

Understanding the Likelihood and Extent of RF Interference caused by In-Home PLT Devices

Start-up meeting

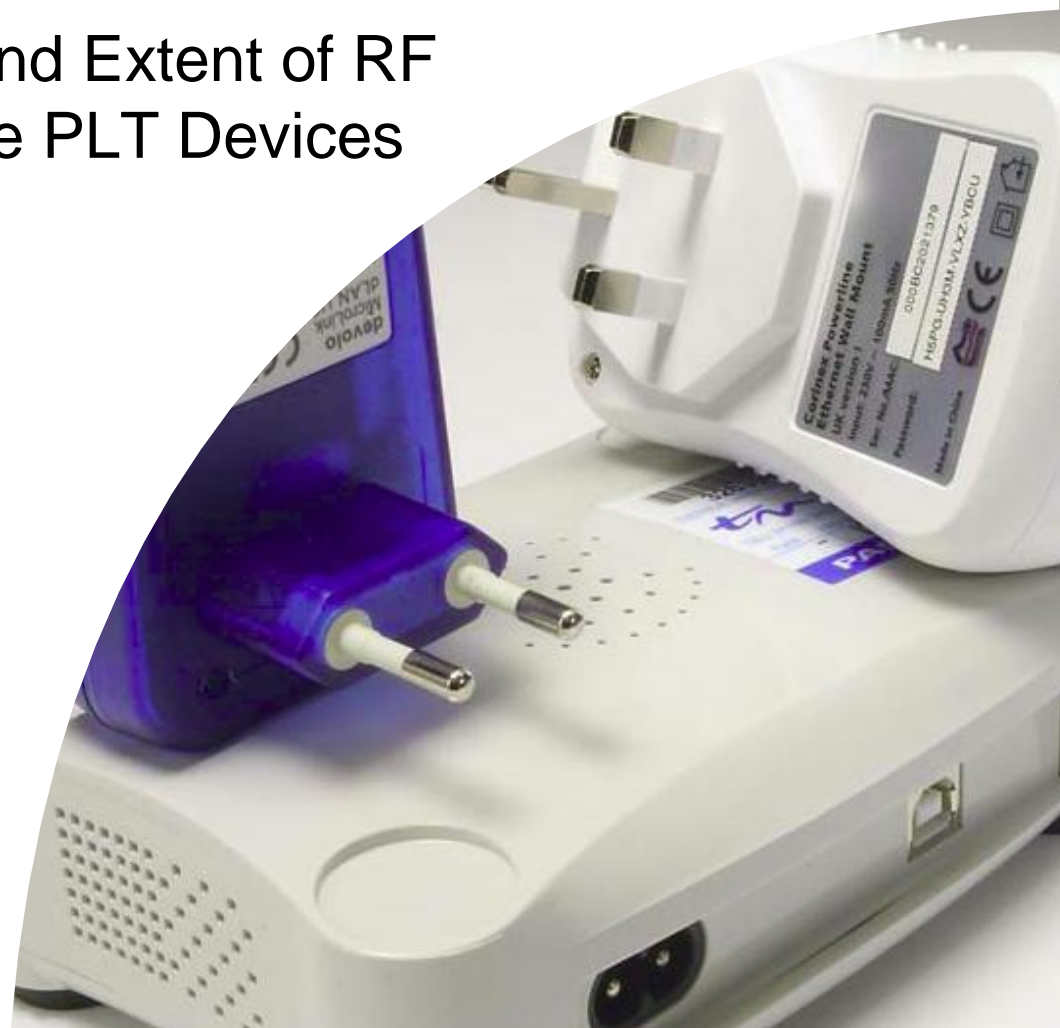
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13 August 2009



Agenda

Introductions	All
Clarify Ofcom's requirements	Ofcom
Confirm PA's approach	PA
Update on progress to date	PA
Discussion	All
Actions	All
Next meeting	

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Study Objective – from Ofcom's ITT

The objective of this study is ...

... to understand the likelihood and extent of radio frequency interference caused by increased use of PLT devices and evolutions of the technology.

A quantitative analysis of expected interference will provide input to any future debate on Ofcom's regulatory duties in this area.



Ofcom estimates there are around 600,000 pairs of PLT equipment in use in the UK. We have received around 140 individual complaints of interference attributed to PLT equipment. All of these complaints are in the process of being investigated or have been successfully resolved. (June 2009)

We the undersigned petition the Prime Minister to require the relevant regulatory authority namely Ofcom to take active and speedy measures to test samples of all makes and types of PLT device and to remove from the UK market all those devices where the sample is found to be non compliant with the requirements of the Electromagnetic Compatibility Regulations 2006. And to take all practicable and necessary steps to prevent anyone placing non compliant PLT devices on the UK market now and in the future. The Department for Business Enterprise and Regulatory Reform and Ofcom are familiar with these devices they being widely distributed by a national communications supplier, various high street stores and on the Internet. These devices are used to transfer electronic data via domestic electrical household wiring and the techniques involved in typical use result in harmful interference to short wave radio reception. [More details](#)

Submitted by Mike Trodd of UKQRM – **Deadline to sign up by:** 24 October 2009 –
Signatures: 2,206

Ofcom needs clear and objective evidence

The exact extent of interference in specific situations needs to be identified

Ofcom can then work with stakeholders based on a rational assessment

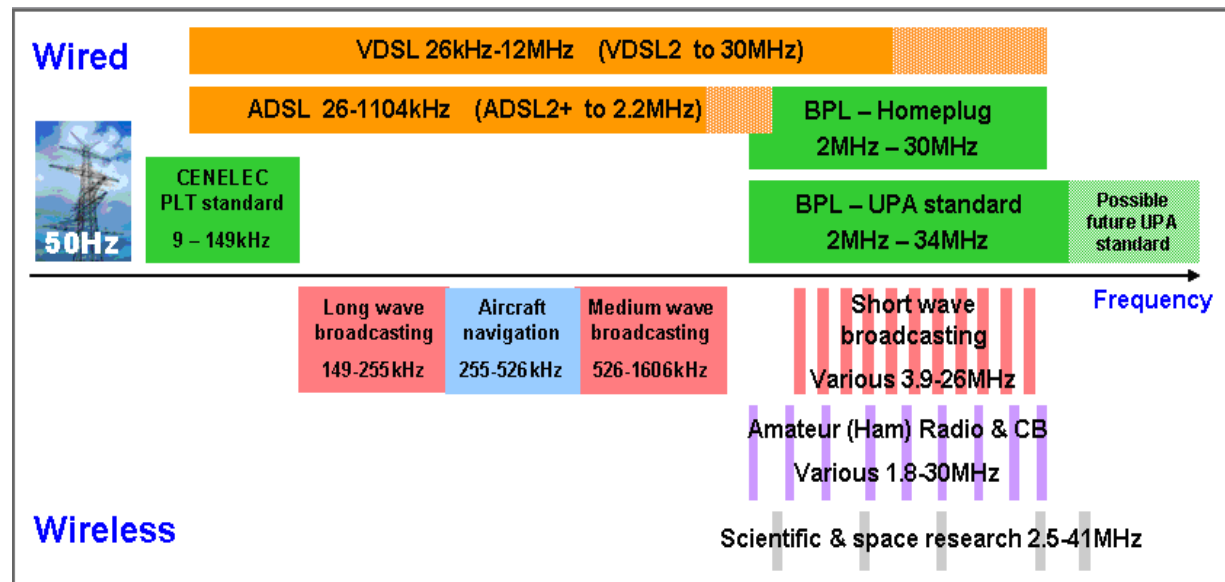
Ofcom's identified work items

By way of guidance, the following work items are suggested:

- *A study of the relevant trends, developments and roadmaps of PLT devices, covering new and emerging technologies and standardisation activities*
- *A study of the options for home networking, including wired Ethernet, WiFi and PLT based approaches, in order to understand under what circumstances PLT networking becomes attractive (or necessary) to users*
- *Derive scenarios covering possible future deployment densities of PLT devices*
- *A modelling activity, to simulate and quantify the interference effects of PLT devices for each scenario*

Confirm potential Victim Systems to be considered

- Emergency communications
- Short wave broadcasting
- Land stations for trans-oceanic aviation and offshore marine
- Military and diplomatic communications
- Amateur & CB radio
- Frequency references and time signals
- Scientific research, including radio astronomy
- **On-site paging**
- **Analogue cordless phones**



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Project plan

Task	Activity	Aug-09				Sep-09				Oct-09				Nov-09			
	Start-up & Data Gathering																
2.3.1	Start-up meeting	X															
2.3.1	Desk research on PLT device characteristics																
2.3.1	Discussion with PLT industry for future trends																
2.3.1	Identifying potential victim systems																
2.3.1	Review of previous measurements and analysis																
	Developing Usage & Density Scenarios																
2.3.2	Develop usage scenarios for in-home devices																
2.3.2	Characterise usage of potential victim systems																
2.3.3	Forecast future take-up of in-home PLT																
2.3.3	Characterise co-location of PLT and victim																
	Interference Modelling																
2.3.4	Characterise interference between systems																
2.3.5	Perform statistical modelling for usage scenarios																
	Sensitivity Analysis & Mitigation																
2.3.6	Perform sensitivity analysis																
2.3.7	Comment on mitigation options																
	Reporting & Delivery																
	<i>Draft Final Report - Month 3</i>																
	Final report updates																
	Prepare model for delivery																
	<i>Final Report & Model - Month 4</i>																
	Meetings with Ofcom	X							X					X			X

Proposed deliverables

- A draft Final Report after approximately 3 months that includes:
 - Information on PLT devices, trends and roadmaps
 - The scenarios for usage of in-home and victim systems
 - PLT device density scenarios, including reasoning behind the predictions
 - Initial results from the interference modelling activity
- A Final Report after 4 months for publication, accounting for comments on the draft Final Report and containing the following additional items:
 - Final results from the interference modelling, including sensitivity analysis
 - Commentary on viability of potential mitigating actions
 - An extended executive summary for use in Ofcom's Annual Research Report
- Interference model user files developed and applied during the study
- One or more outbriefing sessions as agreed with Ofcom (if required)

Team & Working Arrangements

[X] s.40	[X] s.40	Overall quality assurance
[X] s.40	[X] s.40	Assignment manager and day-to-day contact
[X] s.40	[X] s.40	Scenario definition & technical analysis
[X] s.40	[X] s.40	Scenario definition & technical analysis
[X] s.40	[X] s.40	Market forecast review

Working arrangements:

- 2-weekly reports on progress, issues and planned actions
- Deliverable review meetings in line with Project Plan

Ofcom contact:

- **[X] s.40**

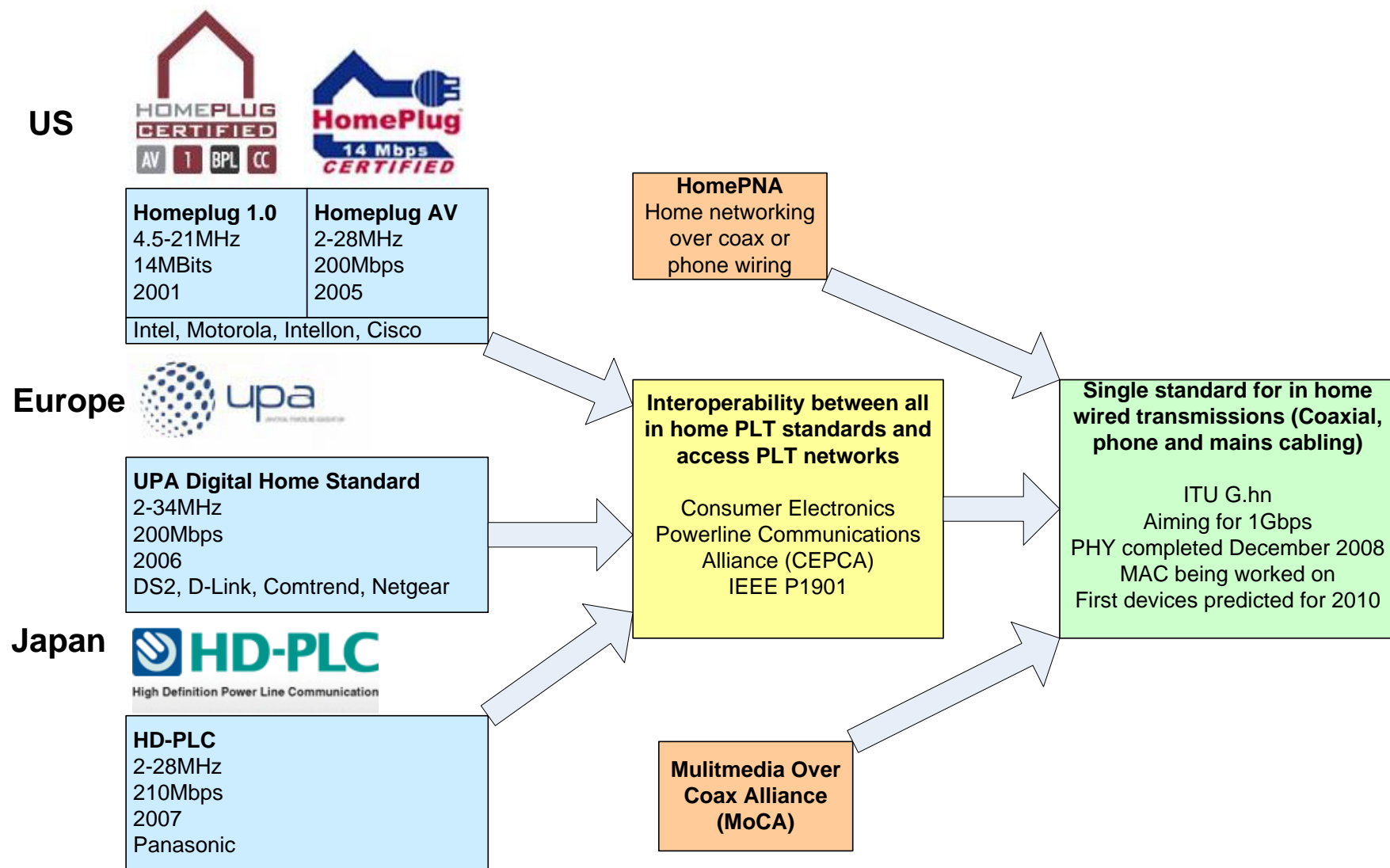
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Progress against Project Plan

Task	Activity	Aug-09				Sep-09				Oct-09				Nov-09			
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In-Home PLT Device Standardisation Roadmap



In-Home PLT devices available in the market

Typical search results for PLT products:

- 40 at DABS
- 25 at Amazon
- 15 at PC world
- Price range from £32 - £125
- Data rates 14Mbps, 85Mbps, 200Mbps
- Belkin device due shortly claiming 1Gbps
- Not just a niche vendors. Netgear and Belkin are selling PLT devices



Different types of in-home networking PLT devices available:

- Single Ethernet connection and hubs
- Power line or coaxial
- WiFi access points
- Built into ADSL modems
- Part of multimedia packages like BT Vision



Initial view of PLT User Scenarios

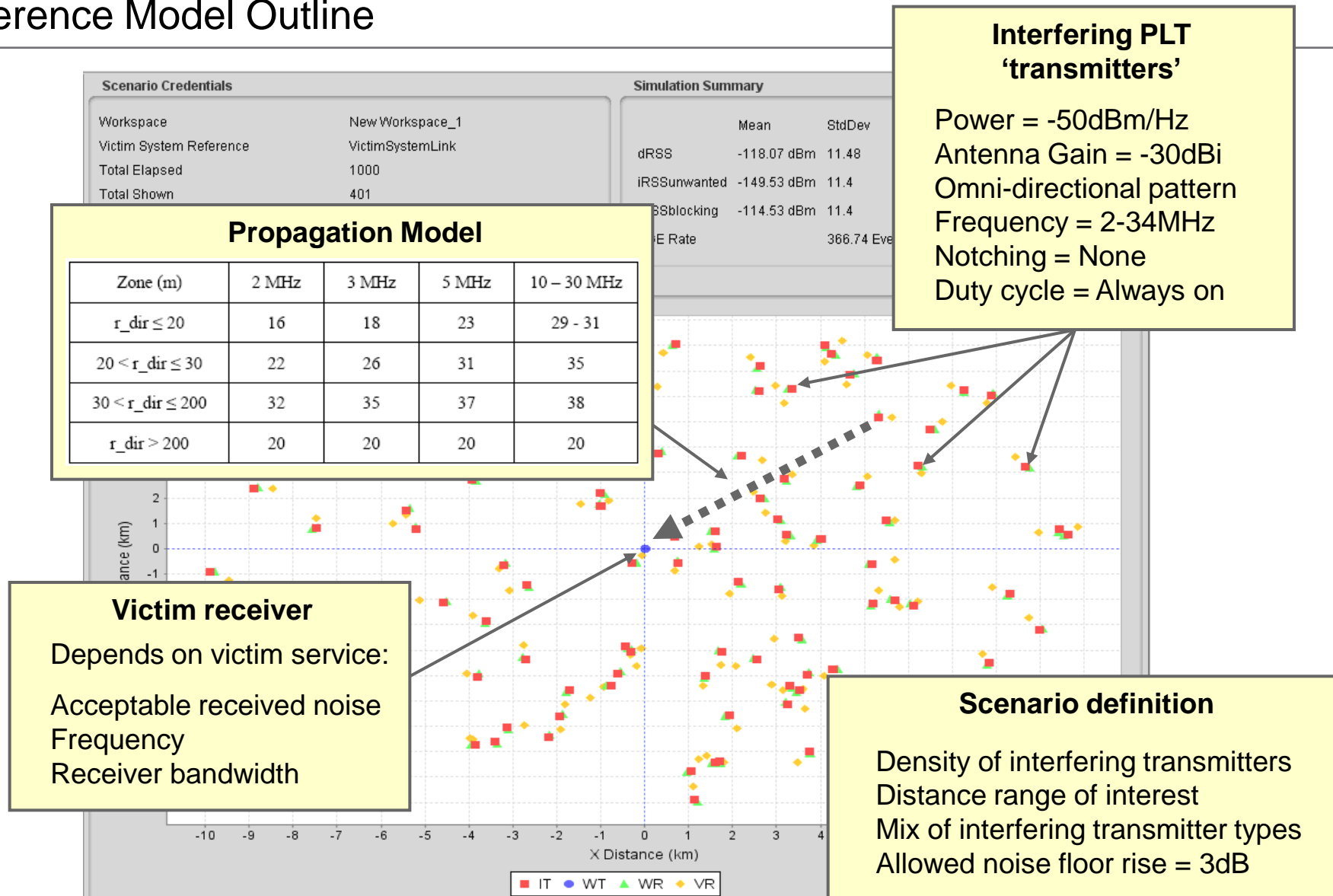
Name	Description	Usage characteristics
Broadband In Every Room	Connecting the internet to one or more PCs that are not co-located with the modem. WiFi has it sown up at present but can PLT make inroads?	7.3 hours broadband use per week average (Forrester, 2008). Mostly PC desktop applications with some video streaming
Wired For Sound And Vision	Early adopter of technology networking the PC, TV, stereo, Xbox etc. together. Sharing a broadband connection is the main motivation so overlaps with above	Content stored on or streamed to one device being played on a different device e.g. MP3 files on PC played on HiFi, or BBC iPlayer to TV
The Home Teleworker	A mini-LAN for working at home with PC, printer, modem, file server etc. Non-work devices likely to be on same network	Brings the work laptop home at least once a week to use on the home LAN
The Automated Home	Embedded / autonomous networked devices such as smart meters, security, health monitors.	A market that is not yet as developed as the others. Likely usage patterns are periodic at low overall data rates

Depending on PLT device behaviour, interference caused may be independent of scenario

Initial view of Victim Scenarios

Name	User profile	Correlation with PLT use	Characteristics of equipment interfered with
Shortwave Listener	A small minority amongst broadcast listeners so probably quite keen. Listens to mostly foreign stations	Similar locations and probably similar hours	AM receiver, probably multi-band. Migration to DRM starting
Radio Amateur	Tech savvy, significant time / money / emotion invested. Vocal and organised in opposition to PLT	Similar locations and probably similar hours	Various, but most common is SSB Tx/Rx, multiple bands.
Professional user – Marine & Aviation	Full-time trained operating staff with expert technical back up. Controlled environment with funding available	Low – immediate area probably has little PLT	SSB or AM Tx/Rx
Professional user – Military & Diplomatic	Full-time trained operating staff with expert technical back up. Controlled environment with funding available	Military low as above, Diplomatic may be higher	Not known. Approach MoD?
Scientific user – Radio Astronomy	Academic researcher or commercial lab technician, good technical expertise	Low – immediate area probably has little PLT	Rx only, power detection only? Very sensitive Rx with high gain antennas
Scientific user – Time & Frequency Standards	Academic researcher or commercial lab technician, good technical expertise	Smaller premises may be at risk from neighbours	Off the shelf receivers, sensitivity to interference not known

Interference Model Outline



Outline Report Structure

Executive Summary

1. Introduction

2. Background, Objectives and Scope

3. PLT Devices & Characteristics

3.1 Device Characteristics

3.2 Standardisation and Future Trends

4. PLT Uptake in the UK

4.1 Applications

4.2 Competing Technologies

4.3 PLT User Scenarios

4.4 Forecast PLT device Deployment

5. Potential Victim Systems

5.1 Usage of Affected Spectrum in the UK

5.2 Interference Characteristics for Victim Systems

6. Interference Simulations

6.1 Method & Assumptions

6.2 Results

6.3 Sensitivity Analysis

7. Conclusions on Likelihood and Extent of Interference

8. Possible Mitigation Options

9. Recommendations

Appendices

A: PLT Device Characteristics

B: Standardisation Status

C: Victim System Characteristics

D: Interference Model Details

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Questions and Assumptions

- Can we discuss (with vendors and industry groups) that we are doing this study for Ofcom?
- What future time horizon should be considered for the study?
- Are there any other parts of Ofcom that should be involved in this study? Do we have access to the teams who produced previous Ofcom PLT reports? Are they relevant?
- Is Ofcom able to provide access to the ITU G.hn specification?
- Are there particular victim systems that Ofcom wish to prioritise?
- Can Ofcom supply data on numbers of potential victim systems by frequency band and service?
- We will not consider secondary users (e.g. CB) as they are not protected from interference
- Ofcom's recent announcement refers to 600,000 pairs of PLT equipment and 140 complaints. What is the source of the numbers and is more information available such as how equipment was installed and being used, the level of interference experienced?
- We will not conduct any protocol level simulation of interference
- What is the latest regulatory position on PLT and its EMC/interference limits?

Start-up Meeting Objectives Checklist

- Clarify Ofcom's Requirements
- Confirm the approach
- Agree format of deliverables
- Provide update on progress to date
- Agree key assumptions
- Obtain relevant information from Ofcom