



TECHNICAL STANDARD

Utility Regulation and Competition Office

FM RADIO BROADCASTING TECHNICAL STANDARD

Introduction

The Utility Regulation and Competition Office (**'the Office'** or **'OfReg'**) is the statutory body responsible for licensing of all radio services in the Cayman Islands. These responsibilities, as well as those of ICT service providers, are set out in the Information and Communications Technology Act (the **'ICT Act'**), the Utility Regulation and Competition Act (the **'URC Act'**) and in service providers' licences.

Under Article 72(1) of the Information and Communications Technology Act (the **'ICT Act'**), ICT service providers and ICT networks shall use their best endeavours to ensure that their services are:

- (b) Provided with due care and skill; and
- (c) Rendered in accordance with standards reasonably expected of a competent provider of those ICT services and ICT networks.

Further, Article 72(3) of the ICT Act states that:

The Office may prescribe quality standards for the provision of ICT services and ICT networks in relation to all ICT service providers and ICT network providers.

It is on this basis that this document has been prepared.

This document sets out the quality standards associated with the use of FM radio broadcasting transmitters ('transmitters') operating in the frequency range 87.7 to 107.9 MHz and covers the following topics:

- Frequency Tolerance
- Frequency Modulation
- Audio Pre-Emphasis
- Stereo Standard
- Radio Data System (RDS)
- Transmitter Power

- Transmitter Cleanliness
- Receiver Blocking / Blanketing, and
- Compliance Testing

Where available, references to international specifications and standards have been provided. These standards can be turned to for additional guidance.

Frequency Tolerance

The unmodulated centre frequency of operation of transmitters shall remain within ± 2 kHz of that assigned. This shall be measured with no audio applied to the transmitter. A measurement accuracy of at least 1 ppm should be used.

Channel spacing shall be 200 kHz, with frequencies beginning at 87.7 MHz and ending with 107.9 MHz. Frequencies will be assigned by OfReg on a first-come first-served basis subject to availability and technical planning restrictions.

See reference: ITU-R Recommendation SM.1045.

Frequency Modulation

100% modulation shall be defined as ± 75 kHz deviation.

Peak modulation shall be defined as the total modulation including, for example, permissible additions for RDS subcarrier injection.

Peak modulation may be increased above 100% modulation by 0.5% for each 1% RDS subcarrier injection.

Peak modulation shall not exceed the prescribed level by more than 10 bursts of 5 millisecond duration in any given minute.

Under no circumstances should peak modulation exceed 106.6% (± 80 kHz deviation).

A measurement accuracy of better than ± 1 kHz should be used.

The alternative method of measuring deviation specified in ITU-R Recommendation SM.1268 employing a spectrum analyser may also be used to confirm correct modulation.

Audio Pre-Emphasis

Audio pre-emphasis corresponding to an RC constant of 75 μ S shall be used.

See reference: ITU-R Recommendation BS450 Section 1.2.

Stereo Standard

The GE Zenith method of encoding stereo audio shall be used.

The deviation caused by the 19 kHz pilot tone shall be between ± 6 kHz and ± 7.5 kHz (8% to 10% modulation).

See reference: ITU-R Recommendation BS450 Section 2.2.

Radio Data System (RDS)

Only supplementary subcarrier systems conforming to the RDS specification (IEC 62106) are permitted.

Where RDS is used on a station, a nominal subcarrier injection level which achieves ± 4.5 kHz (6% modulation) should be aimed for. This should not exceed ± 5.25 kHz (7% modulation) under any circumstances.

See reference: NRSC G300-C.

RDS **PI codes** for FM stations in the Cayman Islands shall follow the format '**Cxyz**' where:

- **x** represents the most significant digit of the transmission frequency in MHz (either 8, 9 or 1);
- **y** represents the 'units' value of the transmission frequency; and
- **z** represents the 'tenths' value of the transmission frequency.

As examples, a station on the frequency of 89.3 MHz should use the PI code **C893**, and a station on the frequency of 107.3 MHz should use the PI code **C173**.

Transmitter Power

Transmitter power shall be defined as the effective radiated power (e.r.p.) of the service per polarisation¹. Licensees are responsible for conducting the necessary calculations to determine their e.r.p. and should provide these to OfReg together with any associated antenna radiation patterns.

EMF Exposure

Licensees shall only establish, install, modify or use radio Apparatus² if the electromagnetic field exposure (EMF) levels produced by the Apparatus are below the basic restrictions in the relevant tables for protection against general public exposure identified in the International Commission of Non-Ionizing Radiation Protection (ICNIRP) Guidelines (as amended from time to time, unless otherwise instructed by the Office).

Transmitter Cleanliness

Unwanted emissions shall not exceed the Category A limits as defined in ITU-R Recommendation SM.329.

This is currently specified as requiring all unwanted emissions to be no greater than

- $46 + 10\log_{10}(\text{Transmitter Output Power in Watts})$ or
- 70dB below the carrier

whichever is less stringent. Unwanted emissions shall not exceed 1 mW under any circumstances.

Manufacturers' equipment specifications may be provided as evidence of compliance with this requirement.

Receiver Blocking / Blanketing

Strong signals from nearby transmitters may overload receivers. The potential area over which this effect is deemed to be present (known as the blocking or blanketing area) is defined as those adjacent to the transmitting antenna that receive a signal with a strength of 115 dB μ V/m or greater. The distance from a site which is deemed to be affected can be determined using the equation:

- Blanketing distance (in miles³) = $0.00775 \sqrt{(e.r.p. \text{ in Watts})}$

¹ For those using linear polarization (e.g. horizontal or vertical) the e.r.p. limit applies to the polarization in use. For those using circular polarization, the e.r.p. limit applies each polarization individually.

² As defined in the Information and Communications Technology Authority (Interference and Equipment Standardization) Regulations 2004.

³ This should be the slant distance between the antenna and ground.

Any new stations, or any stations making a significant change of site, antenna, frequency, or transmitter power shall be responsible for handling FM radio reception complaints in the area within the blanketing distance of the transmitter site for a period of one year following any change, at no cost to the complainant. A significant change is defined as one in which:

- The location of the transmitter site changes by more than half of the blanketing distance as defined above;
- The transmitter power (e.r.p.) of a station increases by more than 3 dB⁴;
- The antenna radiation pattern on any azimuth increases by more than 3 dB; or
- The antenna height changes by more than 20%.

Where multiple changes are made by co-located stations (e.g. on the same tower or using the same antenna), the costs and effort associated with handling reception complaints shall be shared between those stations. The share that each station shall be responsible for should be agreed between the parties concerned or, in the event that no agreement can be reached, shall be equal shares based on the number of co-located stations.

The following complaints shall be excluded from this responsibility:

- those resulting from malfunctioning or mistuned receivers, improperly installed antenna systems (including worn cable), or the use of high gain antennas or antenna booster amplifiers;
- battery-powered receivers (including those in vehicles);
- non-radio devices such as computer screens or hi-fi amplifiers; and
- those cases in which the complainant confirms the issue commenced prior to the date the changes were made.

In the event that it becomes necessary to use an alternative site to that licensed (for example due to using a back-up during routine maintenance, or due to *force majeure*) the following process will apply:

- Licensees should notify OfReg of the change at their earliest opportunity⁵.
- Should the original site be restored within 7 calendar days, no further action is required and the requirement to handle interference complaints caused by the temporary use of the alternative site shall not apply during this period.

⁴ Note that this means a change from linear to circular polarization at the same e.r.p. would not constitute a significant change.

⁵ This does not exempt licensees from the requirement to submit outage reports to the OfReg ICT Outage Reporting system.

- Should the situation require that transmissions from the alternative site continue for more than 7 calendar days, the licensee should apply to OfReg for a modification to its licence and the requirement to handle interference complaints due to the use of the alternative site will apply.

Compliance Testing

Authority to commence a broadcasting service will not be provided by OfReg until the transmitter has satisfactorily passed a compliance test. Until authority is provided by OfReg, only test transmissions are permitted.

All transmission systems shall be tested for compliance with this standard and any associated licence conditions prior to coming into service or following any significant change to antenna, site, transmitter or other major transmission element.

If the licensee wishes these tests to be performed by OfReg then they must book attendance at least 20 working days in advance of the desired test date. If the compliance test fails for reasons that might reasonably have been anticipated, and which cannot be rectified whilst OfReg engineers are in attendance, OfReg may, at its discretion, postpone the tests and authority to transmit until they can next attend the site and may charge the licensee for any future, additional visits.

Alternatively, licensees may opt to carry out their own compliance tests or contract these out to a third party. They must advise OfReg of this course of action at least 20 working days in advance of their intended commissioning date. OfReg would then require documentary evidence of compliance within 5 working days of the compliance test. If not forthcoming, or if the results are not satisfactory, authority to provide a service will be withheld until satisfactory evidence of compliance has been received and assessed.