# Draft UK Interface Requirement 2070

## Mobile Communication Services on Aircraft

**Publication date:** May 2014
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# Contents

Section 1

# References

1.1 ETSI EN 301 502 - Harmonized EN for Global System for Mobile communications (GSM); Base Station and Repeater equipment covering essential requirements under article 3.2 of the R&TTE directive.

1.2 ETSI EN 301 511 - Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC).

1.3 ETSI EN 302 480 - Electromagnetic compatibility and Radio spectrum Matters (ERM); Harmonized EN for the GSM on board aircraft system covering essential requirements of Article 3.2 of the R&TTE Directive

1.4 ETSI EN 301 908-01 – Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 1: Harmonized standard for IMT-2000, introduction and common requirements, covering essential requirements of article 3.2 of the R&TTE Directive.

1.5 ETSI EN 301 908-02 – Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 2: Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive.

1.6 ETSI EN 301 908-03 – Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 3: Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive.

1.7 ETSI EN 301 908-11 – Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 11: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive.

1.8 ETSI EN 301 908-13 IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE).

1.9 ETSI EN 301 908-14 IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)

1.10 ETSI EN 301 908-15 Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 15: Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (FDD Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive

1.11 GSM 05.05 - Digital cellular telecommunications system (GSM); Radio transmission and reception.

1.12 ECC Report 93 - Compatibility between GSM equipment on board aircraft and terrestrial networks.

1.13 ECC/DEC/(06)07 - ECC Decision of 1 December 2006 on the harmonised use of airborne GSM systems in the frequency bands 1710-1785 and 1805-1880 MHz.

1.14 ETSI TS 102 576 - Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Station System (BSS) equipment specification; GSM systems on board aircraft; Part 2: Radiated power outside aircraft.

1.15 Recommendation ITU-R M.1457 – Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000).

1.16 2008/294/EC – Commission Decision of 7 April 2008 on harmonised conditions of spectrum use for the operation of mobile communication services on aircraft (MCA services) in the Community

1.17 2013/654/EU - Commission Implementing Decision of 12 November 2013 amending Decision 2008/294/EC to include additional access technologies and frequency bands for mobile communications services on aircraft (MCA services)

Section 2

# Foreword

2.1 The Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive 99/5/EC (Directive 1999/5/EC) was implemented in the United Kingdom (UK) on the 8 April 2000 by The Radio Equipment and Telecommunications Terminal Equipment Regulations 2000, Statutory Instrument 2000 No. 730 (as amended) . In accordance with Articles 4.1 and 7.2 of Directive 1999/5/EC, this UK Interface Requirement contains the requirements for the licensing and use of Mobile Communication Services on Aircraft in the specified frequency bands.

2.2 Nothing in this UK Radio Interface Requirement shall preclude the need for equipment to comply with Directive 1999/5/EC.

2.3 It is required by the Wireless Telegraphy Act 2006 that no radio equipment is installed or used in the UK except under the authority of a licence granted by or otherwise exempted by regulations made by Ofcom. It is a condition of such a licence or exemption regulations as appropriate that, in order to be installed or used in the UK, the equipment must meet the minimum requirements specified in this UK Interface Requirement for the stated equipment types and for the stated frequency bands. Nothing in this UK Interface Requirement shall preclude equipment from being placed on the market in the UK that complies with the 'essential requirements' specified in Directive 1999/5/EC.

2.4 The requirements given in the main body of this UK Radio Interface Requirement will apply to the licensing of Mobile Communication Services on Aircraft.

2.5 This UK Radio Interface Requirement will be revised as necessary, for example to follow:

i) current technology developments for reasons related to the effective and appropriate use of the spectrum in particular maximising spectrum utilisation; and

ii) changes to the available spectrum allocated for Mobile Communication Services on Aircraft Systems.

2.6 All UK Radio Interface Requirements notified under Directive 1998/34/EC will be published and will be made available free of charge from the Ofcom web-site at http://www.ofcom.org.uk/radiocomms/ifi/tech/interface_req/.

2.7 Further information on this UK Radio Interface Requirement can be obtained from the technical enquiry contact given at the back of this document.

Section 3

# Minimum requirements for operation within the UK

3.1 The minimum requirements in this document are made for reasons related to the effective and appropriate use of the radio spectrum, in particular maximising spectrum utilisation.

3.2 This UK Radio Interface Requirement gives a high level description of how the spectrum in the UK is used for Mobile Communication Services on Aircraft. It does not prescribe technical interpretation of the ‘essential requirements’ of Directive 1999/5/EC.

3.3 This UK Radio Interface Requirement therefore stipulates the necessary equipment parameters for the licensing of Mobile Communication Services on Aircraft in the UK. Tables 3.1 to 3.7 contain the relevant equipment parameters. These taken together with the ‘essential requirements’ detailed in Article 3.2 of Directive 1999/5/EC constitute the minimum requirements for Mobile Communication Services on Aircraft within the UK. Nothing in this UK Interface Requirement shall preclude equipment from being placed on the market in the UK that complies with the ‘essential requirements’ specified in Directive 1999/5/EC.

3.4 The technical parameters specified in the UK Radio Interface Requirement are applied to achieve the desired level of compatibility between Mobile Communication Services on Aircraft and other radiocommunications services, whilst promoting enterprise, innovation and competition.

3.5 This UK Radio Interface requirement provides the necessary technical information which facilitates access to the Mobile Communication Services on Aircraft spectrum by making clear the assumptions that are made in planning the use of the Mobile Communications Services on Aircraft spectrum in the UK. It is not the intention of this UK Radio Interface Requirement to duplicate or impose any additional ‘essential requirements’ of the Directive 1999/5/EC on products. Any specified parameters within this document are for the purpose of identifying product options and not as a national de facto product requirement.

## Table 3.1: Minimum requirements for the use of: - GSM mobile stations when connected to Mobile Communication Services on Aircraft operating in the 1710-1785 MHz band

<table>
<tr><td colspan="3">Mandatory (1-9)</td></tr>
<tr><td>1</td><td>Frequency / Bands</td><td>1710 to 1785 MHz</td></tr>
<tr><td>2</td><td>Radio service</td><td>Mobile Service</td></tr>
<tr><td>3</td><td>Application</td><td>Mobile Communication Services on Aircraft</td></tr>
<tr><td>4</td><td>Channelling / modulation</td><td>GMSK or 8-PSK<br><br>200 kHz channel raster</td></tr>
<tr><td>5</td><td>Maximum transmit power limit</td><td>When connected to a Mobile Communication Service on Aircraft base station the mobile will be cotrolled and shall not exceed the power set in 2013/654/EU.<br><br>The e.i.r.p, defined outside the aircraft, resulting from the GSM mobile terminal transmitting at 0 dBm shall not exceed, the level in the table below*<br><br>
<table>
<tr><th rowspan="2">Height above ground (m)</th><td>Maximum e.i.r.p, defined outside the aircraft, resulting from the GSM mobile terminal in dBm/channel</td></tr>
<tr><td>1800 MHz</td></tr>
<tr><td>3000</td><td>-3.3</td></tr>
<tr><td>4000</td><td>-1.1</td></tr>
<tr><td>5000</td><td>0.5</td></tr>
<tr><td>6000</td><td>1.8</td></tr>
<tr><td>7000</td><td>2.9</td></tr>
<tr><td>8000</td><td>3.8</td></tr>
</table>
<br>*See 2013/654/EU for more details.</td></tr>
<tr><td>6</td><td>Channel occupation rules</td><td>Time division multiple access (TDMA)</td></tr>
<tr><td>7</td><td>Duplex type / separation</td><td>Mobile station transmit<br><br>Paired carriers 95 MHz above (Table 3.2)</td></tr>
<tr><td>8</td><td>Licensing Regime</td><td>1) Network user equipment is licence-exempt<br><br>2) Mobile Communication Services on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement are licensed under the existing Aircraft Licensing regime.</td></tr>
<tr><td>9</td><td>Additional essential requirements</td><td></td></tr>
<tr><td colspan="3">Informative (10-13)</td></tr>
<tr><td>10</td><td>Frequency planning assumptions</td><td>GSM 05.05</td></tr>
<tr><td>11</td><td>Reference</td><td>EN 301 511<br>EN 302 480</td></tr>
</table>

| | | |
|---|---|---|
| | | 2013/654/EU<br>ECC/DEC/(06)07 |
| 12 | Remarks | The Mobile Communication Service on Aircraft system will continuously control the Mobile Stations power to a maximum of 0dBm (0dBi antenna gain), including initial access.<br><br>The absolute height above ground for the system in operation shall be no less than 3000 metres.<br><br>TS 102 576 contains illustrative examples of how test methodologies can be implemented to determine the power outside of the e.i.r.p as set out in the above table. |
| 13 | Notification Number | 2008/44/UK |

## Table 3.2: Minimum requirements for the use of: - GSM Mobile Communication Services on Aircraft base stations operating in the 1805-1880 MHz band

<table>
<tr><td colspan="3">Mandatory (1-9)</td></tr>
<tr><td>1</td><td>Frequency / Bands</td><td>1805 to 1880 MHz</td></tr>
<tr><td>2</td><td>Radio service</td><td>Mobile Service</td></tr>
<tr><td>3</td><td>Application</td><td>Mobile Communication Services on Aircraft</td></tr>
<tr><td>4</td><td>Channelling / modulation</td><td>GMSK or 8-PSK<br><br>200 kHz channel raster</td></tr>
<tr><td>5</td><td>Maximum transmit power limit</td><td>
<table>
<tr><th rowspan="3">Height above ground (m)</th><th>Maximum e.i.r.p. produced by aircraft-BTS, outside the aircraft in dBm/channel</th></tr>
<tr><th>Band: 1800 MHz</th></tr>
<tr><th>Channel Bandwidth=200 kHz</th></tr>
<tr><td>3000</td><td>-13.0</td></tr>
<tr><td>4000</td><td>-10.5</td></tr>
<tr><td>5000</td><td>-8.5</td></tr>
<tr><td>6000</td><td>-6.9</td></tr>
<tr><td>7000</td><td>-5.6</td></tr>
<tr><td>8000</td><td>-4.4</td></tr>
</table>
<br>See 2013/654/EU for more details.</td></tr>
<tr><td>6</td><td>Channel occupation rules</td><td>Time division multiple access (TDMA)</td></tr>
<tr><td>7</td><td>Duplex type / separation</td><td>Base station transmit<br><br>Paired carriers 95 MHz below (Table 3.1)</td></tr>
<tr><td>8</td><td>Licensing Regime</td><td>Mobile Communication Services on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement are licensed under the existing Aircraft Licensing regime.</td></tr>
<tr><td>9</td><td>Additional essential requirements</td><td></td></tr>
<tr><td colspan="3">Informative (10-13)</td></tr>
<tr><td>10</td><td>Frequency planning assumptions</td><td>GSM 05.05</td></tr>
<tr><td>11</td><td>Reference</td><td>EN 301 502<br>EN 302 480<br>ECC/DEC/(06)07<br>2013/654/EU</td></tr>
<tr><td>12</td><td>Remarks</td><td>The Mobile Communication Service on Aircraft system will continuously control the Mobile Stations power to a maximum of 0dBm (0dBi antenna gain), including initial access.<br><br>The absolute height above ground for the system in operation shall be no less than 3000 metres.</td></tr>
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| | | DRAFT TS 102 576 contains illustrative examples of how test methodologies can be implemented to determine the power outside of the e.i.r.p as set out in the above table. |
| 13 | Notification Number | 2008/44/UK |

<table>
<tr><td colspan="3">Table 3.3: Minimum requirements for the use of: - LTE mobile stations when connected to Mobile Communication Services on Aircraft operating in the 1710-1785 MHz band</td></tr>
<tr><td colspan="3">Mandatory (1-9)</td></tr>
<tr><td>1</td><td>Frequency / Bands</td><td>1710 to 1785 MHz</td></tr>
<tr><td>2</td><td>Radio service</td><td>Mobile Service</td></tr>
<tr><td>3</td><td>Application</td><td>Mobile Communication Services on Aircraft</td></tr>
<tr><td>4</td><td>Channelling / modulation</td><td>100 kHz channel raster<br>QPSK<br>Up to 64-QAM</td></tr>
<tr><td>5</td><td>Maximum transmit power limit</td><td>When connected to a Mobile Communication Service on Aircraft base station the mobile will be cotrolled and shall not exceed the power set in 2013/654/EU.<br><br>The e.i.r.p, defined outside the aircraft, resulting from the LTE mobile terminal transmitting at 5 dBm shall not exceed, the level in the table below*
<table>
<tr><th rowspan="2">Height above ground (m)</th><td>Maximum e.i.r.p, defined outside the aircraft, resulting from the LTE mobile terminal in dBm/channel</td></tr>
<tr><th>1800 MHz</th></tr>
<tr><td>3000</td><td>1.7</td></tr>
<tr><td>4000</td><td>3.9</td></tr>
<tr><td>5000</td><td>5</td></tr>
<tr><td>6000</td><td>5</td></tr>
<tr><td>7000</td><td>5</td></tr>
<tr><td>8000</td><td>5</td></tr>
</table>
*See 2013/654/EU for more details.</td></tr>
<tr><td>6</td><td>Channel occupation rules</td><td>SC-FDMA</td></tr>
<tr><td>7</td><td>Duplex type / separation</td><td>Mobile station transmit<br><br>Paired carriers 95 MHz above (Table 3.2)</td></tr>
<tr><td>8</td><td>Licensing Regime</td><td>1) Network user equipment is licence-exempt<br>2) Mobile Communication Services on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement are licensed under the existing Aircraft Licensing regime.</td></tr>
<tr><td>9</td><td>Additional essential requirements</td><td></td></tr>
<tr><td colspan="3">Informative (10-13)</td></tr>
<tr><td>10</td><td>Frequency planning assumptions</td><td>ETSI TS 136 101 ETSI TS 136 106<br>CEPT Report 40 CEPT Report 41</td></tr>
</table>

| | | |
|---|---|---|
| 11 | Reference | LTE complying with LTE Standards, as published by ETSI, in particular EN301 908-1, EN301 908-13, EN301 908-14 and EN301 908-15, or equivalent specifications. 2013/654/EU |
| 12 | Remarks | The Mobile Communication Service on Aircraft system will continuously control the Mobile Stations power to a maximum of 5dBm (0dBi antenna gain), including initial access.<br><br>The absolute height above ground for the system in operation shall be no less than 3000 metres. |
| 13 | Notification Number | |

<table>
<tr><td colspan="3">Table 3.4: Minimum requirements for the use of: - LTE Mobile Communication Services on Aircraft base stations operating in the 1805-1880 MHz band</td></tr>
<tr><td colspan="3">Mandatory (1-9)</td></tr>
<tr><td>1</td><td>Frequency / Bands</td><td>1805 to 1880 MHz</td></tr>
<tr><td>2</td><td>Radio service</td><td>Mobile Service</td></tr>
<tr><td>3</td><td>Application</td><td>Mobile Communication Services on Aircraft</td></tr>
<tr><td>4</td><td>Channelling / modulation</td><td>100 kHz channel raster<br>QPSK<br>Up to 64-QAM</td></tr>
<tr><td>5</td><td>Maximum transmit power limit</td><td>
<table>
<tr><th rowspan="3">Height above ground (m)</th><th>Maximum e.i.r.p. produced by aircraft-BTS, outside the aircraft in dBm/channel</th></tr>
<tr><th>Band: 1800 MHz</th></tr>
<tr><th>Channel Bandwidth=200 kHz</th></tr>
<tr><td>3000</td><td>-13.0</td></tr>
<tr><td>4000</td><td>-10.5</td></tr>
<tr><td>5000</td><td>-8.5</td></tr>
<tr><td>6000</td><td>-6.9</td></tr>
<tr><td>7000</td><td>-5.6</td></tr>
<tr><td>8000</td><td>-4.4</td></tr>
</table>
<br>See 2013/654/EU for more details.</td></tr>
<tr><td>6</td><td>Channel occupation rules</td><td>OFDMA</td></tr>
<tr><td>7</td><td>Duplex type / separation</td><td>Base station transmit<br><br>Paired carriers 95 MHz below (Table 3.3)</td></tr>
<tr><td>8</td><td>Licensing Regime</td><td>Mobile Communication Services on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement are licensed under the existing Aircraft Licensing regime.</td></tr>
<tr><td>9</td><td>Additional essential requirements</td><td></td></tr>
<tr><td colspan="3">Informative (10-13)</td></tr>
<tr><td>10</td><td>Frequency planning assumptions</td><td>ETSI TS 136 101 ETSI TS 136 106<br>CEPT Report 40 CEPT Report 41</td></tr>
<tr><td>11</td><td>Reference</td><td>LTE complying with LTE Standards, as published by ETSI, in particular EN301 908- 1, EN301 908-13, EN301 908-14 and EN301 908-15, or equivalent specifications.<br>2013/654/EU</td></tr>
<tr><td>12</td><td>Remarks</td><td>The Mobile Communication Service on Aircraft system will continuously control the Mobile Stations power to a maximum of 5dBm (0dBi antenna gain), including initial access.<br><br>The absolute height above ground for the system</td></tr>
</table>

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| | | in operation shall be no less than 3000 metres. |
| 13 | Notification Number | |

## Table 3.5: Minimum requirements for the use of: - UMTS mobile stations when connected to Mobile Communication Services on Aircraft operating in the 1920-1980 MHz band

<table>
<tr><td colspan="3">Mandatory (1-9)</td></tr>
<tr><td>1</td><td>Frequency / Bands</td><td>1920 to 1980 MHz</td></tr>
<tr><td>2</td><td>Radio service</td><td>Mobile Service</td></tr>
<tr><td>3</td><td>Application</td><td>Mobile Communication Services on Aircraft</td></tr>
<tr><td>4</td><td>Channelling / modulation</td><td>200 kHz channel raster<br>QPSK<br>16QAM</td></tr>
<tr><td>5</td><td>Maximum transmit power limit</td><td>When connected to a Mobile Communication Service on Aircraft base station the mobile will be cotrolled and shall not exceed the power set in 2013/654/EU.<br><br>The e.i.r.p, defined outside the aircraft, resulting from the UMTS mobile terminal transmitting at −6 dBm/3.84 shall not exceed, the level in the table below*<br><br>
<table>
<tr><th rowspan="2">Height above ground (m)</th><td>Maximum e.i.r.p, defined outside the aircraft, resulting from the UMTS mobile terminal in dBm/channel</td></tr>
<tr><td>2100 MHz</td></tr>
<tr><td>3000</td><td>3.1</td></tr>
<tr><td>4000</td><td>5.6</td></tr>
<tr><td>5000</td><td>7</td></tr>
<tr><td>6000</td><td>7</td></tr>
<tr><td>7000</td><td>7</td></tr>
<tr><td>8000</td><td>7</td></tr>
</table>
<br>*See 2013/654/EU for more details.</td></tr>
<tr><td>6</td><td>Channel occupation rules</td><td>CDMA</td></tr>
<tr><td>7</td><td>Duplex type / separation</td><td>Mobile station transmit<br><br>Paired carriers 190 MHz above (Table 3.6)</td></tr>
<tr><td>8</td><td>Licensing Regime</td><td>1) Network user equipment is licence-exempt<br><br>2) Mobile Communication Services on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement are licensed under the existing Aircraft Licensing regime.</td></tr>
<tr><td>9</td><td>Additional essential requirements</td><td></td></tr>
<tr><td colspan="3">Informative (10-13)</td></tr>
<tr><td>10</td><td>Frequency planning assumptions</td><td>• ETSI TS 125 101<br><br>ETSI TS 125 106</td></tr>
</table>

| | | |
|---|---|---|
| 11 | Reference | UMTS complying with the UMTS Standards as published by ETSI, in particular EN301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11, or equivalent specifications. 2013/654/EU |
| 12 | Remarks | The Mobile Communication Service on Aircraft system will continuously control the Mobile Stations power to a maximum of -6dBm (0dBi antenna gain), including initial access.<br><br>The absolute height above ground for the system in operation shall be no less than 3000 metres. |
| 13 | Notification Number | |

## Table 3.6: Minimum requirements for the use of: - UMTS Mobile Communication Services on Aircraft base stations operating in the 2110 - 2170 MHz band

<table>
<tr><td colspan="3">Mandatory (1-9)</td></tr>
<tr><td>1</td><td>Frequency / Bands</td><td>2110 to 2170 MHz</td></tr>
<tr><td>2</td><td>Radio service</td><td>Mobile Service</td></tr>
<tr><td>3</td><td>Application</td><td>Mobile Communication Services on Aircraft</td></tr>
<tr><td>4</td><td>Channelling / modulation</td><td>200 kHz channel raster<br>QPSK<br>16QAM<br>64QAM</td></tr>
<tr><td>5</td><td>Maximum transmit power limit</td><td>
<table>
<tr><th rowspan="3">Height above ground (m)</th><th>Maximum e.i.r.p. produced by aircraft-BTS, outside the aircraft in dBm/channel</th></tr>
<tr><th>Band: 2100 MHz</th></tr>
<tr><th>Channel Bandwidth=3.84 MHz</th></tr>
<tr><td>3000</td><td>1.0</td></tr>
<tr><td>4000</td><td>3.5</td></tr>
<tr><td>5000</td><td>5.4</td></tr>
<tr><td>6000</td><td>7</td></tr>
<tr><td>7000</td><td>8.3</td></tr>
<tr><td>8000</td><td>9.5</td></tr>
</table>
<br>See 2013/654/EU for more details.</td></tr>
<tr><td>6</td><td>Channel occupation rules</td><td>CDMA</td></tr>
<tr><td>7</td><td>Duplex type / separation</td><td>Base station transmit<br><br>Paired carriers 190 MHz below (Table 3.5)</td></tr>
<tr><td>8</td><td>Licensing Regime</td><td>Mobile Communication Services on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement are licensed under the existing Aircraft Licensing regime.</td></tr>
<tr><td>9</td><td>Additional essential requirements</td><td></td></tr>
<tr><td colspan="3">Informative (10-13)</td></tr>
<tr><td>10</td><td>Frequency planning assumptions</td><td></td></tr>
<tr><td>11</td><td>Reference</td><td>UMTS complying with the UMTS Standards as published by ETSI, in particular EN301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11, or equivalent specifications.<br>2013/654/EU</td></tr>
<tr><td>12</td><td>Remarks</td><td>The Mobile Communication Service on Aircraft system will continuously control the Mobile Stations power to a maximum of -6dBm (0dBi antenna gain), including initial access.<br><br>The absolute height above ground for the system</td></tr>
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| | | in operation shall be no less than 3000 metres. |
| 13 | Notification Number | |

## Table 3.7: Minimum requirements for the use of: - Mobile Communication Services on Aircraft Network Control Unit (NCU) operating in the 460 to 470 MHz, 791 to 821 MHz, 921 to 960 MHz, 1805 to 1880 MHz and 2110 to 2170 MHz bands

Mandatory (1-9)

| | | |
|---|---|---|
| 1 | **Frequency / Bands** | 460 to 470 MHz<br>791 to 821 MHz<br>921 to 960 MHz<br>1805 to 1880 MHz<br>2110 to 2170 MHz |
| 2 | **Radio service** | Mobile Service |
| 3 | **Application** | Mobile Communication Services on Aircraft |
| 4 | **Channelling / modulation** | N/A |
| 5 | **Maximum transmit power limit** | See nested table below |
| 6 | **Channel occupation rules** | N/A |
| 7 | **Duplex type / separation** | N/A |
| 8 | **Licensing Regime** | Mobile Communication Service on Aircraft equipment meeting the minimum requirements outlined in this Interface Requirement is licensed under the existing Aircraft Licensing regime. |
| 9 | **Additional essential requirements** | |

| **Height above ground (m)** | **Maximum e.i.r.p. produced by NCU/aircraft-BTS, outside the aircraft in dBm/channel** | | | | |
|---|---|---|---|---|---|
| | **460-470 MHz** | **791-821 MHz** | **921-960 MHz** | **1805-1880 MHz** | **2110-2170 MHz** |
| | **Channel Bandwidth=1.25 MHz** | **Channel Bandwidth= 10 MHz** | **Channel Bandwidth=200 kHz** | **Channel Bandwidth=200 kHz** | **Channel Bandwidth=3.84 MHz** |
| 3000 | -17.0 | -0.87 | -19.0 | -13.0 | 1.0 |
| 4000 | -14.5 | 1.63 | -16.5 | -10.5 | 3.5 |
| 5000 | -12.6 | 3.57 | -14.5 | -8.5 | 5.4 |
| 6000 | -11.0 | 5.15 | -12.9 | -6.9 | 7.0 |
| 7000 | -9.6 | 6.49 | -11.6 | -5.6 | 8.3 |
| 8000 | -8.5 | 7.65 | -10.5 | -4.4 | 9.5 |

See 2013/654/EU for more details

| Informative (10-13) | | |
|---|---|---|
| 10 | Frequency planning assumptions | N/A |
| 11 | Reference | GSM complying with the GSM Standards as published by ETSI, in particular EN 301 502, EN 301 511 and EN 302 480, or equivalent specifications.<br>UMTS complying with the UMTS Standards as published by ETSI, in particular EN301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11, or equivalent specifications<br>LTE complying with LTE Standards, as published by ETSI, in particular EN301 908- 1, EN301 908-13, EN301 908-14 and EN301 908-15, or equivalent specifications.<br>ECC/DEC/(06)07<br>TS 102 576<br>2008/294/EC<br>2013/654/EU |
| 12 | Remarks | The absolute height above ground for the system in operation shall be no less than 3000 meters.<br><br>TS 102 576 contains illustrative examples of how test methodologies can be implemented to determine the power outside of the e.i.r.p as set out in the above table. |
| 13 | Notification Number | |

**Section 4**

# Additional performance parameters

**(informative)**

4.1 The following requirements are taken from the Annex of 2013/654/EU.

# Technical and operational requirements for airborne GSM systems

## Description of the Airborne GSM system

The onboard GSM mobile system (the System) enables airline passengers to use their personal mobile terminals during approved stages of flight. GSM access onboard aircraft is provided by one or more pico cell BTS (aircraft-BTS). Onboard mobile terminals must be prevented from attempting to access networks on the ground. This could be ensured:

- By the inclusion of a Network Control Unit (NCU), which raises the noise floor inside the cabin in mobile receive bands and/or;
- Through RF shielding of the aircraft fuselage to further attenuate the signal entering and leaving the fuselage.

The power of the onboard GSM mobile terminals is controlled to the minimum value by the aircraft-BTS. The aircraft-BTS operates in the GSM 1800 frequency band. This band has been selected because the minimum transmit power of the mobile terminal is lower than for the GSM 900 band and the path loss is higher for the 1800 MHz band.. The NCU power must be sufficient to remove “visibility” of the networks located on the ground, whilst not being so high as to cause harmful interference to these networks. Similarly the power of the aircraft-BTS should be sufficient to provide a reliable service, without causing harmful interference to networks on the ground.

The terrestrial networks protected are those operating in frequency bands:

- 450-470 MHz
- 791-821 / 822-862 MHz
- 876-915 MHz / 921-960 MHz
- 1710-1785 MHz / 1805-1880 MHz
- 1920-1980 MHz / 2110-2170 MHz
- 2500-2690 MHz[1]

Other frequency bands (such as the 2500-2690 MHz band) might need to be addressed in the future.

This decision applies to operation of the System at a minimum height of 3000 m above ground.

[1] Since the use of the upgraded network control unit (NCU) for the 2,6 GHz band would be delayed until the technical constraints are agreed by the competent aeronautical certification authorities to allow the start of the production of the NCUs and until airworthiness certification has been completed for each type of aircraft, the application of the NCU parameters for the 2,6 GHz band could be postponed until 1 January 2017

## Prevention of mobile terminals from attaching to networks on the ground

During the period when the use of GSM mobile terminals is authorized on an aircraft, terminals operating within the frequency bands defined in table 1 shall be prevented from attempting to register with networks on the ground.

| Frequency band (MHz) | Considered systems on the ground[2] |
|---|---|
| 460-470 | CDMA2000, FLASH OFDM |
| 791-821 | LTE |
| 921-960 | GSM, WCDMA |
| 1805-1880 | GSM, WCDMA |
| 2110-2170 | WCDMA |
| 2570-2620 | UMTS, LTE, WiMAX |
| 2620-2690 | UMTS, LTE |

**Table 1**

If an NCU is used, the noise power radiated by the NCU must be sufficient to prevent terminals from receiving and connecting to networks on the ground, while also meeting the requirement, described in the section A.3, for maximum power radiated from the aircraft in mobile receive bands[3].

Since the use of the upgraded network control unit (NCU) for the 2,6 GHz band would be delayed until the technical constraints are agreed by the competent aeronautical certification authorities to allow the start of the production of the NCUs and until airworthiness certification has been completed for each type of aircraft, the application of the NCU parameters for the 2.6 GHz band could be postponed until 1 January 2017

[2] The parameters of the considered victim systems were used when defining the limits described in this annex; see ECC report 93 for the values assumed in the studies.

[3] If these two requirements cannot be simultaneously met for a particular aircraft height, the minimum height for the operation of the System must be increased.

## E.I.R.P from the NCU/aircraft-BTS, outside the aircraft

The total e.i.r.p, defined outside the aircraft, resulting from the NCU/aircraft-BTS shall not exceed[4]:

| Height above ground (m) | Maximum e.i.r.p. produced by NCU/aircraft-BTS, outside the aircraft in dBm/channel | | | |
|---|---|---|---|---|
| | Band: 450 MHz | Band: 900 MHz | Band: 1800 MHz | Band: 2 GHz |
| | Channel Bandwidth=1.25 MHz | Channel Bandwidth=200 kHz | Channel Bandwidth=200 kHz | Channel Bandwidth=3.84 MHz |
| 3000 | -17.0 | -19.0 | -13.0 | 1.0 |
| 4000 | -14.5 | -16.5 | -10.5 | 3.5 |
| 5000 | -12.6 | -14.5 | -8.5 | 5.4 |
| 6000 | -11.0 | -12.9 | -6.9 | 7.0 |
| 7000 | -9.6 | -11.6 | -5.6 | 8.3 |
| 8000 | -8.5 | -10.5 | -4.4 | 9.5 |

**Table 2**

It should be noted that the limits, defined in the table 2, are dependant on the elevation angle at the victim terminal on the ground (see the attachment to this annex). The values contained in the table are for the case where the victim terminal is directly below the aircraft, and are therefore conservative.

## E.I.R.P from the onboard terminal outside the aircraft

The e.i.r.p, defined outside the aircraft, resulting from the GSM mobile terminal transmitting at 0 dBm shall not exceed[5]:

| Height above ground (m) | Maximum e.i.r.p, defined outside the aircraft, resulting from the GSM mobile terminal in dBm/channel |
|---|---|
| | 1800 MHz |
| 3000 | -3.3 |
| 4000 | -1.1 |
| 5000 | 0.5 |
| 6000 | 1.8 |
| 7000 | 2.9 |
| 8000 | 3.8 |

**Table 3**

It should be noted that the limits, defined in table 3, are dependant on the elevation angle at the victim base station on the ground (see the attachment to this annex). The values contained in the table correspond to an angle of elevation of 2°, which are conservative.

[4] The values quoted in the tables 2 and 3 correspond to a maximum increase of the receiver noise floor 1 dB (i.e. I/N ≤ -6 dB) with a high statistical confidence using the most sensitive types of base stations and terminals.

[5] The values quoted in the tables 2 and 3 correspond to a maximum increase of the receiver noise floor 1 dB (i.e. I/N ≤ -6 dB) with a high statistical confidence using the most sensitive types of base stations and terminals.

## Minimum height for operation

The absolute minimum height above ground for any transmission from the system in operation shall be 3000 metres. However, this minimum height requirement could be set higher, in particular:

- in order to comply with the aircraft-BTS and the onboard terminals emission requirements set in previous sections,
- depending on the terrain and related network deployments in a country.

## Operational requirements

The aircraft-BTS shall control the transmit power of all GSM mobile terminals, transmitting in the GSM 1800 band, to the minimum nominal value of 0 dBm at all stages of communication, including initial access.

It is necessary that appropriate measures are taken to ensure that onboard terminals are switched off when the airborne GSM system is not in operation and that mobile terminals not controlled by the System (such as those from professional mobile networks) remain switched off during all the phases of the flight.

Section 5

# Contact details

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**Section 6**

# Document history

| Version | Date | Changes |
|---|---|---|
| 1.0 | 29 January 2008 | Draft Published |
| 1.1 | September 2008 | Final version |
| 2.0 | February 2014 | Revised draft containing 2013/654/EU changes |
| 2.1 | May 2014 | Final version |
| | | |