Compatibility between radiocommunication services and PLT

A challenge for Standards Developing Organizations

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Content (1)

1 ITU-R and PLT (1)

- ITU-R is the Radio Spectrum Management Organization on the world-wide level
- ITU World Radio Communication Conferences (WRCs) update every four years the spectrum allocations to the radiocomunication services
- Technical compatibility studies between radiocommunication services are carried out in ITU-R Study Groups, in particular for WRC preparations
- Unwanted radiation from PLT may also affect radiocommunications

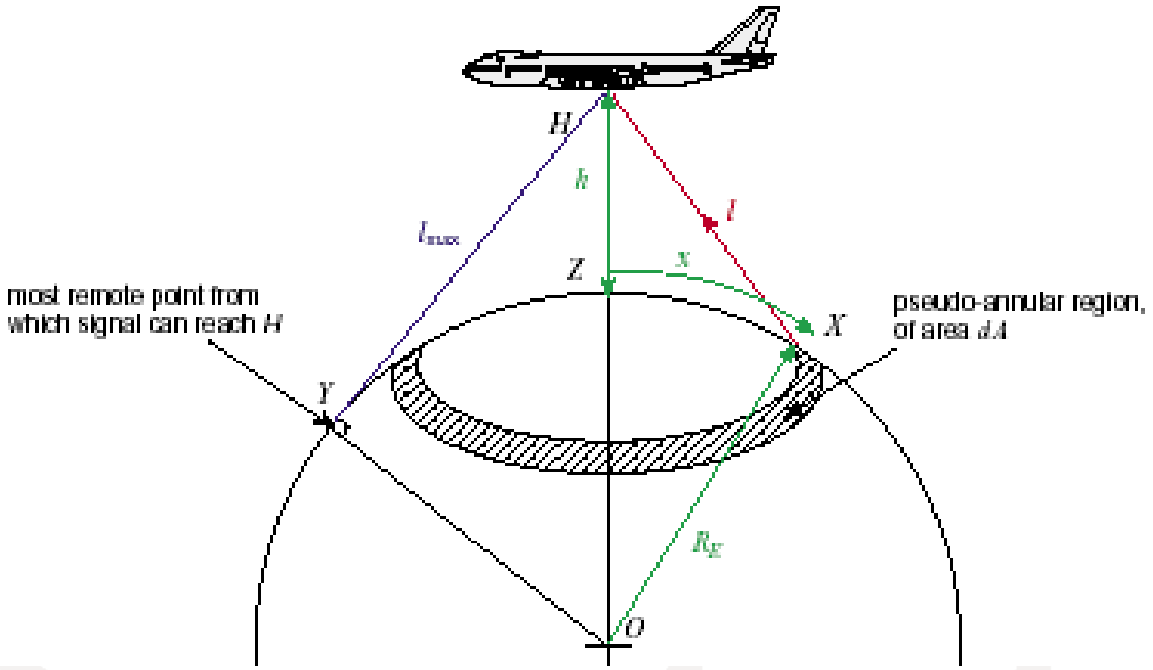
1 ITU-R and PLT (2)

- ITU-R compatibility studies on radiocommunications and PLT, including establishing protection criteria
- ITU-R Deliverables so far:
  -Report ITU-R SM. 2158 "Impact of PLT systems on radiocommunication systems operating in the LF, MF, HF and VHF bands below 80 MHz" and
  -Recommendation ITU-R SM.1879 "Impact of PLT systems on radiocommunication systems below 30 MHz"
- Additional ITU-R Deliverables under preparation:
  New Report covering 80 – 470 MHz as well as Extension of Rec. to cover 80 – 470 MHz

2 ITU-T and PLT

- ITU-T creates universally-recognized infocommunications standards
- Rec. ITU-T G.9960 on home networking specifies (inter alia) PHY layer of home networking transceivers capable of operating over power-line wiring.
- ITU-T Draft Recommendation ITU-T G.9955 on Narrow-band OFDM power line communication transceivers – physical layer specification
- Both Rec. contain various tools to meet protection requirements and regulations

3 Example for protection requirements / interference cases (1)



Model for determination of the aggregate effect of interference to the aeronautical mobile

(source: Working Document toward a preliminary draft new ITU-R Report on „Impact of PLT on radiocommunication systems operating in the VHF and UHF bands above 80 MHz, Annex 2.2, Doc 1A/311 Annex 1)

3 Example for protection requirements / interference cases (2)

	Maximum permissible interference field strength	Maximum permissible power flux-density	Aggregated radiated field strength	Aggregated radiated power flux-density	Margin required for protection
VHF COM 8.3 kHz raster 117.975-137 MHz	6 dB(µV/m)	0.0106 pW/m²	30 dBµV/m	2.512 pW/m²	−24 dB

The last column shows margin needed to reduce the interference caused by PLT devices. Assuming a maximum PSD for PLT devices of −85 dBm/Hz (RMS), a reduction of 24 dB would be necessary for the protection of aeronautical VHF systems. These calculations were made for an interferer density of 250 interferer/km².

(Source: Working Document toward a preliminary draft new ITU-R Report on "Impact of PLT on radiocommunication systems operating in the VHF and UHF bands above 80 MHz, Annex 2.2", Doc 1A/311 Annex 1)

4 Tools to meet protection requirements as stipulated in Rec. ITU-T G. 9960 (1)

Rec. ITU-T G.9960 provides features to facilitate compatibility to radiocommunication systems. These include:

- Mandatory function that enables nodes to automatically reduce the transmitted signal power in response to channel conditions
- A PSD limit mask that equipment must not exceed (-55/-85 dBm/Hz (RMS))
- PSD notches can flexibly provisioned to eliminate transmitted power in provisioned frequency bands

4 Tools to meet protection requirements as stipulated in Rec. ITU-T G. 9960 (2)

- PSD shaping can be flexibly provisioned to reduce PSD to a provisioned level as a function of frequency
- PSD notches and PSD shaping can be dynamically changed
- Upper frequency limit: 80 MHz for the time being (awaiting outcome of ITU-R on protection requirements/criteria above 80 MHz) – Use of frequencies above 80 MHz by PLT is a major concern for radiocommunication stakeholders

Inclusion of autonomous dynamic notching specification is under consideration

5 Co-operation ITU-R&ITU-T on PLT (1)

- ITU has the privilege to bring together PLT stakeholders (ITU-T) and radiocommunication stakeholders (ITU-R)
- Rapporteur Group has been established by ITU-R Working Party 1A (responsible for Spectrum engineering techniques) to work specifically on relevant PLT issues
- Co-operation by exchange of liaisons and participation of ITU-T experts in the ITU-R Rapporteur Group on PLT

5 Co-operation ITU-R&ITU-T on PLT (2)

- Requirements from ITU-R are taken into account by ITU-T standardization

- ITU Forum on Technical Compatibility between Power Line Telecommunication (PLT) systems and Radiocommunication Services, Geneva, 27 May 2011;

  http://www.itu.int/ITU-R/go/itu-plt-forum-11/en

6 Co-operation of PLT-SDOs on compatibility with Radiocommunication Services (1)

ITU Forum on Technical Compatibility between Power Line Telecommunication systems (PLT) and Radiocommunication Services, Geneva, 27 May 2011	
08:00	**Registration on Friday 27/05/11**
09:00	**Opening Addresses** *(Mr. François Rancy, Director, ITU BR - Mr. Malcolm Johnson, Director, ITU TSB)*
09:25	**Session 1: Overview of PLT developments & standardisation activities with respect to radio compatibility** *(Chairman: Mr. Tom Starr, Chairman of ITU-T Working Party 1/15)* **09:30 - PLT Standardization landscape** *(Mr. Stefano Galli)* **09:40 - The IEEE approach** *(Mr. Jean-Philippe Faure)* **09:55 - The HomePlug approach** *(Mr. Michael Koch)* **10:10 - The IEC approach** *(Mr. Martin Wright)* **10:25 - The ITU-T approach** *(Mr. Les Brown)* **10:40 - The HomeGrid approach** *(Mr. Matt Theall)* **10:55 - Summary discussion on approaches**

6 Co-operation of PLT-SDOs on compatibility with Radiocommunication Services (2)

ITU Forum on Technical Compatibility between Power Line Telecommunication systems (PLT) and Radiocommunication Services, Geneva, 27 May 2011	
11:30	**Session 2: Impacts of PLT on radiocommunication services** *(Chairman: Mr. Raphael de Souza, Chairman of ITU-R Working Party 1A)* **11:30 - ITU-R deliverables and working documents** *(Mr. Reiner Liebler, ITU-R Working Party 1A Rapporteur on PLT issues)* **11:45 - Case Study – PLT impacts on aeronautical services** *(Mr. John Mettrop, Chairman of ITU-R Working Party 5B)* **12:00 - Case Study – PLT impacts on broadcasting services** *(Mr. Charles Einolf, Representative of ITU-R Study Group 6/Working Party 6A)* **12:15 - Case Study – PLT impacts on radio astronomy** *(Mr. Masatoshi Ohishi, Representative of ITU-R Study Group 7/Working Party 7D)*

6 Co-operation of PLT-SDOs on compatibility with Radiocommunication Services (3)

ITU Forum on Technical Compatibility between Power Line Telecommunication systems (PLT) and Radiocommunication Services, Geneva, 27 May 2011	
14:30	**Session 3: Let´s get compatible** *(Chairman: Mr. Ahmed Zeddam, Chairman of ITU-T Study Group 5)* **14:30 - What can regulators do?** *(Mr. Reiner Liebler, Federal Network Agency, Germany)* **14:50 - What should PLT stakeholders do?** *(ATIS/NIST)* **15:10 - What should radiocommunication stakeholders do?** *(Mr. Peter Chadwick, IARU Technical Consultant)*
15:45	**Final Session: Panel Discussion – Next steps to be taken** *(Chairman: Mr. Robin H. Haines, Chairman of ITU-R Study Group 1)* **Panel members: HomeGrid Forum (Mr. Matt Theall), IEEE (*), Home Plug Powerline Alliance (*), IEC (*), National Regulator (Mr. Raphael de Souza), ITU-R Study Group 5 (Mr. John Mettrop), ITU-R Study Group 6 (Mr. Christoph Dosch, Chairman), ITU-R Study Group 7 (Mr. Masatoshi Ohishi), ITU TSB (Mr. Bilel Jamoussi), ITU BR (Mr. Fabio Leite).**
	* name of the representative to be confirmed

7 Final Remarks: (1)

Two main messages:

1) Using frequencies above 80 MHz for PLT is a major concern for radiocommunication stakeholders

➔ Work on protection criteria to be finalized as quickly as possible in ITU-R

7 Final Remarks: (2)

2) Establishing radiocommunication protection criteria and developing appropriate interference mitigation tools/methods to achieve compatibility **are only preconditions** for keeping/achieving compatibility between radiocommunications and PLT in frequency bands below and above 80 MHZ.

➔ In order to keep/get actually "compatible" : Protection criteria and mitigation tools/methods are to be taken into account by

"**all PLT standardization organizations**".