

Claims

1. A method of testing a device under test DUT, especially
5 a device using standard IEEE 802.11, in a test system,
comprising

initiating (202) exchange (300) of an ICMP message
pair (302, 308) between the DUT (104) and the test system
(102); and determining (204) a backoff time (306) selected
10 by the DUT (104) during the message exchange (300),

wherein the backoff time is determined by:

$$t_r = t_3 - (t_2 + t_{2a} + t_{2b}),$$

wherein t_r is the backoff time,

wherein t_2 is a first received burst time point
15 measured at a rising edge of a first received burst
comprising an acknowledgement frame ACK received from the
DUT,

wherein t_3 is a second received burst time point
measured at a rising edge of a second received burst
20 comprising an ICMP message received from the DUT, wherein
the second received burst follows the first received
burst,

wherein t_{2a} is the burst duration of the
acknowledgement frame ACK received from the DUT, and

25 wherein t_{2b} is a time span which indicates waiting for
a distributed coordination function interframe space
interval.

2. The method according to claim 1,
30 wherein the backoff time (306) is determined from a
measured time span between the acknowledgement frame ACK
(304) received from the DUT (104) and the ICMP message
(308) received from the DUT (104).

35 3. The method according to claim 2,

wherein a carrier transmission (506) is performed for delaying the ICMP message (510) from the DUT (104).

4. The method according to claim 3,

5 wherein the carrier transmission (506) comprises one or more ICMP messages.

5. The method according to any one of the preceding claims,

10 comprising a step of triggering (808) the DUT (104) to perform a retransmission (812).

6. The method according to claim 5,

wherein the retransmission (812) is triggered by

15 suppressing an acknowledgement frame ACK (808) to be sent to the DUT (104).

7. The method according to claim 5 or 6,

wherein at least a second retransmission is triggered.

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8. The method according to claim 7,

wherein triggering a higher order transmission includes inspecting a retry bit of a Frame Control Field of the frame carrying the ICMP message of the DUT.

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9. The method according to any of claims 5 to 8, comprising

performing (1002) a plurality of message exchanges including initial transmissions and retransmissions; and

30 classifying (1006) the DUT according to at least one classification criterion related to coverage of contention window in the initial transmissions and/or the retransmissions.

10. The method according to claim 9,
wherein the classification is based on retransmissions of
various contention window sizes.

5 11. The method according to claim 3,
performing (702) a plurality of message exchanges
with and/or without triggering a delay in the DUT; and
classifying (706) the DUT according to at least one
classification criterion related to coverage of a
10 contention window in the delayed and/or non-delayed
transmissions.

12. The method according to claim 9 or 11,
wherein the classification criterion comprises a
15 predefined threshold number representative of backoff
slots.

13. The method according to any one of the preceding
claims,
20 performing (1102) a plurality of message exchanges
with different levels of Quality of Service; and
classifying (1106) the DUT according to at least one
classification criterion related to coverage of a
contention window in one or more of the different Quality
25 of Service levels.

14. A computer program comprising program code portions
for performing the steps of any one of the preceding
claims when the computer program is executed on one or
30 more computing devices:

testing a device under test (DUT) in a test system,
initiating exchange of an Internet Control Message
Protocol (ICMP) message pair between the DUT and the test
system; and

determining a backoff time selected by the DUT during the message exchange,

wherein the backoff time is determined by:

$$t_r = t_3 - (t_2 + t_{2a} + t_{2b}),$$

5 wherein t_r is the backoff time,

wherein t_2 is a first received burst time point measured at a rising edge of a first received burst comprising an acknowledgement frame ACK received from the DUT,

10 wherein t_3 is a second received burst time point measured at a rising edge of a second received burst comprising an ICMP message received from the DUT, wherein the second received burst follows the first received burst,

15 wherein t_{2a} is the burst duration of the acknowledgement frame ACK received from the DUT, and

wherein t_{2b} is a time span which indicates waiting for a distributed coordination function interframe space interval.

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15. A test system (102) for testing a device under test DUT, especially a device using standard IEEE 802.11, comprising

25 a component (110) adapted to initiate exchange of an ICMP message pair between the DUT (104) and the test system (102, 106); and

a component (112) adapted to determine a backoff time selected by the DUT (104) during the message exchange,

wherein the backoff time is determined by:

30 $t_r = t_3 - (t_2 + t_{2a} + t_{2b}),$

wherein t_r is the backoff time,

wherein t_2 is a first received burst time point measured at a rising edge of a first received burst

comprising an acknowledgement frame ACK received from the DUT,

wherein t_3 is a second received burst time point measured at a rising edge of a second received burst comprising an ICMP message received from the DUT, wherein
5 the second received burst follows the first received burst,

wherein t_{2a} is the burst duration of the acknowledgement frame ACK received from the DUT, and

10 wherein t_{2b} is a time span which indicates waiting for a distributed coordination function interframe space interval.