

# ASSESSMENT OF INADEQUATE RECEPTION OF BROADCASTING SERVICES

## FREQUENTLY ASKED QUESTIONS

### **Q1. Why is a technical assessment of the broadcasting service reception quality required?**

Amendments to the *Broadcasting Services Act 1992* (the Act), which came into effect on 23 December 1999, allow the Australian Broadcasting Authority (ABA) to give a broadcaster permission, under certain conditions, to transmit outside of its licence area<sup>1</sup>. These conditions are:

- (i) That a person in another licence area is not receiving adequate reception of a service within that licence area;
- (ii) The out-of-area service is provided to that person only to the extent necessary to ensure adequate reception of that service by that person; and
- (iii) The ABA must give permission in writing.

Services affected by these provisions include commercial television and radio, and community broadcasting.

The ABA therefore requires a technical assessment of whether the reception of broadcasting services is inadequate in order to approve the transmission of a broadcasting service outside of its licence area.

### **Q2. How can I assess whether the reception of a broadcasting service is inadequate?**

The level and quality of the broadcasting service at the customer's premises needs to be assessed using a suitable antenna, cable and measuring receiver. The reception assessment, measurement results and factors used in the calculation of the received field strength need to be recorded and forwarded by the broadcasters to the ABA on the "Assessment of inadequate reception of broadcasting services" proforma.

### **Q3. What is an adequate quality of service?**

The ABA specifies a minimum acceptable grade of service by defining a minimum median field strength in the absence of interference from other services, ghosting or man-made noise. The minimum median field strength is the field strength exceeded at 50% of locations, 50% of the time, in an area of approximately 200 metres square.

For the purposes of assessing the reception quality of broadcasting services for permission for out of area reception, ABA accepts that measured field strengths below the value listed in the following table are inadequate.

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<sup>1</sup> The complete BSA 1992 is available online at <http://scaleplus.law.gov.au/html/pasteact/0/136/top.htm>.

<b>Band</b>	<b>Channel or frequency</b>	<b>Minimum median field strength</b>
AM radio	Every 9 kHz from 531 kHz to 1602 kHz	0.5 mV/m (54 dB $\mu$ V/m) <sup>2</sup>
FM radio	Every 200 kHz from 88.1 kHz to 107.9 kHz	54 dB $\mu$ V/m
TV – Band I	0, 1, 2	50 dB $\mu$ V/m
TV – Band II	3, 4, 5	50 dB $\mu$ V/m
TV – Band III	5A, 6, 7, 8, 9, 9A, 10, 11,12	50 dB $\mu$ V/m
TV – Band IV	28-35	62 dB $\mu$ V/m
TV – Band V	36-69	67 dB $\mu$ V/m

The minimum median field strength is a statistical target value that will provide an acceptable grade of service when received with a notional receiver environment in the absence of interference, ghosting and man-made noise. Therefore, reception may be considered inadequate at field strengths higher than listed in the table above where interference from other services, ghosting or man-made noise are present.

**Q4. How do I measure the field strength at a customer’s premises?**

The field strength of a television or FM radio service is measured using a typical consumer antenna, of known gain, suitable for reception of the service being measured. The antenna is raised to a 10 metre height and rotated for the best reception.

The field strength is either read directly from a field strength meter, into which the antenna gain and system losses have been entered as an antenna calibration factor (often known as the k-factor), or calculated from the measured terminal voltage and system gains and losses. A spectrum analyser can be used to measure the terminal voltage as the peak sync tip voltage of the vision carrier of the television service.

**Q5. Why should I measure the field strength at an antenna height of 10 metres when few people have antennas of this height?**

An internationally agreed height of 10 metres is used for measuring field strengths. Measurements at this height are statistically repeatable. The majority of viewers get adequate pictures with lower antenna heights, however, some viewers may require an antenna at a height of 10 metres to obtain adequate reception.

**Q6. Do I need to fill in all the information?**

The ABA will return applications to broadcasters that do not contain all the information requested. The information is required so that the ABA can ascertain, as required by the legislation, whether reception is inadequate. The more information that can be provided to satisfy the ABA that reception is inadequate the better.

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<sup>2</sup> For AM services this is the protected field strength in the presence of man made radio noise alone.

## Q7. What do the fields in the application form mean?

The following table gives a description of fields in the application proforma.

Proforma Field/s	Definition
Applicant	This part is to provide details of the applicant broadcaster.
Viewer or listener	The part is to provide details of the viewer or listener and precise physical location.
Satellite Receiving Equipment	This part is optional to complete as the viewer or listener may chose not to purchase the necessary equipment until permission is given to receive an out of area service.
Services proposed for reception	The relevant services to be received if permission is given. eg Imparja and Central Seven.
Broadcasting licence area(s)	The licence area within which the viewer or listener resides. eg Sydney licence area.
Services licensed in the area	The services which the viewer or listener is entitled to receive, but not including national services.
Commercial terrestrial broadcast service	The callsign or operator and channel of the service being measured – eg WIN32.
Channel and Frequency (TV) or Frequency (radio)	The television channel and vision carrier being measured or the radio frequency being measured.
Transmission site	The name of the transmission site, eg. Mt Alexander.
Measured terminal voltage in dB $\mu$ V	This is the principle measurement of signal level. It does not readily relate to planned television coverage.
Antenna used – Brand, model and gain	Brand and model of antenna used to measure and assess the service reception. This allows the ABA to determine whether an appropriate antenna has been used. For television, the estimated antenna gain with respect to a dipole at the frequency being measured, is 2.1 dB greater than the antenna gain with respect to an isotropic radiator, dBi. The gain can be measured, although not easily, or estimated from manufacturers specifications.
Cable used – Type, length and loss	Type and length of cable used to measure and assess the service reception. This allows the ABA to determine whether an appropriate cable has been used. The loss should preferably measured, but can be calculated from the cable specifications.
Masthead amplifier (if used) – Brand, model, gain	The minimum median field strength is defined for a notional receiver installation which does not include a mast head amplifier. If an amplifier is used to make the measurement then details of the amplifier are required. Amplifier gain can be measured by measuring the difference between terminal voltage at the measurement frequency with the amplifier in and out of circuit.
Calculated Field Strength in dB $\mu$ V/m	The field strength is independent of the reception environment and relates to the planned coverage. See question Q8 the formula used to calculated the field strength. The field strength alone does not indicate whether coverage is inadequate or not.
ITU Picture Quality Grade (television only)	See question Q9.
Short description of reception in words (eg ‘No picture’, ‘Severe ghosting’, ‘inaudible’) and likely reason (‘behind hill’, ‘impulse noise’, ‘dense vegetation’)*  [For AM Radio: please provide description of day and night time reception]	The more information that can be provided on why reception is inadequate the better.
Field strength meter – Make and model	Make and model of instrument used to measure the field strength or terminal voltage. This includes spectrum analysers. This allows the ABA to determine whether an appropriate measuring device has been used.

**Q8. What is the formula for calculating field strength?**

The field strength formula for a television or FM radio service is :

$$E = V + K$$

Where E is the field strength in dB $\mu$ V/m;  
V is the terminal voltage or peak sync tip voltage of the vision carrier in dB $\mu$ V; and  
K is the antenna factor for the channel being measured.

The antenna factor, K, is frequency dependant and incorporates all the gains and losses in the system.

$$K = F - Ga - Gd + Lc - Z - C$$

Where F is the measurement frequency in dB relative to 1 MHz, ie  $F = 20\log[f \text{ (MHz)}]$ ;  
Ga is amplifier gain in dB, if an amplifier is in circuit;  
Gd is antenna gain in dB relative to a dipole, this is 2.1 dB greater than the gain relative to an isotropic radiator, Gi;  
Lc is cable loss in dB; and  
Z is the system impedance in dB, typically  $Z = 10.\log(75) = 18.8$ ; and  
C is a constant, 14.9 dB, which corrects for the units used and converts the voltage to field strength.

For example, assume a channel 9 service with no amplifier, 3 dB cable loss and 10 dB antenna gain, the antenna factor K would be:

$$K = 20.\log(196.25) - 0 - 10 + 3 - 18.8 - 14.9$$
$$K = 5.2 \text{ dB}$$

**Q9. What is the ITU Picture quality scale?**

The International Telecommunications Union (formerly known as the CCIR) defined a scale for assessing picture quality as defined below.

**Reference: ITU Picture Quality Scale**

<b>ITU Grade</b>	<b>Picture Quality</b>	<b>Impairment</b>
5	Excellent	Imperceptible
4	Good	Perceptible
3	Fair	Slightly annoying
2	Poor	Annoying
1	Bad	Very annoying

**Q10. How do I assess picture quality?**

Where possible, picture quality should be assessed on a television receiver connected to the same antenna and cable used to measure field strength. When assessing picture quality it is important to establish reasonable viewing conditions – for example, not having the sun or other light sources shining directly on the screen. For consistency, an attempt should be made to use similar viewing conditions at each test site. A typical viewing distance for picture evaluation is five times the height of the screen.

The Australian Communications Authority (ACA) produces a booklet “Better television and radio reception” which is useful in identifying and describing typical interference problems. The booklet is available from ACA area offices.

**Q11. Where can I find further information?**

Antenna technician associations and other industry associations may also be useful sources of information.

Antenna Technicians Association Inc  
P.O. Box 160,  
MITCHAM Victoria 3132  
Freecall 1800 659 726, Fax 03 5148 0443  
Email [ata@netspace.net.au](mailto:ata@netspace.net.au)