1. SCOPE

Free TV Operational Practice OP 70 is a guideline for use of radio frequency spectrum bands for the application of electronic news gathering (ENG) and television outside broadcast (TVOB) in the Perth area.

This Operational Practice has been developed to assist all those involved in ENG and TVOB operations in the Perth area with relevant instructions for access to and coordination of the bands assigned by the Australian Communications and Media Authority for ENG and TVOB operations as specified in ACMA's Radiocommunications Advisory Licensing instruction (RALI) FX 21.

2. FREQUENCY BAND ASSIGNED and LICENSED to ENG and TVOB

This Operational Practice applies in the Perth area and the surrounds as defined by the combined area of the red line in Figure 1 (hereafter referred to as the "red zone"). This zone is an area 150km radius from the Perth CBD and the Carmel transmitter site.

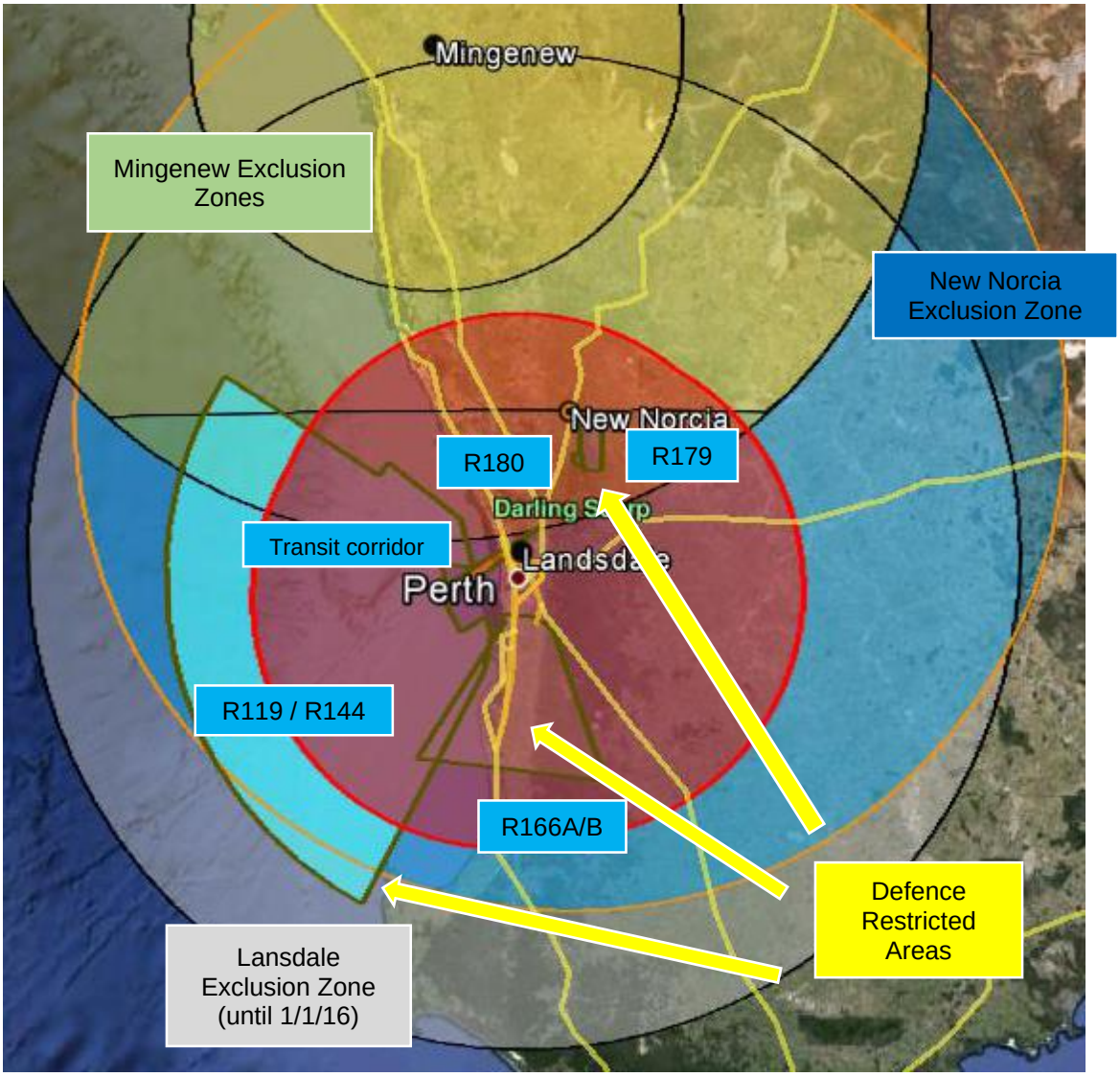

Figure 1 Perth Area Definition

Channel arrangements for TOB services in the frequency bands 2010 - 2110 MHz and 2200 - 2300 MHz are to be implemented in a phased approach across Australia. These arrangements are illustrated in

Figure 2. Each channel in the raster is identified by a three or four character code used by broadcasters for coordination and planning.

After 31 January 2016, the sub-band 2268-2290 MHz in Perth will be available for use by FOX Sports who will coordinate the subscription television (STV) use of this sub-band.

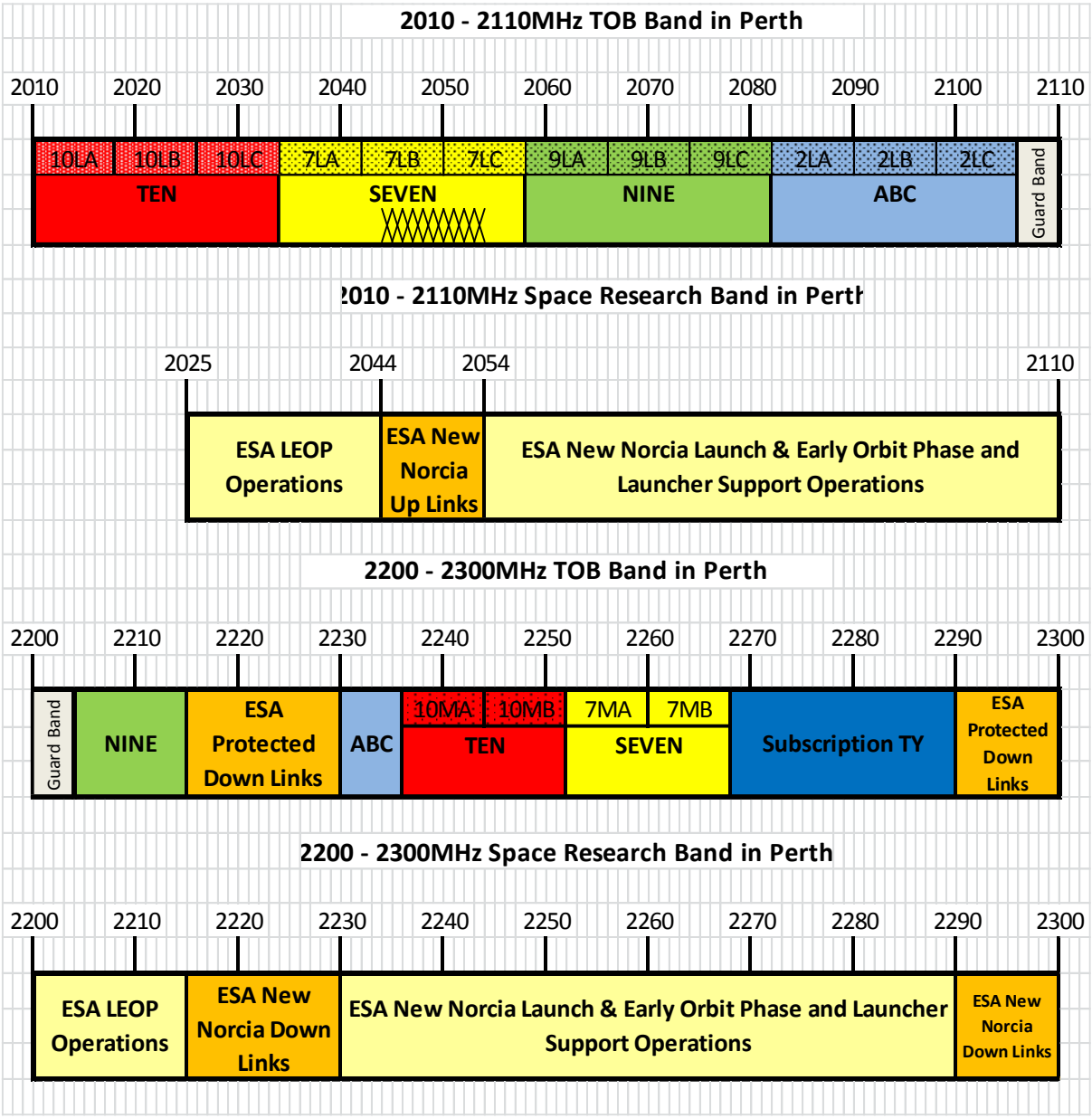

Figure 2: 2 GHz and 2.2 GHz TOB channeling arrangements

3. PERMISSABLE EQUIPMENT SPECIFICATIONS FOR ENG and TVOB OPERATIONS

Across the 3 bands in which TVOB and ENG are permitted to operate, there are a range of power, height and equipment type limits that apply in various band segments. These are shown in Table 1.

The figures provide for effective isotropic radiated power (EIRP) radiated within an 8 MHz channel. Wireless cameras are nominally operated at 2 metres above the local ground height.

Table 1 TOB Equipment Permitted in the 2 GHz and 2.2 GHz Bands

Frequency Range (MHz)	Wireless Cameras	TVOB Vans and Temporary Links	Helicopters and other airborne links
	EIRP	EIRP	EIRP
2010 -2110	26 dBm	62.5 dBm	62.5 dBm
2200 -2268	26 dBm	62.5 dBm	**Not permitted**
2268 - 2300	26 dBm	62.5 dBm	**Not permitted**

4. FREQUENCY COORDINATION

4.1 Interference to ENG and TVOB receivers

In the 2 GHz band, all fixed microwave links are cleared within the red zone so no interference should be encountered.

TOB / ENG receivers are not protected from interference from satellite earth station uplinks. Earth stations uplinking in the 2 GHz band that are within or adjacent to the Perth area are located at New Norcia and Mingenew Earth stations at frequencies as shown in Table 2. It is unlikely that TOB / ENG receivers will be located in close proximity to these uplinks, but if so, operation in these frequencies should be avoided.

Table 2 Earth Station Uplinks in the 2 GHz Band

Earth Station	Location (Latitude, Longitude) [1]	Frequency Range (MHz)	Notes	Affected TOB Licensee / Channel
New Norcia Earth station	-31.049444°, 116.190000°	2025 - 2110	Until 1st January 2016	All except 10LA (only 1MHz of 10LB)
		2044 – 2054 2110 - 2120	After 1st January 2016	7LB, 7LC

[1] All coordinates use the ADG66 geodetic systems

Mingenew Earth station	-29.046989°, 115.347197°	2025 - 2110		All except 10LA (only 1MHz of 10LB)

Yet to be determined is the wider area interference from these earth stations, particularly to main central receive sites

The upper edge of the 2 GHz band may encounter some interference from public telecommunications services in the adjacent band, so guard bands have been assigned in the TVOB / ENG channel plans to cater for this interference.

In the 2.2 GHz band, all fixed microwave links are cleared within the red zone so no interference should be encountered from these services. In this band the satellite services are downlinks, so no interference to TOB / ENG should be encountered.

The Department of Defence operates aeronautical mobile telemetry (AMT) systems in the band 2200 - 2300 MHz near Perth in Restricted Areas R119, R144, R116A, R116B, R179 and R180 and a transit corridor from RAAF Base Pearce to the zones off the coast as shown in

Figure **1**. The restricted zones are outlined in brown and filled in cyan. Licensed frequencies are at 2255 MHz, 2265 MHz and 2275 MHz, each with a 2 MHz bandwidth.

Therefore, before deploying links in the 2.2 GHz band, broadcasters should check the advice from Defence (via ACMA to their respective email account) to assess if the link will suffer any interference. It should be noted that interference may occur at any location in the Perth area.

The upper edge of the bands may encounter some interference from public telecommunications services in the adjacent band, but a 2 MHz guard band exists immediately above 2300 MHz, to the likelihood of interference is reduced.

4.2 Interference from ENG and TVOB transmitters

In the 2.2 GHz band, operation of TVOB / ENG services will not interfere with other services.

The operation of TOB in the Perth area[2] is limited by the Treaty between the Government of Australian and the European Space Agency. To satisfy the Treaty, TOB licensees wishing to operate before 1 January 2016 in the band 2200-2300 MHz will not be permitted within 300km of the Landsdale and New Norcia earth stations. After 1 January 2016 ESA operations will be limited to the bands 2215-2230 MHz and 2290-2300 MHz in the Perth area, in which TOB will not be permitted to operate.

After 1 January the European Space Agency may occasionally request access to the remainder of these bands for short duration activities, such as launcher tracking and Launch and Early Orbit Phase (LEOP) support[3].

To protect earth station receivers, the ACMA has stipulated various TOB / ENG exclusion zones around licenced earth station facilities within or adjacent to the Perth area as shown in Table 2.

[2] 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 (see Appendix F)

[3] A requirement included in the implementation arrangement to support the Treaty between the Government of Australian and the European Space Agency

Table 3 Earth Station Exclusion Zones in the 2.2 GHz Band

Earth Station	Location (Latitude, Longitude) [4]	Frequency Range (MHz)	Exclusion Zone Distance (km)	Notes	Affected TOB Licensee / Channel
New Norcia Earth station	-31.049444°, 116.190000°	2215 – 2230 2290 - 2300	300	After 1st January 2016	9MB, 2MA, 2MB, STVC, STVD
Mingenew Earth station	-29.046989°, 115.347197°	2200 - 2280	150		All except STVB - D
		2280 - 2290	North of New Norcia and within 300km		STVB, STVC
		2290 - 2300	300		STVC, STVD

4.3 Summary

Post 1st January 2016

Post 1st January 2016 New Norcia Earth station will be the dominant site that requires co-ordination, but only for channels STVB, STVC and STVD as indicated in

[4] All coordinates use the ADG66 geodetic systems

Table **3**.

In the 2 GHz band, potential interference will only occur from New Norcia to channels 7LB and 7LC. All other channels may be used without co-ordination, but Defence AMT operations advice from Defence (via ACMA to their respective email account) should be checked as well.

Table 4 summarises the types of equipment that may be used in different segments of the 2 GHz and 2.2 GHz bands and co-ordination with other services. If a band segment row is all green, no co-ordination is required.

Table 4 Co-ordination / Spectrum Sharing Summary - 2 GHz and 2.2 GHz Bands

Frequency Range (MHz)	**Typical TOB Equipment**	**Interferors**			**Co-ordination Requirements**	
		Fixed Links	**Earth Stations**	**Defence**	**Where TOB may be the victim**	**Where TOB may be the interferor**
2044-2054	All types of TOB links				Check uplink schedule with New Norcia and Mingenew	
2200 – 2215 and 2230 – 2268	All types of TOB links except helicopters				Defence to advise broadcasters of AMT operations	Coordinate any operation in the exclusion zones with New Norcia and Mingenew as per Table 2

Frequency Range (MHz)	Typical TOB Equipment	Interferors	Co-ordination Requirements	
2215 - 2230	All types of TOB links			TOB not permitted to operate
2268 - 2290	All types of TOB links except helicopters.		Defence to advise TOB operators of AMT operations	Coordinate any operation in the exclusion zones with New Norcia and Mingenew as per Table 2 Co-ordinate as required with other TOB operations
2290-2300	All types of TOB links			TOB not permitted to operate

Legend

	No spectrum sharing so no co-ordination required
	Spectrum Sharing with low interference impact to TOB / ENG no co-ordination required by broadcasters or TOB operators, check advice provided by other users of the spectrum
	Spectrum sharing with low interference impact from TOB / ENG, co-ordination required by broadcasters with other spectrum users
	Spectrum sharing with interference impact to TOB / ENG, co-ordination required by broadcasters with other spectrum users

5. REFERENCES FOR SPECTRUM USAGE FOR ENG AND TVOB OPERATIONS

RALI FX-21 Television Outside Broadcasting Services in the Bands 1980-2110 MHz and 2170-2300 MHz.

Go to www.acma.gov.au and search for RALI FX 21