

From: Peter Black

To: Hung Le

Date: October 15, 2020

Subject: Request for Info - File # 0711-EX-CN-2020

Message:

Dear Sir,

We had prepared a document but were not able to submit. We put brief summary of our response in below. If possible, we would like to submit a pdf file to explain in more details and supplement the following response.

(1) Explanation of how it would coordinate any usage with a Spectrum Access System (SAS)

XCOM Response:

- Our system consists of 12 RRUs. It is permanently located in the lab and not for outdoor use. Although the max transmit power of each RRU is around 200mW(23dBm)/antenna, the output power is further reduced to control radiation at all times, to avoid unnecessary radiation outside of the lab. Effective coordination is achieved by interference avoidance. Please see the response to (2) for more details.
- The system only needs 50MHz bandwidth (3650-3700) most of the time for 5G NR system development. The request was to cover 5GNR testing with up to 100MHz bandwidth that will only be performed in the absence of co-channel/band usage and in a dedicated shield room to avoid any radiation outside of our lab. It will not have any impact on PAL or other high-priority users.
- SAS capability is a feature on our roadmap to commercial. We are actively working on the SAS certification test since related feature development work is almost done.

(2) Explanation of how it would specifically avoid causing interference to incumbent and commercial operations in the band, including General Authorized Access (GAA).

XCOM Response:

- The system is currently operating at a maximum transmit power of 20mW (13dBm) EIRP (radio unit- antenna sum). The experimental license maximum power could be limited to this power level.
- The system operation is limited to indoor-only locations at XCOM's facility.
- The radio units are ceiling mount design with a downward-facing antenna. Units are tested with a downward-facing antenna. Coverage is limited but is sufficient for testing.
- XCOM has performed calibrated EIRP measurements and determined outdoor referred EIRP is reduced at least 29dB due to the setup antenna orientation and building isolation. (refer to the measurement section for more details)
- The outdoor referred interference is -28.5dB/1MHz (20mW and 20MHz LTE). This is below the CBRS inband spurious emission limit for licensed operation -25dBm/1MHz. (refer to FCC Emission Limit Part 96.41(e) section).
- For 100MHz NR testing the emissions per 1MHz is further reduced by the bandwidth scaling.
- In conclusion, proponents are operating a low power indoor test system. Any interference in the band is at a level below the spurious emission limits of other operators in the band.
- FCC Emission Limit Part 96.41 (e). This Limit applies only for devices operating in the CBRS band
- Measurements – Calibrated EIRP
 - o Indoor to outdoor isolation was estimated from the differential between calibrated EIRP of the radio unit (RU) measured indoor at 3m reference distance and outdoor at 3m reference distance.
 - o Measurements were made at two locations A and B representative of each end of the lab and closest to the exterior wall.

- o The test was conducted at the max EIRP of RU. Note this is NOT the proposed operational transmit power.
- o RU EIRP indoor = 24.4dBm
- o RU EIRP outdoor maximum = -4.9dBm
- o Indoor to outdoor isolation = 24.4 – (-4.9) = 29.3dB.

• Calibration of the Xcom RRU device under test (DUT)

- o Calibration of the DUT to determine the EIRP at maximum conducted output power. Refer to ‘Test Setup and Calibration’ pictures of the calibration setup:
- o DUTs were tested in the CBRS band.
- o All field strength field measurements dBuV/m integrated in 1MHz.
- o All EIRP measurements dBm integrated in the modulation BW; 18MHz.
- o Nominal Conducted TX output power during calibration; 23.32 dBm.
- o Measured Field Strength during calibration at 3m; 107.1 dBuV/m.

• Measured Field Strength, outside building in a typical setup.

- o The lab which will house all devices during development, is on the outside wall of the building. The calibrated DUT was placed in two locations closest to the outside wall where a 3m radiated measurement was possible. Measurement locations A and B are shown below.
- o Measured Field Strength location A building 3m from DUT; 77.79 dBuV/m.
- o Measured Field Strength location B building 3m from DUT; 73.39 dBuV/m.
- o DUT at location A EIRP; -4.9 dBm.
- o DUT at location B EIRP; -9.28 dBm.
- o Isolation location A (24.4 - -4.9) = 29.3dB
- o Isolation location B (24.4 - -9.28) = 33.68dB
- o Minimum isolation 29dB.
- o DUT EIRP 24.4 dBm.

 