

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title: Consultation on authorising higher duty cycle Network Relay Points

To (Ofcom contact): Stephen Jones

Name of respondent: Johnny Dixon

Representing (self or organisation/s): BT plc

Address (if not received by email):

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Please tick below what part of your response you consider is confidential, giving your reasons why

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Issue 1

BT's response to:

**Ofcom consultation on authorising higher duty cycle
Network Relay Points**

(Issued by Ofcom on 2 September 2014)

BT's response to the Ofcom Consultation on authorising higher duty cycle Network Relay Points

INTRODUCTION

BT welcomes the opportunity to comment on these proposals from Ofcom regarding the authorisation of Network Relay Points, which are expected to be a key element of the Internet of Things.

Recognising that there is growing interest in the Internet of Things (IoT), and the opportunities that it presents, we are generally supportive of the proposals presented by Ofcom in order to develop this nascent industry. Furthermore we do recognise the importance of ensuring that interference is minimised between devices, given that there is the potential for multiple networks to be deployed in the same geographical area. Given that multiple licences might be issued, on a non-exclusive basis, without any co-ordination, then it is essential that the "politeness protocol" (Clear Channel Assessment, CCA) works effectively. However we are concerned to see that the CCA threshold limit seems to be too high (based on our assumptions). We therefore believe that consideration should be given to significantly tightening the CCA threshold limit, to reduce the risk of interference from NRPs into other NRPs or SRDs.

RESPONSES TO CONSULTATION QUESTIONS

Question 1. Do you have any evidence to inform Ofcom's view on the density of higher duty cycle (up to 10%) NRPs deployments, whether this is likely to exceed 10 NRPs/ km² and the total number of higher duty cycle NRPs that might be deployed?

The IoT is a nascent industry, and it is difficult to predict the magnitude of the networks for the many different applications which are proposed. But in a (future) world where there is a widespread deployment of M2M devices, we would agree that the density of deployment of such NRPs in this frequency is unlikely to be significantly greater than 10 NRPs / km². Clearly if there were to be an explosive growth in M2M devices, then it is likely that additional spectrum bands would also need to be identified in order to meet capacity.

Question 2. Do you have a view on how intra-network interference caused by NRPs deployed in large numbers within a network will be managed?

Ordinarily intra-network interference would be addressed by planning on a "cellular-type" pattern. However given the shared nature of this band, it is expected that the required politeness protocol will need to be relied upon to mitigate interference. However given the nature of the expected M2M traffic, a small amount of interference should be tolerable, particularly as data re-send requests could be used for more critical applications.

Question 3. Do you have any evidence that networks may fail if the aggregate density of higher duty cycle NRPs reaches or exceeds 10 NRPs/ km²?

We have not conducted such detailed studies.

Question 4. Do you have any views on whether exchanging NRP deployment information between licensees and developing and using an industry-managed code of practice would be practical and sufficient to manage the risk of some networks failing?

No opinion

Question 5. Do you think CCA as defined by ETSI will be an effective protocol for (a) managing interference between networks? (b) managing interference to short range devices using the 870-873 MHz band?

We have not studied the Clear Channel Assessment mechanism in detail, however it would appear that *in principle* it should be capable of managing interference between networks, and also interference to other SRDs. We also recognise that there are several different radio systems using listen before talk mechanisms which have previously been standardised by ETSI and which are now successfully operating.

However we question whether the threshold proposed for the CCA is sufficiently low to protect *in practice*. Given that the channel spacing for these devices is 25 to 200 kHz, if this is taken as a proxy for channel bandwidth, then the thermal noise floor (kTB) will be -130 to -121 dBm. If we then assume that:

- the receiver noise figure is (no more than) 10dB (which is probably reasonable for such devices), and
- a signal to noise ratio of 10dB (which is probably reasonable for a relatively robust modulation scheme, which would be appropriate for this application)

then this would lead to a receiver sensitivity of -110 to -101 dBm.

It is recognised that Clause 8.2.3 of Draft EN 303 204-1 gives a receiver sensitivity of -91 dBm, but it should be noted that that is the maximum permitted value.

Furthermore, Clause 8.3.3 of Draft EN 303 204-1 gives the CCA threshold as “10dB above Rx sensitivity”, namely -81 dBm. However it is not clear why the threshold should be above the receiver sensitivity.

If our assumptions above are correct, then it would be possible for a NRP (or SRD) receiver to be satisfactorily receiving at a level that is about 20 to 30 dB below the CCA threshold limit, in which case another nearby NRP would be permitted to transmit, and the CCA would fail to protect the receiver. Whilst that may be a simplistic analysis (no account has been taken of antenna gain or

connector losses), we consider that it provides an indication that there may not be sufficient interference protection.

We therefore believe that consideration should be given to tightening the CCA threshold; perhaps a more appropriate value might be 10dB *below* the receiver sensitivity limit, i.e. -101 dBm?

Question 6. Do you have a view on the costs and benefits of adding effective mitigation protocols such as Clear Channel Assessment to higher duty cycle NRPs?

We consider that the addition of a Clear Channel Assessment protocol to the Network Relay Point would not be particularly onerous in terms of either the cost or system overhead. And recognising that this band is proposed to be shared, potentially between several different M2M networks, we certainly believe that some form of interference mitigation should be applied, to ensure that the band does not become a “free for all”, with NRPs interfering with each other.

Question 7. Do you agree with our proposals to authorise spectrum for NRPs using non-exclusive, network licences available on demand?

We support the proposal that higher duty cycle NRPs should be permitted to operate in this band on a licensed basis, given that such licences are non-exclusive and available on demand. We consider that such light licensing would be most appropriate for this application in this band.

Question 8. Do you agree with the proposed licence conditions for higher duty cycle NRPs?

We agree with the proposed licence conditions for higher duty cycle NRPs as described in the consultation document.

END