

Exhibit

By this application, T-Mobile License, LLC seeks special temporary authorization (“STA”) so that its affiliate, T-Mobile, USA, Inc. (“T-Mobile”), may experiment by operating 600 MHz stations for which it is licensed outside the parameters described in Section 27.1310 of the rules and Bulletin No. 74 issued by the Commission’s Office of Engineering and Technology for a period of six months from the date of grant.

As described further below, the STA will permit T-Mobile to assess the circumstances under which adherence to the requirements of Section 27.1310 and OET Bulletin No. 74 may not be necessary to protect broadcast viewers, ultimately permitting T-Mobile to cooperate with broadcasters, seek relief from the Commission, and provide wireless broadband services to consumers using spectrum that would not otherwise be available to it in advance of broadcasters’ transition to new post-incentive auction channel assignments.

Background

Section 27.1310 of the rules states that licensees operating in the 600 MHz band must not cause harmful interference to reception of full power and Class A broadcast stations transmitting co-channel or adjacent channel. In an abundance of caution, in order to implement that protection requirement, the rules and OET Bulletin No. 74 impose a 5 megahertz adjacent channel separation requirement when a 600 MHz LTE device – handset or base station – operates within the protected service contour of a full power or Class A television station.

T-Mobile holds the 600 MHz B Block (622-627/668-673 MHz) license in the Greensboro area. Television stations in the Greensboro area are authorized to operate adjacent to these frequencies. In particular, station WUVC is authorized to operate on channel 38 (614-620 MHz), which is less than 5 megahertz away from B block downlink – an inter-service interference (“ISIX”) scenario designated “Case 3” by the Commission.^{1/}

Using the parameters contained in OET Bulletin No. 74, T-Mobile would not be permitted to use the B Block under Section 27.1310 of the rules to provide service to the public because of WUVC’s operations.

Description of Tests

T-Mobile wishes to investigate the possibility of transmitting on portions of the B block spectrally closer to the affected television stations than permitted by the rules and OET Bulletin No. 74 in a manner that will not cause harmful interference to television viewers. To gather sound engineering data to assess this possibility, T-Mobile requires experimental authorization for a limited period of time to operate outside the rule parameters.

^{1/} *In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Second Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd. 13071, ¶¶ 42-56 (2014). Two other stations, WJZY (Channel 47) and WHKY (Channel 40) are licensed in the 600 MHz band in the surrounding areas. T-Mobile has confirmed that its proposed operations comply with the Commission’s ISIX rules with respect to these stations.

To conduct the experiment, T-Mobile will activate a small number of devices that will operate across the entire B Block.^{2/} This will provide at least 1 megahertz of guard band between the LTE and ATSC occupied spectrum in the downlink portions of 600 MHz band. T-Mobile will not operate co-channel within any full power television stations contour during the STA period – operations will be on adjacent spectrum only.

To implement this testing, T-Mobile will enable retail handsets within range of two LTE base stations to access this spectrum during specific time periods. Testing will start during low viewership times – i.e. late night – and transition to normal daytime hours. T-Mobile estimates that fewer than 50 handsets will connect to the LTE base stations during the testing periods. In all circumstances should T-Mobile, a broadcaster, or a television viewer detect harmful interference to licensed television operations the testing shall cease. T-Mobile will not activate either customer units or base stations for the exclusive purpose of using the 600 MHz channels. Those customer units and base stations are already in operation in North Carolina using other mobile bands including the 700 MHz A block, PCS, and AWS-1 bands. Accordingly, T-Mobile is not marketing service based on the authority it has requested.

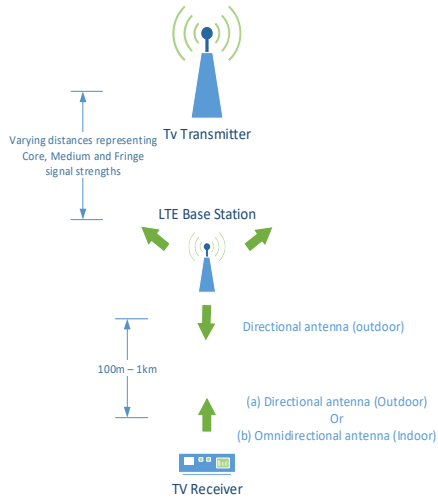
During the testing T-Mobile will work with broadcast engineers to assess the validity of the testing scenarios and the performance of LTE, 5G radios, and ATSC technologies in close spectral proximity.

Previous Testing Efforts

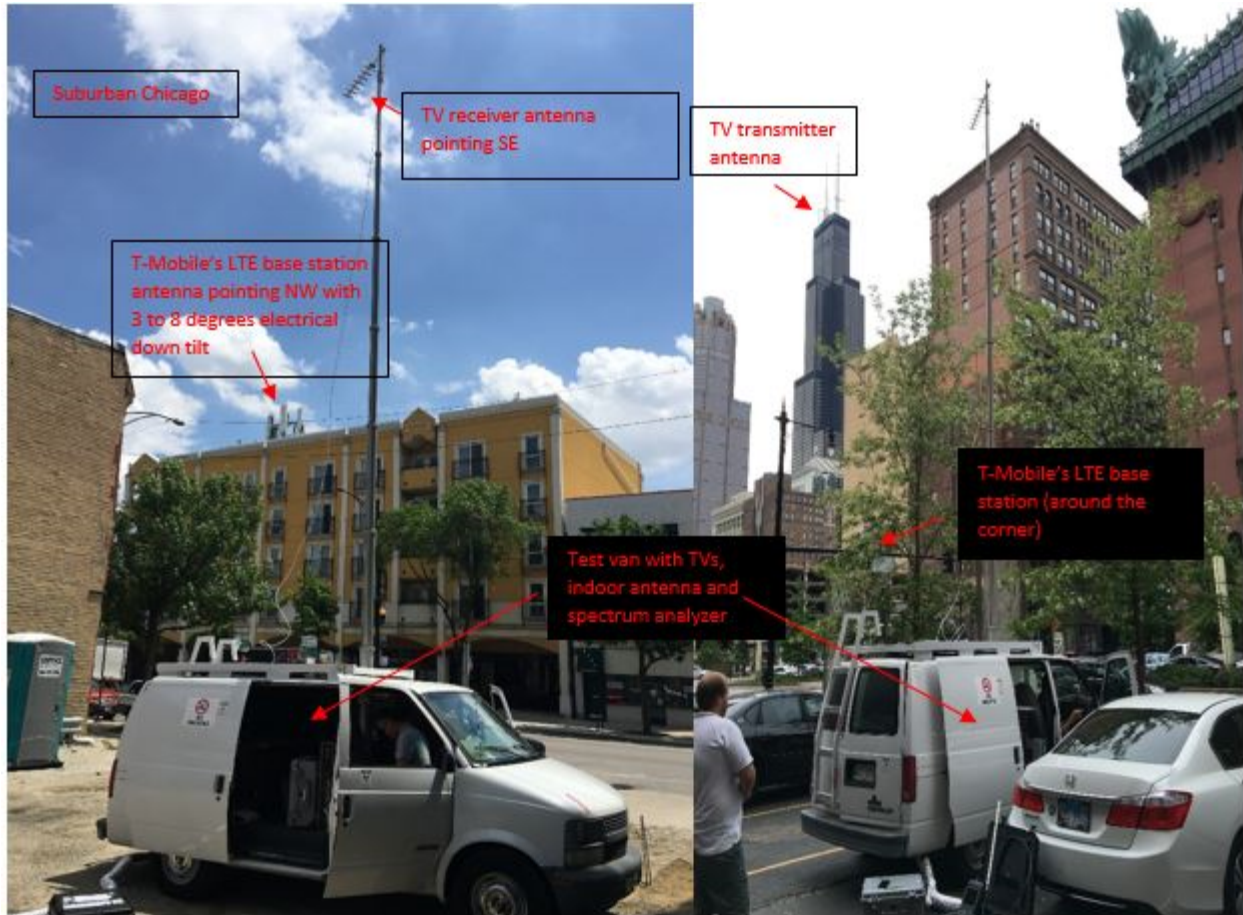
The proposed testing follows from laboratory and field testing (against low power stations not subject to the protection requirements of the rules and OET Bulletin No. 74). Those tests suggest the testing proposed in this application will yield favorable results. These tests were performed with a DTV simulator and commercially available television sets representing both low and high cost models, with 0 megahertz guard band between LTE and DTV signal. This LTE signal level corresponds to a case where a typical LTE cell site is transmitting at +43dBm power with a 15dBi gain antenna, a DTV receiver with 10dBi gain antenna, and both antennas are in each other's main beam with approximately 230m (using free-space path loss model) separation between them. This is a worst-case scenario that is not expected to occur commonly. In most cases the LTE and DTV antennas will not be in each other's main beam. The figure below depicts this generic scenario.

^{2/} The form seeking information about T-Mobile's facilities asks whether the antenna will extend more than six meters above the ground or existing buildings. Some of the antennas contemplated by the application will be mounted on antenna towers. However, none of the antennas will extend more than 6 meters above the towers.

Case 1: Interference from Single LTE Base Station into TV Receiver with
(a) Outdoor directional antenna
(b) Indoor omnidirectional antenna



Field testing in Chicago confirmed that even in such an extreme case, TV reception is not degraded. As shown in the picture below, testing was performed with the worst-case antenna setting in a suburban area. The actual measured DTV and LTE signal powers at TV receivers were -57dBm (76dBu) and -33dBm (100dBu), respectively. No pixilation was noticed on either the low cost or the high cost TVs. In order to further worsen the case, the electrical down tilt on the LTE antenna was increased from 3 degree (typical) to 8 degree (not common) resulting in the LTE power level at the TVs increased to -26dBm (107dBu). Still no pixilation was observed.



Another test was performed in urban downtown Chicago where indoor antennas would be prevalent. The test was performed inside a vehicle with off-the-shelf indoor antenna having a ~15dB gain internal amplifier. The actual measured DTV and LTE signal powers at the TVs' input were -38dBm (95dBu) and -43dBm (90dBu) respectively. No pixilation was observed on the low or the high cost TVs.

Post Testing

T-Mobile will share the testing results with the FCC and the broadcast engineering community. The results that T-Mobile obtains will inform its decision whether to seek future relief from the limitations in Section 27.1310 and OET Bulletin No. 74 in certain limited circumstances during the period when television stations are transitioning from stations that are adjacent channels to T-Mobile's licensed spectrum.

The associated form requesting STA notes a contact person with T-Mobile. That person will be available to immediately cease operations on T-Mobile's channels that are adjacent to station WUVC in the unlikely event that T-Mobile's experiment causes harmful interference to broadcast station viewers.