



To: The Proper Officer, ACMA

Thank you for the opportunity to respond to the ACMA's review of the 700MHz band spectrum licence technical framework consultation paper. Please see below Free TV's submission on behalf of the television broadcast industry. It should be read in conjunction with the submission from Telstra on behalf of all 700MHz spectrum licensees.

The major concern about increasing the registration threshold for UE operating in the 700MHz spectrum licensed bands has naturally been the risk of interference, either directly into TV spectrum from out-of-band (OOB) emissions or from overload to receivers and mast-head amplifiers from increased radiated levels of LTE. Prolific and untraceable sources of interference would be a nightmare for television broadcasters.

A further source of concern was the suggestion of introducing Power Class 1 devices in the 700MHz band. In particular, TV broadcasters would be concerned if these devices were ever made available to retail customers and proliferated beyond the proposed use case of Emergency Services.

When Telstra's test report on adjacent channel interference from higher powered 700MHz UE into broadcast TV was presented to the TLG in August 2024, broadcasters had five points of concern with the findings:

1. The relevance of the licence condition placing more restrictive OOB limits on UE used in Television Block-E areas, about which the report was completely silent. It is worth noting that in August 2024 Free TV was not aware of the Communications Alliance Australian Standard AS/CA S042.4:2022 and its predecessors being in force for some time, referencing ETSI EN 301 908-13 V13.1.1 (2019-11), which contains a more restrictive OOB limit.
2. Shortcomings in Telstra's testing methodology, including a relatively small sample of TV receivers and, of greater relevance to TV receiver performance, the testing had only used a single broadcast service on Ch-51, rather than a block of multiple adjacent TV signals as is deployed in most areas of Australia.
3. Reasonable questions about the report's assertion that impulsive LTE traffic had the dominant negative impact on TV reception, as opposed to OOB emissions or a combination.
4. The minimum sensitivity threshold of TV sets in Telstra's testing was found to be around 10dB higher than Free TV found during the (more extensive) TV receiver testing it performed for the ACMA in 2023. This difference could have a significant flow-on effect to any conclusions drawn about the tolerable LTE signal level.
5. The protection ratios required by the TV sets derived in Telstra's testing were quite variable and not what our members would have intuitively expected.

Discussion between Telstra and the FTA industry about findings in the 2024 test report led to a subsequent round of joint testing of a representative sample of 11 receivers, spanning age and affordability, at Freeview Australia's lab at Lane Cove on 9-10 December 2024. The testing was conducted with the participation of experts from Telstra, BAI, Free TV, and Freeview.

Performance measurements on the LTE device used for testing confirmed that OOB emissions were not a detectable source of interference to the TV receivers. OOB signal levels were measured well below those required by the Australian and, by association, ETSI standard, which in turn is more conservative than spectrum licence limits in Block-E television areas. We are satisfied devices imported into Australia and complying with AS/CA S042.4:2022 are unlikely to cause interference to TV reception from their OOB emissions.

Based on evidence from testing we support the Consultation Paper's Option B2: adoption of ETSI standard for Band 28.

To perform TV receiver LTE immunity testing, a block of three adjacent-channel TV services was generated on UHF channels 49, 50 and 51, i.e., the uppermost 3-channels of television Block-E. These services were configured to the DVB-T, 23.05Mbit/s modulation scheme commonly used by most broadcasters in Australia. The combined block of TV services was distributed to 11 TV receivers simultaneously, via an adjustable attenuator and necessary splitters.

Receiver sensitivity and interference threshold levels were determined using the methodology described in ITU-R BT.1368-13, Annex 8 - (*"no more than one error is visible in the picture for an average observation time of 20 s."*). This methodology, combined with a larger sample of receivers, delivered more consistent and repeatable results, and confirmed the nominal receiver sensitivity threshold to be approximately 10dB lower than Telstra's testing had found. The results validated the previous testing carried out by Free TV for the ACMA in 2023.

The interfering LTE signal was manipulated into a wide variety of RF waveforms to test which, if any, were more or less disruptive to TV reception. At one extreme, the RF waveform became a relatively low level, wide-band signal carrying high-volume uplink traffic, occupying a large proportion of the 10MHz available. At the other extreme, very low volume traffic generated by a simple ping test resulted in a narrowband, relatively high signal level LTE waveform that was very impulsive in nature. Waveforms between these extremes were also studied. The narrow-band, high level, impulsive waveforms proved to be most disruptive, in line with Telstra's previous findings, so this type of LTE signal was introduced to the TV distribution system using a variable attenuator.

Testing established that several TV receivers were indeed more susceptible to LTE interference than found during Telstra's earlier testing. The poorer LTE immunity was measured as a difference of around -2dB. Using the ITU methodology, some of the Protection Ratio variabilities were also narrowed.

After 2-days of testing, employing many repeated combinations of varying TV and LTE signal levels and monitoring TV services on all three channels, the collaboration established that all parties would be comfortable with a compromise LTE level of -35dBm as the interference threshold.

Telstra's parallel submission to this consultation will include an Addendum test report, detailing the methodology and findings of the collaborative work at Freeview's lab in December 2024. This submission should be read together with the Addendum test report.

Applying a realistic and practical link budget to the agreed interference threshold suggests that TV receivers installed in a nominal suburban domestic configuration should not be adversely affected by LTE levels of up to 35dBm EIRP. Setting the registration exemption at this level should cater for most circumstances where users install external antennas on vehicles for mobile phones in cradles and external antennas on fixed mobile broadband modems. As such, Free TV has agreed with Telstra and test partners BAI to jointly propose a new, 4th option to those presented in the Consultation Paper (**Option A4: Relaxation of the exemption from registration to 35dBm EIRP – total device radiated power**).

The final proposal raised by Telstra and discussed within the TLG was the introduction of Power Class 1 devices, particularly for installation on Emergency Services vehicles to increase their access to the cellular networks during natural disasters. Understandably, the higher radiated signal levels these devices are capable of producing are of concern to television broadcasters. Without suitable controls, we hold serious concerns about Power Class 1 devices becoming widely available to the general public. Should they proliferate, we believe they are certain to become a major source of interference to TV viewing. We understand Telstra may decide not to pursue their introduction in this consultation cycle. For the record, however, Free TV would not object to Power Class 1 devices for the very specific use-case of Emergency

Services vehicles only. Provided a sure way could be found to restrict access to these devices to this use case, Free TV would not oppose further ACMA consideration of the introduction of these devices. However, at this stage it is not clear to us how carriers or the ACMA would be able to prevent wider proliferation of these devices once they were in use by Emergency Services vehicles. Uncontrolled proliferation would have very serious consequences for the reliability of TV coverage. Our concerns have been shared with Telstra, and the company has undertaken to explore what control measures might be feasible that might allay our concerns.

We wish to express our appreciation and recognize the invaluable assistance Free TV received from our industry partners during this work. BAI provided combining equipment, test and measurement instruments and highly respected and experienced personnel. Freeview provided access to their testing lab, on-site assistance and extensive catalogue of TV receivers, and TX Australia provided the TV transmitters necessary to generate multiple simultaneous TV signals. We also acknowledge the healthy respect and collaborative spirit engendered by the joint testing exercise, and hope it sets an example for further work in the future as and if necessary.

Kind Regards
David

David Searle
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