

**Wireless Telegraphy Acts 1949 and 1998**  
**Office of Communications (Ofcom)**

**CONCURRENT SPECTRUM ACCESS LICENCE FOR THE USE OF THE  
SPECTRUM BANDS 1781.7 – 1785.0 MHz PAIRED WITH 1876.7 – 1880.0 MHz**

Licence no. **291498**

Date of first issue: **02 May 2006**

1. The Office of Communications (Ofcom) grants this licence to

**Opal Telecom Limited**  
**Company Registration Number 03849133**  
("the Licensee")  
**Stanford House**  
**Garrett Field**  
**Birchwood**  
**Warrington**  
**WA3 7BH**

to establish, install and use radio transmitting and receiving stations and/or radio apparatus as described in the schedule(s) (herein after together called "the Radio Equipment") subject to the terms set out below.

**Licence Term**

2. This Licence shall continue in force until revoked by Ofcom in accordance with paragraph 3 below or surrendered by the Licensee.

## Licence Revocation and Variation

3. Where Ofcom exercises its power to revoke or vary the Licence in accordance with section 1(4) of the Wireless Telegraphy Act 1949, the Licensee shall be notified in writing.
4. Pursuant to section 4 of the Wireless Telegraphy Act 1998 Ofcom may not revoke this Licence under section 1(4) of the Wireless Telegraphy Act 1949 except:
  - (a) at the request, or with the consent, of the Licensee;
  - (b) in accordance with paragraphs 8 and 9 ;
  - (c) if there has been a material breach of any of the terms of the Licence;
  - (d) if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of the Licence, there has been a breach of any provision of regulations made by Ofcom under the powers conferred by section 168(1) and (3) of the Communications Act 2003<sup>1</sup>;
  - (e) if, in relation to the Licensee, any of the events listed in regulation 32 of the Wireless Telegraphy (Licence Award) Regulations 2006 occurred prior to the grant of this Licence where the occurrence of the event materially affected the outcome of the award process under these regulations;
  - (f) in accordance with section 4(5) of the Wireless Telegraphy Act 1998;
  - (g) if it appears to Ofcom to be necessary or expedient to revoke the Licence for the purposes of complying with a direction by the Secretary of State given to Ofcom under section 5 or section 156 of the Communications Act 2003; or
  - (h) for reasons related to the management of the radio spectrum, provided that in such case:
    - (i) this power to revoke may only be exercised after at least five (5) years notice is given in writing to the Licensee; and
    - (ii) such notice must expire after ten (10) years from the date of first issue of this Licence.
5. For the avoidance of doubt, and without prejudice to paragraphs 3 and 4 above, Ofcom may only revoke this Licence in accordance with section 1E of the Wireless Telegraphy Act 1949.

## Changes

6. This Licence may not be transferred.<sup>2</sup>

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<sup>1</sup> These are regulations on spectrum trading.

<sup>2</sup> However rights and obligations arising by virtue of this wireless telegraphy licence may be transferred in accordance with regulations made by Ofcom under powers conferred by section 168(1) and (3) of the Communications Act 2003. See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

7. The Licensee must give immediate notice to Ofcom in writing of any change to the Licensee's name and address from that recorded on the Licence.

## **Fees**

8. The Licensee shall pay to Ofcom the fee(s), in cash and without set-off or counter-claim, described in Schedule 2 of this Licence, on the date(s) also described therein, failing which Ofcom may revoke this Licence. In accordance with section 4A of the Wireless Telegraphy Act 1998 any such fee is recoverable by Ofcom.
9. On or after the expiry of ten years from the date of issue of this Licence the Licensee shall pay to Ofcom such sum(s) as may be provided for in regulations made by Ofcom under section 1 and 2(2) of the Wireless Telegraphy Act 1998, failing which Ofcom may revoke this Licence.
10. The Licensee shall also pay interest to Ofcom on any amount which is due under the terms of this Licence or provided for in any regulations made by Ofcom under section 1 and 2(2) of the Wireless Telegraphy Act 1998 from the date such amount falls due until the date of payment, calculated with reference to the Bank of England base rate from time to time. In accordance with section 4A of the Wireless Telegraphy Act 1998 any such amount and any such interest is recoverable by Ofcom.
11. If the Licence is surrendered or revoked, no refund, whether in whole or in part of any amount which is due under the terms of this Licence or provided for in any regulations made by Ofcom under section 1 and 2(2) of the Wireless Telegraphy Act 1998 will be made, except at the absolute discretion of Ofcom in accordance with regulation 36 of the Wireless Telegraphy (Licence Award) Regulations 2006.

## **Radio Equipment Use**

12. The Licensee must ensure that the Radio Equipment is constructed, established, installed and used only in accordance with the provisions specified in Schedule 1 of this Licence. Any proposal to amend any detail specified in Schedule 1 of this Licence must be agreed with Ofcom in advance and implemented only after this Licence has been varied or reissued accordingly.
13. The Licensee must ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been authorised in writing by the Licensee to do so and that such persons are made aware of, and of the requirement to comply with, the terms of this Licence.

## Access and Inspection

14. The Licensee shall permit any person authorised by Ofcom:
- (a) to have access to the Radio Equipment; and
  - (b) to inspect this Licence and to inspect, examine and test the Radio Equipment,
- at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time to ensure the Radio Equipment is being used in accordance with the terms of this Licence.

## Modification, Restriction and Closedown

15. A person authorised by Ofcom may require the Radio Equipment, or any part thereof, to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:
- (a) a material breach of this Licence has occurred; and/or
  - (b) the use of the Radio Equipment is causing or contributing to undue interference to the use of other authorised radio equipment.
16. Ofcom may require the Radio Equipment to be modified or restricted in use, or temporarily closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may only exercise this power after a written notice is served on the Licensee or a general notice applicable to holders of a named class of Licence is published.

## Geographical Boundaries

17. This Licence authorises the Licensee to establish, install and use the Radio Equipment only in the United Kingdom.
18. This Licence does not authorise the establishment, installation and use of the Radio Equipment in the Isle of Man or in the Channel Islands.

## Interpretation

19. In this Licence:

- (a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of stations and installation and use of apparatus for wireless telegraphy as specified in section 1 of the Wireless Telegraphy Act 1949; and
  - (b) the expressions "undue interference", "station for wireless telegraphy" and "apparatus for wireless telegraphy" shall be construed in accordance with section 19 of the Wireless Telegraphy Act 1949;
20. The schedules to this Licence form part of this Licence together with any subsequent schedules which Ofcom may issue as a variation to this Licence at a later date.
21. The Interpretation Act 1978 shall apply to this Licence as it applies to an Act of Parliament.

**Issued by Ofcom**

Signed by

**For the Office of Communications**

**SCHEDULE 1 TO LICENCE NUMBER: 291498**

Licence Category: **Licence for the Use of the Spectrum Bands 1781.7 – 1785.0 MHz paired with 1876.7 – 1880.0 MHz**

This schedule forms part of licence no **291498**, issued to **Opal Telecom Limited**, on **02 May 2006**.

**1. Description of Radio Equipment Licensed**

In this Licence, the Radio Equipment means any station for wireless telegraphy or apparatus for wireless telegraphy.

**2. Interface Requirements for the Radio Equipment**

That Radio Equipment shall comply with one or other of the following Interface Requirements:

IR 2045      Low Power Concurrent Systems

IR 2014      Public Wireless Networks

**IR 2087      (LTE and WiMAX equipment in 900 MHz and 1800 MHz Bands)**

These Interface Requirements have been published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity.

**3. Special Conditions relating to the Operation of the Radio Equipment**

(a) During the period that this Licence remains in force and for 6 months thereafter, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of:

(i) The following details relating to the Radio Equipment:

a) postal address;

b) National Grid Reference, (to 100 Metres resolution);

- c) antenna height (AGL) and type;
  - d) radio frequencies used by the Radio Equipment;
- (ii) a statement of the number of subscribing customers.
- (b) The Licensee shall inform Ofcom of the address of the premises at which this Licence and the information detailed at sub-paragraph (a) above shall be kept.
- (c) The Licensee must submit to Ofcom copies of the records detailed in sub-paragraph (a) above at such intervals as Ofcom shall notify to the Licensee.
- (d) The Licensee must also submit to Ofcom in such a manner and at such times, all information relating to the establishment, installation or use of the station for wireless telegraphy or apparatus for wireless telegraphy, whether stored in hard copy or electronic form, as reasonably requested for the purposes of verifying compliance with this Licence or for statistical purposes.

#### **4. Site Clearance Requirements**

(a) A site clearance certificate is not required for any transmitter (whether indoor or outdoor) which:

- (i) only uses a transmitter radiating not more than 17dBW ERP; and
- (ii) only uses a transmitter with the highest point of the antenna being less than thirty (30) metres above ground level.

(b) Further, a site clearance certificate is not required for a transmitter which uses an antenna which is placed at an existing site, which has received site clearance by Ofcom, where the height of that antenna does not exceed the antenna height permitted under the existing site clearance certificate by five (5) metres.

(c) Subject to sub-paragraphs (a) and (b), the Radio Equipment must not be established, installed or used without Ofcom first issuing a site clearance certificate for each transmitter.

#### **5. Code of Practice on Engineering Coordination**

- (a) The Licensee shall use best endeavours to agree within six months of the date of first issue of this Licence, with the Notified Licensees, engineering coordination principles (to be set out in an industry Code of Practice on Engineering Coordination).
- (b) The objective of the Code of Practice on Engineering Coordination shall be to secure the efficient use of the radio spectrum such that stations for wireless telegraphy and apparatus for wireless telegraphy shall be established or installed, sited, used and transmit in a manner that will allow services in the Permitted Frequency Bands, whether similar, competing or otherwise, (including those offered by the Notified Licensees) to be employed in neighbouring premises (including premises on different floors on the same building).
- (c) In developing the Code of Practice on Engineering Coordination the Licensee and the Notified Licensees shall at a minimum consider principles relating to:
  - (i) Efficient use of radio frequency channels, by not using more channels than are necessary to service customers;
  - (ii) Avoidance of interference by limiting transmission power to that which is no greater than necessary for service of customers;
  - (iii) Selection of sites in a manner that will minimise the probability of interference arising;
  - (iv) Siting of equipment within customer premises and at other sites in a manner that will minimise the probability of interference arising; and
  - (v) Arrangements for communicating information between companies to facilitate engineering coordination.

The Code of Practice on Engineering Coordination, when agreed, shall be provided to Ofcom.

- (d) The Licensee shall use its best endeavours to adhere to the agreed Code of Practice when establishing and using stations for wireless telegraphy and installing and using apparatus for wireless telegraphy.



- (e) If a Code of Practice on Engineering Coordination containing such engineering coordination principles is not agreed within six months as required by sub-paragraph (a), or, where at any time the objective described in sub-paragraph (b) is in Ofcom's sole opinion not being secured, Ofcom shall require that the Licensee and the Notified Licensees shall adhere to the terms of a Code of Practice containing such principles as Ofcom in its sole discretion deems necessary for the achievement of the objective.
- (f) Any breach of the principles in a Code of Practice on Engineering Coordination imposed by Ofcom under sub-paragraphs (e) above or (g) below shall constitute a breach of this Licence.
- (g) The Licensee and the Notified Licensees may agree changes to the Code of Practice on Engineering Coordination which was provided to Ofcom under sub-paragraph (c). When agreed, such a revised Code of Practice must immediately be provided to Ofcom. Where at any time the objective described in sub-paragraph (b) is not being secured by the revised Code of Practice Ofcom shall require that the Licensee and the Notified Licensees shall adhere to the terms of a Code of Practice containing such principles as Ofcom in its sole discretion deems necessary for the achievement of the objective.

## **6. Cross-border Coordination**

The Radio Equipment shall be operated in compliance with such cross-border coordination and sharing procedures as may be notified to the Licensee by Ofcom.

## **7. Permitted Frequency Bands**

Subject to the Out-of-Block Emissions permitted under paragraph 8, the Radio Equipment must only transmit and/or receive on the following two frequency bands (the "Permitted Frequency Bands"):

- (i) 1781.7 – 1785.0 MHz – Mobile Transmit; and
- (ii) 1876.7 – 1880.0 MHz – Base Transmit.

## **8. Permissible Out-of-Block Emissions**

For Out-of-Block Emissions, the Maximum mean EIRP density within the frequency ranges set out below as measured from the upper or lower frequencies of either of the Permitted Frequency Bands of Operation shall not exceed the following:

Permitted frequency band 1781.7 – 1785.0 MHz

Frequency range as measured from the lower frequency of the frequency band	Maximum mean EIRP density dBm/kHz
0.0 to -0.1 MHz	$- 33 + 140 \times \Delta_{FL}^*$
-0.1 to -0.3 MHz	$- 47 + 30 \times (\Delta_{FL}^* + 0.1)$
-0.3 to -1.5 MHz	- 53
-1.5 to -5.7 MHz	- 63

\* Note:  $\Delta_{FL}$  is the offset from the lower edge of the relevant Permitted Frequency Band in MHz (it has values between 0 and - 0.3 MHz).

Permitted frequency band 1781.7 – 1785.0 MHz

Frequency range as measured from the higher frequency of the frequency band	Maximum mean EIRP density dBm/kHz
0.0 to 0.05 MHz	$-23 - 60 \times \Delta_{FH}^*$
0.05 to 0.2 MHz	$-26 - 140 \times (\Delta_{FH}^* - 0.05)$
0.2 to 0.4 MHz	$-47 - 30 \times (\Delta_{FH}^* - 0.2)$
0.4 to 1.6 MHz	-53
1.6 to 5.8 MHz	-63

\* Note:  $\Delta_{FH}$  is the offset from the upper edge of the relevant Permitted Frequency Band in MHz (it has values between 0 and + 0.4 MHz).

**Permitted frequency band 1876.7 – 1880.0 MHz**

Frequency range as measured from the lower frequency of the frequency band	Maximum mean EIRP density dBm/kHz
-0.0 to -0.1 MHz	$-33.6 + 153.3 \times \Delta_{FL}^*$
-0.1 to -0.3 MHz	$-49 + 20 \times (\Delta_{FL}^* + 0.1)$
-0.3 to -0.9 MHz	-53
-0.9 to -1.5 MHz	-56
-1.5 to -5.7 MHz	-74

**Permitted frequency band 1876.7 – 1880.0 MHz**

Frequency range as measured from the lower frequency of the frequency band	Maximum mean EIRP density dBm/kHz
-6.2 to -3.2 MHz	-55
-3.2 to 0.0 MHz	$-45 + 10 \times (\Delta_{FL}^* - 0.2)/3$

\* Note:  $\Delta_{FL}$  is the offset from the lower edge of the relevant Permitted Frequency Band in MHz (it has values between 0 and - 0.3 MHz).

**Permitted frequency band 1876.7 – 1880.0 MHz**

Frequency range as measured from the higher frequency of the frequency band	Maximum mean EIRP density dBm/kHz
0.0 to 0.05 MHz	$-23 - 60 \times \Delta_{FH}^*$
0.05 to 0.2 MHz	$-26 - 153.3 \times (\Delta_{FH}^* - 0.05)$
0.2 to 0.4 MHz	$-49 - 20 \times (\Delta_{FH}^* - 0.2)$
0.4 to 1.0 MHz	-53
1.0 to 1.6 MHz	-56
1.6 to 5.8 MHz	-74

**Permitted frequency band 1876.7 – 1880.0 MHz**

Frequency range as measured from the higher frequency of the frequency band	Maximum mean EIRP density dBm/kHz
0.0 to 0.05 MHz	$-23 - 60 \times \Delta_{FH}^*$
0.05 to 0.1 MHz	$-26 - 153.3 \times (\Delta_{FH}^* - 0.05)$
0.1 to 2.8 MHz	$-45 - 10 \times (\Delta_{FH}^* - 0.2)/3$
2.8 to 5.8 MHz	-55

\* Note:  $\Delta_{FH}$  is the offset from the upper edge of the relevant Permitted Frequency Band in MHz (it has values between 0 and + 0.4 MHz).

## 9. Maximum Mean EIRP Density

(a) Except where Ofcom consents in accordance with sub-paragraphs (b) and (c) to the higher maximum mean EIRP density mentioned therein, the Maximum mean EIRP density in the Permitted Frequency Bands shall not be greater than the figures indicated in the second column of the following tables.

For the frequency band 1781.7 to 1785.0 MHz

Frequency range as measured from the lower frequency of the frequency band	Maximum mean EIRP density dBm/kHz	
	where paragraph 9(a) above applies	where paragraph 9(b) below applies
0 to 0.05 MHz	$-33 + 140 \times \Delta_{FL}^*$	$-33 + 140 \times \Delta_{FL}^*$
0.05 to 0.1 MHz	$-26 + 60 \times (\Delta_{FL}^* - 0.05)$	$-26 + 60 \times (\Delta_{FL}^* - 0.05)$
0.1 to 0.2 MHz	$-23 + 230 \times (\Delta_{FL}^* - 0.1)$	$-23 + 300 \times (\Delta_{FL}^* - 0.1)$
0.2 to 3.2 MHz	0 <sup>†</sup>	7 <sup>†</sup>
3.2 to 3.3 MHz	$-23 + 230 \times (3.3 - \Delta_{FL}^*)$	$-23 + 300 \times (3.3 - \Delta_{FL}^*)$

For the frequency band 1876.7 to 1880.0 MHz

Frequency range as measured from the lower frequency of the frequency band	Maximum mean EIRP density dBm/kHz	
	where paragraph 9(a) above applies	where paragraph 9(b) below applies
0 to 0.05 MHz	$-33.6 + 153.3 \times \Delta_{FL}^*$	$-33.6 + 153.3 \times \Delta_{FL}^*$
0.05 to 0.1 MHz	$-26 + 60 \times (\Delta_{FL}^* - 0.05)$	$-26 + 60 \times (\Delta_{FL}^* - 0.05)$
0.1 to 0.2 MHz	$-23 + 230 \times (\Delta_{FL}^* - 0.1)$	$-23 + 300 \times (\Delta_{FL}^* - 0.1)$
0.2 to 3.2 MHz	0 <sup>†</sup>	7 <sup>†</sup>
3.2 to 3.3 MHz	$-23 + 230 \times (3.3 - \Delta_{FL}^*)$	$-23 + 300 \times (3.3 - \Delta_{FL}^*)$

\* Note:  $\Delta_{FL}$  is the offset from the lower edge of the relevant Permitted Frequency Band in MHz (it has values between 0 and +0.2 MHz and between +3.2 and +3.3 MHz).

† within the occupied bandwidth of the transmission.

(b) Where the Licensee wishes to operate with a higher maximum mean EIRP density indicated in the third column in the tables above in any particular location or in any particular circumstances the Licensee must first procure the notification to Ofcom of letters of consent from each of the Notified Licensees in which each Notified Licensee agrees to the use by the Licensee in a particular location or particular circumstances of that higher density.

**10. Antenna Height**

Irrespective of any site clearance provided by Ofcom, the highest point of outdoor antenna systems shall be no more than 10 metres above ground level.

## **11. Interpretation of terms in this Schedule**

In this Schedule:

- a) "Mobile Transmit" means transmission from any mobile or user station;
- b) "Base Transmit" mean transmission from any base station;
- c) "EIRP" means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);
- d) "ERP" means the effective radiated power. This is the product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction;
- e) "dBm" means the power level in decibels (logarithmic scale) referenced against 1 milliWatt (i.e. a value of 0 dBm is 1 mW);
- f) "dBW" means the power level in decibels (logarithmic scale) referenced against 1 Watt (i.e. a value of 0 dBW is 1 W);
- g) "Occupied bandwidth" means the width of the frequency band occupied such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the total mean power of the emission;
- h) "Maximum mean EIRP density" means the average EIRP transmitted during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions;
- i) "Out-of-Block Emissions" means radio frequency emissions generated by the Radio Equipment and radiated into the frequency bands adjacent (in terms of frequency) to the Licensee's Permitted Frequency Bands;
- j) "Permitted Frequency Bands" means the two frequency bands set out in paragraph 7; and
- k) "Notified Licensees" means the holders of wireless telegraphy licences (which relate to the Permitted Frequency Bands) which are notified to the Licensee by Ofcom.

Opal Telecom Limited  
Concurrent Spectrum Access Licence for the use of the Spectrum Bands  
1781.7 – 1785.0 MHz paired with 1876.7 – 1880.0 MHz  
Company Registration no. 03849133  
First Issued: 02 May 2006 - Licence Number: 291498 – Issue 1 - 02/05/06

**SCHEDULE 2 TO LICENCE NUMBER: 291498**

Licence Category: **Licence for use of the Spectrum Bands 1781.7 – 1785 MHz paired with 1876.7-1880 MHz**

Licence fee: £155,555.