CLAIMS:

1. A method for detecting a radar signal using a module communicatively connected to a wireless transceiver, the method comprising:

   obtaining a series of pulse intervals from a series of received signal pulses wherein each signal pulse comprises a predetermined duration and power level, whereby each pulse interval comprises a time interval between two adjacent signal pulses;

   identifying at least one primary interval from the series of pulse intervals;

   generating a combined sequence list from a set of predetermined lists using the identified at least one primary interval;

   identifying pulse intervals in the series of obtained pulse intervals that match with pulse intervals in the combined sequence list and determining if a number of the identified matching pulse intervals exceeds a predetermined matching threshold, whereby the received signal pulses are determined to contain a radar signal if the number of identified matching pulse intervals exceeds the predetermined matching threshold.

2. The method according to claim 1, whereby the obtaining the series of pulse intervals further comprises organizing the obtained series of pulse intervals sequentially.

3. The method according to claim 1 or 2, wherein the identifying the at least one primary interval further comprises determining whether the identified at least one primary interval comprises a valid signal series and determining that the received signal pulses do not contain a radar signal when determined that the identified at least one primary interval is not a valid signal series.

4. The method according to any of claims 1 to 3 further comprising:

   verifying the radar signal in the series of received signal pulses if it is determined that a value of a smallest primary interval exceeds a minimum pulse repetition threshold value and if it is determined that a value of a largest primary interval is lower than a maximum pulse repetition threshold value,

   whereby the minimum and maximum pulse repetition threshold values are based on an associated radar signal types that are to be detected and as specified in

the European Telecommunications Standards Institute Broadband Radio Access Networks (ETSI BRAN) requirements.

5. The method according to any of claims 2 to 4 wherein the identifying the at least one primary interval from the series of pulse intervals comprises:

identifying pulse intervals that have a value less than a primary interval threshold value, T_{pth}, whereby:

$$T_{pth} = [(2 \times T_{min}) - \textit{tolerance}]$$

where T_{min} is a pulse interval from the series of pulse intervals that has the lowest value and *tolerance* is a value between -10% x (2 x T_{min}) and 10% x (2 x T_{min});

determining, from the identified pulse intervals, pulse intervals having a sequential pulse interval increment that exceeds an interval threshold parameter and categorizing the determined signal pulses as the at least one primary interval,

whereby the interval threshold parameter is set according to types of radar signals that are to be detected.

6. The method according to claim 3, or any of claims 4 to 5 as dependent on claim 3, wherein the determining whether the identified at least one primary interval comprises a valid signal series comprises:

determining from the identified at least one primary interval if there are more than three primary intervals and if it is determined that there are more than three primary intervals, classifying the identified at least one primary interval as an invalid signal series.

7. The method according to any of claims 1 to 6 wherein the generating the combined sequence list from the set of predetermined lists comprises:

selecting from the set of predetermined lists an appropriate predetermined list, whereby predetermined list L_1 is selected when the at least one primary interval comprises one primary interval, T_1, predetermined list L_2 is selected when the at least one primary interval comprises two primary intervals, T_1 and T_2, and predetermined list L_3 is selected when the at least one primary interval comprises three primary intervals, T_1, T_2 and T_3, are identified, where:

$L_1 = \{T_1, 2T_1, 3T_1, 4T_1, 5T_1, 6T_1, 7T_1, 8T_1\}$;

$L_2 = \{T_1, T_2, T_1+T_2, 2T_1+T_2, T_1+2T_2, 2T_1+2T_2, 3T_1+2T_2, 2T_1+3T_2\}$; and

$L_3 = \{T_1, T_2, T_3, T_1+T_2, T_1+T_3, T_2+T_3, T_1+T_2+T_3, 2T_1+T_2+T_3, T_1+2T_2+T_3, T_1+T_2+2T_3\}$.

8. A wireless transceiver for detecting radar signals comprising:

an electronic module configured to:

obtain a series of pulse intervals from a series of received signal pulses wherein each signal pulse comprises a predetermined duration and power level, whereby each pulse interval comprises a time interval between two adjacent signal pulses;

identify at least one primary interval from the series of pulse intervals;

generate a combined sequence list from a set of predetermined lists using the identified at least one primary interval;

identify pulse intervals in the series of obtained pulse intervals that match with pulse intervals in the combined sequence list and determine if a number of the identified matching pulse intervals exceeds a predetermined matching threshold, whereby the received signal pulses are determined to contain a radar signal if the number of identified matching pulse intervals exceeds the predetermined matching threshold.

9. The wireless transceiver according to claim 8, whereby the obtaining the series of pulse intervals further comprises the electronic module being configured to organize the obtained series of pulse intervals sequentially.

10. The wireless transceiver according to claim 8 or 9, wherein the identifying the at least one primary interval further comprises the electronic module being configured to determine whether the identified at least one primary interval comprises a valid signal series and to determine that the received signal pulses do not contain a radar signal when determined that the identified at least one primary interval is not a valid signal series.

11. The wireless transceiver according to any of claims 8 to 10 further comprising the electronic module being configured to:

verify the radar signal in the series of received signal pulses if it is determined that a value of a smallest primary interval exceeds a minimum pulse repetition threshold value and if it is determined that a value of a largest primary interval is lower than a maximum pulse repetition threshold value,

whereby the minimum and maximum pulse repetition threshold values are based on an associated radar signal types that are to be detected and as specified in the European Telecommunications Standards Institute Broadband Radio Access Networks (ETSI BRAN) requirements.

12. The wireless transceiver according to any of claims 9 to 11 wherein the identifying the at least one primary interval from the series of pulse intervals comprises the electronic module being configured to:

identify pulse intervals that have a value less than a primary interval threshold value, T_{pth}, whereby:

$$T_{pth} = [(2 \times T_{min}) - \textit{tolerance}]$$

where T_{min} is a pulse interval from the series of pulse intervals that has the lowest value and *tolerance* is a value between -10% x (2 x T_{min}) and 10% x (2 x T_{min});

determine, from the identified pulse intervals, pulse intervals having a sequential pulse interval increment that exceeds an interval threshold parameter and to categorize the determined signal pulses as the at least one primary interval,

whereby the interval threshold parameter is set according to types of radar signals that are to be detected.

13. The wireless transceiver according to claim 10, or any of claims 11-12 as dependent on claim 10, wherein the determining whether the identified at least one primary interval comprises a valid signal series comprises the electronic module being configured to:

determine from the identified at least one primary interval if there are more than three primary intervals and if it is determined that there are more than three primary intervals, classify the identified at least one primary interval as an invalid signal series.

14. The wireless transceiver according to any of claims 8 to 13 wherein the generating the combined sequence list from the set of predetermined lists comprises:

selecting from the set of predetermined lists an appropriate predetermined list, whereby predetermined list L_1 is selected when the at least one primary interval comprises one primary interval, T_1, predetermined list L_2 is selected when the at least one primary interval comprises two primary intervals, T_1 and T_2, and predetermined list L_3 is selected when the at least one primary interval comprises three primary intervals, T_1, T_2 and T_3, are identified, where:

$L_1 = \{T_1, 2T_1, 3T_1, 4T_1, 5T_1, 6T_1, 7T_1, 8T_1\}$;

$L_2 = \{T_1, T_2, T_1+T_2, 2T_1+T_2, T_1+2T_2, 2T_1+2T_2, 3T_1+2T_2, 2T_1+3T_2\}$; and

$L_3 = \{T_1, T_2, T_3, T_1+T_2, T_1+T_3, T_2+T_3, T_1+T_2+T_3, 2T_1+T_2+T_3, T_1+2T_2+T_3, T_1+T_2+2T_3\}$.

SYSTEM AND METHOD FOR DETECTING A RADAR PULSE USING PATTERN MATCHING

ABSTRACT

This document describes a module in a Wi-Fi transceiver that is configured to detect a radar pulse when the Wi-Fi transceiver is transmitting and receiving data in the 5 GHz Wi-Fi / WLAN frequency spectrum. In particular, the module is configured to detect a radar pulse by analysing the stored pattern to determine if the pattern exhibits traits of a radar pulse.