



**Group of Administrative Co-operation
Under the R&TTE Directive**

**5th R&TTE Market Surveillance Campaign
on WLAN 5 GHz**

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REPORT

ON THE 5TH JOINT CROSS-BORDER

R&TTE MARKET SURVEILLANCE CAMPAIGN

(2013)

WLAN 5 GHz

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A. EXECUTIVE SUMMARY

As a result of discussions at the 41st R&TTE ADCO meeting in Berlin reinforced by the information received from Electronic Communication Committee Working Group SE it was agreed that the fifth joint cross-border R&TTE market surveillance campaign should assess the compliance of 5 GHz Wireless Local Area Network devices (WLANs) especially with the essential requirement on the effective use of spectrum (article 3.2 R&TTE directive).

Due the fact that 5 GHz WLANs utilize the frequency band primarily dedicated to meteorological and military radars, these devices have to pass over frequency channels currently used by radars. That task is performed by the Dynamic Frequency Selection (DFS) function which is described in harmonized standard EN 301 893. DFS function is mandatory unless WLANs operate in 5150-5250 MHz band only or in slave mode with maximum e.i.r.p of less than 23dBm only.

This report provides an overview of the findings, and makes recommendations on next steps and future actions.

The primary purpose of the campaign was to determine:

- compliance with some DFS requirements of applicable harmonised standards,
- compliance with some administrative requirements of the R&TTE directive.

Campaign was conducted between 16th of November 2012 and 15th of March 2013. Twenty one European countries participated in the campaign. One hundred and one (101) samples were randomly taken from the market. Sixty four (64) WLANs were checked in line with the code of practise of the campaign.

Forty five (45) WLANs were manufactured in Far East countries, in 10 cases the origin of the product could not be determined.

Campaign revealed that the overall level of compliance with assessed requirements is low. Only eighteen (18) WLANs were compliant with DFS requirements and some administrative requirements.

1. Compliance with some DFS requirements

Campaign showed that almost all (61 of 64) checked WLANs had implemented DFS function but on the other hand in twenty two (22) cases (34%) the device's firmware allows the end-user to switch off the DFS function. This is not in line with the requirement 4.9.2 of harmonized standard EN 301 893 version 1.5.1, 4.10.2 of harmonized standard EN 301 893 version 1.6.1. or 1.7.1 (5.15-5.35 GHz and 5.47-5.725 GHz) or requirement 4.6.1 of the harmonized standard EN 302 502 (5.725 – 5.875 GHz). In some cases information how to deactivate DFS function was included in device's user manual or presented on manufacturer's web site.

In thirty eight (38) cases DFS function could be indirectly deactivated by changing the device's region of use.

2. Compliance with some administrative requirements

Campaign revealed that only one third (21 of 64) of assessed WLANs fulfil the applicable administrative requirements.

The level of compliance of checked WLANs with CE marking requirements was about 88%. Eight (8) devices did not fulfil the formatting requirements (layout and/or height). Whereas forty one (41) Declarations of Conformity were found compliant, only in twenty three (23) cases the technical documentations were compliant.

B. ELEMENTS OF THE CAMPAIGN

1. Reasons for the campaign

At ADCO R&TTE 41 in Berlin, several contributions showed a possible potential compliance problem of Wireless Local Area Network devices (WLANs) which operate on 5 GHz band. The analysis of interference cases on radar were due to WLANs either without the DFS (Dynamic Frequency Selection) functionality or with a DFS functionality which may be deactivated by the user.

Since the opening of the radar bands in 5 GHz, the RLAN industry has laboured long and hard to meet the detect-and-avoid needs of all radar use in the band. This has resulted finally in Harmonised Standard EN 301 893 which protects radiolocation systems and ground-based meteorological radars from interferences.

Manufacturers that have correctly implemented DFS mechanisms are very much concerned about other manufacturers who deliberately do not comply with the applicable DFS requirements, as they put the availability of the frequency bands at risk for all manufacturers.

ADCO R&TTE members agreed to start a common market surveillance campaign to check the compliance of WLAN equipment especially on the requirement that DFS can neither be disabled nor altered. The findings of this campaign should be used to gain information on the real situation on the market and to remove all non-compliant equipment found from market

2. Scope of the campaign

The primary purpose of the campaign was to carry out a partial conformity assessment of each WLAN with the essential requirement on the effective use of spectrum (article 3.2 R&TTE directive). Market Surveillance Authorities have checked if WLANs apparatus fulfil the "user access restrictions" requirement according the currently applicable harmonised standard EN 301 893 in the versions 1.5.1, 1.6.1 and 1.7.1 (called applicable harmonized standard in this document).

Furthermore administrative compliance was checked against the CE marking and Declaration of Conformity (DoC). General marking requirements, user information and Technical documentation were assessed on an optional basis. For the purposes of this campaign it was decided to assess on an optional basis the full compliance with the R&TTE essential requirements by performing a laboratory test.

Based on the outcome of the campaign, guidance information could be developed and/or the necessary regulatory action taken to ensure that notified bodies are made aware of the applicable technical requirements for equipment implementing DFS and of their responsibilities with regard to giving opinions of presumption of conformity against article 3.2 of the R&TTE Directive for such equipment. This work could be done in cooperation with ETSI, R&TTE CA and ECC.

The campaign was also intended to provide market surveillance authorities with the opportunity to participate in R&TTE market surveillance, to improve the exchange of information and to raise economic operator and consumer's awareness of the impact of WLAN 5GHz on radiolocation systems and ground-based meteorological radars.

It was agreed that TCAM, ECC, R&TTE CA and ETSI will be informed on this campaign and its results.

3. Participation in the campaign

Participation in the campaign was voluntary, and was open to all members of R&TTE ADCO. Twenty one European countries participated in the campaign: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Switzerland, the United Kingdom.

4. Timing

The campaign commenced on the 16th of November 2012. The information gathering, testing and data reporting phases of the campaign ended on the 28th of February 2013. Within that period, MSAs carried out their actions to their own timescales. Further 15 days, ended on the 15th of March 2013, were allowed for results to be uploaded to CIRCABC.

5. Sampling

The aim was to obtain the broadest possible view of WLANs in the European marketplace. Therefore, a quasi-random sampling was performed over the whole price range, and from all origins (national, EEA, and imported from third countries). However, to avoid the double sampling, participating MSA were encouraged to upload details of their selections to CIRCABC as early in the campaign as possible. According to Code of Practice each participating market surveillance authority was requested to take at least 5 WLANs on its market.

6. Documents

A Code of Practice was drawn up to provide guidance and a common understanding of the purpose of the campaign and to ensure, as far as possible, the adoption of harmonised practices during the carrying out of the campaign. The results of the assessment of each WLAN were recorded on a common electronic data input form for R&TTE (R&TTE DIF).

7. Assessment procedure

Participating market surveillance authority had to carry out a partial conformity assessment of each chosen WLAN equipment by verifying:

- test report demonstrating the compliance of the equipment with the essential requirement on the effective use of spectrum (article 3.2 R&TTE directive),
- descriptions and explanations of the solutions adopted to meet the essential requirement on the effective use of spectrum (article 3.2 R&TTE directive) where the manufacturer has not applied or only partly applied one of the current applicable harmonised standards (EN 301 893 V1.5.1, V1.6.1 and V1.7.1),
- the version of the harmonised standard that has been applied (EN 301 893 V1.5.1 up to 31.12.2012 and V1.6.1 up to 31.12.2014 and V1.7.1 after),
- a copy of the opinion issued by an involved notified body where the manufacturer has not applied or only partly applied one of the current applicable harmonised standards (EN 301 893 V1.5.1, V1.6.1 and V1.7.1) or if the manufacturer has involved a notified body voluntary (case where the manufacturer claimed the compliance with the current applicable harmonised standard and the equipment carry out an identification number of a notified body).

Participating market surveillance authorities have checked at least the fulfilling of the "user access restrictions" requirement according the applicable harmonised standard. To assess the fulfilling of this requirement, market surveillance authorities have verified:

- user manual if it indicates a way on how to disable DFS;
- software included in the packaging if it allows to disable DFS;
- the manufacturer's (or its representative) web page if it proposes an updated firmware and/or software which allows to disable DFS;
- the manufacturer's web page if it gives an indication on how to disable DFS.

To have a clear picture of the situation on European market, participating market surveillance authorities answered following questions respectively:

- is DFS function implemented into the device?

- can a user deactivate DFS directly by accessing the apparatus firmware or by a mechanical switch?
- can a user change the 'region of use'?
- is the apparatus capable of operating as a 'Master'?
- is the apparatus capable of operating as a 'Slave' with a maximum transmit power of less than 200 mW e.i.r.p.?
- is the apparatus capable of operating as a 'Slave' with a maximum transmit power of 200 mW e.i.r.p. or more?

C. RESULTS

Participating market surveillance authorities have taken one hundred and one (101) samples of WLANs from the market. Table 1 shows the number of devices grouped by sub-bands of 5GHz band, working mode and DFS function.

During the analysis of the results, it comes up that six (6) equipment using also the 5.8 GHz frequency band have been checked. Such equipment are not covered by the EN 301 893 but by the EN 302 502 which states that DFS is also required for WLANs using the 5.725 – 5.850 GHz frequency band. Therefore such equipment have been also taken in account in the results.

Group of samples	Radar detection required	Number of samples	Percentage
Devices operate only in 5150-5250 MHz	No	35	34,65%
Devices operate in 5 GHz band only in slave mode with maximum e.i.r.p of less than 23dBm	No	2	1,98%
Other 5 GHz devices	Yes	64	63,37%
All taken devices		101	100,00%

According to EN 301 893 the DFS function is required when a device operate within the frequency ranges 5250 MHz to 5 350 MHz or 5 470 MHz to 5 725 MHz. Note 2 of table D.2 in Annex D to EN 301 893 states that slave devices with a maximum e.i.r.p. of less than 23 dBm do not have to implement radar detection.

These facts have limited the number of WLAN samples to sixty four (64). Further statistics were based on that group of devices.

Table 2 presents overall level of compliance with assessed requirements (see chapter B.7 of this report).

Number checked	Number compliant	Compliance [%]
64	18	28,13%

1. Number and origin of products

MSAs had to report on the country where WLANs have been manufactured; the information “Made in” present either on the WLAN itself, on its packaging, in or on the accompanying documents or in the Declaration of Conformity (DoC). The “country of origin” therefore refers not generally to the economic operator who is responsible for placing the product on the EU market. The vast majority of WLANs indicated that they were manufactured in Far East countries (China, Taiwan and Vietnam).

Table 3 presents the number of devices grouped by country of origin with the information about compliance with assessed requirements.

Table 3: Number and origin of products			
Country of origin	Number of assessed products**	Number of compliant products**	Percentage of compliant products**
Far East*	45	16	35,56%
EU	6	1	16,67%
USA	3	0	0,00%
Unknown	10	1	10,00%
* Note: China, Taiwan, Vietnam			
** Note: of the assessed requirements			

2. Administrative compliance

Less than a third of assessed WLANs fulfilled the applicable administrative requirements. Outcome of that analysis is presented in table 4.

Table 4: Compliance with administrative requirements		
Number checked	Number compliant	Compliance [%]
64	21	32,81%

2.1. CE marking

The level of compliance of checked WLANs with CE marking requirements is about 88%. Eight (8) devices did not fulfil the formatting requirements (layout and/or height).

Table 5: Compliance with CE marking requirements				
Number assessed	Not fulfil CE mark layout	Not fulfil CE mark height	Overall CE marking compliance	Overall CE marking compliance [%]
64	1	8	56	87,50%

2.2. EC Declaration of Conformity

From sixty four (64) WLANs assessed against the DoC requirements, in 48 cases complete or short forms of the DoC were available. From those 41 were found compliant. Overall level of compliance is about 64%.

Table 6: Compliance with DoC requirements				
Number assessed	DoC available*	DoC available [%]	DoC compliance	DoC compliance [%]
64	48	75%	41	64,06%
* Note: complete form and short form.				

In almost all cases (98%) of the delivered DoCs, the elements – as described in the harmonised standard EN-17025 – were present.

2.3. Technical documentation (TD)

From 47 WLANs assessed against the TD requirements, 40 TD were made available. In 23 cases technical documentations were compliant. Overall level of compliance is about 49%.

Table 7: Compliance with TD requirements				
Number assessed	TD available	TD available [%]	TD compliance	TD compliance [%]
47	40	85,11%	23	48,94%

3. Compliance with DFS requirements

Dynamic Frequency Selection is a mechanism that allows WLANs devices to operate in 5250-5350 MHz and 5470-5725MHz bands without causing harmful interferences to maritime and weather radars which have a priority right to use that band. Terms of DFS implementation are described in the harmonized applicable standards.

Verification of WLANs showed that only 3 of 64 WLANs hadn't implemented DFS function.

Table 8: Implementation of DFS		
Number checked	DFS not implemented	DFS not implemented [%]
64	3	4,69%

It is assumed that due to the high occupancy and penetration of 5 GHz band WLANs users try to directly or indirectly deactivate the DFS functionality. In about 34% of tested devices, the firmware allows the end-user to switch off the DFS function.

Table 9: Deactivation of DFS		
Number checked	DFS can be deactivated	DFS can be deactivated [%]
64	22	34,38%

In some cases it is necessary for user to update device firmware with the new version, alternative version or even old version which allows to deactivate DFS function. Detailed information about ways to deactivate DFS function can be found in the user manual or on the manufacturer's web page.

Table 10: Ways of DFS deactivation				
Number checked	User manual indicates how to deactivate DFS	Original firmware/software allows to deactivate DFS	Web site suggests a firmware update to deactivate DFS	Web site indicates how to deactivate DFS
22	7	20	5	4

The applicable harmonized standard EN 301 893 states that DFS controls (hardware or software) related to radar detection shall not be accessible to the user so the DFS requirements described in the above-mentioned harmonized standard can neither be disabled nor altered.

Taking into account that DFS functionality is not obligatory in all regions or countries, some manufacturers allow the user to select appropriate country of installation during the setup procedure. Such a feature may alter functionality of the DFS system. During the campaign the effect of the change of the "Region of use" on the DFS functionality has not been analysed.

Table 11: Setting of "Region of use"		
Number checked	Region of use can be changed	Region of use can be changed [%]
64	38	59,38%

4. Other observations

Some market surveillance authorities observed that different firmware versions were made available for the WLAN samples. In at least one case a DFS enable/disable feature was altered from one software version to the other.

D. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

- 35 of 101 (35%) WLANs avoided frequency bands where DFS is mandatory.
- Almost all WLANs (95%) which use frequency bands where the DFS system is mandatory have the DFS function implemented.
- 22 of 64 (34%) WLANs equipment can have DFS deactivated by the user, in 91% cases by using WLANs' original or provided on manufacturer's web site firmware.
- 38 of 64 (59%) WLANs give the possibility to the user to change the "Region of use".
- The availability of the TD (85%) is not satisfactory for MSA. The overall level of compliance of TD is low (49%).
- Despite the fact that the level of compliance of the CE marking (88%) and compliance of DoC (64%) is higher than in recent¹ MSC under the R&TTE directive, the overall fulfilment of the assessed requirements is low 28%.
- The vast majority of checked WLANs (70%) were manufactured in Far East countries (China, Taiwan and Vietnam).
- The firmware can have an important and a deliberate impact on the compliance to the essential requirements of a state of the art radio equipment.
- The results of this campaign confirm the problem identified by interference management people and contained in the ECC liaison statement.
- Number of participating MSAs in campaign is satisfactory (21 MSA actively took part in the task). The campaign showed a good level of cooperation between MSAs.
- The resource in conducting this type of campaign is significant. Activities including preparation (eg. drafting its Code of Practice), coordination, tests, analysis of the results and the drafting of the report are carried out by R&TTE ADCO members in addition to their national activities.

¹ the fourth R&TTE Market Surveillance Campaign on low power FM transmitter: compliance of CE marking – 38%, compliance of DoC – 30%

2. Recommendations

- Market surveillance authorities should continue to check at national level such products and take all appropriate measures to ban non compliant product from the market.
- It should be ensured that the change of the “Region of use” do not alter or disable the DFS functionality.
- In a general way it should be ensured that changes of “Region of use” cannot alter the compliance against the essential requirements.
- All relevant firmware release numbers that may alter the compliance to the essential requirements, shall be considered during the evaluation of the conformity of a radio equipment.
- For reproducibility reasons the manufacturer shall indicate in the test report, a part of the technical documentation, all relevant firmware release numbers.
- Based on the outcome of this campaign, ADCO R&TTE should discuss with ECC, ETSI and industry the possibilities to solve the problem and increase the level of conformity of 5 GHz WLAN on the market.
- The cooperation at national level between interference management and market surveillance authorities should be improved to detect rapidly non compliant products as possible sources of interferences and to take them off the market.
- All national MSA should participate in future market surveillance campaigns to fulfil the requirement of market surveillance obligations included in the New Legislative Framework (NLF).
- The results of the campaign should be publicized widely throughout Europe and to other countries of origin of the products.
- Due to high influence of non-compliant WLANs on radiolocation systems and ground-based meteorological radars MSAs are asked to increase the amount of inspections on 5GHz WLANs until the situation has improved. MSA should regularly report to ADCO R&TTE.

E. References

- ETSI EN 301 893 – Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive,
- ETSI EN 302 502 - Broadband Radio Access Networks (BRAN); 5,8 GHz fixed broadband data transmitting systems; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive,
- ETSI TR 102 651 - Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Guide to the implementation of Dynamic Frequency Selection (DFS),
- ECC/DEC/(04)08 - Electronic Communications Committee Decision of 09 July 2004 on the harmonised use of the 5 GHz frequency bands for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs),
- 2005/513/EC – Commission Decision of 11 July 2005 on the harmonised use of radio spectrum in the 5 GHz frequency band for the implementation of wireless access systems including radio local area networks (WAS/RLANs),
- ERC Recommendation 70-03 Relating to the use of Short Range Devices (SRD)
- The European Table of Frequency Allocations and Applications in the Frequency Range 8.3 kHz to 3000 GHz (ECA Table),

F. Abbreviations

ADCO R&TTE	Group of Administrative Cooperation for the sector of radio equipment and telecommunications terminal equipment
BFWA	Broadband Fixed Wireless Access
CIRCABC	Communication and Information Resource Centre for Administrations, Businesses and Citizens
DFS	Dynamic Frequency Selection
DIF	Data Input Form
DoC	Declaration of Conformity
ECC	the Electronic Communications Committee
EEA	the European Economic Area
e.i.r.p.	Equivalent Isotropically Radiated Power
ETSI	European Telecommunications Standards Institute
MSA	Market Surveillance Authority
RLAN	Radio Local Area Network
R&TTE CA	the Radio and Telecommunications Terminal Equipment Compliance Association
TCAM	the Telecommunication Conformity Assessment and Market Surveillance Committee
TD	technical documentation
TPC	Transmit Power Control
WAS	Wireless Access Systems
WLAN	Wireless Local Area Network