REPORT

ON THE 10TH JOINT CROSS-BORDER

EMC MARKET SURVEILLANCE CAMPAIGN

(2018)

POWER LINE COMMUNICATION (PLC) APPARATUS

(for in-home use)

October 2018

CONTENTS

A. EXECUTIVE SUMMARY

As a result of the discussions at the 42nd EMC Administrative Cooperation Working Group (EMC ADCO) meeting in Amsterdam, it was decided that the tenth joint cross-border EMC market surveillance campaign would assess the compliance of Power Line Communication (PLC) apparatus intended for in-home use.

PLC apparatus is also known as Power Line Telecommunication (PLT) apparatus[1] and could additionally be marketed as Powerline Adapters or Powerline PassThru Adapters.

PLC technology consists of the utilization of power lines as a transmission medium, i.e. PLC technology uses the existing public and private mains power wiring for the transmission of telecommunication signals, offering Internet access via electrical networks in the home and at work.

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

The primary purpose of the campaign is to assess the compliance of the equipment under test ('EUT'), samples taken from the European market, with the essential requirements of the EMC Directives 2004/108/EC or 2014/30/EU.

This campaign has several goals, which include:

- to determine the administrative and technical compliance levels of Power Line Communication (PLC) apparatus available within the EU market;
- to apply the measures of the new EMC Directive 2014/30/EU (including safeguard procedure) for Power Line Communication (PLC) apparatuses placed on the market from 20 April 2016.
- to take appropriate compliance actions to rectify non-compliances;
- to propose further actions;
- to improve cooperation and information exchange between MSAs;
- to increase knowledge of the Power Line Communication (PLC) apparatus industry;
- to improve the knowledge of manufacturers; importers; distributors; and economic operators of their obligations under the EMC Directive;
- use the new ICSMS DRPI and become familiar with it.

Eleven national Market Surveillance Authorities ('MSA') EMC ADCO members participated in the campaign. 46 products were assessed between the 1st January 2018 and the 31th August 2018. In general, the level of compliance issues found with the administrative and technical requirements was considered as very high. Overall, only 17% of the EUT had no issues found by MSAs.

Based on this campaign, EMC ADCO has formulated conclusions and recommendations which can be found in Chapter D of this report.

[1] Historically the two abbreviations "PLC" and "PLT", also "PLC port" and "PLT port" have been used interchangeably " in the standards and in the technical literature.

Administrative compliance

The results of the administrative assessment of EUT showed:

- No administrative issues were found in 61% of EUT.
- There were no objections made by MSAs regarding the CE marking in all cases (100% of EUT).
- Declarations of Conformity (DoCs) were available for all 46 EUT; six of them were non-compliant. 87% of the inspected DoCs had no compliance issues.
- In 20 cases the Technical Documentation ('TD') was requested and 16 were supplied. Of those, 13 were found to have no issues (65%).

Technical testing to harmonised standards

The results of the technical assessment of PLC apparatus (for in-home use) showed that nearly three quarters of tested EUT were non-compliant (i.e. 21% overall testing to harmonised standards found no compliance issues).

B. ELEMENTS OF THE CAMPAIGN

1. Reasons for the campaign

As a result of the discussions at the 42nd EMC Administrative Cooperation Working Group (EMC ADCO) meeting in Amsterdam, it was decided that the tenth joint cross-border EMC market surveillance campaign would assess the compliance of Power Line Communication (PLC) apparatus intended for in-home use. For the purpose of this campaign, the MSA assessed the compliance of the Power Line Communication (PLC) apparatus intended only for in-home use and solely communicating to each other in the same home.

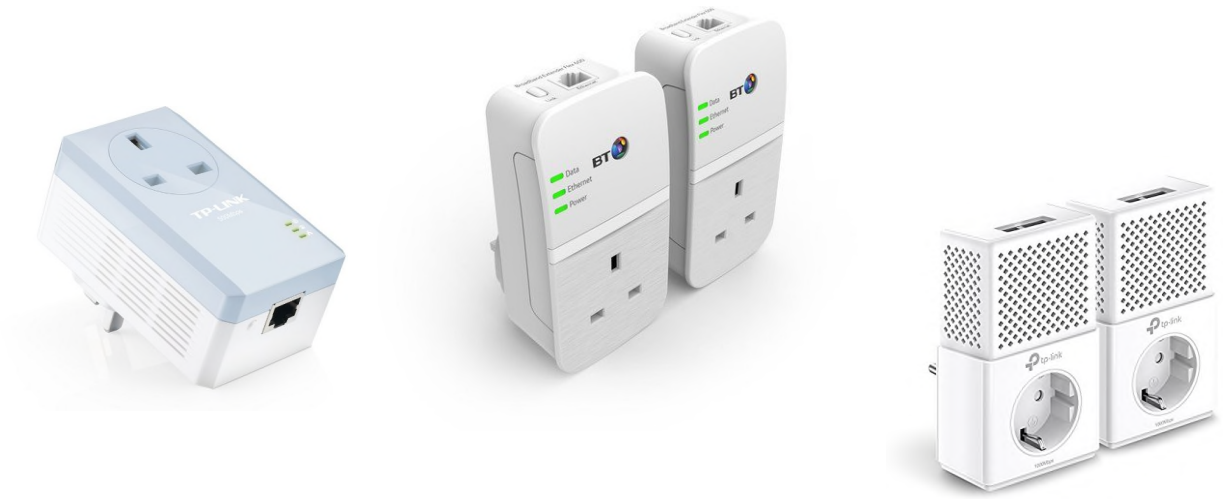

Fig.1. Examples of power line communication apparatus intended for in-home use.

PLC systems available today mostly use only one transmission path between two outlets. It is the differential mode channel between the phase (or live) and neutral contact of the mains. These systems are called **SISO** (*Single Input Single Output*) modems. In contrast, **MIMO** (*Multiple Input Multiple Output*) PLC systems make use of the third wire, PE (Protective Earth), which provides several transmission combinations for feeding and receiving signals into and from the low voltage distribution network. There is no standard for PLC using MIMO technology.[2]

2. Scope of the campaign

The primary purpose of the campaign was to assess the compliance level of samples taken from the market with the provisions of the EMC Directives 2004/108/EC or 2014/30/EU. Administrative compliance was checked against the CE marking, Declaration of Conformity and the relevant parts of the technical

[2] prEN 50561-4 *Power line communication apparatus used in low-voltage installations - Radio disturbance characteristics - Limits and methods of measurement - Part 4: Apparatus using MIMO technology* is under preparation.

documentation of the acquired EUT. For the purposes of this campaign, it was decided to assess compliance with the EMC essential requirements (i.e. generated electromagnetic disturbances of EUT) by testing against a relevant harmonised standard[3]. Immunity aspects were assessed on a voluntary basis.

The campaign was also intended to provide MSAs with the opportunity to participate in EMC market surveillance, to improve the exchange of information and to raise economic operator and consumer awareness of the need for conformity with the essential requirements of the EMC Directive.

It was agreed that following the analysis of the results of the campaign, a report would be prepared and presented to the EMC Working Party for subsequent publication by the Commissionhttp://ec.europa.eu/. The present document constitutes the report of the campaign.

3. Participation in the campaign

Participation in the campaign was voluntary and was open to all members of EMC ADCO. Each MSA was responsible for the costs of obtaining the EUT and tests.

Eleven European countries participated in the campaign: Cyprus, Estonia, Finland, Germany, Hungary, Lithuania, Luxembourg, Netherlands, Portugal, Switzerland and the United Kingdom.

4. Timing

The campaign commenced on the 1st January 2018. The information gathering, testing and data reporting phases of the campaign took eight months, ending on the 31st August 2018. Within that period, MSAs carried out their actions to their own timescales. During the last month (September 2018), all of the results of testing and administrative assessments were collected together and the final report of the joint action was prepared.

4. Sampling

The aim was to obtain the broadest possible view of the investigated product group 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 double sampling, participating MSAs were encouraged to upload details of their selections into ICSMS as early in the course of campaign as possible.
Selected EUT can fall under EMC and LV Directives. The recommended number of selected EUT was three different types for each participating MSA, but MSAs were free to select any number of EUT for this campaign.[4] Selections may include products purchased on the internet (from eBay, Amazon, etc.). In order to maximise the value of this campaign and increase knowledge of the marketplace, the aim was to select

[3] EUT were assessed against harmonised standards displayed in the DoC (if available). See chapter 7 for the applicable standards.
[4] For testing purposes two PLC devices (compatible (the same type) and paired) were used: one as EUT (equipment under test), and the other as AE (associated equipment).

products from the broadest range possible. PLC apparatus with radio functionality was excluded from this campaign, as it falls to the scope of the RED.

5. Documents

A Code of Practice document 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 execution of the campaign. The results of the assessment of each EUT were recorded on a common electronic data input form for EMC (EMC DIF V4.0).

6. Tests performed

For the purposes of the campaign, it was agreed to assess compliance to the EMC essential requirements by measuring against the harmonised standards according to the DoC issued by the manufacturer.

Actual situation for conducted and radiated emissions test:

EN 50561-1:2013 + AC:2015 [5]
EN 55032:2012 could be used until 2016-10-09 [6]
EN 55022:2010 could be used until 2016-10-09

Actual situation for immunity to disturbances tests:
EN 50412-2-1:2005 + AC:2009
EN 61000-6-1:2007 or EN 61000-6-1:2001 could be used until 2008-04-01
EN 55024:1998 + A1:2001 + A2:2003 could be used until 2008-04-01.

For the purposes of the campaign, it was agreed to assess compliance with the EMC essential requirements (only emissions, immunity aspects could be assessed on voluntary basis) by measuring against the harmonised standards according to the DoC issued by the manufacturer.

If the DoC was not available for the EUT, then the assessment for the RF emissions should be done against harmonised standard EN 50561-1:2013+AC:2015, and immunity assessment according to harmonised standard EN 50412-2-1:2005.

MSAs assessed:

1. Conducted disturbances at telecommunications/network ports in the frequency range 150 kHz to 30 MHz;
2. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (when user data is being transmitted);
3. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (without user data transmission);
4. Radiated disturbances in the frequency range 30 MHz to 1,000 MHz.

[5] For PLCs that use frequencies including those above 30 MHz in order to communicate, EN 50561-3:2016 could be used.

[6] i.e. could appear in DoC for products placed on the market before 2016-10-09

C. RESULTS

1. Number and origin of products

MSAs had to report on the country where EUT was manufactured; the information "Made in" presented either on the EUT itself, on its packaging or on the accompanying documents and finally from the DoC (where available). The "country of origin" therefore does not necessarily refer to the economic operator who is responsible for placing the product on the EU market.

A total of 46 products were selected and evaluated, as follows:

Table 1: Number and origin of products

Country of origin	Number of evaluated PLC apparatuses	Number of PLCs assessed during the campaign for administrative and technical issues with no issues found (%)
China	35	5 (14%)
EU	3	0
Taiwan	1	0
Unknown	7	3 (43%)
All origins	**46**	**8 (17%)**

Conclusion: the PLC apparatuses were made mainly in China (76%). Products of unknown origin had the highest percentage showing no compliance issues found during the administrative and technical inspections.

2. Administrative compliance

The EUT were assessed for the presence and format of CE marking, the availability and compliance of the DoC and technical documentation.

Table 2: Compliance with administrative requirements

Number checked	Number with no issues found	No issues found (%)
46	**28**	**61**

2.1 CE marking

All assessed EUT were CE marked and fulfilled the layout requirements and CE mark height requirement.

Table 3: Compliance with CE marking requirements

Number assessed	Did not fulfil CE mark requirements	Missing CE mark	No issues found with CE mark (number)	No issues found with CE mark (%)
46	**0**	**0**	**46**	**100**

2.2 EC Declarations of Conformity (DoC)

MSAs assessed 46 EUT against the DoC requirements. Six DoCs were found to have no issues.
19 DoCs were issued in the EU (or in Switzerland), 15 DoCs were issued in China, 8 in Taiwan and 4 in the USA.

Table 4: Compliance with DoC requirements				
Number of EUT assessed	**DoC available**	**DoC available (%)**	**No issues found with DoC (number)**	**No issues found with DoC (%)**
46	**46**	**100**	**40**	**87**

Table 5: Compliance rate of the DoC requirements	
Requirements for DoC	**Compliance rate for 46 DoC (%)**
Reference to EMCD	96
Identification of the apparatus	100
Name and address of the manufacturer	100
Dated reference to the specifications	93
Date of declaration	96
Identity of the person empowered to sign on behalf of the manufacturer	98
Signature of the person empowered to sign on behalf of the manufacturer	100

2.3 Technical documentation (TD)

MSAs requested TD for 20 of the 46 EUT, however only 16 were supplied. Of those, 13 were found to have no issues.

Table 6: Issues found with TD requirements				
Number assessed	**TD available**	**TD available (%)**	**No issues found with TD (number)**	**No issues found with TD (%)**
20	**16**	**80**	**13**	**65**

2.4 Traceability Requirements

Manufacturers shall ensure that products which they have placed on the market bear a type, batch or serial number or other element allowing its identification. Manufacturers and importers (if manufacturer is not established in the EU) shall indicate on the product their name, registered trade name or registered trade mark and the postal address at which they can be contacted.

A total of 46 products were assessed, as follows:

Table 7: Compliance with traceability requirements		
Requirement of traceability	**No issues found (Number)**	**No issues found (%)**
Identification requirements (type designation)	46	100
Name of the manufacturer	44	96
Address of the manufacturer	38	83
Name of the importer	21*	81
Address of the importer	21*	81

*In 20 cases the importer information was not required because the manufacturer is established in the EU.

According to the assessed results, the name and address of the manufacturer had been indicated better than the name and address of importer.

3. Compliance with harmonised standards

3.1 Emissions requirements

The measured result was compared directly with the limit in the harmonised standard without taking into account the measurement uncertainty. A failure was recorded if any emission exceeded a certain limit when measured with the appropriate detector.

46 EUT were assessed for the emissions of:

1. Conducted disturbances at telecommunications/network ports in the frequency range 150 kHz to 30 MHz;
2. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (when user data is being transmitted);
3. Conducted disturbances at the PLC port in the frequency range 150 kHz to 30 MHz (without user data transmission);
4. Radiated disturbances in the frequency range 30 MHz to 1 000 MHz.

The technical compliance rate of the products tested for emissions was as follows:

Table 7: Compliance with the emissions requirements		
Number tested	**Number with no issues found**	**% with no issues found**
43 *	**9**	**21**

* Three PLC apparatuses were tested without data transmission and therefore excluded from assessment.

3.2 Immunity requirements

Immunity tests were not performed during this campaign.

4. Other evaluations

4.1 DoC compliance vs. compliance with emissions requirements

EUT with a correct DoC had a better rate of technical compliance than those with not correct DoC.

Table 8: DoC compliance vs. compliance with emissions requirements			
DoC	**Number of DoCs**	**Number of products with no issues found for emissions**	**Products with no issues found for emissions (%)**
DoC not correct	**6**	**1**	**17**
DoC – no issues	**37**	**9 ***	**24**
DoC issued after 2016-10-09	**13 ***	**1**	**8**
DoC issued before 2016-10-09	**25 ***	**4**	**16**

* Three PLC apparatuses were tested without data transmission and therefore excluded from assessment.
** Two DoCs were without data and for six DoCs the data was not available, therefore they were excluded from the assessment.

4. Overview of findings

Table 9 summarises the overall rate of 'no issues found' for EUT in terms of emissions against harmonised standards, overall administrative, CE marking and Declaration of Conformity requirements.

Table 9: Overview of findings

Number assessed	Overall 'no issues found' (%)	Emissions (%)	Administrative (assessed formal requirements)		
			Overall adm. (%)	CE Marking (%)	DoC (%)
46	17	21	61	100	87

D. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

- PLC apparatus were made mainly in China (76%).
- Approximately one-fourth (21%) of the tested EUT met the disturbance emissions compliance tests.
- More than a half (61%) of the EUT met the administrative requirements (as assessed).
- All assessed EUT were CE marked correctly.
- 87% of the DoC provided had no compliance issues found. This represents quite high percentage.
- Only 17% of the EUT had no compliance issues found overall. In general, the level of compliance with the administrative and technical requirements is considered as very low.
- The EUT represented a large sample of the products available on the market and it is clear that much remains to be done by manufacturers in terms of compliance.
- The impact assessment for the 10th EMC market surveillance campaign has proven its justification.
- The use of ICSMS for sampling EUT was very helpful.
- The resource in conducting this type of campaign is significant. Activities including preparation (e.g. drafting its Code of Practice), coordination, tests and analysis of the results and the drafting of the report are carried out by EMC ADCO members supplemental to their national activities.

2. Recommendations

It is recommended that:

- The results of the campaign should be publicised widely throughout Europe and the other countries where the products originate. Publicity should target all economic operators in the power line communications industry.
- MSAs should take the results of this campaign into consideration when making their multi annual plan as stated in the Regulation (EC) 765/2008.
- The results of this campaign should be forwarded to the European Standardisation bodies in order to take into account in the development of the future standards for PLC apparatus.
- The test method for radiated emissions of PLC apparatus is not adequately specified in the standard EN 50561-1 (it only gives reference to standard EN 55022) and therefore results of testing in different laboratories might be inconsistent. The CENELEC TC 210 should consider specifying this test method for PLC apparatus in detail.
- MSAs who did not participate should be encouraged to join in future campaigns. Regulation (EC) 765/2008 promotes this type of co-operation and co-ordinated action between MSAs in article 25.
- A similar campaign should be considered on the same basis after a certain period to assess the effect on the market. This campaign should focus on the PLC products placed on the market after 9 October 2016.
- MSAs shall increase the use ICSMS in the future campaigns for sampling and exchange of information.
- Market surveillance actions for PLC apparatus should be continued.