IEEE P802.11
Wireless LANs

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| Response to 3GPP RAN 4 liaison on RTT on round trip time (RTT) measurement accuracy Nov. 9th  |
| Date: 2016-11-10 |
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Abstract

This contribution is the proposed response to 3GPP RAN4 on the request for information on RTT measurement performance using Fine Timing Measurement.

3GPP specification (TS 36.355, Rel-13) has specified WLAN round trip time (RTT) measurement for performing UE positioning. But hitherto no requirements for WLAN RTT measurement have been specified in 3GPP specifications. However in Rel-14 as part of Indoor Positioning Enhancement work item, RAN4 plans to specify requirements for WLAN RTT measurement. More specifically the intended WLAN RTT requirements will consist of the following main aspects:

1. **Measurement accuracy of WLAN RTT with respect to the ideal value of WLAN RTT,**
2. **Physical layer measurement period over which the above measurement accuracy is met, and**
3. **WLAN RTT measurement reporting range i.e. minimum value of RTT, maximum value of RTT and resolution or granularity of reported value**.

RAN4 would like to seek feedback from IEEE 802.11 and WiFi Alliance regarding performance figures related to the above mentioned WLAN RTT requirement aspects.

Furthermore, RAN4 would like to know **if it is possible for the UE to also indicate the number of samples used for estimating WLAN RTT accuracy, which is expressed as the standard deviation of the WLAN RTT**. The reporting of RTT accuracy is also defined in TS 36.355.

Dear 3GPP RAN4 chairs,

The IEEE 802.11 Working Group (WG) thanks the 3GPP RAN4 for their Liaison on WLAN round trip time (RTT) measurement for performing UE positioning and appreciates the opportunity to provide 3GPP RAN4 feedback on the request [1]

IEEE 802.11 WG informs 3GPP RAN WG2 that:

Most features in the IEEE 802.11 specification does not include performance metrics and rely on the market to set requirements and expectations based on considerations that include the type of device, typical operating environment, relative priority of the UE positioning task with respect to other tasks running on the UE, wireless load on the infrastructure, etc.

The IEEE 802.11 specification provides mechanisms for obtaining an RTT estimate or a set of RTT estimates over a period of time. Accuracy of RTT estimates depend on the detection of line-of-sight signal between the UE and the infrastructure peer with which the UE executes the protocol. When line-of-sight signal is weak or unavailable RTT accuracy deteriorates.

1. Measurement accuracy of WLAN RTT with respect to the ideal value of WLAN RTT (+/- 6nsec under line-of-sight conditions)
2. Physical layer measurement period over which the above measurement accuracy is met (depends on implementation – can be as short as 500msec), and
3. WLAN RTT measurement reporting range i.e. minimum value of RTT (6nsec), maximum value of RTT (900 nsec) and resolution or granularity (RTT is derived from timestamps represented in units of picoseconds) of reported value.

If it is possible for the UE to also indicate the number of samples used for estimating WLAN RTT accuracy, which is expressed as the standard deviation of the WLAN RTT: Yes. The protocol has mechanisms to obtain a number of samples. A higher layer entity may be required to perform statistical analysis on the samples and derive corresponding metrics.

As a result with regards to item (1) and (2) in your liaison letter [1] the IEEE 802.11 specification does not require specific WLAN RTT measurement or give requirements as to measurement period over which the measurement accuracy is met.

As for item (3) of [1] the protocol limitations are ….

We’re looking forward to any future communication with 3GPP RAN4.

Sincerely,

Adrian P. Stephens, Chair IEEE 802.11 Working Group

**References:**

1. 11-14-0936-03-000m-liaison-response-followup-to-3gpp-tsg-ran-wg2.doc (https://mentor.ieee.org/802.11/)
2. IEEE P802.11REVmc tm /D8, Draft 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)