Radiocommunication Study Groups

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North American Broadcasters Association (NABA)

ADDITIONS TO THE PRELIMINARY DRAFT NEW REPORT

Impact of power line telecommunication systems on radiocommunication systems operating in the LF, MF, HF and VHF bands below 80 MHz

The North American Broadcasters Association (NABA, *www.nabanet.com*) is an association of broadcasters in Canada, Mexico, and the United States, and the NABA Technical Committee is its standing technical body. NABA is thus in a position to present the technical viewpoints of the most authoritative association of professional North American Broadcasters in television and sound programme production, post-production, and distribution for terrestrial, satellite, and cable broadcasting.

NABA is a Sector Member of ITU-R and a long-time participant in ITU-R Study Groups, Working Parties, Task Groups, Rapporteur Groups, etc. NABA numbers among its members Chairmen, Vice-Chairmen and members of the above groups. NABA also participates widely in the ITU work on radio, television and multimedia services and has a strong interest in spectrum management studies including spectrum engineering techniques, spectrum management fundamentals, spectrum monitoring, and inter-service sharing, interference and compatibility.

NABA notes that Working Party 1A established a Correspondence Group to further the development of the preliminary draft new Report on the “Impact of power line telecommunication systems on radiocommunication systems operating in the LF, MF, HF and VHF bands below 80 MHz” (Annex 2 to Document 1A/135). The Correspondence Group has editorially improved the Report which is now found in Document 1A/158. NABA strongly supports the Report and, in particular, the inclusion of studies concerning emissions from Power Line Telecommunication (PLT) systems and the impact that these emission have on all radiocommunication services operating below 80 MHz.

NABA offers the following additional information in order to further improve the Report:

Annex 1 contains the latest version of the test report from the laboratory at the Communications Research Centre (CRC) in Canada[1]. The CRC test report contains additional test results some of which are outlined in Annex 3 below. The reference to the report provided in Appendix 1 to Annex 3 of Document 1A/158 should be updated with the information given in Annex 1.

Annex 2 contains summary information concerning power levels of the PLT systems tested by the CRC. Further details can be found in the complete CRC report contained in Annex 1.

Annex 3 contains additional information from the CRC field tests. The minimum measured noise floor during the field test is presented in order to be more consistent with the methodology described in Recommendation ITU-R P.372-9. Two new sections are proposed which detail an analysis of RF propagation as experienced at the test sites as well as results of actual current measurements. The location for the insertion of this information is given in Annex 3.

The results of the CRC field tests contradict the findings in Section 4.2.1.4 of Document 1A/158. Section 4.2.1.4 claims a 40 dB/decade first approximation for the propagation factor. The 40 dB/decade value has been under contention by the ARRL in the United States (Document 1A/170). The Federal Communication Commission (FCC) in the United States has initiated a process to reconsider the value[2]. The CRC reports, however, that if careful consideration is taken to avoid interference sources beyond the devices under test, the propagation factor is actually 18.2 dB/decade. Unfortunately, the data presented in Section 4.2.1.4 does not lend itself to detailed scrutiny nor does it provide an indication of the underlying noise levels. Consequently, it is appropriate to delete Section 4.2.1.4 in its entirety.

NABA also notes that the ITU-T Recommendation K.60 is referenced in Sections 4.2.1.2 and 4.2.1.3 and Figure 4-4 as an electric field limit. However, in its liaison statement to Study Group 6 (Document 6/164), ITU-T Study Group 5 states:

Quote:

> The following text is to be inserted as the first line of Clause 1 (Scope) of ITU-T Recommendation K.60 – Emission levels and test methods for wireline telecommunication networks to minimize electromagnetic disturbance of radio services (2008-02):
>
> > *"The purpose of this Recommendation is to guide administrations when considering complaints of interference between telecommunication systems and is not intended to set compliance requirements or recommendations for protecting the radio spectrum."*

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[1] The CRC is the Canadian Government's primary laboratory for research and development (R&D) in advanced telecommunications, with a critical mass and expertise in four major platforms that form the basic transport mechanism for information delivery around the world: wireless, broadcasting, satellite and fibre optics. The CRC has been committed to applied and basic research in communications and related technologies since the late 1940s.

Over the last 50 years many scientific and engineering milestones have been achieved at the CRC, contributing advancements in wireless and satellite communications and broadcast technologies. An institute of Industry Canada since 1993, the CRC has maintained its tradition of excellence in managing technical issues concerning the radio spectrum, the deployment of wireless communications and broadcast services, and the development of new technologies and knowledge for exploitation by Canadian industry. CRC is Canada's main research centre for radiocommunications technology R&D. The CRC mission is to be the centre of excellence for communications R&D, ensuring an independent source of advice for public policy purposes.

[2] Request for further comment and further notice of proposed rule making, "In the Matter of Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems," Federal Communication Commission (FCC), ET Docket No. 04 37, 16 July 2009.

Unquote:

It is clear that the references to ITU-T Recommendation K.60 as emission and/or interference limits should be deleted from the text.

Annex 1

Replace the reference in Appendix 1 to Annex 3 in Document 1A/158 to the following:

"Measurements of EM radiation from in-house Power Line Telecommunication (PLT) devices operating in a residential environment – Field Test Report", Communications Research Centre (Canada), 24 March 2009

CRC PLT Test Report

Annex 2

The following table is a summary of the calculated transmission power of the eight PLT devices under test within their operating frequency range with RBW of 9 kHz and Max Hold traces. The average power should be around 10 to 12 dB below the "Max Hold" power. Further details can be found in the complete CRC test report contained in Annex 1 above.

PLT devices transmission power with RBW 9 kHz and Max Hold traces

PLT device	PLT transmission power (dBm)	PLT signal voltage (dBµV)
1	16.4	123.4
2	13.3	120.3
3	19.4	126.4
4	14.9	121.9
5	14.3	121.3
6	19.1	126.1
7	15.5 (f < 15 MHz) 3.3 (f > 15 MHz)	122.5 (f < 15 MHz) 110.3 (f > 15 MHz)
8	-15.1	91.9

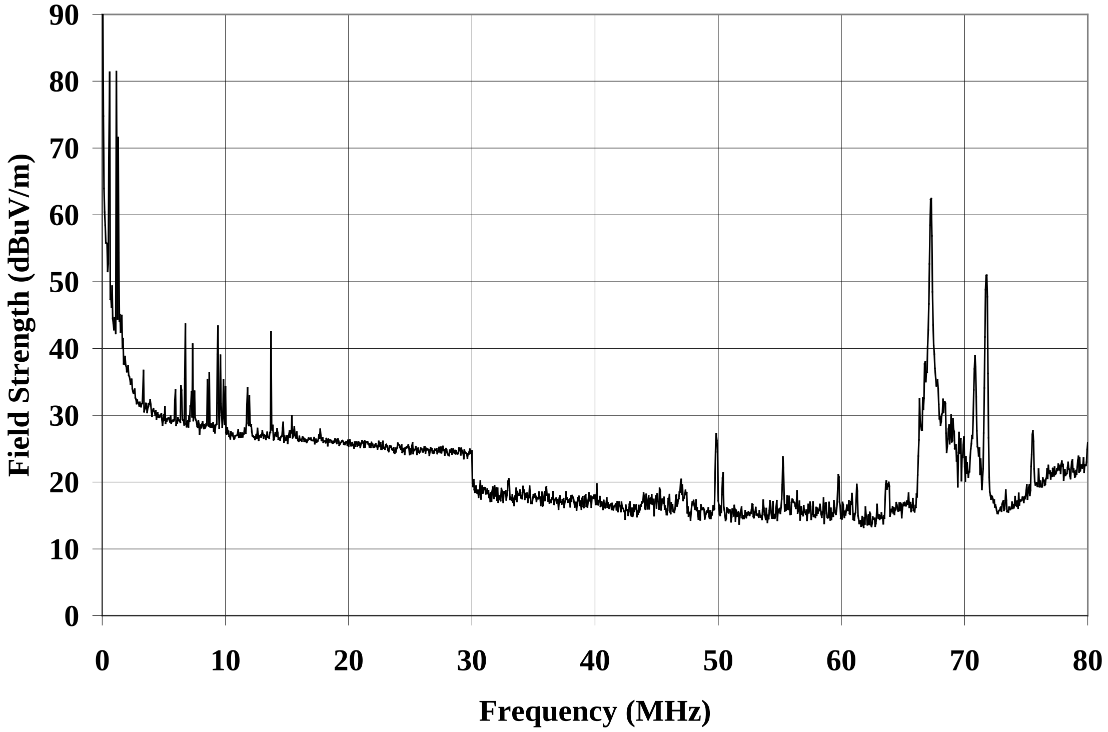
Annex 3

Replace the following text and Figure 7 in Section 6.3.3 in Annex 2 of Document 1A/135 with the text and Figure indicated in the tracked changes:

The minimum ambient noise measurement for 16 test sites is shown in Figure 7. The contribution of the ambient noise in the field strength measurement was not negligible at certain frequencies. Most of the strong signal spikes were believed to be from amateur or short wave band stations. An analogue television station is present between 66 and 72 MHz. Other noise sources such as electric motors (furnace, refrigerator and other appliances) may have contributed in raising the ambient noise.

FIGURE A3-13

Minimum ambient noise distribution at 3 and 10 meters for 16 test sites



Insert the following text before Section A3.2.4 in Annex 3 of Document of 1A/158:

A3.2.4 PLT emissions propagation analysis between 3 meters and 10 meters

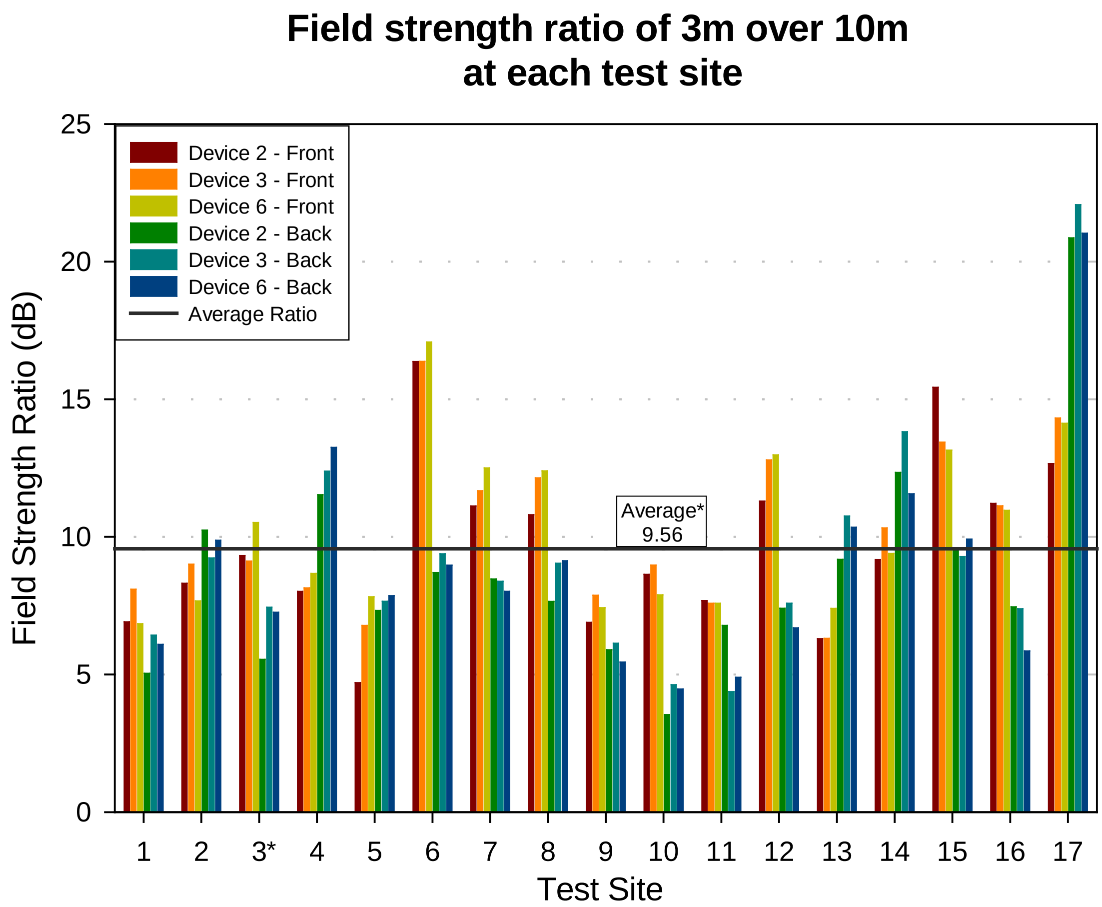
The ratio of the RF field strength between three meters and ten meters was studied to understand propagation loss in the operating frequencies of PLT devices. The theoretical field strength ratio between measurements at three meters over ten meters can be derived from the free space loss propagation equation. Since it is a ratio, the equation can be simplified to:

$$Field\ Strength\ Ratio_{(dB)} = 20 * Log\left(\frac{10\,meters}{3\,meters}\right) \approx 10.5\ dB$$

The equation above assumes an extrapolation factor of 20 dB per decades of distance for free space propagation. Thus, there should theoretically be 10.5 dB more power at three meters than at ten meters from the houses.

The Figure A3-20 below shows the field strength ratio of three meters over ten meters for each device at each test site. To reduce the effect of the ambient noise, the calculations were done from 16 to 28 MHz only. The average field strength ratio over all the devices and test sites is 9.56 dB, 1 dB lower than the theoretical value. Based on these test results, the extrapolation factor was actually 18.2 dB per decade of distance.

FIGURE A3-20



***Test Site 3 is shown on the graph but not taken into consideration for the calculation of the average.**

A3.2.5 CMI measurements

The Common Mode Current (CMI) and Differential Mode Current (DMI) measurements were done in two selected houses (Site 1 and Site 4). The purpose of measuring CMI and DMI was to determine if there is a relationship between these two measurements and RF emissions caused by PLT devices. The results of the CRC tests showed that for a single device and outlet, CMI level vary greatly over the frequency range. When comparing different devices on a single outlet, devices that transmit stronger conducted power don't necessarily have stronger CMI over all of the frequency range. Devices that transmit lower conducted power can have higher CMI than other devices at certain frequencies. From outlet to outlet, the CMI is completely different. There is no discernable relationship between RF emissions and CMI.

The DMI measurements in contrast to CMI show more consistent results with the conducted power of the PLT device. Devices with stronger output power show stronger current readings. There was no observable relationship between CMI and DMI.

A3.2.6 Conclusions