IEEE P802.11
Wireless LANs

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| Reply to Liaison from 3GPP RAN2 on Estimated Throughput 11-16-1384 |
| Date: 2017-01-19 |
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* Abstract

This document contains draft text for a proposed liaison response by IEEE 802.11 to the 3GPP RAN2 liaison R2-167306 (11-16/1384r0), received by 802.11 on 05 November 2016. This liaison response provides 802.11 feedback on whether there are any accuracy specification requirements for “Estimated Throughput” and variation of the accuracy across different implementations for “Estimated Throughput”.

R1 – This version was created by merging content from 11-16/1510 and 11-16/1517 and further modified by comments during the AANI SC Tuesday 8 November 2012 EVE session.

R2 – This version includes offline contributions from Roger Marks and Thomas Derham as suggested at the AANI SC meeting on 17 January 2017 PM1.

To: 3GPP RAN WG2

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CC:

Subject: IEEE 802.11 Working Group response Liaison to 3GPP RAN2 on Estimated WLAN Throughput

**Discussion:**

The IEEE 802.11 Working Group (WG) thanks the 3GPP RAN WG2 for its Liaison on Estimated WLAN Throughput, related to RAN WG2 Release 14 work item LTE-WLAN\_aggr-Core [1].

The Liaison asked for “feedback on whether there are any accuracy requirements for “Estimated Throughput”, its variations across different implementations, and feasibility of calculation by either STA or AP”, and also “if it would be feasible for IEEE to define such requirements, if not already defined, as well as suggest other metrics which can also be useful for LWA operation.”

The Estimated Throughput metric was introduced in IEEE 802.11-2016 [2] with the intent to allow external entities to make better quality traffic steering decisions and network selection decisions by being able to predict the throughput that might be obtained through a link with an 802.11 STA [3].

A WLAN device that supports Estimated Throughput (an “ESP STA”) transmits the Estimated Service Parameters (ESP) element in Beacon frames (in the case of APs) and Probe Responses (in the case of APs and, optionally, STAs), and should use the algorithm in Annex R.7, which takes values contained in the ESP element received from a peer device as inputs, to calculate the Estimated Throughput metric for the “outbound” direction (from the peer device to this device). A WLAN device that does not support Estimated Throughput does not transmit the ESP element and does not calculate the Estimated Throughput metric(s).

Therefore, a non-AP (client) device that supports Estimated Throughput can receive the ESP element in Beacon (or Probe Response) frames from an AP, and use it to calculate the Estimated Throughput metric for the downlink direction (from the AP to the client device).

Similarly, an AP that supports Estimated Throughput can first solicit the ESP element from client device(s) by sending a Probe Request frame that requests this element and, on receiving a response, use it to calculate the Estimated Throughput metric for the uplink direction (from the client device to the AP).

Since Beacon frames are transmitted at a constant cadence by APs, and Probe Request/Response frames can be transmitted both pre-association and post-association, in principle the Estimated Throughput metric can be applied to both the pre-activation and post-activation phases of LWA.

The IEEE 802.11 standard does not currently specify the accuracy of the Estimated Throughput metric or its variation across different implementations. We welcome any clarifications on RAN2’s requirements for WLAN metrics. For example, it is noted that additional metrics may be more relevant in post-activation phase where historical link quality statistics may be available.

**Actions:**

To 3GPP RAN WG2:

IEEE 802.11 asks for additional clarification with regard to 3GPP RAN WG2 requirements for WLAN performance metrics.

**Date of Next IEEE 802.11 WG Meetings:**

802 Interim - January 15-20 2017 in Atlanta, GA, USA

802 Plenary - March 12-17 2017 in Vancouver, BC, Canada

Sincerely,

Adrian Stephens
IEEE 802.11 Working Group Chair

**References:**

1. [R2-167306](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_95bis/Docs/R2-167306.zip), 3GPP RAN WG2 LS on Estimated WLAN Throughput (also IEEE 802.11-16-1384-00)
2. IEEE Std 802.11-2016 (Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY))
3. IEEE 802.[11-14/0936r3](https://mentor.ieee.org/802.11/dcn/14/11-14-0936-03-000m-liaison-response-followup-to-3gpp-tsg-ran-wg2.docx), Liaison Response followup to 3GPP TSG RAN WG2