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Notice of coordination procedure for MOD sites related to the 3.6-3.8 GHz band

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Section

1. Introduction

1.1 This Notice is notified to each 3.6-3.8 GHz Licensee under their respective 3.6-3.8 GHz licences.

1.2 MOD has a small amount of ongoing use within the band at one location in Cornwall which must be protected.

1.3 This Notice specifies the protection thresholds and coordination procedure necessary to ensure the protection of existing and continuing MOD usage in the 3.6-3.8 GHz band from potential harmful interference from the networks in the 3.6-3.8 GHz Band.

1.4 In this Notice:

- "3.6-3.8 GHz Band" means the following frequencies: 3600 MHz to 3800 MHz;
- "3.6-3.8 GHz Base Station" means a Base Station which are licensed to transmit using frequencies in the 3.6-3.8 GHz Band;
- "3.6-3.8 GHz Deployment" means a 3.6-3.8 GHz Base Station or a 3.6-3.8 GHz Fixed or Installed Terminal Station deployed by a 3.6-3.8 GHz Licensee. For the purposes of this Notice indoor femtocells and indoor smart/intelligent repeaters, as defined in Schedule 1 of the 3.6-3.8 GHz licence, are excluded from a 3.6-3.8 GHz Deployment;
- "3.6-3.8 GHz Fixed or Installed Terminal Station" means a fixed or installed Terminal Stations which is not exempt from licensing by the Wireless Telegraphy Act (Exemption) Regulations and which is licensed to transmit using frequencies in the 3.6-3.8 GHz Band;
- "3.6-3.8 GHz Licensee" means the licensee under a licence authorising use in the United Kingdom of frequencies in the 3.6-3.8 GHz Band;
- "Base Station" means radio equipment that transmits to a Terminal Station(s);
- "MOD" means the Ministry of Defence;
- "Protected Site" means the list of sites set out in this Notice;
- "Signals" means the transmission in the 3600 to 3800 MHz band from the 3.6-3.8 GHz communications equipment;
- "Site Protection Threshold" means the threshold that the 3.6-3.8 GHz Licensee must comply with as specified in this Notice;
- "Terminal Station" means radio equipment that receives downlink transmissions from Base Stations.

2. The procedure

Overview of coordination procedure

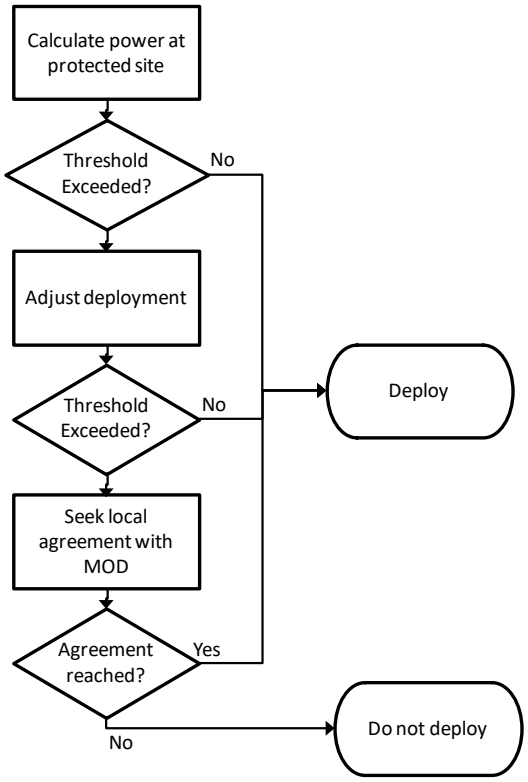
2.1 When planning its network deployment, the 3.6-3.8 GHz Licensee must check whether the protection thresholds set out in this document would be exceeded as a result of any proposed 3.6-3.8 GHz Deployment. To do so, the 3.6-3.8 GHz Licensee will need to calculate the communications signal at the relevant Protected Site location(s) (see protection thresholds section below).

2.2 If these calculations show that the relevant threshold will not be exceeded as a result of the planned deployment, then the deployment can go ahead. If the calculations show that the relevant threshold(s) would be exceeded as a result of the planned deployment, the 3.6-3.8 GHz Licensee may consider adjusting the deployment.

2.3 If it is not possible to adjust the deployment so that the threshold(s) are not exceeded, the 3.6-3.8 GHz Licensee may only deploy if agreement is reached with the operator(s) of the relevant site(s).

2.4 In the first instance, contact should be made via Ofcom who will facilitate a discussion between the licensee's appropriately security cleared personnel and the operator of the Protected Site.

Figure 2:1: Flowchart illustrating coordination procedures for deployments within the coordination zone



List of sites to be protected

2.5 The sites to which these coordination procedures apply are listed in Figure 2.2 below.

Figure 2.2: 3.6-3.8 GHz Band Protected Site Locations

Site	Location
Bude	SS 208 126

Protection thresholds

2.6 The 3.6-3.8 GHz Licensee must use the methodology in this Notice to ensure that emissions from each proposed 3.6-3.8 GHz deployment (or combination of deployments) in its licensed 3.6-3.8 GHz Band do not exceed the threshold for the in-band communications signal given in Figure 2.3.

Figure 2.3: Site Protection Thresholds

In-band communication signal		
	Bude	
Site protection thresholds	Threshold for Signals in the 3600 to 3800 MHz band [1]	-69 dBm /5 MHz
	Height	18m above ground level
	Area where calculation is to be performed	Up to 25km from Bude
Note [1]: The protection thresholds are defined during the 'on' period of the transmit signal and referenced to a 0 dBi receive antenna		

Compliance with the thresholds

2.7 Prior to deployment, the 3.6-3.8 GHz Licensee must use the methodology in this Notice to assess whether the protection thresholds specified in Figure 2.3 will be exceeded as a result of its planned 3.6-3.8 GHz deployment for any Protected Site. There is no requirement to undertake an assessment outside of the calculation areas given in Figure 2.3 except as described in paragraph 2.8 below.

2.8 The calculation areas in Figure 2.3 have been developed on the basis of Base Stations at 30m above ground level in order to constrain the area over which coordination must be undertaken. However, Licensees are advised that sites which are higher than this but located outside of the coordination area may still cause interference to MOD systems in certain circumstances. The 3.6-3.8 GHz Licensee must therefore consider whether any of its deployments which are greater than 30m above ground level are likely to cause any impact to the Protected Site and coordinate if it deems necessary.

2.9 In carrying out this assessment for deployments within the calculation areas described in Figure 2.3 the 3.6-3.8 GHz Licensee must use propagation models described below with the parameters given in Figure 2.4.

2.10 The 3.6-3.8 GHz Licensee must maintain records of its calculations and assessments and make these available to Ofcom if required.

Exceeding the threshold

2.11 The thresholds may only be exceeded in relation to a specific Protected Site if the 3.6-3.8 GHz Licensee has reached an agreement with the operator of that Protected Site (Ofcom will facilitate the necessary introductions). Any such agreement must be recorded in writing in a form agreed by both the 3.6-3.8 GHz Licensee and the site operator. The 3.6-3.8 GHz Licensee must maintain a record of all such agreements, and make them available to Ofcom on request.

Propagation Model

2.12 A basic transmission loss (path loss) will be calculated using ITU-R Recommendation P.1812-4 "A path-specific propagation prediction method for point-to-area terrestrial services in the VHF and UHF bands"[1]. It predicts signal levels exceeded for a given percentage of time. The assessment will use a time percentage of 10% as included in Figure 2.4 below.

2.13 This recommendation predicts signal levels exceeded for a given percentage of locations and a given percentage of time. The assessment will use locations percentage of 50% for all cases. Time percentage of 10% for Base Stations and Fixed or Installed Terminal will be used, as included in Figure 2.4 below.

2.14 Predictions are based on the terrain profile and clutter along the path.

2.15 Additional losses due to terminal surroundings (terminal clutter losses) shall be applied at both the transmitter and receiver where they are on land. This is based on a representative clutter height assigned to each clutter category. The representative clutter height depends not only on the typical physical height of clutter objects but also on the horizontal spacing of objects and the gaps between them. The required values are given in Figure 2.5.

Figure 2.4: ITU-R P.1812 parameters

Time percentage	10%
Nominal path centre latitude φ (°)	Bude: 51 The path centre latitude φ may be selected on a case by case basis
Sea level surface refractivity, N_0 (N-units)	obtained from digital maps provided in Recommendation P.1812-4 as described in §3.5

[1] www.itu.int/rec/R-REC-P.1812-4-201507-I/en

The average radio-refractive index lapse-rate through the lowest 1km of the atmosphere, ΔN (N-units/km)	obtained from digital maps provided in Recommendation P.1812-4 as described in §3.5

Figure 2.5: Representative clutter heights

ITU-R P.1812-4 Clutter Type	Representative Clutter Height (m)	
	Use in profile equation[2] For i=2 to n-1	Use in Terminal clutter losses[3] and add to profile equation for i=1 and n
Water/Sea	0	10
Open/Rural	0	10
Suburban	10	10
Urban/Trees/Forest	15	15
Dense Urban	20	20
In all cases the default parameter value for w_s of 27 should be used		

Terrain database

2.16 Digital terrain map data with 50m resolution shall be used. Examples include Ordnance Survey "Landform Panorama®" or "OS Terrain® 50" datasets[4].

Clutter database

2.17 A digital land classification ("clutter") dataset with 50m or better resolution such as Infoterra 50m clutter[5], Siradel 20m clutter[6] or other equivalent shall be used.

2.18 The Infoterra and Siradel datasets identify 10 and 17 different clutter categories respectively. Mapping of these clutter categories to the required P.1812 clutter designations in Figure 2.5 is given in Figure 2.6.

[2] Equation 1c in P.1812-2: http://www.itu.int/rec/R-REC-P.1812-2-201202-I/en
[3] Section 4.7 in P.1812-2 applicable to Equation 64b for water/sea/open and rural categories and Equation 64a for the other categories and profile equation 1c
[4] http://www.ordnancesurvey.co.uk/business-and-government/products/opendata-products-grid.html
[5] http://www.space-airbusds.com
[6] https://www.siradel.com

Figure 2.6: P-1812-4 clutter code mapping

ITU-R P 1812-4 Clutter Categories	Infoterra		Siradel	
	Category	Code	Category	Code
Water/Sea	Water	10	Sea	1
			River	2
			Lake	3
Open/Rural	Parks/Recreation	6	Open	4
	Open	7	Low density vegetation	5
	Open in urban	8	Park	7
Suburban	Industry	3	Village	8
	Suburban	4	Residential	9
	Village	5	Dense residential	10
Urban	Urban	2	Urban	11
			Mean dense urban	12
Trees/Forest	Forest	9	High density vegetation	6
Dense urban	Dense urban	1	Dense urban	13
			High dense urban	14
			Industrial	15
			Building blocks	16
			Airport	17