

Progress in CISPR/I, EMC of multimedia equipment Theory and practice !

Martin Wright, Chairman CISPR I
March 28 2007



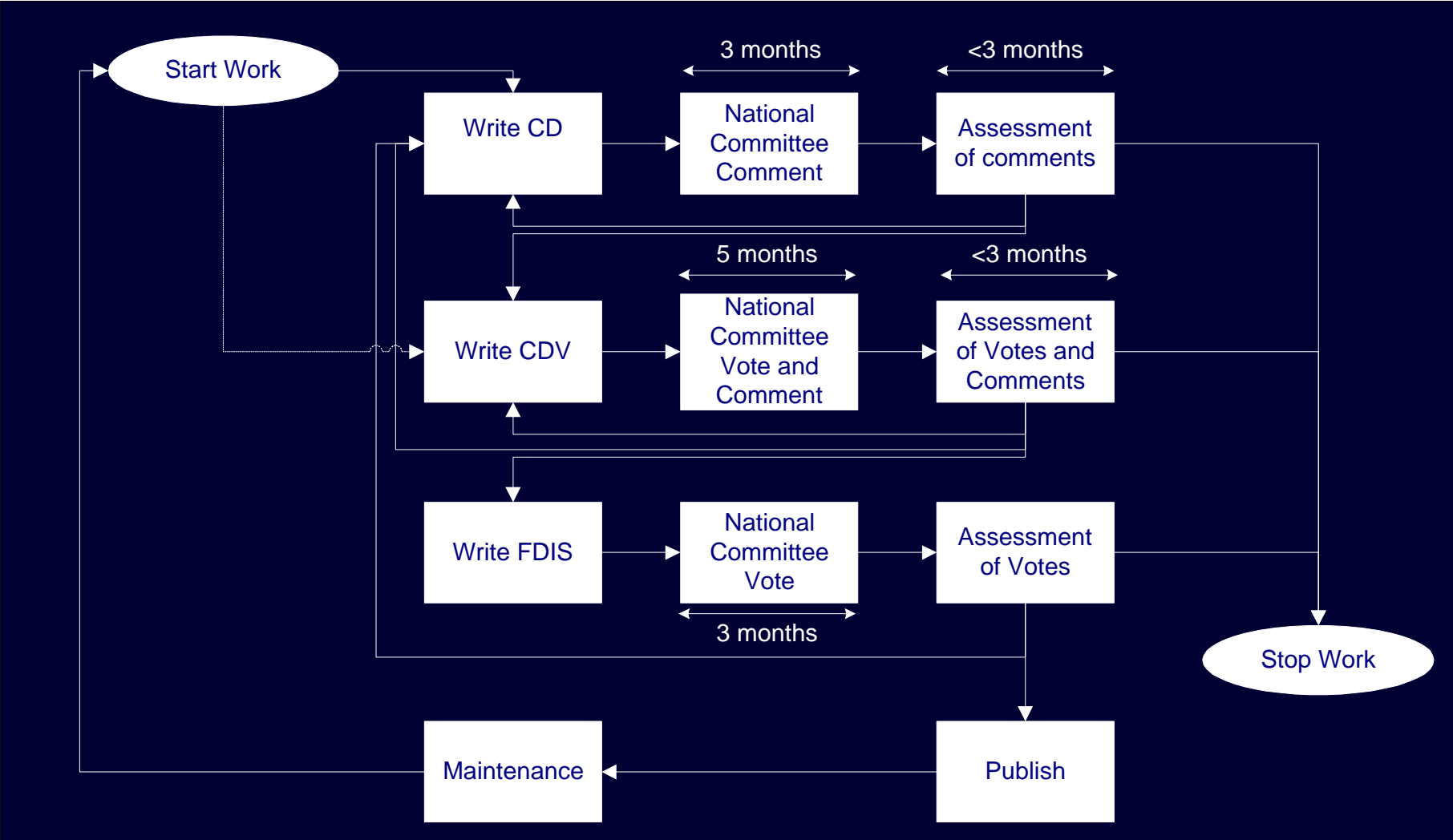
Summary

- Standard development process
 - A bit of background
- Multimedia Standards
 - Why do we need them ?
- Multimedia Emissions
- Multimedia Immunity
- Conclusions

EMC Standardisation Principles

- The standard shall be
 - A Product Standard
 - Technology Independent
 - Based on equivalent probability of interference
 - Ease the use of new technology
 - End user friendly
 - Timely
 - Democratically agreed
 - Useable

CISPR Standardisation Process



Development of Multimedia Standard

- Technology Convergence Issue Raised in late 1990s
- Example
 - Internet Ready TV
 - EMC requirements- CISPR 13 and CISPR 20
 - PC with Broadcast Reception card
 - EMC requirements- CISPR 22 and CISPR 24
 - Requirements Fairly Similar, Test Methods quite diverse
 - Performance criteria quite diverse
- CISPR I set up in 2001 from CISPR E and CISPR G
 - Set up WG 2 - Multimedia (Convenor R Storrs, Secretary D Traver)
 - 2003 added WG4 - Multimedia Immunity (Convenor J Davies, Secretary C Verholt)

Scope of Multimedia Standards

- Replacement for existing standards
 - CISPR 13, CISPR 22
 - CISPR 20, CISPR 24
- Options
 - Combination of existing standards **rejected**
 - New start, best practice across the board **agreed**
 - Choices from a menu of methods **agreed**

CISPR 32 Emissions from Multimedia Equipment

- Key Documents
- CISPR I 84 NP closed 21/11/2003
- CISPR I 146 DC closed 22/4/2005
- CISPR I 157 INF circulated 20/5/2005
- CISPR I 187 CD closed 23/6/2006
- CISPR I 196 CC circulated 14/7/2006
- CISPR I 205 Q closed 27/10/2006
- CISPR I 217 INF circulated 27/10/2006
- CISPR I XXX CD circ Feb 2007

CISPR 32 Emissions from Multimedia Equipment

- Key Documents
- CISPR I 84 NP Result : Work supported
- CISPR I 146 DC Result : 33 pages (250 ish comments)
- CISPR I 187 CD Result : 887 comments
 - 4 WG meetings to sort out and incorporate comments in new version
- CISPR I 205 Q Result: Inconclusive
- CISPR I XXX CD issued Mar 2007

The real standards process CISPR 32

- 1. Someone decides it's a good idea and writes a proposal (Japan)
- 2. The proposal gets voted on (3 months)
- 3. Work starts
- 4. The old arguments surface (class A class B (class C !))
- 5. Some decisions get made (3 meetings – 18 months)
- 6. A first draft is issued
- 7. The NC's make comments (6 months)
- 8. The real work starts (2 years in)

The real standards process

- 9. The NC comments get discussed
- 10. The old arguments surface (Ethernet)
- 11. It's tricky to get consensus
- 12. Some questionnaires get issued
- 13. The responses create confusion instead of clarity (ethernet) (3 months)
- 14. Some new arguments surface because of the new words (Professional equipment)
- 15. A second draft is prepared (2 meetings, 6 months)
- 16. The second draft is issued
- 17. Some NC's who missed the first draft notice and raise whole new issues (3 months)

The real standards process

- 17. The NC's make comments (3 .5 years in)
- 18. The NC comments get discussed
- 19. The old arguments surface (Class A, Class B, Ethernet)
- 20. The new arguments resurface because the new words are never ideal (Professional equipment)
- 21. In order to review draft 2 the NC's read the original standard(s)
- 13. Now we're interpreting both the new and the old standard
- 14. A third draft is prepared (4 meetings, 18 months)
- 15. The third draft is issued (5 years)
- 16. Today and under IEC rules 18 months remain to finish the job !

Remaining Issues

- Testing of Ethernet
- Broadband interferers
- (Class A/ Class B)
- Professional AV Equipment
- Test Methods
 - IEC Directives
 - Options
 - Continuation of existing (OATS, Stripline etc)
 - New best practice (FAR)
 - Combination
 - Choice of options
 - Limit Correlation issue

CIS/I/205/Q Ethernet Questionnaire

Question 1:

Should Ethernet ports with a maximum data rate of 10 Mbit/sec be excluded from the Telecommunication Port Conducted Disturbance requirements? This would apply to **10BaseT** ports.

Answers: Yes: 10 /21 (48%) No: 8 /21 (38%)

Question 2:

Should Ethernet ports with a maximum data rate of 100 Mbit/sec be excluded from the Telecommunication Port Conducted Disturbance requirements? This would apply to **10/100BaseT** ports.

Answers: Yes: 11 /21 (52%) No: 7 /21 (33%)

Question 3:

Should Ethernet ports with a maximum data rate above 1000 Mbit/sec be excluded from the Telecommunication Port Conducted Disturbance requirements? This would apply to **10/100/1000BaseT** ports

Answers: Yes: 9 /21 (43%) No: 8 /21 (38%)

Emissions from Broadband Systems

Definition of Broadband System:

- This limit should apply to all systems which utilise data transmission and/or data processing techniques which utilise broad band techniques. In this context broadband means systems which produce emissions from wanted signals across parts of the frequency band which are wider than 10kHz (where the carrier frequencies are below 30MHz). This definition is intended to include systems which either use frequency hopping or dithered clocks and systems which use spread spectrum techniques.
- Examples: ADSL, ISDN, PLT, Ethernet etc.

CISPR Interference Model

- Key task- protection of radio services
- Process
 - Wanted field strength, Protection Ratio, Emission Limit
 - $E_d = E_w - R_{req}$ where
 - E_d is the wanted field strength in dB(μ V/m)
 - E_w is the disturbance field strength in dB(μ V/m)
 - R is the required protection Ratio
 - R_{actual} can be expressed as a sum of probability functions (in dB)
 - $R_{actual} = \Sigma (p_1 \dots p_n)$
 - $(p_1 \dots p_n)$ are Probability factors

Probability Functions

<i>Description</i>	
P₁	Emitting Antenna Gain (0dB for isotropic antenna)
P₂	Receiving Antenna Gain (6dB default)
P₃	Mobility factor (0 for non mobile receivers)
P₄	Probability that the disturbance source frequency is the same as the susceptibility frequency
P₅	Radiation efficiency factor (6dB exc for broad band systems)
P₆	Factor allowing for Analogue: digital effect
P₇	Time factor (victim service usage)
P₈	Distance factor (based on 30m in domestic environment)
P₉	Service coverage factor (fringe effects)
P₁₀	Attenuation Factor (0dB for internal, 10dB for external)
P₁₁	Situation specific factor

Key Probability Functions for Broadband Systems

- **P₄** Probability that the disturbance source frequency is the same as the susceptibility frequency
- **P₅** Radiation efficiency factor
 - 6dB for analogue systems
 - For broad band systems varies across the band (0-10dB)
 - correction is -6 to +4 dB for broad band systems
- **P₁₀** Attenuation Factor
 - Based on radiated field interference
 - 10dB protection for internal to building, 0dB for external



Timeline CISPR 32

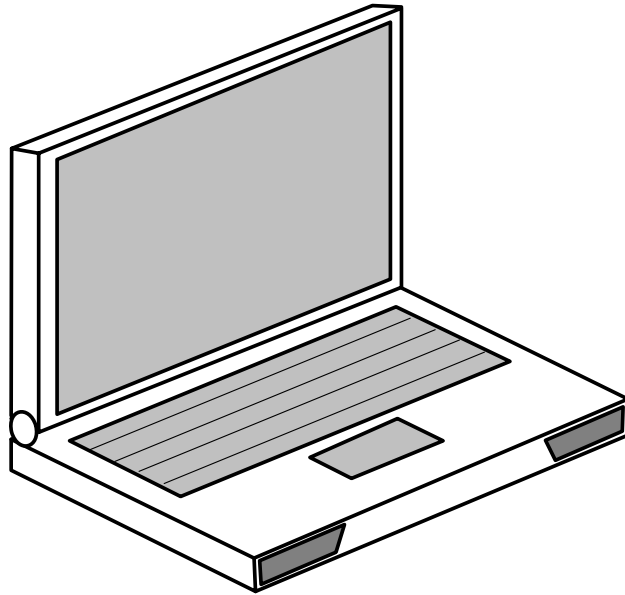
- Proposed (best case) timeline
- CD 3 months – June 2007
- CDV preparation- 3 months September 2007
- CDV translation – 2 months- November 2007
- CDV vote 5 months April 2008
- FDIS preparation 3 months August 2008
- FDIS vote 2 months October 2008
- Likely to take at least 6 months more April 2009
- 5 years is up November 2008

CISPR 35 Immunity of Multimedia Equipment

- Key Documents
- CISPR I 111 NP closed 3/9/2004
- CISPR I 190 DC closed 23/6/2006
- CISPR I 197 INF circulated 14/7/2006
- 2 WG meetings to prepare CD
- CISPR I XXX CD circulates Mar 2007

CISPR 35 Remaining Issues

- Conversion from Equipment based to Function based
- Preparation of Annexes
- Correlation between Annexes
- Minimising Test costs
 - IEC Directives



Option 1

Test as a laptop

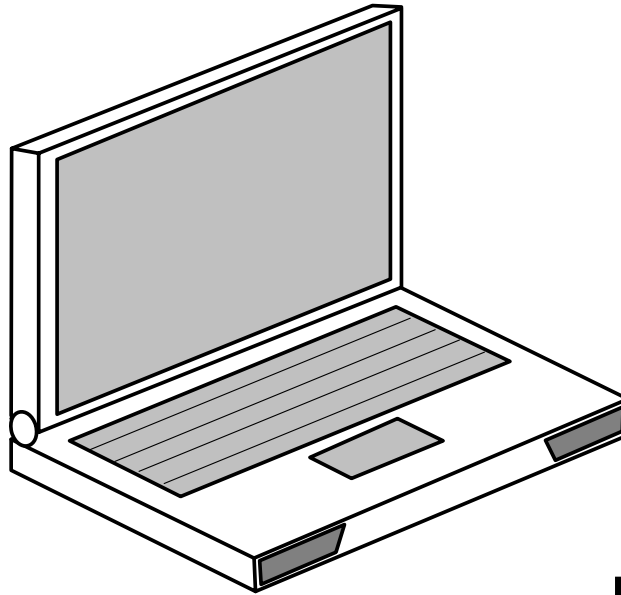
Display

Data
processor

Option 2

Data
Input

Function based



Phone
call

Sound
Reproduction

Data
storage

Timeline CISPR 35

- Proposed (best case) timeline
- CD comment 3 months – June 2007
- 2nd CD preparation- 9 months March 2008
- CD comment 3 months June 2008
- CDV preparation 3 months September 2008
- CDV translation – 2 months- November 2008
- CDV vote 5 months April 2009
- FDIS preparation 3 months August 2009
- FDIS vote 2 months October 2009
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Conclusions

- Replacing CISPR 22/13 is a major undertaking
 - Not helped by the faults in CISPR 22/13
 - NC's comment and vote based on perceived gains/losses rather than technical accuracy
 - We are making solid progress (maybe !)
- Replacing CISPR 24/20 is a major undertaking
 - See above
- The major battle (implementation) is in the future
 - 10 years after agreeing telecomms port testing in CISPR22 no one has yet implemented it solely for non technical reasons.

Thank You



Any Questions ?

Martin Wright, Chairman CISPR I

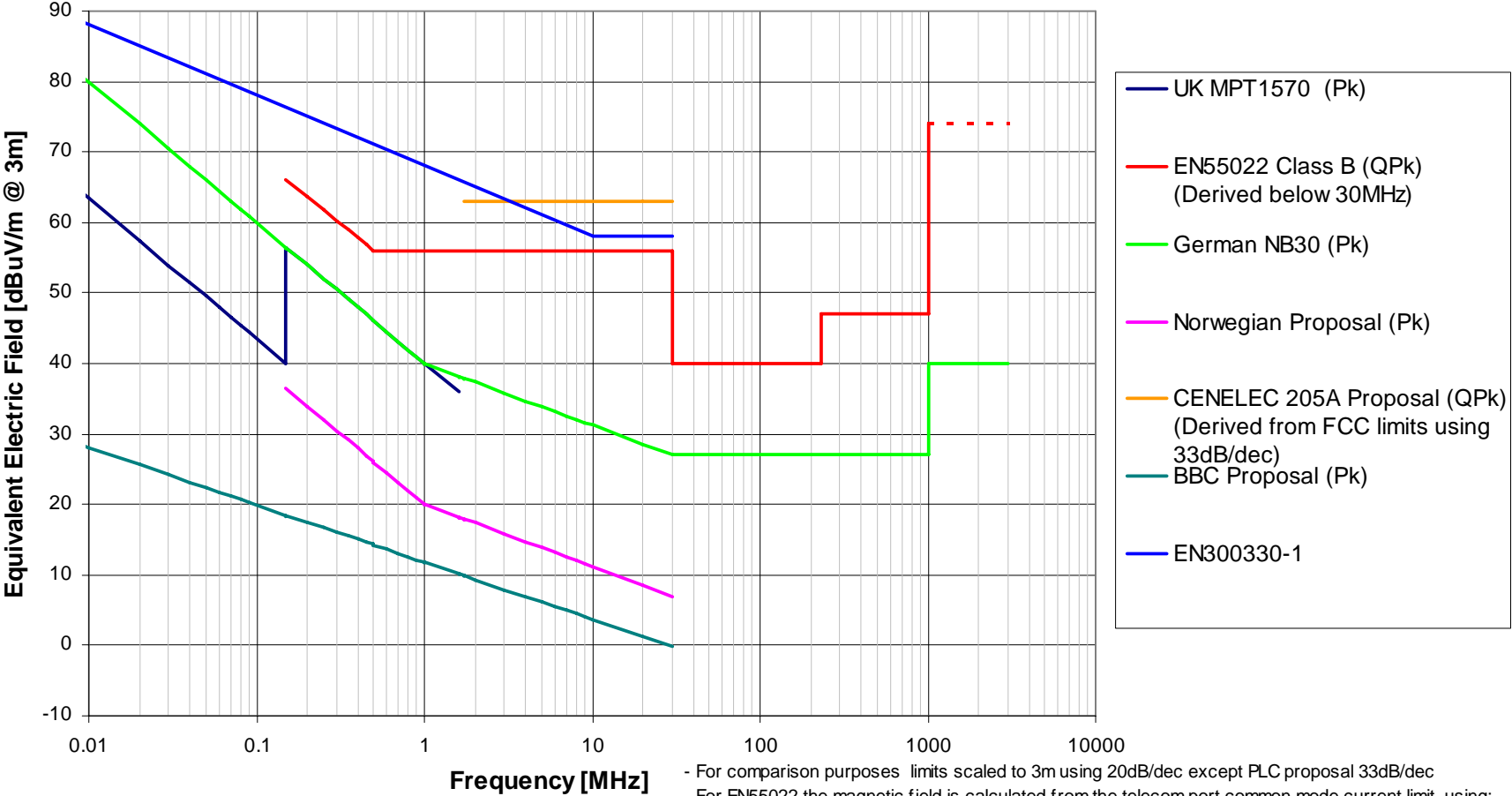


Emission/ Immunity

- Emission standard much more advanced
 - CD expected this year
- Immunity standard began this year
 - will be based on CISPR 24 structure
- Co-ordination issue
 - Same scope
 - Same definitions

- Concentrate on emissions here on in

Limit Proposals (Aug 2003)



- For comparison purposes limits scaled to 3m using 20dB/dec except PLC proposal 33dB/dec
- For EN55022 the magnetic field is calculated from the telecom port common mode current limit using:

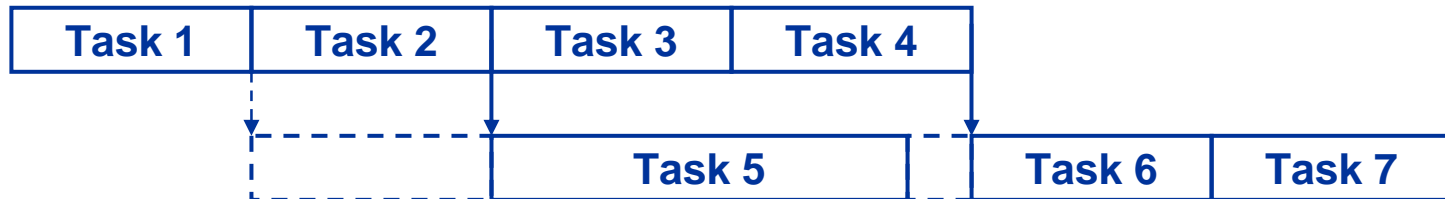
$$H = I / 2 \cdot \pi \cdot r$$
 where $r = 3m$
- H-field limits converted to E-field using the far field correction of 51.5 dB



PLT Documents issued by CISPR I

- CIS/I/7/DC issued 17 August 2001
 - 16 pages of comments covers all broadband- no support (impact on existing systems and evidence of interference cases questioned)
- CIS/I/26/DC issued 21 December 2001
 - 16 pages of comments mainly editorial and applicable limits
- CIS/I/44/CD issued 12 July 02
 - 28 pages of comments mainly on limits and test methods questions on applicability of LCL and LCL values (CIS/I/63/CC, 13th December 2003)
- CIS/I/89/CD issued 14 November 2003
 - 29 pages of comments mainly on limits and test methods, more questions on applicability of LCL and LCL values (CIS/I/102/CC, 23th April 2004)
- CIS/I/143/INF issued 21 January 2005

CISPR I PT on PLC (BPL) Work plan



- **T 1:** Describe the typical electricity installations where it is intended to connect PLC equipment
- **T 2:** For each typical section of electricity installations described in Task 1, identify the potential disturbed services/equipment
- **T 3:** For each equipment/service listed in Task 2, assess the level of protection currently provided by the CISPR22
- **T 4:** Set radiated and conducted limits for emissions of each typical section of electricity installation when PLC is operating i.e section of a PLC installation
- **T 5:** For each typical section of PLC installation, develop a measuring method for testing PLC equipment in laboratory that predicts emissions on installations
- **T 6:** For each typical section of PLC installation, set limits for the tests of PLC equipment in laboratory
- **T 7:** Regroup the typical PLC sections into a limited number of classes.

Main Stakeholders

- Regulators
 - DTI etc
- Wireline Operators
 - Broadband and powerline
 - BT, EDF etc
- Equipment Manufacturers
- Broadcasters
 - EBU, BBC etc.
- Standards Bodies

CENELEC-ETSI JWG issued prEN 50471

- Product Family Standard for the Network
 - Limits based on EN55022
- Terminal Equipment must meet own product family standard (EN55022 etc.)
- Parallel Vote in ETSI and CENELEC
 - Needs to pass both votes
- Closing date- 16th December 2005