

**BT response to the Radiocommunications Agency's
Consultation on proposals for Technical Requirements for Short
Range, High Data Rate Equipment operating in the frequency
range 5150 to 5875 MHz - Final Stage**

Submission date: February 15th 2002



Executive Summary

1. BT welcomes this opportunity to contribute to the development of new regulation for the 5GHz bands. We believe this present consultation to be an important element of the broader consultation process now underway that will hopefully realise the full economic and social benefits that licence-exempt spectrum can provide.
2. In that this consultation proposes that access to the 5GHz bands is broadened to allow public “tetherless” access applications, it is welcomed by BT. In conjunction with similar treatment of the 2.4GHz band this will allow a significant step forward in achieving a *Broadband Britain*. Whilst the tetherless market is initially to be found in 2.4GHz, we believe the 5GHz bands will provide space for market growth, higher data rates and innovation in technology and applications.
3. BT was pleased to find that the Radiocommunications Agency had accepted the general principles behind the Recommendations of the UK 5GHz Advisory Group. We believe that operators, manufacturers and potential new players in the licence-exempt bands all supported these recommendations.
4. The close alignment between the 5GHz Advisory Group’s output and RA’s own proposals in this present consultation means that BT’s position, as set out in this document, is generally supportive of the Radiocommunications Agency’s proposals for 5GHz regulation.
5. Notwithstanding our general support, we have found it necessary to highlight a few significant concerns relating to the implementation of the new regulation that we believe need to be addressed before the 5GHz regulation would be successful in stimulating a dynamic 5GHz licence-exempt environment. These concerns relate to terminology, detail of the regulatory proposals and the relationship between UK regulation and the ERC Decision on 5GHz spectrum.
6. BT is particularly concerned over aspects of the regulation relating to the use of *Dynamic Frequency Selection* (DFS). We believe the complexity of the DFS issue, including the lack of an agreed requirement for its functionality, is a risk to the early development of Technology for the UK/European 5GHz market.
7. BT considers that, by mandating a complex DFS requirement for a limited market (because of varying national frequency arrangements, policy and timescales for licence-exempt bands), the present ERC Decision could inhibit or delay a truly competitive market for 5GHz devices. We believe that the UK should show leadership in developing a flexible, phased, approach to achieving the full implementation of DFS as required by the ERC Decision. BT offers some ideas for consideration by the Radiocommunications Agency.
8. BT has identified a range of issues associated with the draft Interface Requirement that accompanied the consultation document. It appears that further attention will be needed to the logical coupling of the requirements of ERC Decision (99)23, the final drafting of the relevant ETSI standards and the UK’s own regulatory text.

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1 Introduction

This response provides BT's views on the technical requirements associated with the forthcoming regulatory changes for the 5GHz licence-exempt bands. This consultation is part of the broader consultation process underway on licence-exempt spectrum, including the use of the licence-exempt bands for public broadband access applications¹. We believe that, with the right regulatory regime, including the enabling of public access applications, the 5GHz bands have the potential to stimulate a significant step forward in the provision of broadband communications services in the UK and the rest of Europe. As such BT welcomes this opportunity to contribute to the early establishment of a new regulatory regime for these bands.

In our response² to the parallel consultation on public access to the licence-exempt bands we stated our strong belief that both the 2.4GHz and the 5GHz bands must be made available without further delay if the licence-exempt bands are to yield the maximum economic and social benefit to the UK. We summarised in that response why we do not consider that a 5GHz only solution will successfully address the currently suppressed "tetherless" market. We believe that access to the 2.4GHz band for public applications will allow the UK to respond quickly to the existing demanding market for communications, whilst the 5GHz bands will provide scope for growth of this market, broader-bandwidth services and further innovation in technology and applications. Our response to this 5GHz consultation should therefore be taken in that broader context.

BT was pleased to find that the Radiocommunications Agency had accepted the general principles of the Recommendations³ of the UK 5GHz Advisory Group (UK 5GAG) within which BT was an active contributor. We believe that the major issues affecting the future use of the 5GHz band were considered in depth by that group, and that the recommendations were widely supported by operators, manufacturers and potential new players in the licence-exempt bands.

The close alignment between the 5GHz Consultation Group's output and RA's own proposals in this present consultation means that our response, as set out below, is generally supportive of the Radiocommunications Agency's proposals for 5GHz regulation. However we have found it necessary to highlight a few significant concerns that we believe need to be addressed before the 5GHz regulation would be successful in stimulating a dynamic 5GHz licence-exempt environment. Wherever possible we have tried to provide constructive proposals for the changes we believe to be essential. BT's main concerns are discussed in §2 and §3. In §4 we offer general comments on the consultation document, and in §5 we comment on the specific proposals set out in the consultation document. In §6 we turn our attention to the associated draft Interface Requirement that RA has also provided for comment, and BT offers some proposals for changes to that document.

¹ RA Consultation Document on *The use of license-exempt spectrum for provision of public telecommunications services*. October 2001

² BT's Response to the RA Consultation on *The use of license-exempt spectrum for provision of public telecommunications services*. 15th February 2002

³ *Recommendations for the licensing of the 5GHz (5150-5350, 5470-5725 and 5725-5875MHz) frequency bands*. A submission by the UK 5GHz Advisory Group, February 2001.

2 Enabling the European market

The regulation proposed for the UK 5GHz licence-exempt bands has its roots in the ERC “HIPERLAN” Decision⁴ and the draft ETSI Harmonised Standard⁵ for 5GHz high performance RLANs. Together these two documents describe a spectrum, radio regulatory and standards combination that is unique to the European (CEPT) region. A thriving UK 5GHz licence-exempt market therefore depends on the existence of a sizeable and stable market within Europe as a whole.

However, by no means all of the CEPT countries have yet signed up to the 5GHz ERC Decision⁶. Even fewer have considered the public/private regulatory issues to the depth now underway within the UK. BT is therefore concerned that Europe is not signalling a sufficiently well developed spectrum and regulatory regime to encourage the development of the necessary European specific hardware, at least in the short term. BT believes that the UK regulation must help to encourage such a market.

It is clear that the uncertainty over the eventual European market is contributing (along with other issues) to a situation where the availability of devices compliant with the ERC Decision is not making significant headway. Indeed it is now apparent that they attract a lower priority from some major European manufacturers who are now more focused on the greater global potential of IEEE 802.11x technologies. Without suitable 5GHz devices there is little pressure on the administrations to take action, and the problem becomes circular. This is a significant issue, as it makes it rather difficult to envisage a UK/European 5GHz start-up scenario that will benefit from the early availability of low-cost 5GHz hardware.

Nevertheless, we recognise that there are discussions in the IEEE 802.11x committees relating to an IEEE 802.11h variant that would be compatible with the European ERC Decision. BT believes that every attempt should be made to find a way to encourage this co-operation rather than thwart the attempt by over-regulation in the first instance.

⁴ ERC Decision ERC/DEC/ (99)23: *ERC Decision of 29th November 1999 on the harmonised frequency bands to be designated for the introduction of High Performance Local Area Networks (HIPERLAN)*. Entered into force 31st January 2000

⁵ Draft ETSI EN 301 893 V0.h (2002-01) Harmonised EN covering essential requirements for 5GHz high performance RLAN

⁶ 13 CEPT countries have signed, including the UK, but notably France, Germany, Italy, The Netherlands, Spain, The Russian Federation, Sweden and Switzerland are amongst those who have not yet indicated to ERO that they have committed to the Decision. (Source: ERO Web Site, 3/1/02).

3 Dynamic Frequency Selection (DFS)

3.1 General concerns

BT is particularly concerned about the impact on the early availability of devices arising from the requirements within the ERC Decision for *Dynamic Frequency Selection* (DFS).

DFS was introduced as a means of dispersing the aggregate interference from a large number of WLAN devices across as wide a frequency range as possible in order to keep the power spectral density low for the other 5GHz spectrum users (particularly the MSS feeder links). It was for this reason that HIPERLAN was given access to a significant amount of spectrum (455MHz total in bands A and B). As well as spreading the energy, the channel selection mechanism of DFS was required to detect and avoid channels occupied by terrestrial (including aeronautical and maritime) radar systems that share these bands.

The fact that DFS functionality was not fully defined at the time of the ERC Decision has resulted in its functionality becoming a rather open-ended issue. For example, in addition to the detection and avoidance of terrestrial Radars, a suggestion has recently arisen⁷ that DFS might also need the capability to detect and avoid channels that are occupied by EESS systems⁸. The need for, and practicality of, such requirements have yet to be established. With multiple interest parties within the spectrum management community the debate over a solution to the DFS function will undoubtedly broaden still further, and it will probably go all the way to WRC-03 before it is finally agreed.

BT fully agrees that measures are necessary in the medium to long term to protect other spectrum users once the number of 5GHz WLAN devices becomes large. However, we are concerned that DFS is proving to be a challenging “political” and technical topic. The absence, as yet, of any finalised specification for the DFS functionality, and indeed any final consensus over its requirements, is another factor inhibiting the early availability of 5GHz equipment for the European countries. This delay applies equally to HIPERLAN and to any “European” adaptation of the US IEEE 802.11x 5GHz standards.

BT believes that the UK should encourage forward a framework for the definition and approval of DFS that will ensure that all interested parties are consulted (to avoid late objections) and that a technically sound solution is realised with minimum delay.

3.2 Finding a way forward

Perhaps a pragmatic solution to overcoming the immediate barriers would be to approach eventual full compliance with the requirements of the ERC Decision with greater flexibility. The goal would be to provide an interim route forward using such low-cost 5GHz technologies as are, or might soonest become, available.

In this context BT was particularly interested to see Proposal 4 in the consultation document and the associated elements of Table 2.1 in the draft Interface Regulation. To BT, this proposal indicated a welcome willingness by RA to depart from the letter of the

⁷ JPT5GHz document JPT5G (02) 001, *5GHz Issues*, JPT5GHz Chairman, Mainz, 14th-16th January 2002

⁸ Essentially specialised remote-sensing radars on spacecraft

ERC Decision, albeit on a temporary basis, where it was believed to be of general longer-term benefit.

As BT understands the modified dispensation in Proposal 4, devices without DFS and without Transmit Power Control (TPC) would be permitted to operate indoors in the 100MHz wide sub-band 5150-5250MHz. We also interpret the footnote⁹ to Table 2.1 of the IR to indicate that, although ETSI HIPERLAN Standards are referenced, the use of HIPERLAN technology is not mandatory, i.e. there is implicit technology neutrality within the overall technical limits of the UK regulation. This would suggest that the use of IEEE 802.11a devices, for example, which are anyway limited to 50mW in this sub-band in the USA, would be permitted. The proposals also indicate that devices with TPC (but presumably without DFS) can operate at up to 200mW EIRP in the same sub band.

This UK initiative to create an opportunity for technology choice is indeed welcome and supported, but (in its present form) it would result in the initial deployment of all 5GHz devices in just the 4 x 20MHz channels in 5150-5250MHz. Obviously no devices are yet available with the Dynamic Frequency Selection (DFS) functionality required for access to the other spectrum. This would initially concentrate UK emissions in a sensitive area of the 5GHz bands in the Mobile Satellite Service context. However, whilst the number of deployed 5GHz devices is small this would not be a significant problem.

As a further issue, 4 contiguous channels are not believed to be sufficient to allow a competitive tetherless environment to exist, as adjacent (and 2nd adjacent channels at least) channels cannot be used in the same immediate locality¹⁰.

To avoid sharing problems arising in the medium term, BT believes that a further stage of flexibility will be needed within which devices spanning all of Band A (5150-5350MHz) are permitted. This scenario, which could require DFS and TPC (and/or additional power limits) across Band A, is not currently recognised within the ERC Decision.

If DFS was required, BT believes this scenario would encourage the IEEE 802.11x community and the manufacturers to expedite a DFS/TPC version of their now readily available IEEE 802.11a technology. It would still need the functionality of DFS to be defined and agreed (an issue discussed in §3 below), but there could be a greater global will to achieve this. Such devices could have applications in many markets, and hence offer the economies of scale to give low costs as early as possible. This is the key enabler for 5GHz that the present European arrangements cannot offer.

The provision of DFS across Band A only would have a maximum implication of less than 3dB in the power spectral density context (compared to using both Bands A and B), but in practice this difference would be moderated by the effects of Transmit Power Control (TPC). If need be, such “Band A only” devices could be limited to some EIRP value between 100mW and 200mW to compensate for the reduced DFS range. Full power

⁹ See also §6.2.5

¹⁰ Equipment unavailability currently prevents measurements in this respect at 5GHz, but our studies at 2.4GHz summarised in the technical Annex to our response to the Public Access Consultation illustrates the underlying problem.

devices (200mW EIRP) would still need DFS across 330MHz of Bands A and B as per the ERC Decision.

As a final stage of development, the market could expand into Band B as well, and devices would then need to comply fully with the DFS and other requirements of the ERC Decision.

3.3 Summary of general concerns

In summary, BT considers that the present requirements of the ERC Decision, by mandating a regional spectrum arrangement and DFS requirement for an uncertain regional market (because of currently different national regulatory regimes) will delay or inhibit a truly competitive European market for 5GHz devices. These delays are exacerbated by the need to complete the definition of the DFS functionality.

We believe that the UK should consider a flexible, phased, approach to the full implementation of the ERC Decision in the DFS context. We offer the above suggestion for RA's consideration.

4 Comments on the consultation document

4.1 Interpretation of spreading requirements in the ERC Decision

Decides 5 of the ERC Decision states that the DFS associated with the channel selection mechanism (is) required to provide a uniform spread of the loading of the HIPERLAN across a minimum of 330MHz, or 255MHz in the case of equipment used only in the band 5470-5725MHz. The text of the consultation document uses an interpretation of this that can be summarised as follows: -

HIPERLAN 2 equipment operating in Bands A must be capable of operating on all 8-channel frequencies in that band. In addition, it must also be capable of operating over at least 7 carrier frequencies out of the 11 in Band B. Similarly; outdoor equipment operating in Band B (only) must be capable of operating over all 11 channels of that band.

Such wording does not appear in the ERC Decision. The same text did appear in earlier versions of the scope of the draft ETSI EN 301 893 standard, but it has been removed from the latest version⁵. If implemented as written, the DFS system may not provide the most uniform loading across the bands, as it would tend to load Band A and the lower part of Band B more heavily. BT would prefer to see the UK regulation reflect the greater flexibility of the wording of the ERC Decision. We would not wish to see UK-specific spreading requirements as these could significantly increase costs and make roaming difficult.

4.2 Terminology

The draft Interface Requirement¹¹ refers to *Short-range, Broadband, Data Services* (HIPERLAN) to describe the applications. We have concerns here on two counts, the first with the words “data services”, upon which we elaborate in §2.1.1, and the second on the use of the term “HIPERLAN”, which we discuss in §2.1.2.

To avoid the difficulties discussed below BT believes that the UK regulation should be modified to become general and technology neutral, and that the above generic description should be amended to *Short-range Broadband Wireless Communications*.

4.2.1 Applications

The proposed UK text, as written, implies a re-definition of HIPERLAN as *Data Services*, rather than as a family of technical standards. Data services are not appropriate to radio regulation. The original consultation in October 1999 referred to short range, High Data Rate, Nomadic Equipment Operating in the Frequency Range 5.150 to 5.875GHz. This made it clear that the consideration was to be of the technical standards and not the services being provided as such. We believe this was appropriate and would urge the RA to return to this concept.

Furthermore, the use of the words *data services* could imply constraints on the applications for which the 5GHz technologies might be used. This is to be avoided, as the greatest economic and social benefit will be achieved if the licence-exempt technology is used for as wide a range of innovative applications and services as possible. Wireless Local Area Networks (WLANs) and Public Access to IP data services will undoubtedly be core applications in the 5GHz bands. However, the technology may stimulate many other applications, e.g. Home Area Networks, in which the “traffic” may include broadcast content, music, and education material etc, albeit all in a digital format. We believe that the terminology used should encourage a wide diversity of applications rather than imply some kind of constraint.

4.2.2 Use of the term “HIPERLAN”

BT has significant concern over the use of the term HIPERLAN in the manner proposed for the 5GHz regulation.

We believe that the forthcoming UK 5GHz licence-exemption regulation should be technology neutral to the maximum extent possible, commensurate with effective use of the spectrum. To BT, the term HIPERLAN implies a specific family of WLAN technology standards being developed within the ETSI standards framework. HIPERLAN has its own specific physical layer technical characteristics that differentiate it from other WLAN technologies, and its name is certainly not a “technology neutral” expression. For example, HIPERLAN uses a time-slot reservation protocol to support applications, e.g. voice, with QoS requirements (it is effectively connection orientated), whereas the IEEE 802.11x

¹¹ [Draft] UK Interface Requirement 2006: *Short Range, Broadband, Data Services (HIPERLAN) operating in the frequency range 5-6 GHz*

family of standards uses carrier-sense multiple access (like Ethernet) that is better suited to Internet access applications. The different WLAN technologies are each optimised for different types of WLAN traffic and applications, and they are not all the same thing. They cannot collectively be referred to as HIPERLAN.

We appreciate that the enabling ERC Decision⁴ is worded in terms of HIPERLAN. Decides 1 of the that Decision states “*that for the purposes of this Decision High Performance Radio Local Area Networks (HIPERLAN Types 1 and 2) shall mean equipment complying with the relevant European Telecommunications Standards*”. This wording is clearly very specific to HIPERLAN, and could be perceived as a barrier to technology neutrality. We do not believe that the linkage between the ERC Decision and the UK 5GHz regulation should be established via a blurring of the understanding of the term HIPERLAN, as currently arises.

ETSI BRAN has indicated that the *relevant European Telecommunication Standards* mentioned above would be those defined in (draft) EN 301 893 (i.e. the Harmonised Standard under the R&TTE Directive). In the latest draft of this standard⁵ the scope has been broadened and now covers *HIPERLAN 2 and other high performance RLAN equipment*, i.e. the standard is now deemed to be generic for 5 GHz RLANs rather than being specific to HIPERLAN. The reference to HIPERLAN within the brackets in *Decides 1* of the ERC Decision could therefore be considered to be obsolete. For this reason also the technology specific association with HIPERLAN should not therefore propagate into new UK regulation.

BT also believes that a colloquial usage of the term HIPERLAN could cause confusion outside the UK (even within CEPT Europe), and especially in the US and Japan. For example, the Japanese *HiSWAN* standard has been made very similar to the ETSI technical definition of HIPERLAN 2. HiSWAN is currently being promoted in Europe with reference to this HIPERLAN synergy. However, the requirements for TPC and DFS do not apply in Japan, therefore they are not currently included in HiSWAN. The US IEEE 802.11 Community and the ETSI BRAN committee are together exploring possibilities for the technical convergence of HIPERLAN and IEEE 802.11 5GHz standards. To try to use HIPERLAN as a generic term could risk undermining these complex discussions.

Finally, it is possible that in future ETSI might legally protect the HIPERLAN name, just as they have recently done with *UMTS*. This could cause a number of significant problems for UK regulation if it is worded as currently proposed.

BT believes that the use of the term HIPERLAN should be avoided within the UK 5GHz regulation. If a generic term must be used, the expression “high performance wireless LANs” might prove less technology specific. However, BT does not believe such a descriptor is necessary.

4.3 DFS and Radar avoidance

The Radar avoidance requirement is not raised in the Decides of the ERC Decision but appears only in its *noting b*). BT was concerned to see this, as yet technically undefined, requirement mandated in the draft Interface Requirement (Table 2.1). Furthermore BT believes that the present wording of the UK requirement “*shall prevent co-channel*

operation with Radars”, taken literally, could be interpreted as preventing any 5GHz WLAN operation in any channels also allocated to Radars, irrespective of where the radar and communications systems are located.

The radar detection aspect of DFS is now addressed within the EN 301 893 standard referenced by the draft Interface Requirement, and we believe the UK regulation itself should revert to being general, and not go beyond what is explicitly required by the Decides of the ERC Decision. We would not wish to see the UK locked into UK-specific situations if the general situation changes.

As the issue is now being addressed within the relevant standards, BT believes that references to the specific Radar issue should be removed from the draft UK Interface Requirement. However, we also believe that the UK should take every opportunity to encourage forward the discussions that will lead to an international and inter-Service agreement on a definition of the functionality of DFS.

4.4 *WLANs in the coverage area of a satellite*

In the draft IR there are proposals (in several places in Table 2.1) that Transmit Power Control should apply to *devices under the coverage area of a satellite*.

BT believes that this requirement is incompatible with a licence-exempt environment. This wording was also in earlier drafts of EN 301 893 standard, but has been removed from the latest draft⁵. It does not feature in the ERC Decision.

BT believes that all explicit references to *coverage area of a satellite* should be removed from the draft UK regulation.

5 Comments on the proposals in the main text of the consultation

Proposal 1

The proposals for this frequency range are to make licence exempt a range of equipment providing short range, broadband services in all three bands. The individual technical requirements for operation are different for each band and, when finalised, must be met by ALL equipment operators providing services in these bands.

In principle this is acceptable to BT, subject to the Interface Requirement being modified to accommodate the relevant issues we have raised within this response.

Proposal 2

In Bands A and B all devices will be nomadic/mobile and be compliant to ERC Decision 99(23) and IR 2006.

As written, the words *all devices will be nomadic¹²/mobile* would exclude WLAN access points, and possibly some elements of Home Area Networks, neither of which are

¹² The term “nomadic” is an application defined in an ITU-R recommendation ITU-R F.1399 as “*Wireless access application in which the location of the end-user termination may be in different places but it must be stationary while in use*”

necessarily nomadic or mobile, although they exist within the Mobile Service. These are legitimate devices because the former (access points) are necessary to the existence of many WLAN deployments and the nomadic public access terminals, while the latter (home network elements) are in effect "transportable" and not strictly speaking "fixed". Furthermore, the mandated compliance with the ERC Decision, as stated here, does not recognise the modified dispensation for 5150-5250MHz proposed in Proposal 4 below.

The wording might be modified to read *“In Bands A and B all devices will be associated with the provision of nomadic/mobile and Local Area Network applications operating within the Mobile Service and be compliant to ERC Decision 99(23), subject to the modified dispensation discussed in proposal 4, and IR 2006”*.

Having said this, and given the trend towards fixed/mobile/broadcasting convergence, we believe that excluding the use of standard WLAN technologies meeting the Interface Requirements in a static mode could become inappropriate and not have a clear technical justification.

In Band C equipment compliant with IR2006 may be used to provide fixed services with a maximum EIRP of 2W. Devices compliant to IR 2030 may continue to use this band up to a maximum EIRP of 25 mW.

This provision usefully permits the use of a reasonable band for licence-exempt Fixed Wireless Access (FWA) applications operating in the Fixed Service to complement the Mobile Service applications in Bands A and B. BT believes that this is a convenient way of managing Mobile and Fixed Service applications in the 5GHz licence-exempt bands if (as is likely) the FWA applications need to use different technologies and/or higher EIRP limits than the mobile services. As proposed, both applications areas could then develop without mutual hindrance. BT can therefore support this proposal.

Proposal 3

In addition RA considers that, for the purpose of aiding planning and promoting efficient use of the radio spectrum this band would be an ideal candidate to implement a database showing the locations and other technical parameters of outdoor fixed service stations deployed in this band. It is further proposed that RA would ensure that the information is made publicly available on the database. The identities of operators would not form part of the publicly available material.

The “base station registration” idea was proposed albeit in a more general context (i.e. not just limited to FWA applications in Band C) in the Public Access consultation document. BT is supportive of the concept in that parallel consultation; equally we can support what is proposed here.

We would support the idea of a database of the type proposed.

Proposal 4

In ERC decision 99-23 a dispensation is given for HIPERLAN Type 1 without DFS/TPC. This dispensation allows devices to operate in the band 5150 - 5250 MHz at 200mW EIRP without DFS/TPC. The UK considers that allowing 200mW devices without TPC in this band would discriminate against future devices in the band who have TPC as a mandatory

requirement. Therefore until this decision is reviewed RLAN products without DFS/TPC as standard will be able to operate with a maximum EIRP of 50mW or products with TPC as standard will be able to operate with a maximum EIRP of 200mW. This dispensation applies to indoor only usage in the band 5150-5250 MHz. This proposal will be reviewed at a suitable time after this regulation comes into force.

We refer here to our comments in Section 3.2 above.

6 Comments on the draft Interface Requirements

6.1 General comments

1 Foreword

1.1 The Radio Equipment and Telecommunications Terminal Equipment Directive 99/5/EC (R&TTE Directive) was implemented in the United Kingdom (UK) on the 8 April 2000 by The Radio Equipment and Telecommunications Terminal Equipment Regulations, Statutory Instrument 2000 No. 730. In accordance with Articles 4.1 and 7.2 of Directive 1999/5/EC, this UK Interface Requirement contains the requirements for the use of Short Range, Broadband, ~~Data Services~~ Wireless Communications (HIPERLAN) operating in three bands in the frequency range 5-6 GHz.

BT can support this provision if amended as shown.

1.2 Nothing in this UK Radio Interface Requirement shall preclude the need for equipment to comply with Directive 1999/5/EC.

BT supports this provision.

1.3 It is required by the Wireless Telegraphy Act 1949 that no radio equipment is installed or used in the UK except under the authority of a licence granted by or otherwise exempted by regulations made by the Secretary of State. It is a condition of such a licence or exemption regulations as appropriate that the equipment must meet the minimum requirements specified in this UK Interface Requirement for the stated equipment types and for the stated frequency bands.

BT supports this provision.

1.4 The requirements given in the main body of this UK Radio Interface Requirement will apply in the use of short range, broadband, ~~Data equipment~~ Wireless Communications (HIPERLAN) operating in the frequency range 5-6 GHz, in the UK.

BT can support this provision if amended as shown.

1.5 This UK Radio Interface Requirement will be revised as necessary, for example to follow;

- i) *current technology developments for reasons related to the effective and appropriate use of the spectrum in particular maximising spectrum utilisation; and*
- ii) *changes to the available spectrum allocated for short range, broadband, ~~Data Services~~ Wireless Communications (HIPERLAN).*

BT can support this provision if amended as shown

- 1.6 *All UK Radio Interface Requirements notified under Directive 98/34/EC will be published and will be made available free of charge from the RA Information and Library Service and/or the RA web-site. The addresses for both the Library and the web-site are given on the back cover of this document.*

No comment necessary

- 1.7 *Further information on this UK Radio Interface Requirement can be obtained from the technical enquiry contact given on the back of this document.*

No comment necessary

2 *Minimum Equipment Requirements for Operation within the UK*

- 2.1 *The minimum requirements in this document are made for reasons related to the effective and appropriate use of the radio spectrum, in particular maximising spectrum utilisation.*

No comment necessary

- 2.2 *This UK Radio Interface Requirement gives a high level description of how the spectrum in the UK is used for short range, broadband, ~~Data Services~~ Wireless Communications (HIPERLAN) operating in the frequency range 5-6 GHz. It does not prescribe a technical interpretation of the 'essential requirements' of Directive 1999/5/EC.*

BT can support this provision if amended as shown

- 2.3 *This UK Radio Interface Requirement therefore stipulates the necessary equipment parameters for the use of short range, broadband, ~~Data Services~~ Wireless Communications (HIPERLAN) in the UK. Tables 2.1 and 2.2 contain the relevant equipment parameters. These together with the 'essential requirement' detailed in Article 3.2 of the Directive 1999/5/EC constitute the minimum equipment requirements for the operation of short range, broadband, ~~Data Services~~ Wireless Communications (HIPERLAN) operating in the frequency range 5-6 GHz within the UK.*

BT can support this provision if amended as shown here and in Tables 2.1 and 2.2.

- 2.4 *~~It is the intention of the Radiocommunications Agency to make provision for this equipment to be exempt from licensing. When this has been completed, Relevant equipment, meeting the minimum requirements outlined in this Interface Requirement, will be exempt from licensing provided that it meets the requirements~~*

of the appropriate exemption regulations. Details of the exemption regulations will be available from the RA on request.

BT fully supports this provision with the deletion as shown. We do not think the deleted text is appropriate to the IR.

- 2.5 *The technical parameters specified in the UK Radio Interface Requirement are applied to achieve the desired level of compatibility for short range, broadband, ~~Data Services~~ Wireless Communications (HIPERLAN) and with other radiocommunications services while promoting enterprise, innovation and competition.*

BT can support this provision if amended as shown

- 2.6 *This UK Radio Interface Requirement provides the necessary technical information that facilitates access to spectrum allocated to short range, broadband, ~~Data Services~~ Wireless Communications (HIPERLAN) in the UK. It is not the intention of this UK Radio Interface requirement to duplicate or impose any additional 'essential requirements' of the Directive 1999/5/EC on products. Any specified parameters within this document are for the purpose of identifying product options and not as a national product requirement.*

BT can support this provision if amended as shown.

6.2 Comments on Table 2.1 of the Draft Interface Requirement

6.2.1 Consequences of earlier comments

Many of the comments in the sections above have an impact on Table 2.1 of the draft Interface Requirement, and we have tried to embrace the necessary changes in a modified table below.

6.2.2 The modified band A dispensation

As originally written, there was some ambiguity in the table between what is required within the sub-band 5150-5250MHz, i.e. the sub-band with the dispensation, and what is required for the full band A. BT believes that these two entries in the original table need to be rationalised. We have attempted this in the revised table shown below

6.2.3 Designated Service

In the 2nd column of Table 2.1 the Service is indicated as Mobile/Nomadic. BT believes this should either be Mobile or mobile/nomadic depending on whether the application or formal Service is being described. Elsewhere in this document we refer to *Devices associated with mobile/nomadic and Local Area Network applications operating within the Mobile Service*. Perhaps this would be appropriate for the table.

6.2.4 Modulation scheme in Bands A and B

BT notes that the requirement for the modulation for bands A and B to be *Orthogonal Frequency Division Multiplexing* (OFDM). OFDM is not strictly a modulation scheme, but rather a way of efficiently using the channel.

BT would wish to confirm with RA that the stipulation of OFDM as the “Modulation Scheme” does not preclude the use of innovative adaptive modulation arrangements within the OFDM “umbrella” that improve the capacity and performance of the 5GHz WLAN equipment. Question 4 of the “Public/Private” consultation document¹ requests information on the technologies that could be used to improve performance, particularly in the context of interference and congestion avoidance. In our response to that question we indicate adaptive modulation schemes as one ongoing source of improved spectrum efficiency, and we believe that RA would wish to avoid constraints in the IR that would inhibit the development of the technologies to their full potential.

We would add that whilst OFDM is currently a widely-favoured technology, this might not always be so. Greater flexibility might be advisable if users are to be able take advantage of future technology improvements (e.g. new modulation techniques) that give greater spectrum efficiency. However, we are aware that the ETSI EN 301 893 standards are written around OFDM, and we would not wish to see this issue cause delay to the opening up of the 5GHz bands A and B. We are therefore able to accept OFDM at the present time.

6.2.5 Footnote to the “Reference Standard” in Table 2.1

In the draft IR there is a footnote to the heading “Reference Standard” in Table 2.1. This footnote states: “*Assumed to be fulfilled in frequency planning and defining the equipment type – compliance with which is not mandatory*”.

The intention of this footnote is not clear to BT. We suspect that it is intended to imply that, whilst HIPERLAN standards are quoted in the table, the use of the HIPERLAN technology itself is not mandated, and that the use of other technologies compliant with the standards are permitted.

However, reference in the relevant column of the table is made to, *inter-alia*, EN 301 893, which ETSI have apparently deemed to be technology neutral. If the footnote is indicating that compliance to this generic standard is not mandatory, then there is a regulatory problem to be resolved.

6.2.6 Issues relating to Band C

In the context of Band C we have a further concerns.

The Table, as written, cites EN 301 893 as the relevant standard for Band C. However, as currently drafted, this EN relates only to bands A and B. The standard would need to be extended to cover Band C if the UK regulation is to operate in this way. This might involve further discussion in CEPT, possibly including an ERC Decision for this band.

In Table 2.2 of the draft Interface Requirement, the association of Band C channels with HIPERLAN was incorrect, as this part of the spectrum is not included in the ERC HIPERLAN Decision. The requirements for radar avoidance, TPC and DFS in band C, as

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given in the original Table 2.1, are therefore UK specific requirements not mandated by CEPT. These requirements may not be commensurate with the early availability of low-cost equipment. As noted in the paragraph above, BT believes that these channels could usefully be made the subject of a separate ERC Decision. This would encourage a European-wide market in Band C.

Whilst all the major 5GHz WLAN technologies (HIPERLAN, IEEE 802.11a and HiSWAN) use OFDM technology, this may not be true for FWA applications. Good spectrum efficiency can also be achieved by non-OFDM technologies by means of adaptive equalisation. Some FWA products may follow this latter approach. For the FWA applications in Band C at least, it would be worth considering a spectrum mask to allow flexibility in the modulation scheme, rather than enforcing OFDM.

Frequency range (MHz)	Service	Licensing Requirement	Maximum EIRP	Modulation Scheme	Additional Technical Requirements	Reference Standard ¹³
5150-5250 (Band A)	Mobile/ Nomadic Indoor only	Licence exempt	50 mW (no TPC) or 200mW (with TPC)	Orthogonal Frequency Division Multiplexing (OFDM)		ETS 300 836- 01 part 1
5150-5350 (Band A)	Mobile/ Nomadic Indoor only	Licence exempt	200 mW	Orthogonal Frequency Division Multiplexing (OFDM)	<p>TPC shall be employed in up and down link to ensure a mitigation factor of at least 3 dB on the average output power of the devices under the coverage area of a satellite</p> <p>DFS. Equipment operating in this band only must be capable of operating on all 8 carrier frequencies. In addition it must be capable of operating over at least 7 carrier frequencies out of the 11 channels in the range 5470-5725 MHz. Shall prevent co-channel operation with Radars.</p> <p>Note 1: Devices without DFS and TPC are also permitted but are limited to the Band 5150-5250MHz and a maximum EIRP of 50mW</p> <p>Note 2: Devices without DFS but with TPC are also permitted but are limited to the Band 5150-5250MHz and a maximum EIRP of 200mW</p>	Draft EN 301 893 ETS 300 836- 01 part 1
5470-5725 (Band B)	Mobile/ Nomadic	Licence exempt	1 W	Orthogonal Frequency Division Multiplexing (OFDM)	<p>DFS. Equipment that is not capable of operating in the range 5150-5350 MHz must be capable of operating at all of the 11 carrier frequencies defined in the range 5470-5725 MHz. Shall prevent co-channel operation with Radars.</p> <p>Equipment that is also capable of operating in the range 5150-5350 MHz must be capable of operating at a minimum of 15 carrier frequencies in the 2 bands</p> <p>TPC shall be employed in up and down link to ensure a mitigation factor of at least 3 dB on the average output power of the devices. under the coverage area of a satellite</p>	Draft EN 301 893
5725-5875 (Band C)	Fixed	Licence exempt	2W	Orthogonal Frequency Division Multiplexing (OFDM)	<p>DFS. Equipment must be capable of operating at all of the 6 carrier frequencies defined in the range 5725-5875 MHz. Shall prevent co-channel operation with Radars</p> <p>TPC shall be employed in up and down link to ensure a mitigation factor of at least 3 dB on the average output power of the devices under the coverage area of a satellite.</p> <p>In addition RA considers that, for the purpose of aiding planning and promoting efficient use of the radio spectrum this band would be an ideal candidate to implement a database of the locations and other technical parameters of outdoor fixed service stations deployed in this band. It is further proposed that RA would set up this database and those locations and some technical parameters would be information available in the public domain. The identities of operators would not form part of the publicly available material.</p>	Draft EN 301 893

¹³ Assumed to be fulfilled in frequency planning and defining the equipment type – compliance with which is not mandatory. {Footnote extracted from draft IR}

6.3 Other comments on Table 2.2 of the Draft Interface Requirement

The table below (Table 2.2 of the draft Interface Requirement) can be supported with the amendment shown. The reference to HIPERLAN/2 is technology specific and inappropriate. BT believes that the 20MHz channel spacing arrangement is a good choice for these bands and will provide for much-needed broadband services.

Table 2.2 HIPERLAN/2 n Nominal carrier frequency allocations

Band designation	Carrier centre frequency f_c (MHz)
A	5180
A	5200
A	5220
A	5240
A	5260
A	5280
A	5300
A	5320
B	5500
B	5520
B	5540
B	5560
B	5580
B	5600
B	5620
B	5640
B	5660
B	5680
B	5700

/Continued

C	5740
C	5760
C	5780
C	5800
C	5820
C	5840

Conclusions

The close alignment between the UK 5GHz Advisory Group's recommendations and the proposals in this present consultation means that BT's position, as set out in this document, is generally supportive of the Radiocommunications Agency's proposals for 5GHz regulation.

Notwithstanding this general support, we have found it necessary to highlight a few significant concerns that we believe should be addressed to enable the 5GHz regulation to be successful in stimulating a dynamic 5GHz licence-exempt environment. These concerns relate to terminology, detail of the regulatory proposals and the relationship between UK regulation and the ERC Decision on 5GHz spectrum. In particular we conclude that: -

- i) without remedial action, the requirements of the present ERC Decision will delay a truly competitive market in 5GHz devices. We believe that the UK should encourage the more general acceptance of a flexible, phased, approach to the full implementation of the DFS requirements of the ERC Decision.
- ii) the complexity of the DFS issue, including the absence (as yet) of an agreed requirement for its functionality, is a further barrier to the early development of technology for the UK/European 5GHz market.
- iii) short-term measures are needed to circumvent the barriers to 5GHz developments. We have suggested ideas for consideration by the Radiocommunications Agency, and we would be pleased to have further discussions with RA on this, or indeed other issues within this response, if required.
- iv) the description of the applications area needs to avoid implied constraints on the permissible applications, and we believe the use of the term HIPERLAN should be avoided to avoid confusion and to ensure technology neutrality.
- v) within the proposed Interface Requirement itself, specific references to satellite coverage areas and co-channel operation with Radars is are not necessary and not appropriate.
- vi) further attention needs to be given to a range of issues associated with the draft Interface Requirement that accompanied the consultation document. We believe the logical coupling of the requirements of ERC Decision (99)23, the latest drafting of the relevant

ETSI standards and the UK's own regulatory text. We have proposed relevant changes to the text and tables of the draft Interface Requirement.
