IEEE 802.11
Wireless Access Method and Physical Layer Specifications

Title: **PCF Time-Bounded Services (Version 2)**

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Abstract: **This paper proposes a way to use the Point Coordination Function (PCF) for Time Bounded Services (TBS).**

Introduction

The PCF currently has a specified method for asynchronous data transfer, this paper will propose a method for connection based data transfer, which could be used as the basis for running applications that generate streams of time-bounded data. This paper will take the form of text that could be added to the draft standard to support this function.

5.1.5 MAC Data Service

Add to MA_DATA.request

"Connection ID = integer. Note a value of zero is reserved for all asynchronous data requests."

Add to MA_DATA.indication

"Connection ID = integer. Note a value of zero is reserved for all asynchronous data requests."

5.1.7 Connection Control Service

Start Connection Request with parameters of maximum length of MSDU size (= integer) and mean data interval (= integer in ms).

Connection not granted indication.

Connection granted indication with parameter user connection ID (= integer), maximum length of MSDU size (= integer) and mean data interval (= integer in ms).

5.3.4 Contention Free Service Types

The following service types are provided:

Asynchronous Service

Time-Bounded Services (TBS), that may have multiple service levels.

5.3.6. Contention Free Time-Bounded Services

Time-Bounded services are implemented within the PCF as connection based data transfers. The access point adds connections to the polling-list in a best attempt to maintain the requested connection.

5.3.6.1 Contention Free Management Frames

The contention free management frames are used in the following way.

STA Start Connection Request

Generated if the MAC user (of a station) makes a "Start Connection Request" when there is no outstanding request.
A station initiates a request for a connection to be established within the contention free period.
The Payload element (or field) must be included in this frame.
Receipt of this management frame will generate a "Start Connection Indication".

AP Start Connection Request

Generated if the MAC user (of an AP) makes a "Start Connection Request" when there is no outstanding request
An AP initiates a request for a connection to be established within the contention free period.
The Payload and Connection ID elements (or fields) must be included in this frame. The connection ID is the proposed connection ID that of the connection that will be established if this request is granted.
N.B. AP and STA Start Connection Request frames can be the same type, using the "To AP" bit to distinguish them.

Grant Connection

After a Start Connection Request frame has been received the MAC may reply with a "Grant Connection frame.
The requested connection is granted. Only an access point may assign MAC connection numbers; so if a station is to grant a connection it must return a MAC connection ID that was proposed by the access point. The MAC Connection ID element (or field) must be included in this frame.
Transmitting or receiving this frame causes a Connection Granted Indication.
When a connection is granted, the connection may be added to the poll list.

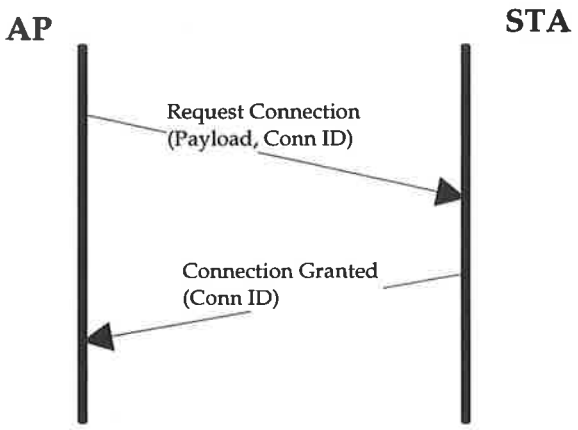
End Connection

Either a station or an access point may initiate the end of a connection. When a node receives an End Connection frame it should stop using that connection, since the sending node will no longer maintain it. The MAC Connection ID element (or field) must be included in this frame.

3. Contention Free Connections

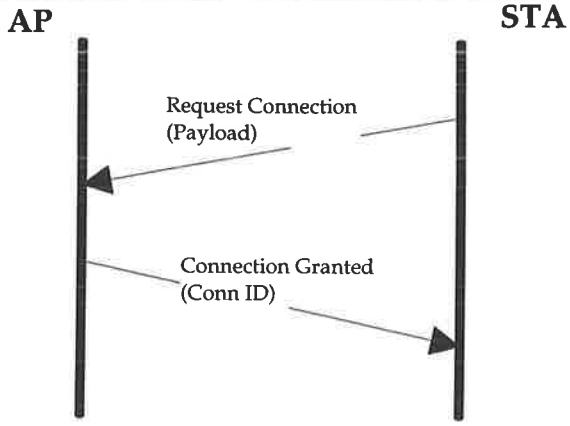
Access Point Initiates Connection Set-up

The following exchange will be used when an AP wants to establish a connection.
1. AP MAC user makes Start Connection Request. If the AP MAC believes that it can support this connection then the AP MAC generates Start Connection Request frame (otherwise the AP MAC asserts a Connection Not Granted Indication).
2. If the STA MAC can support this connection then it generates a Grant Connection frame and a Grant Connection Indication. On receipt of the Grant Connection Frame a Grant Connection Indication is generated.
Note: Only one connection request may be outstanding, with any one station, at any given time. The exchange fails if no response is received before a time-out (connection set up time-out). This will result in a Connection Not Granted Indication.



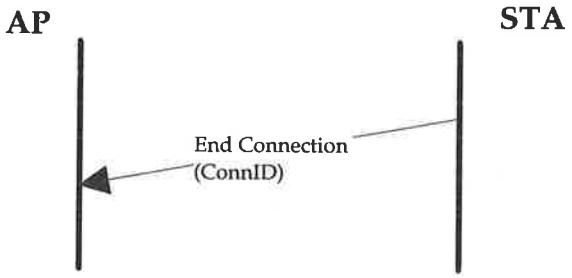
Station Initiates Connection Set-up

The following exchange will be used when a STA wants to establish a connection.
1. STA MAC user makes a Start Connection Request. If the STA MAC can support this connection then it generates a Start Connection Request frame (otherwise it will assert the Connection Not Granted Indication).
2. If the AP MAC believes that it can support this connection request then it will generate a Grant Connection frame and a Grant Connection Indication.
Note: Only one connection request may be outstanding at any given time. The exchange fails if no response is received before a time-out (connection set up time-out).



End Connection

Either an AP or a station may end a connection in the following way.
1. End Connection.
No MAC layer negotiation is needed to end a connection.



Constants.
The connection set up time-out is 500ms.

4.1.2.1.2 Type and Sub-type

Contention Free Time-Bounded Data needs a data type. Use type Contention Free Type with sub-type CF TB Data (1000) and sub-type CF TB Data + ACK (1001).

Management type will need sub-types of start connection request (1100), grant connection (1101) and end connection (1110).

4.1.2.5 Duration or Connection ID

Add: "During the contention free period the duration field may be replaced by a connection ID field. (Note: only contention free time-bounded data used a connection ID; contention based data and contention free asynchronous data do not use connection IDs)".

4.2.2.1 DATA Frame Format

Change "Duration" in diagram to be "Duration or Connection ID".

4.4 Elements (or Fields)

4.4.x Payload

Additional octets: 3
The first two bytes are the maximum number of bytes that will be sent as the payload of a time-bounded data packet and the last byte represents the mean data request interval, in ms.

4.4.x Connection ID

Additional octets 2
A unique identifier for a connection to transfer data between an access point and a station. A connection ID need only unique per station.

References

[1] "Draft Standard IEEE 802.11 Wireless LAN", Doc IEEE P802.11-93/20b3.