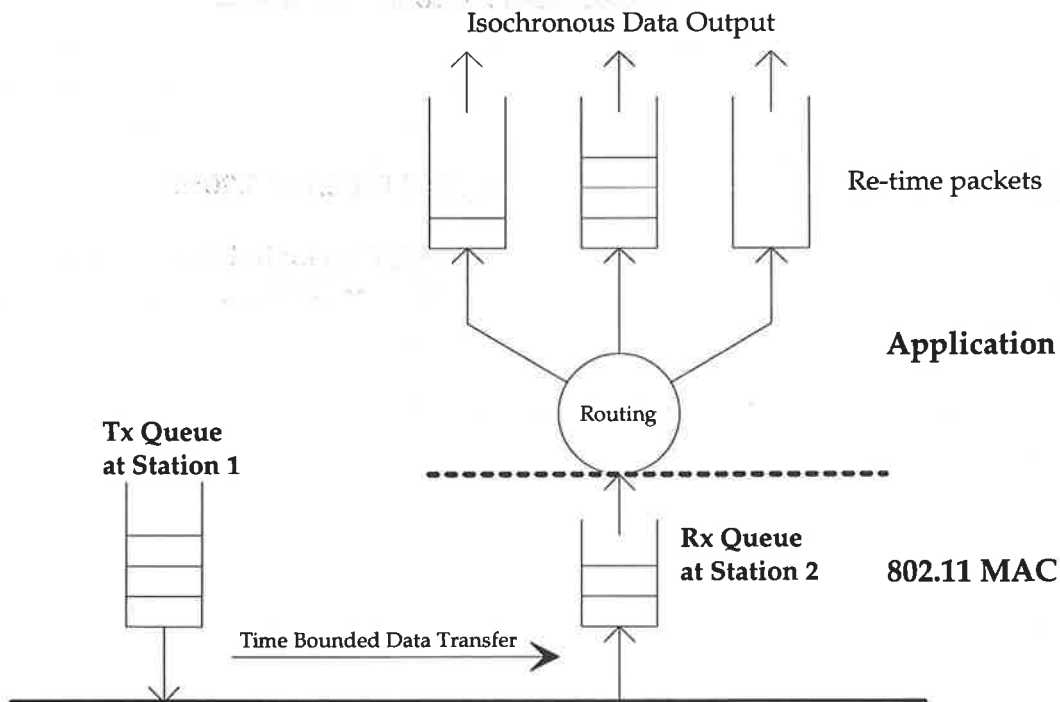

Figure 3: Re-timing Received Data

Advantages of Distributed Method

The greatest advantage of the distributed method is that is does not rely on any specific placement of equipment, any number of stations and access points can share the same channel, each supporting the full range of services without failure of the medium access control.

The use of two medium access priorities (or possibly more than two) gives a better way to provide a "Quality of Service" (QoS) for any given packet. This allows us to specify a QoS that does not have to be a single type, as with the old "Time-Bounded" data, but can take a range of values. I believe that this flexibility will fit well with the wide variety of applications that could be supported when higher rate physical layers are used with this MAC. In the PCF model, we have only the option of two qualities of service, firstly asynchronous data and secondly data transfer service that has use of a reserved, regular "time-slot". This method of supporting "Time Bounded" data does not, serve all types of time dependant data equally well, though it is obviously well suited to processes that produce a single isochronous output stream, such as speech codecs.

Conclusion

I have given a short review of the arguments about how best to implement provision for a variety of qualities of service. I believe the "Distributed" method to be preferable to the "Point Coordination Function" method.

Therefore the following motion is suggested:
> Move that the principle of Distributed Time Bounded Services be adopted into the standard, and that the Point Coordination Function be removed.

References

[1] "Draft Standard IEEE 802.11 Wireless LAN", Doc IEEE P802.11-93/20b0.

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[3] Chandos Rypinski - LACE, "Evaluation of the DFWMAC", Doc IEEE P802.11-94-12 Jan. 1994.

[4] Philip Rakity, Larry Taylor - Apple Computer, "Distributed Time Bound Services", Doc RES10SAG93/62 Dec. 1993.

[5] Wim Diepstraten - AT&T GIS, "Priority in CSMA/CA to support distributed Time-Bounded Services", Doc IEEE P802.11-94/58 Mar. 1994.