

Engineering Exhibit in support of Bombardier Experimental Application

Bombardier Transportation (“BT”) manufactures, among other items, automated people mover systems for use at airports around the world. Radio communications for these vehicles is typically accommodated via UHF frequencies. For purposes of the applicant’s test facilities, this requires a TETRA modulation scheme with very low operating power, as the test track is less than 1500 meters in length. The only available frequency for this operation at the proposed location is 460/465.775 MHz, which is in use by American Airlines at the Pittsburgh International Airport (KPIT) under WZT263. It is also in use on adjacent channels 12.5 kHz removed by two hospitals, the closest of which is under WQCN692. The Undersigned has examined the potential for co- and adjacent channel interference from the proponent, and finds none.

Allocation Considerations

TETRA emissions (22k0D7W, typically) span an entire 25 kHz channel, and thus must protect, and be protected by, both 12.5 kHz adjacent channel users. TETRA qualifies for wideband use in that its four time slots each carry a bit rate of 7.2 kbps, for a total of 28.8 kbps, which exceeds the minimum requirement of 19.2 kbps for wideband operation.

Normal co-channel protection is provided by generating a 21 dBμ Carey Interference contour according to §90.187, and establishing that it does not overlap any part of an incumbent service area. Adjacent channel protection is provided by consensus among the Land Mobile Communications Council frequency coordinators, according to the agreed-on Adjacent Channel Contour Value (ACCV) table submitted to the Commission in 2013. Those contour values for this are dependent on the incumbent modulation types, and range from F(50,10) Contour values of 46 dBμ to 37 dBμ (in the case of analog narrowband). As with co-channel operation, the interfering contour must not overlap any incumbent service area. In this exhibit, the worst case value of 37 dBμ is used.

Co-channel analysis

Upon examination of WZT263, we find, as often happens for very old records, a discrepancy in the location coordinates, which appear to be in a residential subdivision at least 1.7 kilometers from the nearest point of the Airport property. Though the licensed location is not any closer to the proposed test track than the Airport, we thought it best to protect all points on the airport property as well as the WZT263 record. The WZT263 39 dBμ service contour derived from the license data is actually smaller than the 8 kilometer (5 mile) mobile operational area, and both contour and radius encompass the entire KPIT airport area. The service contour is plotted in Figure 1 in Green, and the radius in Blue. The proposed Interfering contour is plotted in Red, and overlaps neither.

Adjacent Channel analysis

There are two nearby hospitals licensed for mobile-only operation, as it happens, on both adjacent 12.5 kHz channels--there are no nearby users of the 6.25 kHz adjacents. The closest is St. Clair Hospital under

WQCN692 (9.9 kilometers distant) and the other is licensed to the Sewickley Valley Hospital under WNZN590 which is 28.5 kilometers distant. Both WQCN692 and WNZN590 show an ERP of only 0.003 watts, so their service contours (somewhat enlarged for this plot) are essentially a point contained within the respective hospital buildings. The proposed adjacent channel interfering contour of 37 dB μ is plotted in magenta on Figure 2, and the two hospital locations are indicated by crosshairs. Both lie well outside the predicted interference contour, and moreover would be unlikely to receive any interference from the proposal as the proposed adjacent channel energy would be significantly attenuated by the hospital building walls.

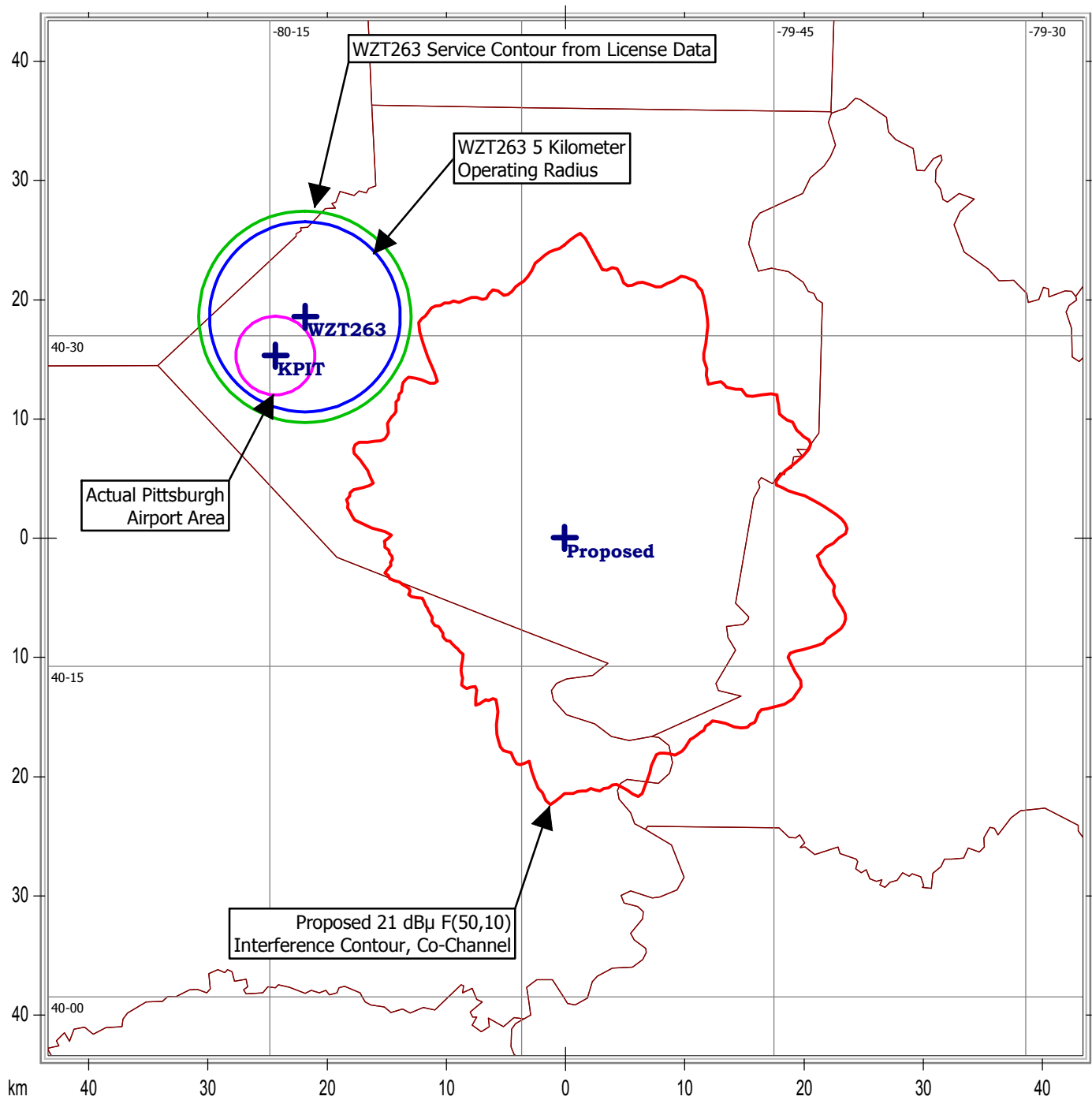
Conclusion

Though it is a TETRA application, no interference is believed to be caused or received by this proposal.

/s

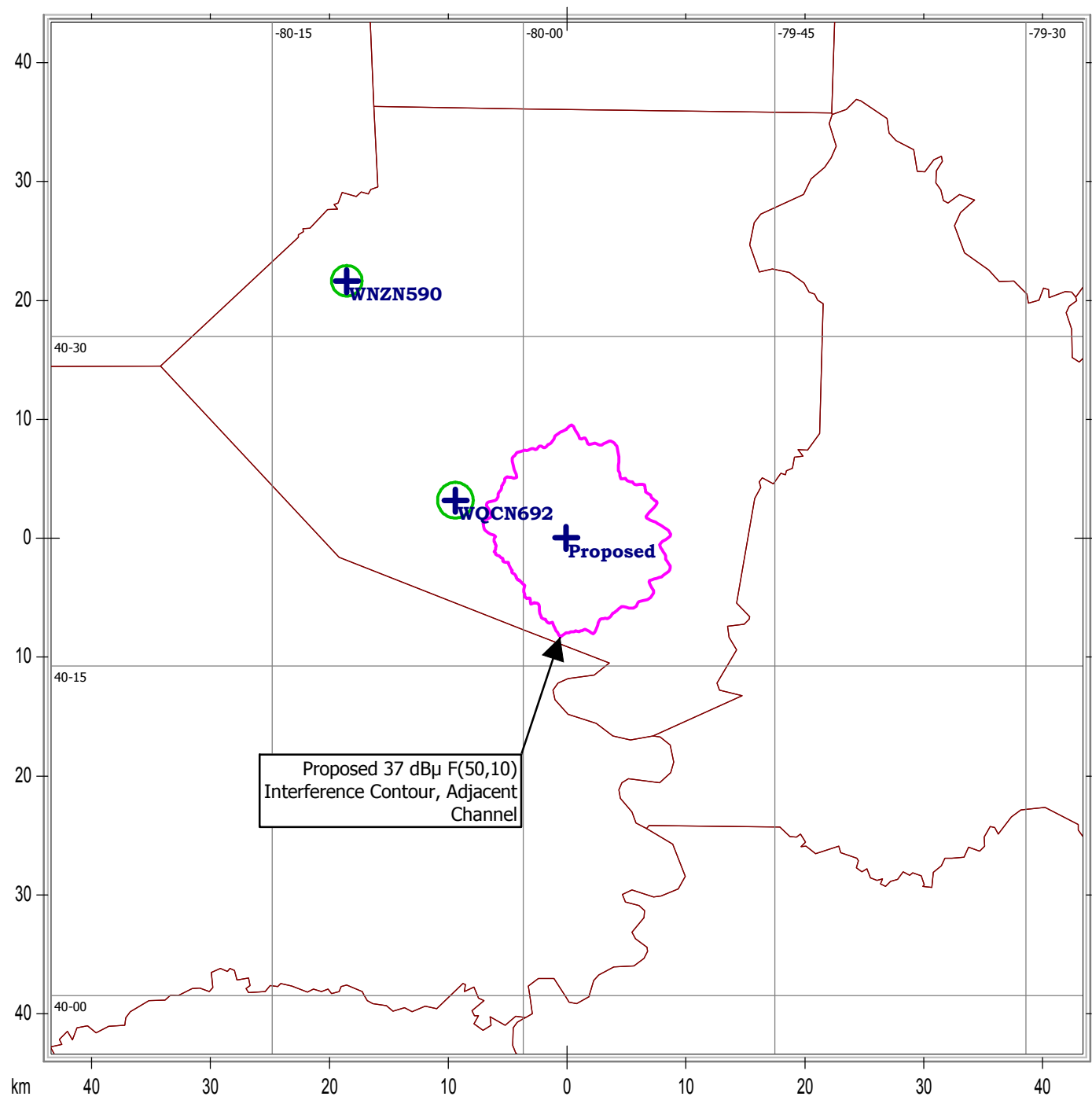
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Figure 1



Co-Channel Incumbent Protection

Figure 2



Adjacent Channel Incumbent Protection