IEEE P802.11
Wireless LANs

Consultation Document

Short Range, High Data Rate, Nomadic Equipment

operating in the frequency range 5.150 to 5.875 GHz

Date: October 29, 1999

Author: UK Radio Communications Agency

Abstract

Radio frequencies between 5.150 GHz and 5.875 GHz are becoming available for RLANs. The Agency aims to manage use of these frequencies so as to promote innovation in services and technologies, maximise user benefits and competitiveness gains and promote the development of e-commerce.

The Agency believes that the direction of development should be driven by needs of the market in terms of cost, required service and accessibility of the technology concerned.

In particular the Agency is seeking views on:-

- whether only interoperable systems should be permitted to use the spectrum or whether other systems, only capable of co-existence, should also be allowed in;
- whether only private systems should be permitted or whether public systems should also be allowed;
- determining the best way to allocate the available spectrum.

The closing date for this consultation is Friday 28 January 2000.

Radiocommunications Agency

Consultation Document

Short Range, High Data Rate, Nomadic Equipment operating in the frequency range 5.150 to 5.875 GHz

Summary:

What is an RLAN?

An RLAN is a radio local area network. That is, it is a high bandwidth, two way data communications network using radio as the medium of transmission rather than optical fibre or copper cable and operating over a limited geographic area.

Recent technological and economic developments have led to a new emphasis on the development of computer networks. Inevitably, as a result of the parallel growth of mobile communications, there is great interest in the possibility of mobile computer networks, that is to say, computer networks where the end user is free to move within the network (for instance within a building) or from one computer network to another.

What do RLANs do?

RLANs provide communication between many types of mobile[1] and nomadic[2] terminals. These provide a range of communication services only imagined a few years ago and, the likelihood is, that in the future they will provide communications for yet more novel services.

HIPERLANS are a subset of RLANs that enable both co-existence and interoperability between differing manufacturers' equipment.

These new services have the potential to revolutionise the provision of IT services in business and domestic premises by improving access to a wide range of services. Wireless technology offers a more straightforward method of providing high bandwidth connection between IT equipment. RLANs could support a range of new services, including educational networks, video mail and video telephony, interactive museum guides and distributed database (intranet) services, bringing them into the office and home.

Radio frequencies between 5.150 GHz and 5.875 GHz are becoming available for RLANs. The Agency aims to manage use of these frequencies so as to promote innovation in services and technologies, maximise user benefits and competitiveness gains and promote the development of e-commerce.

What is this consultation about?

The Agency believes that the direction of development should be driven by needs of the market in terms of cost, required service and accessibility of the technology concerned.

In particular the Agency is seeking views on:-

- whether only interoperable systems should be permitted to use the spectrum or whether other systems, only capable of co-existence, should also be allowed in;

- whether only private systems should be permitted or whether public systems should also be allowed;

[1] mobile - can be used on the move and/or whilst stationary
[2] nomadic - normally used whilst stationary and switched off when on the move

- determining the best way to allocate the available spectrum.

1 INTRODUCTION

1.1 An RLAN is a radio local area network. That is, it is a high bandwidth, two way data communications network using radio as the medium of transmission rather than optical fibre or copper cable and operating over a limited geographic area. Recent technological and economic developments have led to a new emphasis on the development of computer networks. Inevitably, as a result of the parallel growth of mobile communications, there is great interest in the possibility of mobile computer networks, that is to say, computer networks where the end user is free to move within the network (for instance within a building) or from one computer network to another.

1.2 RLANs provide communication between many types of mobile[3] and nomadic[4] terminals. These provide a range of communication services only imagined a few years ago and, the likelihood is, that in the future they will provide communications for yet more novel services.

1.3 RLANs provide mainly short range wireless communication links for nomadic, small size, high data rate terminals. RLANS provide greater bandwidth capacity than can be expected from third generation (3G) cellular services, but will not match the bandwidth capacity expected from fixed services like those expected to operate around 28 GHz and 40 GHz. RLANs permit the short range use of a wide range of applications, many of which are similar to those likely to be found in longer range Broad Band systems.

1.4 Within the RLAN family, HIPERLANs (HIgh PERformance Radio Local Area Networks) are a subset in which both co-existence and inter-operability factors are defined such that equipment and systems from different manufacturers and suppliers can be expected to function and communicate with one another. *It should, however, be noted that HIPERLAN Types 1 and 2 are separate and different standards within that subset and, as such, will not interoperate with each other.*

1.5 The Agency believes that the direction of development should be driven by needs of the market in terms of cost, required service and accessibility of the technology concerned.

1.6 In order to ensure this market can develop the Agency seeks to determine the best way to use the radio frequencies:-

i) 5.150-5.350 GHz and 5.470-5.725 GHz which are in the process of being allocated[5] in Europe to HIPERLAN,
and

ii) 5.725-5.875 GHz, an Industrial, Scientific and Medical band, which has also been allocated[6] in Europe to non-specific short range devices, which could include RLANs.

1.7 The purpose of this document is to set out the current state of development of standards

[3] mobile - can be used on the move and/or whilst stationary
[4] nomadic - normally used whilst stationary and switched off when on the move
[5] by the Conference of European Posts and Telecommunications (CEPT) the Europe wide Radio Regulators Group totalling some 43 Administrations)
[6] by CEPT Recommendation CEPT/ERC/REC 70-03

for short range, nomadic equipment designed to operate at these frequencies and to consult widely on the appropriateness of current plans and the direction that future planning should take. This area of technology is only now emerging and assumptions made by manufacturers and others involved in equipment and standards development need to be tested.

1.8 The document poses the following questions. The background behind each can be found later in this document.

Q1 HIPERLAN Type 1 and HIPERLAN Type 2 are each open interoperability standards produced by representatives of manufacturing industry, application designers and potential users. It is currently Agency policy that RLANs in the bands 5.150-5.350 GHz and 5.470-5.725 GHz should be restricted to HIPERLAN equipment complying with the relevant ETSI specification. Is there a case for the development of a parallel co-existence standard (HIPERLAN Type 0?) based only on simple radio parameters to allow proprietary equipment to share the bands on a licence exempt basis?

Q2 If HIPERLAN Type 0 is not adopted by ETSI for European wide introduction is there a case for the UK to develop and introduce such a standard on a UK only basis?

Q3: Given the diversity of potential uses, what are the likely applications for these bands, what development issues remain unresolved, and when and how will services be introduced?

Q4: It is currently envisaged that HIPERLAN compliant services will be private system use only. Is there a requirement for public access systems in these bands, what kind of systems would be envisaged, and how should they be regulated?

Q5: Within the HIPERLAN family of standards, HIPERLAN Type 1 and HIPERLAN Type 2 systems are technically incompatible, therefore how best should these bands be assigned, given the aim of frequency assignment is to ensure that the maximum numbers of users get appropriate and fair access to spectrum for their applications? In considering this it should be borne in mind that these devices are likely to be incorporated into Recommendation 70-03 which will permit their movement across national borders and their licence exempt use across CEPT.

1.9 Comments are hereby invited on this document. The closing date for the receipt of comments is Friday 28 January 2000 and all comments should be sent to the address given at the end of this document.

2 SCOPE

2.1 This consultation covers the radio frequency bands 5.150-5.350 GHz, 5.470-5.725 GHz and 5.725-5.875 GHz.

2.2 It aims to consult industry and potential users on the scope of the services available or intended to be made available in these bands and the applications that are appropriate.

2.3 Its objective is to explore the opportunities that the 5 GHz bands present to industry and the public and to validate the Agency's strategy for development.

3 BRIEF HISTORY OF HIPERLAN AND ISM BANDS

3.1 HIPERLAN has been in development since mid-1991 when a number of hi-tech companies (many of them UK based) conceived the idea that a European standard for nomadic, small size, high bandwidth, high quality application, data terminals was the next step in mobile communications.

3.2 They pursued this idea in the European Telecommunications Standards Institute (ETSI) and this led, in January 1992, to the formation of a new technical sub-group of the Radio and Equipment Standards (RES) technical committee, titled ETSI RES-10. RES-10 met regularly to develop the standards, and in 1996 the HIPERLAN Type 1 standards were published.

However it became apparent towards the conclusion of this work that HIPERLAN Type 1 would not cater for connection to ATM[7], IP[8] and other emerging networks. A further development process began leading to HIPERLAN Type 2, which will address these types of network connection.

After that broadband technologies were grouped together under ETSI Project Broadband Radio Access Networks (BRAN) which is currently responsible for the development of standards for HIPERLAN Type 2 and other associated HIPERLANs. It should be noted that HIPERLAN Types 1 and 2 are separate and different standards and, as such, will not interoperate with each other.

3.3 The frequency band 5.725-5.875 GHz is allocated on a world-wide primary basis to ISM applications which, by nature, are non-communications services and therefore are unregulated by Wireless Telegraphy legislation. Many of these may use high powers and hence have the potential to cause interference to any communication services. As a result, the additional allocation in Europe has been restricted to non-specific short range devices operating at a maximum power level of 25 mW. The details of this are set out in Recommendation 70-03.

4 FREQUENCY BANDS

4.1 The frequency bands in question are:

a) 5.150 GHz to 5.350 GHz;
b) 5.470 GHz to 5.725 GHz;
c) 5.725 GHz to 5.875 GHz;

4.2 Bands a) and b) above are in the process of being allocated in Europe to HIPERLAN - this is expected to be adopted in a CEPT European Radio Committee (ERC) Decision, in December. This has followed long and very detailed studies into the sharing issues by the CEPT Spectrum Engineering Group (SE) Project Teams SE24 and SE28.

Band a) is allocated for use with up to 200 milli-Watt (mW) maximum mean Effective Isotropic Radiated Power (EIRP) for indoor use only. Band b) is allocated for use with up to 1 Watt (W) maximum mean EIRP for indoor and outdoor use.

[7] Asynchronous Transfer Mode
[8] Internet Protocol

The draft ERC Decision also specifies that to operate in bands a) and b), most HIPERLANs should implement appropriate measures to limit output power and to uniformly spread HIPERLAN traffic over the available channels. The ERC Decision will be reviewed within two years of its coming into force in order to examine the market development of HIPERLANs and the consequential impact on other services in the bands. The operational conditions for HIPERLANs in these bands may be amended in the light of such a review.

4.3 Band c) is an ISM band. It should be noted that the primary use of this band is for non-communications equipment. In most CEPT countries it has been opened to short range devices operating in accordance with the standard I-ETS 300 440 which is a basic radio co-existence specification, and the UK is currently considering doing likewise. It is in this band that short-range, high bit rate services not conforming to the HIPERLAN standards may be used.

4.4 The spectrum sharing issues in these bands are very complex and extremely contentious and involve a number of terrestrial/satellite and mobile/fixed services.

5 ISSUES OF STANDARDISATION

5.1 The Case for Open Standards

5.1.1 European standards and regulations remove barriers to trade whereas those produced nationally frequently include different (even slightly different) requirements which prevent equipment being marketed generally in all European countries. European standards provide a climate in which a piece of equipment may be manufactured in one European country, have its conformance established in another, and subsequently be installed and used in all European countries.

5.1.2 The harmonisation of standards across Europe and further beyond is even more beneficial. As the nature of economics and telecommunications changes it is more and more common for equipment to be designed and manufactured for a large market encompassing many countries. This is especially true where telecommunications and information technology (IT) merge together. IT is already a global market and it is uneconomic for manufacturers to produce a number of variants to account for different frequency allocations for the radio element of a product. It is, therefore, logical for regulators to reflect this and the fact that operators and users in one country are likely to obtain equipment from a number of sources not restricted to any one country, but rather dictated by financial and economic considerations.

5.1.3 With these facts in mind, whenever new technological ideas appear which have a potentially wide international, or at least European, market there are advantages in seeking widely accepted standards which, where possible, have an associated harmonised frequency allocation.

5.2 Co-Existence and Interoperability

5.2.1 The physics of radio dictate that the basic minimum for co-existence of systems in the same band, especially under licence exempt conditions, is a standard that stipulates the

fundamental radio parameters which all devices must conform to.

5.2.2 An interoperability standard is one where the set of parameters mandated are such that the Medium Access Control layer of the network is common to all equipment and therefore interworking between the products of different companies is possible.

5.3 ISM band

5.3.1 Co-existence requirements only are applied to the 5.8 GHz ISM band in the form of the standard I-ETS 300 440. Maximum power limits for short range communication devices in this band are low and the pre-existence of ISM devices operating in the band militate against the imposition of an interoperability regime.

5.4 HIPERLAN

5.4.1 From the start of development an open interoperability standard has been the preferred option of many of the major organisations[9] involved in HIPERLAN. HIPERLAN is essentially geared towards the provision of networking since proprietary standards were thought to be a barrier to market development because they prevent interworking between the products of different companies. The nature of networking is such that users want products that are sourced from a number of suppliers, and any product that cannot handle communications from a variety of equipment is unlikely to be viable.

5.4.2 An environment involving only a minimum co-existence standard, which would allow manufacturers more freedom in equipment design to develop proprietary standards, is an alternative approach to that detailed above. However, thus far in Europe there has been little formal interest in such a standard for the HIPERLAN bands. As a result there is no co-existence standard for these bands in Europe and non-HIPERLAN equipment is therefore barred from operation, even if its radio parameters were to be such that co-existence was possible. In the US the equivalent frequency allocation in the 5 GHz band has been made on a co-existence basis.

5.4.3 The Agency wishes to canvass the views of the industry on this important issue which may be key to the development of services in these bands.

5.4.4 For comparison it is instructive to look at developments in the 2.4 GHz ISM band, which is a band also used for wireless networking and where communication devices must conform to the minimum radio co-existence standard ETS 300 328. While proprietary equipment has been developed and marketed, the industry itself has, on a world-wide basis, worked to produce interworking standards via the IEEE[10] 802.11 committee in the US and through the Bluetooth[11], HomeRF and other initiatives.

5.4.5 ETSI Project BRAN is working in close co-operation with the IEEE 802.11 committee and the Japanese MMAC-PC[12] which are developing standards for both the 2.4 GHz and 5 GHz spectrum allocations made by the FCC and Japanese MPT respectively. There are many joint industry members within these standards groups and joint meetings are held

[9] these include Apple, Lucent, IBM, Motorola, Nokia, Ericsson, Sony, Dassault, Daimler-Benz,
[10] Institute of Electrical and Electronic Engineers
[11] See www.bluetooth.com
[12] Multimedia Mobile Access Communication-Promotion Council

regularly in the interests of developing harmonised standards.

5.5 HIPERLAN Type 0

5.5.1 As has been said before HIPERLAN Types 1 and 2 are separate and different standards, which will not interoperate with each other. However HIPERLAN Type 1 and 2 can co-exist at the same location in the same frequency band by using different channels. The HIPERLAN Type 2 protocol selects the channel for use to enable uncoordinated sharing among HIPERLAN systems.

5.5.2 Since there will already be two standards in the bands in question it is now reasonable to approach the issue of whether other proprietary equipment should also be permitted access to these frequency bands. It would be possible for ETSI BRAN to develop a parallel co-existence standard (HIPERLAN Type 0?) based only on a simple common subset of parameters to allow proprietary equipment to share the bands. The parameters would need to take into account the restrictions placed on the existing HIPERLAN standards to protect other users of the bands.

5.5.3 To enable sharing with other incumbents in these bands the HIPERLAN Type 2 standard will require equipment to operate transmitter power control and a signal spreading algorithm. This requirement would need to be included in any other HIPERLAN standard developed in the future. It is being considered as a modification to the HIPERLAN Type 1 standard.

Question 1:

HIPERLAN Type 1 and HIPERLAN Type 2 are each open interoperability standards produced by representatives of manufacturing industry, application designers and potential users. It is currently Agency policy that RLANS in the bands 5.150-5.350 GHz and 5.470-5.725 GHz should be restricted to equipment complying with the relevant ETSI specification.
Is there a case for the development of a parallel co-existence standard (HIPERLAN Type 0?) based only on simple radio parameters to allow proprietary equipment to share the bands on a licence exempt basis?

Question 2:

If HIPERLAN Type 0 is not adopted by ETSI for European wide introduction is there a case for the UK to develop and introduce such a standard on an UK only basis?

6 STANDARDS

6.1 The equipment standards for HIPERLAN Type 1 are EN 300 652 and ETS 300 836, and the relevant EMC standard is ETS 300 826. In the absence of any published standards, information on HIPERLAN Type 2 is contained in technical report TR 101 032.

6.2 For the 5.8 GHz ISM band the relevant equipment specification is I-ETS 300 440

6.3 From 8 April 2000 conformity assessment for radio equipment will fall under the Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive 99/5/EC (this replaces the current radio type approval and EMC type examination regimes). It is likely that the standards mentioned above will form the basis of harmonised standards

under this Directive. The Directive does however allow manufacturers the choice of either complying with these harmonised standards and self declaring compliance, or having a technical construction file assessed by a Notified Body, or manufacturing products under a quality system that has been assessed by a Notified Body. The latter two routes to compliance do not require the manufacturer to have used the harmonised standards.

6.4 In order for the Agency to define the necessary characteristics of equipment that can be used we plan to publish what is called an interface regulation. Interface regulations are high level descriptions of how the spectrum should be used. The will contain requirements related to intentional transmissions in allocated frequency bands but will not prescribe technical interpretations of the essential requirements of the R&TTE Directive.

More details of the standards can be found in Annex 1.

7 BIT RATES

7.1 HIPERLAN Type 1 offers a bit rate of up 20 Mbit/s for asynchronous services and 2 Mbit/s for time bounded services using a channel bandwidth of 23.5 MHz.

7.2 HIPERLAN Type 2 will offer bit rates of typically 25 Mbit/s (up to a maximum of 54 Mbit/s) and provides compatibility with IP, ATM and UMTS infrastructure network standards as well as enabling ad-hoc connection using IEEE 1394. The channel bandwidth will be 20 MHz.

7.3 HIPERLAN Type 2 devices could not easily co-exist with HIPERLAN Type 1 devices because of their quality of service criterion.

More details can be found in Annex 1.

8 APPLICATIONS

8.1 The applications to which RLAN technologies are applied are the key feature that will determine the future of these services and hence the use made of the radio spectrum. However, until now it has been extremely difficult to predict which directions application development will take. The views of the industry are sought in this important area. The nature of applications deployed in these bands will determine the regulatory regime that should be applied. Hence it is important for the Agency to obtain accurate information.

8.2 The following suggested list is not intended to be an exhaustive list of potential applications for these bands. It is a sample of possible examples and is intended to stimulate comment:-

1) Straightforward office RLANs, connections to servers, printers and other devices
2) Home networking, distributing an incoming telecom or broadcast service within the home
3) Automated airport check in
4) Train information to railway passengers on trains or platforms
5) Bus information to passengers at bus stops or on board buses
6) Educational networks e.g. National Grid for Learning for inexpensive network distribution within schools

7) ISP (internet service provision)-{public or private?}
8) V -mail (video mail) and video telephony
9) Temporary network facilities during conferences
10) Interactive museum guide for visitors
11) Distributed database services
12) Home or community CCTV Security
13) Any interactive high data rate service

Question 3:

What are the likely applications for these bands? What development issues remain unresolved? When and how will services be introduced?

9 PRIVATE SYSTEMS AND PUBLIC ACCESS SERVICES

9.1 The applications destined to operate in these bands will be a major factor in the final licensing and frequency assignment policy designed for the bands. An appropriate policy will do much to aid the success of services. To be successful the regulatory regime will reflect the requirements of those designing and operating applications and services, and also protect the end user.

9.2 Current plans for these bands are based on the assumption that all services deployed will be private[13] systems operating on the same or a similar basis to fixed local area network facilities. Hence a regime of licence exemption has been proposed. No assumption has been made of the presence in these bands of any type of third party or public access services. With this consultation document the Agency is seeking to verify whether this is still an accurate reflection of the potential uses to which this part of the radio spectrum may be put.

9.3 In the United Kingdom a Wireless Telegraphy Act (WT Act) licence exemption[14] permits the use of 5.15-5.3 GHz spectrum for HIPERLAN Type 1. This licence exemption applies to private mobile radio systems only.

9.4 It is proposed to extend licence exemption to the 5.150 to 5.350 GHz, 5.470 to 5.725 GHz HIPERLAN bands and the 5.725 to 5.875 GHz ISM band since the individual licensing of a wide range of computer equipment does not seem desirable or practicable and would serve no useful administrative purpose.

9.5 It should however be noted that licence exemption does not currently apply to public[15] communications systems, which operate on an entirely different basis.

9.6 Certain applications that are likely to be proposed for this service may turn out to involve third party communications. An example of this is provision of internet access. RLAN technology will certainly support access to and interconnection with the internet either on the basis of distribution throughout a private network or as third party distribution for public access. While a private system providing internet access would be permissible under current policy, local area provision to third parties would be forbidden. The

[13] a private system is one which is self provided, self used with a closed group of users
[14] Statutory Instrument (SI) Number 930 1999
[15] a public system is one which is provided for the use of others

Agency is aware that at present there is no spectrum provision for local area public access to the internet. This consultation seeks to establish whether it would be advisable and desirable to permit public access to this service in these bands.

9.7 RLAN applications would also need to be licensed under the Telecommunications Act (1984). The type of licence required would depend on whether the systems being run are for the provision of service for self use or to third parties.

Question 4:

Is there a requirement for public access systems in these bands? What kind of systems would be envisaged? How should they be regulated?

10 ASSIGNMENT OF HIPERLAN SPECTRUM

10.1 The band 5.725-5.875 GHz is an ISM band. Recommendation 70-03 permits it to be used for non-specific short range communications at EIRPs up to 25 mW. It is not envisaged that this band is suitable for anything other than private, self-provided, low power systems.

10.2 At the moment the HIPERLAN bands are not partitioned - the draft ERC Decision allows HIPERLAN Type 1 and HIPERLAN Type 2 to use all of both bands although some features have been made mandatory on HIPERLAN Type 1 (other than in 5.150-5.250 GHz) and HIPERLAN Type 2 to minimise the potential for interference to other services.

10.3 It is anticipated that the Decision will be incorporated into Recommendation 70-03 which will permit cross-border movement of these devices and their licence exempt use across the CEPT. However, the two bands have different power limits. In addition equipment conforming to HIPERLAN Type 2 cannot interoperate with HIPERLAN Type 1 equipment and the two systems could not, therefore, co-exist at the same location on the same channel.

10.3 Consequently a range of different applications involving a variety of equipment, some of which is incompatible in operation and cannot co-exist will have access to these frequency bands. This raises the issue of potential band partition. There are any number of permutations of options that may be considered, however the main options are as follows:

1	No partitioning of the bands.	All services co-exist on a licence exempt basis. No public access services are permitted
2	No partitioning of the bands.	All services co-exist on a licence exempt basis. Public and private systems are permitted to co-exist. However co-ordination and interference resolution is the responsibility of the operator and third party customers are not guaranteed access to spectrum at all times.

3	Bands are partitioned on the basis of public access/private system requirements.	Public access systems require licences and are co-ordinated. Private systems are licence exempt and uncoordinated.
4	Bands are partitioned on the basis of HIPERLAN Type 1 and 2 but not on public/private basis	All systems are licence exempt and uncoordinated.

Question 5:

How best can these bands be assigned? The aim of frequency assignment is to ensure that the maximum numbers of users get appropriate and fair access to spectrum for their applications.

11 INTERFERENCE RESOLUTION

11.1 Under the licensing exemption regime envisaged for all of the above services it is not RA practice to provide interference resolution. For licence exempt services it is very difficult to search out and resolve any interference problems beyond cases involving blatant illegal transmission. Potential users should therefore take due account of this when designing and implementing systems.

12 RESPONSES TO THE CONSULTATION

Comments by e-mail on this document should be sent to:

5ghzconsultation@ra.gtnet.gov.uk

Comments in writing should be submitted to:

Annette Henley
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11G/6A Wyndham House
189 Marsh Wall
LONDON E14 9SX

Or to

Jeanne Grey
Communications and Information Industries Directorate
Department of Trade and Industry
151 Buckingham Palace Road
LONDON SW1W 9SS

If you have any queries concerning this consultative document please contact Annette Henley on 020 7211 0181

Please note that the responses to the consultation will be published on the RA website. If you wish to make a response that you would prefer to have treated in confidence please make this clear and your wishes will be respected. Please separate any confidential material into a clearly marked annex.

Unconditional permission for publication will be assumed unless the author openly states otherwise and any copyright attached to responses will be assumed to have been relinquished unless it is expressly reserved.

It would be helpful if lengthy written documents could be supplied on disk (preferably Word 6 format) for placement on the RA web site. Additional copies of this document can be obtained by contacting the Information and Library Service of the Radiocommunications Agency.

This consultation document is also being published on the Internet. The address of the web site is:

http://www.radio.gov.uk/

13 DATE OF REPLY

The closing date for this consultation is Friday 28 January 2000.

If you require any additional copies of this document please contact

Radiocommunications Agency Library
Wyndham House
189 Marsh Wall
LONDON E14 9SX
Tel: 020 7211 0507/0505.

Annex 1

A1 Equipment Standards:-

Published ETSI documents are available free of charge from the ETSI web site at:

http://www.etsi.org/

HIPERLAN Type 1
The equipment conformance standards for HIPERLAN Type 1 are:-
EN 300 652 "HIgh PERformance Radio Local Area Network (HIPERLAN) Type 1;Functional Specification"
and
ETS 300 836 "HIgh PERformance Radio Local Area Network (HIPERLAN) Type 1; Conformance Testing Specification".

The relevant EMC standard is ETS 300 826.

HIPERLAN Type 2
For HIPERLAN Type 2 the technical report is:-
TR 101 032 "Broadband Radio Access Networks (BRAN); HIgh PERformance radio Local Area Network (HIPERLAN) Type 2; Requirements and architectures for broadband wireless access".

5.8 GHz ISM band
The relevant specification for 5.8 GHz ISM devices is:-
I-ETS 300 440 "Radio Equipment and Systems (RES); Short Range Devices (SRDs); Technical characteristics and test methods for radio equipment to be used in the 1 GHz to 25 GHz frequency range.

A2 Bit rates

HIPERLAN Type 1
This offers a bit rate of up 20 Mbit/s for asynchronous services and 2 Mbit/s for time bounded services using modified GMSK (Gaussian Minimum Shift Keying) modulation and providing compatibility with ISO 8802.3 Ethernet and ISO 8802.5 Token Ring standards. Channel bandwidth is 23.5 MHz.

The standard consists of a physical layer (PHY) and a medium access control layer (MAC) interfaced by a channel access mechanism EY-NPMA (Elimination Yield Non-pre-emptive Priority Multiple Access).

HIPERLAN Type 2
This will offer bit rates of typically 25 Mbit/s (up to a maximum of 54 Mbit/s) and provides compatibility with Ethernet, IP, ATM and UMTS infrastructure network standards as well as enabling ad-hoc connection using IEEE 1394. The modulation scheme will be OFDM (Orthogonal Frequency Division Multiplexing). The channel bandwidth will be 20 MHz.

The standard consists of a PHY layer and a DLC (data link control) layer. The DLC corresponds to the second layer of the OSI model and comprises the MAC and the LLC (logical link control)

layers.

HIPERLAN Type 2 devices could not easily co-exist with co-located HIPERLAN Type 1 devices because of their quality of service criterion.