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ETSI Adaptivity Test for 88MW32x and 88MW30x

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Document information

Information	Content
Keywords	Adaptivity test, ED threshold, unit under test, transmit power, test preparation, data transmission, data traffic
Abstract	Describes the 88MW32x and 88MW30x setup and procedures for the adaptivity compliance test required by the ETSI EN 300 328 standard.

Revision history

Rev	Date	Description
v.1	20210528	Initial version

1   Introduction

This document describes the 88MW32x and 88MW30x setup and procedures for adaptivity compliance test required by the ETSI EN 300 328 standard.

The adaptivity test confirms the ability of the radio to hold off transmitting when an interfering signal is present.

Meeting this requirement proves the radio can safely share the spectrum with other users.

If the maximum product transmitting power is less than +10 dBm EIRP, the adaptivity requirements do not apply.

The related documents are available on www.nxp.com.

2 Related parameters

The Energy Detect (ED) threshold is the key parameter that can be adjusted to meet the adaptivity requirement.

The ED threshold determines the sensitivity of the radio to interfering signal.

One ED threshold is used for all 2.4 GHz channels. The ED threshold can be enabled or disabled. By default, it is enabled by firmware during boot up.

The ED threshold may need to be adjusted in order to pass the adaptivity test. However, the threshold should not be unnecessarily sensitive, because doing so can impact the performance.
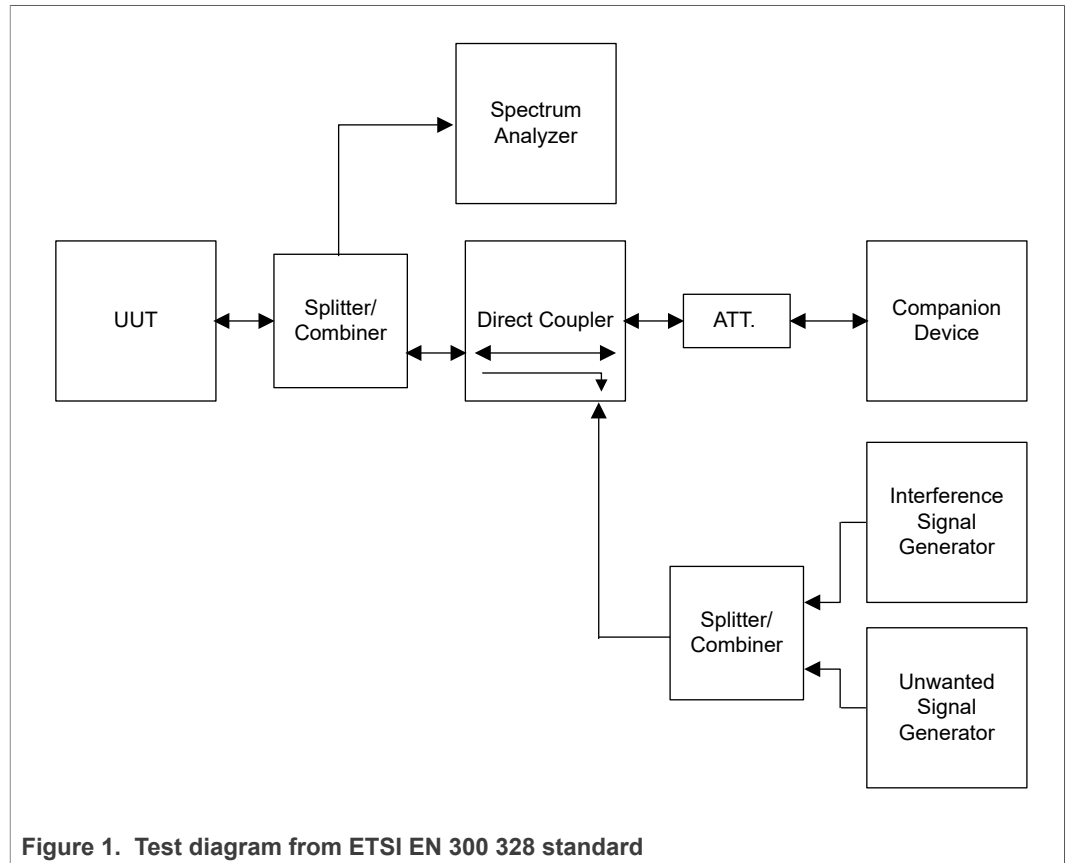
3   Test preparation

Prior to go to the test lab for regulatory compliance testing, the following steps are recommended:

- Work with the test lab to develop a test plan.
- Review the test procedures in Section 4 "General test procedure" to become familiar with the related commands.

The test requires that the unit under test (UUT) transmits data to a companion device. The purpose is to demonstrate that the data transmissions are paused when an interfering signal is present. Hence, a companion device (such as an Access Point) and a tool to generate data traffic (such as iPerf) need to be available for testing.

Figure 1 shows the diagram from ETSI EN 300 328 standard.

Figure 1. Test diagram from ETSI EN 300 328 standard

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The following are frequent questions about the product that the test lab may ask. A complete list is contained in ETSI EN 301 893 standard, Annex G.

Q1: What is the maximum Channel Occupancy Time implemented by the equipment?

A1: It is 13 ms maximum.

Q2: Which spectrum sharing mechanism is used between LBT and DAA?

A2: LBT is used. Read more in ETSI EN 300 328 V2.2.2 clause 4.3.2.6.3.

Q3: If LBT is the spectrum sharing mechanism used, is the equipment frame- or load-based?

A3: The equipment is load-based. Read more in ETSI EN 300 328 V2.2.2 clause 4.3.2.6.3.2.3.

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4   General test procedure

The ETSI standard defines the test procedures and limits. This section provides some guidance to configure the radio for the tests.

- Configure the companion device such as an Access Point for the test case: set the band, channel, channel bandwidth values. Establish the wireless connection to the UUT.
  Refer to *EZConnect Provisioning Application Development Guide* for more information.
- Use a tool such as iPerf to generate data traffic
- Confirm that the ED threshold is enabled by running the following command:

```
iwpriv wdev0 setcmd "setreg bb 0x70"
```

The command returns a message showing the status of ED threshold (enabled or disabled) and the threshold value. For example, the command output below shows that ED threshold is enabled and because BB register 0x70[2] is set to 1.

```
/ # iwpriv wdev0 setcmd "setreg bb 0x70"
Get bb reg 70 = 64
```

- Run the adaptivity test to demonstrate compliance.
  - If the test passes, this test case is complete.
  - If the test fails, adjust the ED threshold and run the test again

Command used to adjust the ED threshold:

```
iwpriv wdev0 setcmd "setreg bb 0x5F 0x3E"
iwpriv wdev0 setcmd "setreg bb 0x60 0x44"
```

ED register description:

Register	Description
0x70[2]	ED threshold enable/disable 0 = disable ED threshold 1 = enable ED threshold
0x5F[6:0]	ED upper threshold Unsigned value in units of dB
0x60[6:0]	ED lower threshold Unsigned value in units of dB

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Example

The following example illustrates the steps used to take the adaptivity test:

• Read the current ED threshold value using the command:

```
iwpriv wdev0 setcmd "setreg bb 0x5F"
iwpriv wdev0 setcmd "setreg bb 0x60"
```

Command output example showing the ED threshold set to 0x3E and 0x44:

```
/ # iwpriv wdev0 setcmd "setreg bb 0x5F"
Get bb reg 5f = 3E
/ # iwpriv wdev0 setcmd "setreg bb 0x60"
Get bb reg 60 = 44
```

• Reduce the threshold value by 1:

```
iwpriv wdev0 setcmd "setreg bb 0x5F 0x3F"
iwpriv wdev0 setcmd "setreg bb 0x60 0x45"
```

• Run the adaptivity test
• If the test still fails, reduce the threshold value again and retest
• Keep repeating the steps until the test passes
• Record the passing ED threshold value
• Repeat the above steps until all the test cases have passed

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5   After testing is completed

Once the product has passed the adaptivity compliance test, select the lowest passing ED threshold value as the new threshold value for the product.

The system software must then set the new ED threshold value when the product boots up, to ensure compliance when the product is used in the field.

Use the `wlan-set-ed-mac-mode` command to set the new value.

To confirm that the new ED threshold value is set correctly, use the `wlan-get-ed-mac-mode` command.

6   Acronyms and abbreviations

Table 1. Acronyms and abbreviations

Acronym	Definition
AP	Access point
ED	Energy detection
EIRP	Equivalent isotropically radiated power
ETSI	European Telecommunication Standards Institute
EU	European union
LBE	Load-based equipment
LBT	Listen-before-talk
MAC	Medium/media access controller
RF	Radio frequency
UUT	Unit under test
WLAN	Wireless local area network

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