

## **SPECTRUM COORDINATION ARRANGEMENTS**

**Between Australian TOB licensees and European Space Agency**

**Sharing between Television Outside Broadcast Services & ESA Launch  
& Early Orbit Phase and Launcher Support Operations in the bands  
2025-2044 MHz, 2054-2110 MHz, 2200-2215 MHz and 2230-2290 MHz in  
Perth, Australia**

**In Accordance with ACMA RALI FX 21**

**December 2015**

## 1. Introduction

This document defines spectrum coordination arrangements between Australian Television Outside Broadcast (TOB) licensees and the European Space Agency (ESA), an international intergovernmental organization, for the purpose of providing ESA access to the frequency ranges in the bands

- 2025-2044 MHz,
- 2054-2110 MHz,
- 2200-2215 MHz, and
- 2230-2290 MHz

in order to support launcher and Launch & Early Orbit Phase (LEOP) support operations from ESA's New Norcia Earth station in Western Australia.

These ESA launcher and LEOP operations activities are performed under Treaty arrangements agreed between the Australian government and the European Space Agency<sup>1</sup>.

These spectrum coordination arrangements are presented in a format to reflect the requirements of the European Space Agency launcher and Launch & Early Orbit Phase (LEOP) and the Television Outside Broadcast (TOB) licensees in each section of the document.

The spectrum coordination arrangements and the procedures are between the Television Outside Broadcasting (TOB) service licensees (Seven Network (Operations) Limited, Nine Network Australia, Network Ten Limited, Australian Broadcasting Corporation (ABC) and FoxSport) who are authorised under Australia wide licences to operate in accordance with the provisions of RALI FX 21 in the 2 GHz frequency bands and the European Space Agency (ESA).

Section 5 outlines spectrum coordination arrangements for TOB in the Perth area as specified in RALI FX 21.

Section 6 describes the application process in which ESA is to request a Launcher or LEOP frequency and timeframes for TOB licensee replies to such requests in the bands:

- 2025-2044 MHz (Earth to Space),
- 2054-2110 MHz (Earth to Space),
- 2204-2215 MHz (space to Earth), and
- 2230-2290 MHz (space to Earth).

Section 7 provides the spectrum coordination requirements between TOB and LEOP for the bands:

- 2025-2044 MHz (Earth to Space),
- 2054-2110 MHz (Earth to Space),
- 2204-2215 MHz (space to Earth), and
- 2230-2290 MHz (space to Earth).

Annex A identifies the main interference mechanisms between TOB and satellite earth stations and outlines the technical parameters, used in the development of these spectrum coordination arrangements, for both TOB and ESA operations.

Annex B outlines, for completeness, the coordination criteria for the daily scheduled transmission and reception activities for the New Norcia earth station in the bands

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<sup>1</sup> 1. The treaty is available at (<http://www.austlii.edu.au/au/other/dfat/treaties/ATS/2012/29.html>)

2044-2054 MHz (Earth-to-space), 2215-2230 MHz and 2290-2300 MHz (space-to-Earth).

## 2. Television Outside Broadcast Licensees

The Television Outside Broadcast service licensees are:

Australian Broadcasting Corporation (ABC)  
700 Harris Street, Ultimo, New South Wales, 2007 Australia

FoxSports  
4 Broadcast Way, Artarmon NSW 2064

Network Ten Limited  
1 Saunders Street, Pyrmont, New South Wales 2009 Australia

Nine Network Australia  
24 Artarmon Road, Willoughby, New South Wales 2068 Australia

Seven Network (Operations) Limited  
38-42 Pirrama Road, Pyrmont, New South Wales 2009 Australia

## 3. Regulatory Framework

- a) The Australian Radiofrequency Spectrum Plan is published by the Australian Communication and Media Authority (ACMA) and specifies use of the radiofrequency spectrum in Australia.
- b) The Television Outside Broadcast (1980-2110 MHz and 2170-2300 MHz) Frequency Band Plan 2012<sup>2</sup> makes provisions for the purposes for which the 1980-2110 MHz and 2170-2300 MHz frequency bands may be used.
- c) The Radiocommunications Assignment and Licensing Instruction (RALI) FX 21 provides information on frequency coordination and licensing arrangements for television outside broadcast (TOB) services in the bands 1980-2110 MHz and 2170-2300 MHz.
- d) The RALI FX 21 documents the ACMA's policy in relation to TOB services operating in the bands 1980-2110 MHz and 2170-2300 MHz.
- e) The RALI FX 21 provides the basis of coordination arrangements in the bands 2010-2110 MHz and 2200-2300 MHz between stations in the TOB service and Earth Stations, fixed point-to-point links and stations operating under spectrum licenses adjacent to these bands.
- f) Television Outside Broadcast (TOB) licensees are licensed by the ACMA to operate radiocommunications services in these bands on an Australia wide basis in accordance with RALI FX21. These activities by the licensed operators of TOB services are of a nomadic nature.

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<sup>2</sup> See <http://www.comlaw.gov.au/Series/F2012L00731>

- g) ESA launcher and LEOP operations activities in Australia are performed under international treaty arrangements concluded between ESA and the Australian government, in particular i) the Agreement between ESA and the Government of Australia for a Co-operative Space Vehicle Tracking Program and ii) the Implementing Arrangement between ESA and the Department of Innovation, Industry, Science and Research of the Government of Australia concerning ESA's Space Tracking Activities in Australia, both having entered into force in 2012. Inmarsat Solutions Australia manages ESA's Earth stations at New Norcia, West Australia, for ESA.
- h) TOB licensees acknowledge that the time/date and frequencies for launch and LEOP operations is normally not within the control of the New Norcia station and can be fixed by orbital, planetary physics or other network constraints. Additionally, New Norcia is recognized as a critical element of ESA's extensive global mission support network.
- i) Australia's support of these launcher and LEOP mission support activities is an ongoing Treaty obligation and participation in these activities enable Australian resources to be engaged in these globally significant scientific activities.
- j) TOB services have been introduced into the 2010-2110 MHz and 2200-2300 MHz bands to provide long term certainty for Australian television broadcasters.
- k) Coverage of planned sporting and cultural events, as well as electronic news gathering is considered to have benefits to Australian society.
- l) These arrangements will take effect from midnight on 31 January 2016 for an unlimited period of time.
- m) These arrangements may be reviewed or amended at the request of either party (TOB or ESA) by one party giving the other at least one month written notice of a request to cooperatively review the arrangements, providing the desired amendments and the reasons for the subject changes.

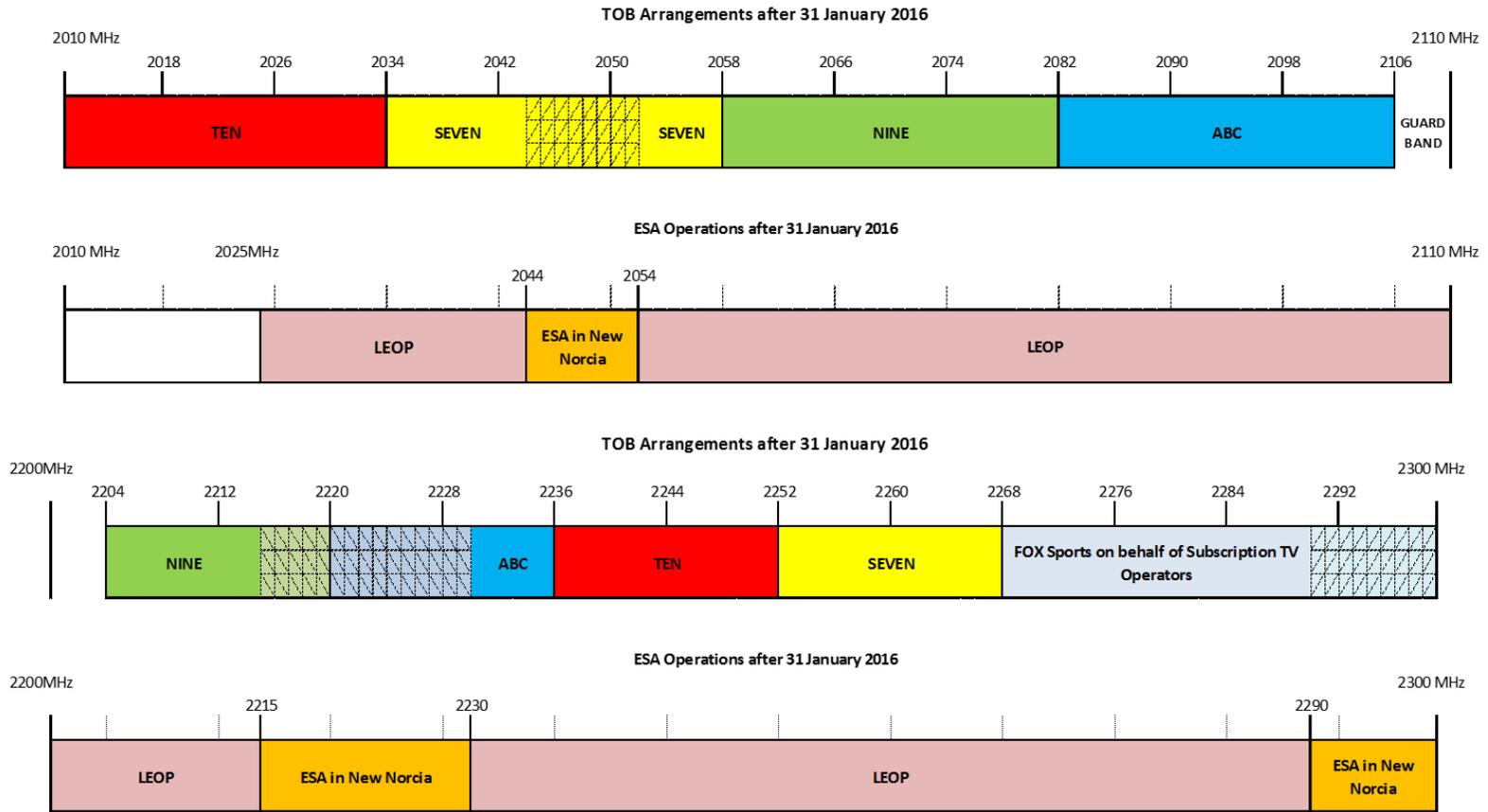
#### **4. European Space Agency Operations**

- a) Operations at New Norcia require regular daily scheduled transmission and reception activities according to requirements determined by the spacecraft projects offices. These activities are undertaken on a regular basis post 31 December 2015 under the authority of apparatus licenses issued by the ACMA for regular unrestricted operation within the bands 2044-2054 MHz and 2110-2120 MHz (Earth-to-space)<sup>3</sup>, 2215-2230 MHz and 2290-2300 MHz (space-to-Earth) - refer Figure 1. Coordination of these bands is outlined in Annex B.

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<sup>3</sup> The sub band 2110-2120 MHz (Earth-to-space) is not licensed to TOB in Australia and therefore not subject to the requirements of these spectrum coordination arrangements.

- b) Earth station transmit and receive parameters that were used in the development of these spectrum coordination arrangements are outlined in Annex A along with typical orbital parameters for various Launcher tracking and LEOP support.
- c) Under the terms of the Treaty arrangement between the Australian government and the European Space Agency, support of Space Research Service missions will include in addition to the regular operations the tracking of launch vehicles and spacecraft during their critical Launch and Early Orbit Phase (LEOP). This activity will continue as an infrequent, but critical mission support obligation requiring communication within the bands 2025-2044 MHz, 2054-2110 MHz, 2200-2215 MHz and 2230-2290 MHz.

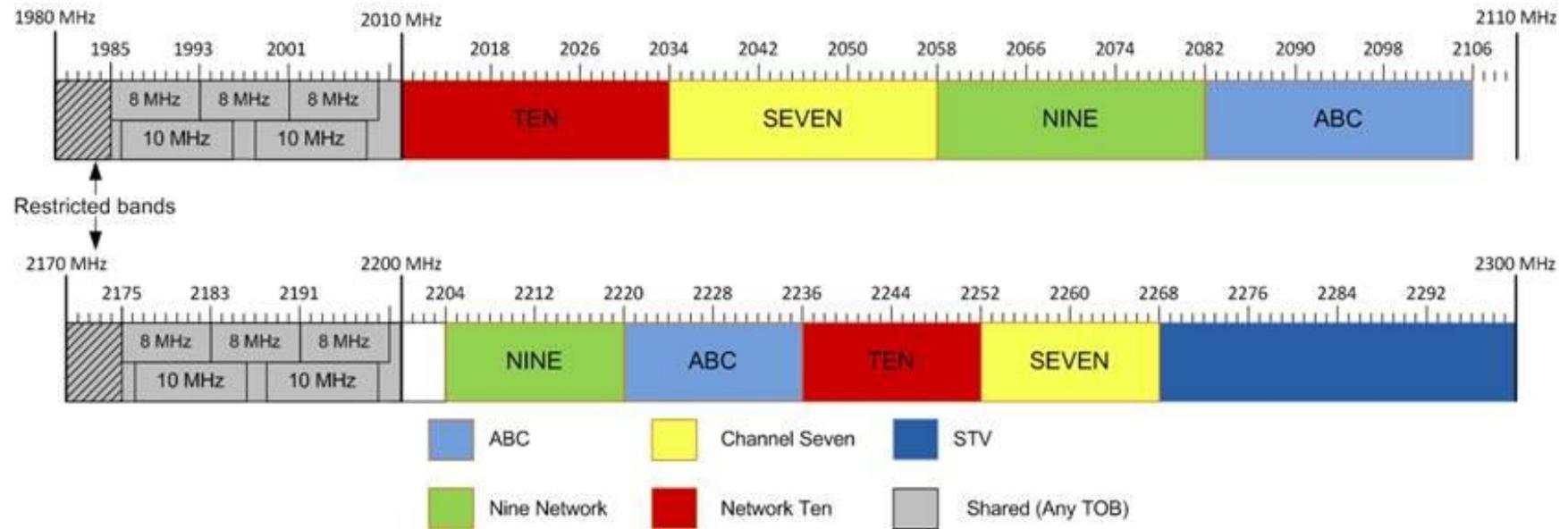


**Figure 1:** TOB and SRS ESA spectrum access in New Norcia, Western Australia

## 5. Television Outside Broadcast Operations

- a) TOB operations within the bands 2010-2110 MHz and 2200-2300 MHz are limited to ABC, Channel Seven, Nine Network, Network Ten and FOX Sports on behalf of subscription television via Australia wide licences with licensees required to operate in accordance with the requirements in RALI FX21.
- b) TOB transmit and receive parameters that have been used in the development of these spectrum coordination arrangements are outlined in Annex A.
- c) In Perth TOB transmitters are not permitted in the 2215 – 2230 MHz and 2290 – 2300 MHz space to Earth down link bands as these require the exclusion of TOB operations within 300km zone of New Norcia. The channel arrangements for TOB use of the bands after 31 January 2016 in Perth are:
  - the bands 2010-2110 MHz and 2200-2215 and 2230-2268 MHz will be available for use by ABC, Seven Network, Nine Network Australia and Network Ten;
  - the bands 2268-2290 MHz will be available outside the ESA New Norcia exclusion zone for use by FOX Sports who will coordinate the subscription television (STV) use of this band;
  - the bands 1980-2010 MHz and 2170-2200 MHz will be available for use for TOB services on a shared, non-exclusive basis. TOB licensees will be required to self-coordinate use.

These arrangements which are subject to RALI FX21 are illustrated in Figure 2 below:



RALI FX 21 Figure 2: TOB channelling arrangements after 31 January 2016

## **6. Process for Providing/Responding to Frequency Requests**

Under the terms of the Treaty arrangement between the Australian government and the European Space Agency support of Space Research Service missions will include the tracking of launch vehicles and spacecraft during their critical Launch and Early Orbit Phase (LEOP).

### **Role of the ACMA**

In the event that arrangements between ESA and TOB licensees cannot be achieved for ESA LEOP operations, the ACMA can be requested to mediate between ESA and TOB licensees.

### **6.1 European Space Agency**

- a) ESA (represented through Inmarsat) will provide an annual schedule to TOB operators by January 31 covering the 12 month period commencing 1 February the following year. After the annual schedule has been reviewed and agreed by TOB operators, ESA would apply to the ACMA for licences for launcher and LEOP operations at New Norcia for missions listed in the annual schedule. The licenses will be conditional on spectrum coordination arrangements being achieved when the exact schedule is confirmed 30 days before the event.
- b) 30 days prior to each event in the annual schedule, ESA (represented through Inmarsat) will provide the relevant TOB licensees (or their appointed centralized coordination representative) with an email request for final confirmation of access to a frequency range or ranges, with details of frequency boundaries, commencement time/date and conclusion time/date to the nominated representative of affected TOB licensee.
- c) The information outlined in 6.1.a and 6.1.b should be provided in the format outlined in Attachment A to the appropriate TOB licensee
- d) Section 49 of the Radiocommunications Act allows for unlicensed operations in the event of emergency. In the event of emergency communications ESA shall, where possible, contact TOB licensees
- e) A brief description of the tracking support activity will optionally be provided as a courtesy to enable the TOB licensees to understand the nature of the support being sought.
- f) An automatic email reception acknowledgment shall be sent back to ESA by TOB licensees.
- g) Subsequent refinements of the time/date, duration and potential support window, including the provision of a possible launch support slip allowance may be required due to mission event time variations as the tracking time draws near. These refinements should be communicated as soon as practicably possible.

## **6.2 TOB licensees**

- a) TOB licensees (or their appointed centralized coordination representative) are to respond via email within 24 hours weekdays or 48 hours weekends to an ESA/Inmarsat request for coordination as per 6.1.b. For the annual schedule, TOB response time will be 30 days.

## **6.3 Arrangements in the bands 2025-2044 and 2054-2110MHz**

### **6.3.1 LEOP**

- a) LEOP and Launcher operational frequencies are identified by ESA on a case-by-case basis within the bands 2025-2044 MHz and 2054-2110 MHz.
- b) ESA will provide an indicative annual schedule of all launch windows by the 31 January each year for support operations for the 12 month period commencing 1 February the following year. This schedule will provide best estimate approximations of preliminary support dates including notional operations support windows and operational frequencies, in the format provided in Attachment A.
- c) ESA will provide more accurate advice to TOB licensees 30 days in advance of each specific launch.
- d) This will result in a schedule in the format provided in Attachment A to be followed by TOB licensees and ESA.
- e) This activity will continue as an infrequent, but critical mission support obligation requiring communication within the bands 2025-2044 MHz and 2054-2110 MHz.
- f) The typical frequency of support will be approximately four times per year with typical durations of less than one day (could be as short as 10 – 15 minutes) for launcher support and 3 or 4 days for LEOP support. It is possible that last minute launch delays will necessitate a revised Spectrum Access Request for an allowance of several days requiring a licensing window submitted to the affected TOB licensee in the format provided in Attachment A.
- g) ESA will advise the affected TOB licensee by email once each event has been completed.

### **6.3.2 TOB**

- a) In considering the coordination request by the European Space Agency for access to small portions of the bands 2025 – 2044 MHz and 2054 – 2110 MHz as outlined in 6.3.1.c, TOB licensees will respond to these requests within 24hrs weekdays or 48hrs weekends. The response time to the annual schedule outlined in 6.3.1.b will be 30 days.

## **6.4 Arrangements in the bands 2200-2215 and 2230-2290MHz**

### **6.4.1 LEOP**

- a) Approval of access by ESA for LEOP and Launcher operational support frequencies is to be considered by TOB on a case-by-case basis within the bands 2200-2215 MHz and 2230-2290 MHz.
- b) ESA will provide an annual indicative schedule of all launch windows by the 31 January each year that covers launcher and LEOP support operations for the 12 month period commencing 1 February the following year. This schedule will provide best estimate approximations of preliminary support dates including notional operations support windows and operational frequencies, including any necessary guard band, in the format provided in Attachment A.
- c) ESA will provide more accurate advice to TOB licensees 30 days in advance of each specific launch.
- d) This will result in a schedule to be followed by TOB licensees and ESA.
- e) This activity will continue as an infrequent, but critical mission support obligation requiring critical launcher tracking and LEOP support communication support within the bands 2200-2215 MHz and 2230-2290 MHz during the period of the launcher tracking and LEOP support.
- f) The typical frequency of support will be approximately four times per year with typical operations durations of less than one day (could be as short as 10 – 15 minutes) for launcher support and 3 or 4 days for LEOP support. It is possible that last minute launch delays will necessitate a revised Spectrum Access request for an allowance of several days requiring a licensing window submitted to the affected TOB licensee in the format provided in Attachment A.
- g) ESA will advise the affected TOB licensee by email once each event has been completed.

### **6.4.2 TOB**

- a) In considering the spectrum coordination request by the European Space Agency for access to small portions of the bands 2204 – 2215 MHz and 2230 – 2290 MHz as outlined in 6.4.1.c, TOB licensees will respond to these requests within 24hrs weekdays or 48hrs weekends. The response time to the annual schedule outlined in 6.4.1.b will be 30 days.

## **7. LEOP / TOB Coordination Requirements**

### **7.1 2025-2044 MHz and 2054-2110 MHz**

#### **7.1.1 Earth station transmitters**

- a) The European Space Agency may occasionally request access to portions of the 2025 – 2044 MHz and 2054 – 2110 MHz band for short duration activities, such as launcher tracking and Launch and Early Orbit Phase (LEOP) support.
- b) Earth to space (uplink) operations requirements for LEOP and Launcher support by ESA may require coordination with TOB in the bands 2025-2044 MHz and 2054-2110 MHz.
- c) Typical characteristics for earth station transmitters operating in the band 2025-2110 MHz are found in Annex A of these spectrum coordination arrangements.

#### **7.1.2 TOB receivers**

- a) The temporary use of frequencies within the ranges 2025-2044 MHz and 2054-2110 MHz (Earth-to-space) may result in occasional interference to TOB collection stations and other TOB receivers operating around the New Norcia ESA Earth station.
- b) Typical characteristics for TOB receivers operating in the band 2010-2110 MHz are found in Annex A of these spectrum coordination arrangements and Appendix B of RALI FX21

### **7.2 2200-2215 MHz and 2230-2290 MHz**

#### **7.2.1 Earth station receivers**

- a) The European Space Agency may occasionally request access to portions of the 2200 – 2215 MHz and 2230 - 2290 MHz bands for short duration activities, such as launcher tracking and Launch and Early Orbit (LEOP) support.
- b) LEOP and Launcher Space to earth (downlink) requirements will require infrequent and brief access to small portions of the band 2200-2215 MHz and 2230-2290 MHz.
- c) Typical characteristics for earth station receivers operating in the band 2200-2300 MHz are found in Annex A of these spectrum coordination arrangements

#### **7.2.2 TOB transmitters**

- a) Protection of the access to small portion of the bands 2200 - 2215 MHz and 2230 - 2290 MHz as outlined in 7.2.1 for critical ESA launcher tracking and LEOP support from radiofrequency interference will require a cessation of TOB emissions in the agreed frequency ranges.

- b) TOB transmitters are not permitted to operate in the bands 2215-2230 MHz and 2290-2300 MHz.
- c) TOB transmitters will be permitted to operate adjacent to launcher and LEOP activity in the bands 2204-2215 MHz and 2230-2290 MHz within the Perth CBD and suburbs but not beyond 60km north of Perth CBD.
- d) Typical characteristics for TOB transmitters operating in the band 2200-2300 MHz are found in Annex A of these spectrum coordination arrangements and Appendix B of RALI FX21.

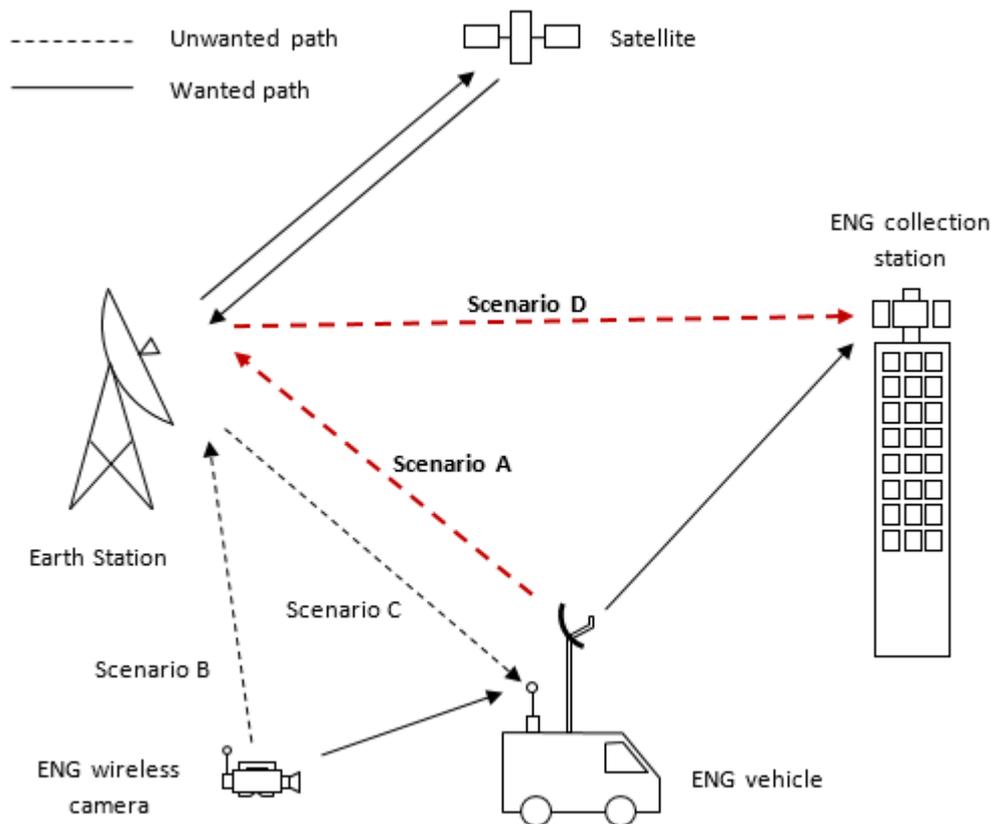
# Annex A: Television Outside Broadcasting and Earth Station Transmitter and Receiver Characteristics

## Introduction

This annex outlines the typical transmission and receive characteristics of both Television Outside Broadcasting (TOB) equipment and earth station equipment that has been used to devise the coordination criteria that is outlined in this document. It outlines possible interference mechanism and the dominant interference mechanisms that have been used in determining coordination procedures.

## Interference scenarios.

Interference scenarios are illustrated in Figure 1. There are two main interference mechanisms when considering sharing between TOB and the New Norcia earth station. The first is interference into the New Norcia earth station receiver from a TOB van transmitting to a TOB collection station (see **Fig A.1**, Scenario A). The other dominant interference mechanism is interference into a TOB collection station from a New Norcia earth station Earth to space transmission (see **Fig A.1**, Scenario D).



**Figure A.1: Different interference scenarios between TOB and an earth station.**

Scenarios A and D are the basis for coordination between the two service types, both co-channel and adjacent channel interference is taken into account.

## Technical Parameters

### TOB parameters

Table A.1, below, outlines TOB transmitter and receiver parameters.

**Table A.1: TOB transmitter and receiver characteristics**

<b>Transmitter Type</b>	<b>Values</b>
<b>TOB Wireless Camera</b>	
Height (m)	2
EIRP (dBm/8MHz)	26
Antenna Gain (dBi)	3
Antenna Type	Omni-directional
Bandwidth (MHz)	8
DVB-T transmission mode	2K
<b>TOB Van</b>	
Height (m)	10
EIRP (dBm/8MHz)	63
Antenna Gain (dBi)	25
Antenna Type	Parabolic
Beamwidth (typical, degrees)	14
Front-to-Back ratio (dB)	30
Bandwidth (MHz)	8
DVB-T transmission mode	8K
Spectrum Mask	ETSI EN 300 744
<b>TOB Collection station (Perth CBD<sup>1</sup>)</b>	
Height (m)	250
Antenna Gain (dBi)	26
Antenna Type	360° (4 x 90° sector antennas)
Interference threshold (dBW/MHz)	-147

Note: 1 - Georges Terrace collection station was used in development of these spectrum coordination arrangements however there are other collection stations used in the Perth area

## Earth station parameters

Table A.2 outlines the relevant characteristics for the New Norcia earth station transmitter and receiver used for Launcher and LEOP activities. **Table A.3** and **Table A.4** outline typical orbital parameters for various launcher and LEOP activities.

**Table A.2: New Norcia earth station launcher and LEOP transmitter and receiver characteristics**

<b>New Norcia Earth Station</b>	
Height (m)	21
Transmitter Power (dBW)	20
Antenna Gain (dBi)	56
Antenna Type	35m parabolic <sup>1</sup>
Beamwidth (typical, degrees)	0.3
Minimum off-axis Gain (dBi)	-13
Antenna Pattern	Modified ITU Appendix 7 (below)
Typical earth station Tx Mask	Recommendation ITU-R SM.1541-3
Minimum elevation angle <sup>2</sup>	Azimuth 110°-152°: 5° Azimuth 152°-110°: 7°
Interference threshold (dBW/MHz)	-156

Note: 1 – Studies were done with 35m antenna (NNO-1) however in practice the 4.5m antenna (NNO-2) will be used for the majority of Launcher and LEOP support

2 – Elevation angle is terrain limited in the azimuth range 152°-110°

**Table A.3: Typical orbital parameters for Launcher tracking**

<b>Launch Type</b>	
<b>Polar Launch</b>	
Acquisition of Signal (Azimuth)	5°
Loss of Signal (Azimuth)	195°
Maximum Elevation	60°
Trajectory height (km)	800
Duration	1 pass, 10min
<b>Galileo Launch</b>	
Acquisition of Signal (Azimuth)	340°
Loss of Signal (Azimuth)	100°
Maximum Elevation	85°
Trajectory height (km)	3800-25000
Duration	1 pass, several hours

**Table A.4: Typical orbital parameters for LEOP support**

<b>Launch Type</b>	
<b>Polar LEOP</b>	
Acquisition of Signal (Azimuth)	0-5°
Loss of Signal (Azimuth)	195-200°
Maximum Elevation	50-60°
Trajectory height (km)	800
Duration	3 days, 4 passes a day, 10min a pass (different parameters for each pass)
<b>Galileo Launch</b>	
Acquisition of Signal (Azimuth)	340°
Loss of Signal (Azimuth)	100°
Maximum Elevation	85°
Trajectory height (km)	3800-25000
Duration	Typical 1 pass, several hours

### **New Norcia Antenna Pattern**

The pattern of the ESA deep space antenna at the New Norcia facility is defined by ITU/RR/AP7/ANNEX 3, modified:

$$G(\varphi) = G_{\max} - 2.5 \cdot 10^{-3} \cdot (\varphi \cdot D/\lambda)^2 \quad \text{for } 0 < \varphi < \varphi_m$$

$$G(\varphi) = G_1 \quad \text{for } \varphi_m < \varphi < \varphi_r$$

$$G(\varphi) = 29 - 25 \cdot \log(\varphi) \quad \text{for } \varphi_r < \varphi < 48^\circ$$

$$G(\varphi) = -13 \quad \text{for } 48^\circ < \varphi < 180^\circ$$

*with:*

$$G_1 = 15 \cdot \log(D/\lambda) - 1$$

$$\varphi_m = 20 \cdot (\lambda/D) \cdot (G_{\max} - G_1)^{0.5}$$

$$\varphi_r = 15.85 \cdot (D/\lambda)^{-0.6}$$

*where:*

$G(\varphi)$  : maximum gain (dBi);  $\varphi$ : off-axis angle (deg);

D: antenna diameter (m);  $\lambda$  wavelength (m).

## **Annex B: Regular Coordination Requirements**

This annex contains coordination requirements related to the regular day to day operations at the New Norcia earth station.

### **B.1 2044-2054 MHz**

#### **B.1.1 Earth station transmitters**

- a) The 2025-2110 MHz band is allocated to the Space Research (Earth-to-space), Space Operation (Earth-to-space) and Earth Exploration-Satellite (Earth-to-space) services on a Primary basis.
- b) Regular use of the band 2025-2120 MHz at New Norcia Earth station will be reduced to the bands 2044-2054 MHz and 2110-2120 MHz after 1 January 2016 for daily operations.

#### **B.1.2 TOB receivers**

- a) TOB receivers will not be afforded protection from interference from earth station transmitters described in RALI FX21 in the bands 2044 – 2054 MHz. Coordination between earth stations and fixed TOB receivers is not required in the band 2044 – 2054 MHz.

### **B.2 2215-2230 MHz and 2290-2300 MHz**

#### **B.2.1 Earth station receivers**

- a) The band 2200-2300 MHz is allocated on a primary basis to the Space Research (space-to-Earth), Space Operation (space-to-Earth), Earth Exploration Satellite (space-to-Earth) services.
- b) The operation of TOB in the Perth area<sup>4</sup> is limited by the Treaty between the Government of Australia and the European Space Agency.
- c) To satisfy the Treaty, after 1 January 2016 regular ESA operations at New Norcia will be limited to the bands 2215-2230 MHz and 2290-2300 MHz.

#### **B.2.2 TOB transmitters**

- a) TOB transmitters are not permitted to operate in the bands 2215-2230MHz and 2290-2300MHz within 300km of New Norcia.
- b) TOB camera and van transmitters are permitted to operate in the bands 2204-2215 MHz and 2230-2290 MHz within the Perth CBD and suburbs.

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<sup>4</sup> The Perth area is defined in Table B in the Schedule to the 2.5 GHz re-allocation declaration, see <http://www.comlaw.gov.au/Details/F2011L02181> (Area illustrated in Appendix F of RALI FX 21)

**ATTACHMENT A – Spectrum Access Request**

SPECTRUM ACCESS REQUEST									
<b>From: ESA</b>			Phone:		Mobile:				
Date Logged:			Fax:		Email:				
Activation date:			Time: UTC		Deactivation date:		Time: UTC		
Brief description of tracking activity:									
ESA is required to provide accurate information on each scheduled LE activity 30 days in advance.									
<b>To: TOB licensee</b>			Phone:		Mobile:				
Contact:			Fax:		Email:				
TOB licensees will respond to this request with 72 hours weekdays / 48 hours weekends of its submission									
<b>NNO1</b>			<b>NNO2</b>						
<b>Transmit</b>					<b>Transmit</b>				
<b>Centre frequency</b>					<b>Centre frequency</b>			MHz	
<b>Bandwidth</b>			MHz		<b>Bandwidth</b>			MHz	
<b>Power</b>			W		<b>Power</b>			W	
If the Spectrum Access requirements are aborted or terminated prior to the Deactivation date and time, New Norcia will contact the affected TOB licensee					If the Spectrum Access requirements are aborted or terminated prior to the Deactivation date and time, New Norcia will contact the affected TOB licensee				
<b>Receive</b>					<b>Receive</b>				
<b>Centre frequency</b>			MHz		<b>Centre frequency</b>			MHz	
<b>Bandwidth (inc. guard band)</b>			MHz		<b>Bandwidth (inc. guard band)</b>			MHz	
If the Spectrum Access requirements are aborted or terminated prior to the Deactivation date and time, New Norcia will contact the affected TOB licensee					If the Spectrum Access requirements are aborted or terminated prior to the Deactivation date and time, New Norcia will contact the affected TOB licensee				