Intellect's Response to Ofcom's Consultation on
The Licence-Exemption Framework Review

(Due date 21st June 2007)

Key Points

1. The introduction of the concept of a version of Commons in which the possible applications would be divided into multiple classes rather than a true "commons" approach opens concerns over how such applications classes would be defined in a fair and equitable way.
2. The proposal to associate each application class to specific spectrum bands may result in significant loss of the advantages of converged service delivery.
3. That within the framework it is made absolutely clear that licence-exempt underlay services are permitted on a non-interference, non-protection basis in all cases.
4. Detect-and-Avoid (DAA) mitigation is only a valid approach for some service types and even then is only effective in very specific and limited cases. In general, time dependent or continuous services are likely to suffer interruptions due to the application of DAA strategies and thus should perhaps be better located in other spectrum where it would be the primary service.
5. The adoption of limits equivalent to the recent UWB arrangements is not clear. It is proposed that such limits implement the full detail as provided in the EU Decision[1] whereby appropriate time limits, duty cycles and other mitigation techniques are mandated. Further, these limits be further revised downwards to accommodate other services in bands where interference is predicted.
6. That the Framework be enhanced to include reviews of the permitted power levels etc. in cases where even though the underlay services are compliant to the current regulations, the introduction of these services is found to cause interference to the prime users. To this end an appropriate definition of Harmful Interference may be required.
7. Referring now to points raised during Ofcom's Stakeholder event on this consultation, we would make the following specific points on UWB Noise Floor concerning the way the UWB limit would be reused:
   - Our members are concerned by the apparent use of aspects of the UWB emission limits provided in the EU Decision in spectrum they occupy.
   - The basis of the compromise EU legislation currently being enacted by Ofcom is the work done by TG3 and Report-64 where 80-90% of all these UWB devices are assumed to be indoors, have certain duty cycles, auto-switch-off, sunshine clauses etc. and this is referred to in Para-8/9 of the EU Decision Preamble. Therefore for the UK to unilaterally propose the limits alone as the default for all applications is considered likely to cause problems
   - The EU UWB scene itself is potentially still evolving, so does not present a particularly sound basis to put a stake in the ground on, at present
   - The above applies equally to the lower bands where commercial services thrive and outdoor propagation is fairly good

[1] 2007/131/EC

Intellect's Responses to the Consultation Questions:

Q1: Do you agree that the spectrum commons model should be the preferred approach for licence-exempt use of spectrum, and that application-specific allocations should only be considered where technical constraints or safety issues require this?

A1: This appears to be slightly misaligned with the consultation proposals of section 4.5. The consultation does not propose the introduction of true "commons" but of the definition of classes of applications which would be grouped together and permitted in bands. This approach is intended to be for the better protection of the services against interference.

The introduction of a true "commons" approach could present considerable difficulty in the light of the permitted power proposed in certain bands under the UWB model.

Q2: Do you agree with the proposal for multiple classes of spectrum commons?

A2: This proposal could be problematic. It appears not to align well with the concept of convergence and service neutrality, it could also cause problems with International roaming (see below).

The further recommendation (4.5(2)) that the regulator be made responsible to define, at a high level, the politeness rules, limiting the diversity of applications within each class appears to place an extremely high burden on the regulator and open them to the issues surrounding preference being given to one service over another. This arises because protocols such as Detect-and-Avoid (DAA) are definitely not suitable for all or even many types of service.

Using the case of low power spread-spectrum devices such as UWB as an example, unless the low power underlay service is mandated to have receivers of a reasonable performance, it is entirely possible that the sensitivity is insufficient to detect the presence of a signal from the primary service except at close range (because the spread-spectrum device normally uses a very wide band receiver). Thus it believes it is operating in clear spectrum and so does not turn off when it should and so harmfully interferes with the primary service, potentially drastically cutting the operational range and the value derived.

It is therefore a logical requirement that underlay services permitted by virtue of a "Detect and Avoid" mitigation regime, should be fitted with a receiver capable of actually detecting the protected service at the right power level.

Q3: Do you agree with the distinction made between the licence-exemption and light-licensing regimes?

A3: Light licensing provides the opportunity to stop the further deployment of services in certain bands once it is deemed that a maximum limit has been reached.

As noted above, reliance on DAA schemes to ensure co-existence would appear to be fundamentally flawed.

Q4: Do you agree with the view that the licence-exemption and light-licensing regimes will converge in the future?

A4: At this stage it appears they address very different requirements and so it is not clear that this is the case.

We do not agree that it is possible at this stage to instigate a policy of default conversion to licence-exemption (5.3(2)).

Q5: Do you agree with the proposed mixture of licence-exempt and light-licensed use of the 105−275 GHz spectrum? Do you agree with the bands that have been identified for such use?

A5: No comment

Q6: Do you agree with the view that the use of the 275−1000 GHz spectrum should be licence-exempt?

A6: At even higher frequencies (above 275GHz) the current ITU regulations suggest no formal allocation, but protection of numerous molecular lines and passive services. Industry however is developing a number of low power applications at these frequencies (e.g. for communications or security) where rules to ease deployment would be welcomed.

As per 60GHz, a far lighter process should be possible above 275GHz given that the ambient noise floor (particularly sky noise) is rising significantly and this should permit modest mW class transmissions by default (as well as stray emissions from receive downconverters) with next to no risk at all even in the lower loss portions of these bands. Again there should be a very light regime that minimises the burden of standardisation, whilst not restricting the ability to formally allocate these at a future WRC. Ofcom's liberal approach in the LEFR documents to these higher bands seems somewhat at odds with the European position on no-change for such frequencies under WRC-07 AI-7.2.

Q7: Do you agree with the view on the levels of future demand for licence-exempt usage in the 40−105 GHz spectrum? Do you agree that the Group-A bands identified above should be considered for licence-exempt use? Do you agree that licence-exempt and light-licensed use of the Group-C bands identified above should only be considered when there is evidence of demand for such use?

A7:

Concerning the Group-A bands (59-64GHz), Intellect believes there are opportunities for a lighter approach which could include licence exemption, facilitated by the 60GHz absorption peak. Intellect would welcome conditions to promote innovation, subject to the appropriate European sharing studies.

The interest and technology availability for the Group-A bands make them a priority for our members relative to the 102-105GHz band.

Intellect believes that the 59-64GHz band could support and spur significant innovation for both consumer, transport and industrial markets. It could also reduce pressure by (increasingly bandwidth hungry) short range applications on the spectrum below 10GHz.

Q8: Do you think it could be desirable for transmissions at levels below certain power spectral density limits to be exempt from licensing?

A8: This appears very problematic and liable to result in harmful interference.

We note the graph of Figure 7[2] in the consultation in which it is shown that other wideband systems utilise higher transmit powers. We do not see the relevance of this in the light of the proposal. Figure 7 clearly shows that the bands for these other higher power wideband services has been carefully chosen to avoid exactly the problems highlighted in this response and which protection would be lost in the event that an underlay approach were to be adopted. Furthermore and even more important, an examination of the transmit powers completely fails to properly encapsulate the fact that interference will occur due to the close proximity of the underlay service transmissions to the receivers the primary service.

We do share concerns on the commons/noise floor. For example, on point-5 we believe that Ofcom has taken what was a 80-90% indoor use emission specification (going back to the EU/CEPT basis/assumptions) to effectively modify the entire outdoor noise floor.

It should be noted that wideband transmissions have a higher capacity to interfere with receivers than do narrowband transmissions.

Concerning T&D Licences, which incidentally are still proving lengthy to obtain, Intellect would welcome a dialog on suitable levels for T&D Licences. An important part of the appropriate arrangements is that, whilst the rights of the incumbent should be protected, they should not have the absolute right to *refuse permission* for an appropriate T&D licence to be issued under arrangements that do not cause harmful interference. In this context, 'harmful interference' must be greater than the allowed EMC emission level, have a measurable, audible or visual effect on reception and be significant in terms of "network capacity or data loss" or "irritation" factor. T&D undertaken within a specified set of limits, designed to minimize the risk of harmful interference, might be permitted to be license free.

Q9: Do you agree with the transmission limits proposed in this document?

[2] Page 45.

A9: No. We note that even the EU Decision[3] had many caveats against the simple adoption of such a mask. Herewith a copy of the summary table from the Decision:

ANNEX

1. **Maximum e.i.r.p. densities in the absence of appropriate mitigation techniques**

Frequency range (GHz)	Maximum mean e.i.r.p. density (dBm/MHz)	Maximum peak e.i.r.p. density (dBm/50 MHz)
Below 1,6	– 90,0	– 50,0
1,6 to 3,4	– 85,0	– 45,0
3,4 to 3,8	– 85,0	– 45,0
3,8 to 4,2	– 70,0	– 30,0
4,2 to 4,8	– 41,3 *(until 31 December 2010)* – 70,0 *(beyond 31 December 2010)*	0,0 *(until 31 December 2010)* – 30,0 *(beyond 31 December 2010)*
4,8 to 6,0	– 70,0	– 30,0
6,0 to 8,5	– 41,3	0,0
8,5 to 10,6	– 65,0	– 25,0
Above 10,6	– 85,0	– 45,0

2. **Appropriate mitigation techniques**

A maximum mean e.i.r.p. density of – 41,3 dBm/MHz is allowed in the 3,4 to 4,8 GHz bands provided that a low duty cycle restriction is applied in which the sum of all transmitted signals is less than 5 % of the time each second and less than 0,5 % of the time each hour, and provided that each transmitted signal does not exceed 5 milliseconds.

Equipment using ultra-wideband technology may also be allowed to use the radio spectrum with e.i.r.p. limits other than those set out in the table in point 1 provided that appropriate mitigation techniques other than those set out in the first sub-paragraph are applied with the result that the equipment achieves at least an equivalent level of protection to that provided by the limits in the table set out in point 1.

We note that even this outcome was the result of intense debate, with the deployment of UWB in some of the bands being agreed only under the condition that it be time-limited, permission expiring at a point at which it was estimated that the intended service would be deployed to a much greater extent than today. Thus the UWB would be withdrawn to avoid harmful interference with the intended service as it comes on stream. The application of strict limitations in duty cycle were intended to permit certain specific valued applications where it was thought to be less harmful (but note that 600MHz of spectrum was even so time-limited in availability for UWB). Our conclusion is that the

[3] 2007/131/EC

Framework should apply at least all these restrictions or their equivalent as required under the Directive.

Q10: Do you agree with the harmonisation strategy discussed above in the context of licence-exempt devices?

A10: It is extremely difficult to reconcile the International harmonisation strategy with the policy of grouping applications into multiple classes directed towards certain bands. We note that a major advantage of harmonisation is in the convenience it provides to users who roam Internationally.

Q11: Do you agree with the view that no additional regulatory instruments, beyond those available today, are required for the protection of licence-exempt equipment?

A11: We strongly support the principle of the deployment of licence-exempt service under a non-interference, no protection regime.

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