IEEE P802.11
Wireless LANs

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| ITS Politeness Measures |
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Abstract

This submission proposes some politeness measures for use in bands where 10 MHz 802.11p radios are used for some primary services.

**Providing priority to ITS/DSRC devices**

Due to 10MHz down-clocked operation, 11p has longer inter-frame spacing (IFS) values compared to 11ac, e.g. SIFS is 32us vs 16us for 11ac (see reference below for IFS values). To bring 11p devices to the same priority as 11ac device, changes need to be made so that eventual IFS values of new 11ac devices is no less than their 11p counterpart. One way to do this is to set aSlotTime and aSIFSTime to the same values as those of 11p, i.e. 13us and 32us (vs current 9us and 16us). With this change, the rest of IFS values become the same as those of 11p.

Reference for original IFS values [802.11-2012, clause 9.3.2.3, and Table 18-17]:

* aSlotTime (us) = 9 (11ac), 13 (11p)
* sSIFSTime (us) = 16 (11ac), 32 (11p)
* PIFS = aSIFSTime + 1 \* aSlotTime
* DIFS = aSIFSTime + 2 \* aSlotTime
* AIFS[AC] = aSIFSTime + AIFSN[AC] \* aSlotTime

To give priority to 11p, we need to make some changes for some of IFS values. The logic for changing IFS values is as follows:

* It's best to set aSIFStime the same for 11ac and 11p. SIFS is used for ACK and BA response and better not to give any device additional priority, so that the intended 11ac responder can respond.
* PIFS is priority access for Beacon etc. It is suggested to give 11p devices priority vs 11ac devices. By this choice, 11p AP has priority to 11ac AP. Also, statistically it's possible that some 11p clients get access to the channel before 11ac AP.
* DIFS is management/control frame access. It is suggested to give 11p devices priority vs 11ac devices.
* AIFS[AC] is for voice/video/BE/BK traffic. We should offset the AIFS[AC] values to give priority to 11p traffic.

Based on above, it is suggested to add a new 11pPriorityTime offset to PIFS/DIFS/EIFS/AIFS. The 11pPriorityTime could be a multiple of aSlotTime, e.g. 11pPriorityTime = aSlotTime, or 11pPriorityTime = 2\*aSlotTime. So new IFS values for modified 11ac devices are suggested to be:

* aSlotTime (us) = 13
* sSIFSTime (us) = 32
* PIFS = aSIFSTime + 1 \* aSlotTime + 11pPriorityTime
* DIFS = aSIFSTime + 2 \* aSlotTime + 11pPriorityTime
* AIFS[AC] = aSIFSTime + AIFSN[AC] \* aSlotTime + 11pPriorityTime
* AIFSN[AC] same as instructed by AP

Simulations need to be done to find out an optimum value for 11pPriorityTime (to be either aSlotTime or a multiple of aSlotTime).

Note that above change of IFS values need to take effect only when 11p preambles are detected (e.g. in the middle of a building there is no need to bring down MAC efficiency by the longer new IFS values since there is no 11p devices there).

The 11ac AP decides when to switch to the new IFS values (e.g. after how many 11p preambles are detected) and how long to keep the new IFS values effective before switching back to original IFS values. For instance, the AP would announce the start of the 11p-awareness period after detecting 11p preamble for multiple instances and embeds an 11p-awareness IE within the Beacon frame from that moment. There is a minimum time that 11p-awareness period continues (for instance 5ms, the exact value is to be negotiated with the DSRC community) and during this period the AP continues to monitor the presence of 11p preamble and if no preamble is detected for a duration, the AP removes the 11p-awareness IE from the Beacon frame.

**References:**

IEEE Std. 802.11-2012