



**JRC Response to the
consultation on the
Variation of the Spectrum
Access Licence for 1452-1492
MHz and changes for fixed link
use in the paired bands 1350-
1375 MHz and 1492-1517 MHz**

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KEY POINTS

- JRC welcomes the opportunity to respond to this consultation.
- JRC does **not** agree with the technical analysis prepared by Qualcomm.
- If a **guard band** is needed to protect services in the adjacent bands from interference caused by the change of use of the 'Qualcomm' band', then the guard band must be contained with the band where the new service resides, not carved out of adjacent bands.
- Qualcomm purchased 40 MHz of spectrum in a competitive auction for a fixed price. The proposed change of use effectively gives **them 52 MHz for the same price as they paid for 40 MHz.**
- Any change of use of the band 1452-1492 MHz must not be to the detriment of services in the adjacent bands which must be **fully protected.**

Consultation Questions

Question 1: Do you agree with:

a) the technical analysis prepared by Qualcomm?

The JRC does not agree with the third part of the technical analysis prepared by Qualcomm.

The analysis states (page 7):

'The conclusions of this analysis were that compatibility between SDL and future FLs can be ensured without coordination [sic] if . . . new FLs users ensure LOS clearance between the transmitter and receiver when installing a new FL'.

Issue:

The Qualcomm assumption that there will be no interference when a nearby SDL site is not along the line-of-sight path between two 1.4 GHz link ends appears flawed.

When planning a fixed link, clear line-of-sight is only necessary surrounding ~0.01 degrees around the bore-sight of the link.

Fixed links antennas have significant gain at angles greater than ~0.01 degrees so they may still be interfered with by a nearby SDL station even when it is not within the line-of-sight of the path.

Examples:

The offset gain at +/- 10 degrees of a 17dBi antenna is ~14 dBi. Table 3.6 of the Qualcomm report suggests that this gain requires a clearance distance of 70.8m.

Even closer to the bore-sight / line-of-sight path, the offset gain at +/- 5 degrees of a 17dBi antenna is ~16.5 dBi. Interpolating the data suggests that this gain requires a clearance distance of ~95m.

Suitable clearance distances will therefore need to be established and documented for each Ofcom Antenna Code and relevant offset angle. Examples are shown within Table 1.

Table 1: Minimum clearance distances for offset angles of a 17dBi gain fixed link antenna

Angle (degrees)	Gain (dBi)	Clearance Distance (m)
0	17	100.0
5	16.5	94.0
10	14.6	75.0
15	11.1	60.0
20	5.0	25.0
25	2.5	15.0
30	2.5	15.0
35	2.5	15.0
40	2.5	15.0

Proposed solution:

1a) The JRC recommends that the Guidance Notes are amended to state:

Minimum Clearance Distance

Applicants will also need to ensure that their planned fixed link path is clear of base stations in the main beam of that fixed link [and also within the area surrounding the link end within a distance proportionate to the gain of the antenna in the appropriate direction, e.g. +/- 45 degrees beam width]. A minimum clearance distance between the main beam [and surrounding area] of a fixed link and SDL base station will depend of the fixed link antenna used. In practice, a fixed link operator will need to ensure that there is a clear path between the two ends of the link[,] as with consistent standard link planning practice[, and indicative minimum [bore-sight] clearance distances for current antenna types are given in the table below.

1b) Noting the possibility of a planned new 1.4 GHz site unknowingly being in close proximity to SDL sites, but not within the line-of-sight between its two ends:
the JRC requests that a database of the locations of the SDL systems be created and updated weekly.

1c) It will also be necessary to:
amend the draft Licence Schedule Clause 3(a)(i)b) to state '1 Metre resolution' to show accurate SDL locations, and thereby enable accurate interference predictions to fixed links.

1d) the JRC suggests that suitable clearance distances will need to be established and documented for each Ofcom Antenna Code and their relevant offset angles.

Non-line-of-sight coverage:

The JRC notes that historically in the UK, and in other countries, the 1.4 GHz fixed link band has been used for non-line-of-sight and near-line-of-sight links which are a valuable property of 1.4 GHz propagation (which SDL wishes to take advantage of). If SDL services are permitted to operate on non-line-of-sight paths as part of this variation, then the JRC requests that fixed links in the 1.4GHz band are similarly permitted to operate over non-line-of-sight paths with an appropriate increase in link budget.

Question 1: Do you agree with:

b) our assessment of the Qualcomm study and our resulting conclusions?

If not, please explain why and support your answer with detailed evidence.

The JRC notes that Qualcomm appears to have only considered the 'least restrictive technical conditions for the use of the band by MFCN SDL within CEPT'¹ and the opposite extreme of including all of the proposed 6 MHz guard band within the 1452 to 1492 MHz band. The latter option resulting in two of the SDL 5 MHz channels being impacted.

The JRC is surprised that Ofcom's assessment didn't highlight the more equitable solution below.

The JRC suggests that the upper 5 MHz channel, i.e. 1487 to 1492 MHz, within the 1452 to 1492 MHz band should be used as the majority of the 6 MHz guard band between the proposed SDL systems and the many existing fixed link systems. This equitable solution will have significantly less impact than that currently being considered.



Figure 1: high-level band diagram showing alternative changes to the 1.4 GHz fixed link band

This 1 MHz solution will also significantly reduce the burden on Qualcomm to ameliorate the interference from its SDL systems.

Additionally, it is assumed that Qualcomm will need to pay an annual fee equivalent to the licence revenue lost as a result of the UK-wide sterilisation of the proposed 6 MHz of fixed links spectrum. Reducing the sterilised spectrum to only 1 MHz will reduce that fee by ~83%.

Further, the JRC requests that the plans of other CEPT countries should be detailed. In particular, are they intending to close 6 MHz of the fixed links 1492 to 1517 MHz band as a guard band for SDL systems?

Question 2:

a) Do you agree with our proposal to grant the variation request as set out in this consultation?

Noting footnote 40, the JRC generally agrees to the proposals set out in Section 5 of the consultation document.

Noting the possibility of proposed new 1.4 GHz sites unknowingly being in close proximity to SDL sites, the JRC requests that an on-going database of the locations (amending Licence Schedule Clause 3(a)(i)b to '1 Metres resolution') of the SDL systems be created and updated weekly. This database will be especially critical when a nearby SDL site is close to a proposed 1.4 GHz link but not along its bore-sight, so not taken into consideration as part of a line-of-sight test.

The JRC is pleased to note that the draft Licence Schedule, Clause 4.(b) includes 'the Licensee must, in particular pay to an Existing Notified Licensee all costs which may be reasonably incurred by it to mitigate the risk of undue interference from Radio Equipment established by the Licensee', e.g. by paying for suitable filtering on the fixed link.

¹ ECC Decision (13)03: The harmonised use of the frequency band 1452-1492 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)

The JRC requests that it is a licensing condition that the 1452-1492 MHz band licensee refrains from commissioning the SDL system until sufficient time has been allowed for the necessary filtering / additional measures to be incorporated. The JRC further requests that the relevant fixed link operator has the option to be included during the SDL system commissioning and the SDL link shall not become operational if interference is caused to the fixed link(s) despite the recommended filtering being fitted.

Additionally, with the 1452 to 1492 MHz spectrum having been unused for many years, the JRC requests that the proposed licensing changes to the 1492 to 1517 MHz band are not introduced until the imminent roll-out of the proposed SDL systems. This should minimise the risk of the adjacent 1 MHz / 6 MHz of fixed link spectrum being excluded unnecessarily if the band isn't subsequently used for the proposed purpose.

b) Do you agree with our proposal to continue the use of the adjacent 1492-1517 MHz and 1350-1375 MHz for legacy fixed links and retain 1356.5-1375 MHz and 1498.5 -1517 MHz for new fixed links from the date of the licence variation?

No, the proposed 2 x 6 MHz of changes disadvantage the fixed links band solely for the benefit of the SDL band. The burden should fall mainly on the service requiring the changes as advocated above.

The JRC / power utilities manage a large number of 1.4 GHz links that are essential for the protection of the existing electricity grid throughout the UK. It should be noted that, with the Smart Grid monitoring approximately 10x more end-points, the number of licensed links is expected to increase dramatically as the control system of the Smart Grid is rolled out. It is therefore essential that this band remains open for new links.

The JRC also notes that new assignments will be from the top of the band. This is seen as an indication from Ofcom that the band isn't likely to suffer interference from future systems operating adjacent to 1517 MHz in the short- to medium-term.

c) Are the technical parameters listed in Annex 9 sufficient to enable the 1452-1492 MHz licensee to assess and manage the interference potential from base stations operating in the 1452-1492 MHz band to fixed point to point links?

The JRC agrees in principle that the technical parameters listed in Annex 9 are sufficient but will need to be reassured that the SDL system planning procedure will not result in harmful interference to adjacent 1.4 GHz links before a definite Yes can be given.

The JRC would therefore like to understand how the SDL licensee(s) will co-ordinate with existing 1.4 GHz links so as to be certain that any proposed SDL system will not cause harmful interference to a 'faded' 1.4 GHz signal.

On a positive note, it is observed that assigning future fixed links from the top of the band downwards will result in their being assigned away from the radar systems that occasionally interfere with the fixed link ends receiving in the lower sub-band.

Should Ofcom consider presenting additional parameters? If so, which parameters and why?

There is great concern that the guidance will make clear that fixed link licence applicants will need to ensure that they have taken appropriate action such that their intended fixed link path would be clear of SDL base stations. Unfortunately, Ofcom's proposal for only 100m location accuracy for SDL systems will make this very difficult. Noting the possibility of proposed new 1.4 GHz sites unknowingly being in close proximity to SDL sites, the JRC requests that an on-going database of the locations, with 1m accuracy, of the SDL systems be created. This database will be especially critical when a nearby SDL site is close to a proposed 1.4 GHz link but not along its bore-sight, so not taken into consideration as part of a line-of-sight test.

The JRC suggests that the horizontal and vertical polarisation patterns of the various 1.4 GHz Transmitter Antenna codes need to be detailed by Ofcom. This should ensure that there is no misunderstanding of an antenna's off-bore-sight rejection properties by the SDL operator(s) and the 1.4 GHz link operators during system co-ordination.

Additionally, the sensitivities of the fixed links receivers are likely to be significantly better than the levels detailed within the relevant ETSI Standards. This additional sensitivity will need to be taken into consideration when proposed SDL systems co-ordinate with fixed links.

With so many interacting parameters of whose miscalculation could result in harmful interference to existing and future fixed links, the JRC requests that it is a licensing condition that the relevant fixed link operator has the option to be included during the SDL system commissioning and the SDL link shall not become operational if interference is caused to the fixed link(s) despite the recommended filtering being fitted.

Observation (email sent to Ofcom):

With reference to the Licence Schedule, Clause 6, 'out of band emissions' text cross-referenced with the Clause 9.(c) 'out of block emissions' text:

it is believed that the Clause 9.(c) text should be amended to 'out of band emissions'.

Ofcom's feedback: "Thank you. This will be corrected."

Background

JRC Ltd is a wholly owned joint venture between the UK electricity and gas industries specifically created to manage the radio spectrum allocations for these industries used to support operational, safety and emergency communications. JRC also represents gas and electricity interests to government on radio issues.

JRC manages a significant number of 1.4 GHz links and is keen for their protection and the on-going access to this band.

JRC also manages blocks of VHF and UHF spectrum for Private Business Radio applications, telemetry & tele-control services and network operations. JRC created and manages a national cellular plan for co-ordinating frequency assignments for a number of large radio networks in the UK.

The VHF and UHF frequency allocations managed by JRC support telecommunications networks to keep the electricity and gas industries in touch with their network assets and field engineers throughout the country. The networks provide comprehensive geographical coverage to support the operation, installation, maintenance and repair of plant in all weather conditions on a 24 hour/365 days per year basis.

JRC's Scanning Telemetry Service is used by radio-based System Control and Data Acquisition (SCADA) networks, which control and monitor safety critical gas and electricity industry plant and equipment throughout the country. These networks provide resilient and reliable communications at all times to unmanned sites and plant in remote locations to maintain the integrity of the UK's energy generation, transmission and distribution.

JRC works with the Energy Networks Association's Future Energy Networks Groups assessing the ICT implications of Smart Networks, Smart Grids and Smart Meters.

