

ENGINEERING STATEMENT REGARDING
CONCURRENT OPERATION OF LOWER-
700-MHZ BLOCK-A IN BEA 010 WITH
CHANNEL-51 TV STATION WNJN
(MONTCLAIR, NJ / NEW YORK, NY MARKET)

This Engineering Statement was prepared on behalf of T-Mobile USA, Inc. ('T-Mobile') regarding the proposed concurrent operation of its lower-700-MHz Block-A in BEA 010 (New York-Northern New Jersey-Long Island, NY-NJ-CT-PA-MA-VT)* with Channel-51 TV station WNJN, Montclair, NJ in the New York, NY market. This statement will detail the means by which T-Mobile will mitigate the potential for interference from the 700 MHz Block-A uplink to TV Channel 51.

T-Mobile is the licensee of the lower 700 MHz Block A (part of Band 12) spectrum in BEA 010 and it has reached an agreement for concurrent operation with the licensee of WNJN, New Jersey Public Broadcasting Authority, or 'NJTV'. WNJN is licensed for operation on RF Channel 51 (Virtual Channel 50)[†] with a maximum effective radiated power of 200 kW using a non-directional transmitting antenna, with an antenna radiation center height above average terrain of 233 m. The technical details of the WNJN operation are shown in the FCC Engineering Database summary sheet included with this statement.

In addition to WNJN, the NJTV system includes stations WNJB, New Brunswick, NJ (RF Channel 8, Virtual Channel 58); WNJS, Camden, NJ (RF Channel

* Bureau of Economic Analysis Economic Areas. See FCC website:

<http://transition.fcc.gov/oet/info/maps/>

[†] RF Channel 51 is the 6 MHz TV channel from 692 to 698 MHz. Over-the-air viewers of WNJN will see virtual Channel 50 displayed on their TV sets. Every digital TV station has a given virtual channel that is coded in the digital transmission PSIP, which may differ from the given RF channel.

22, Virtual Channel 23); and WNJT, Trenton, NJ (RF Channel 43, Virtual Channel 52). A map is included with this statement that shows the WNJN equivalent Grade B service area, BEA 010 boundaries and the equivalent Grade B service areas of the other NJTV stations.[‡]

The lower 700 MHz Block-A uplink channel is contained within the former Channel 52 TV channel, which is 6 MHz in bandwidth extending from 698 to 704 MHz. The lower edge of the Block A uplink is adjacent to the upper edge of the Channel 51 spectrum.

Section 27.60(b) of the FCC Rules specifies the means for protection of the adjacent Channel 51 spectrum. In this case, T-Mobile has reached an agreement with the licensee of the Channel 51 for concurrent operation. In accordance with the agreement, T-Mobile will strategically deploy its 700 MHz Block A wireless system in such a way as to minimize any interference potential with over-the-air viewers of WNJN. A key deployment strategy involves prioritizing user-equipment (UE) handsets to communicate with other bands ahead of 700 MHz Block A as follows:

1. First, via Band 4 (uplink band 1710-1755 MHz);
2. Second, via Band 2 (uplink band 1850-1910 MHz); and,
3. Third, via Band 12 (Block A uplink band 699-704 MHz).

This means that UE handsets will attempt communications on the 700 MHz Block A spectrum only after failing proper acquisition firstly from Band 4 base stations; and secondly from Band 2 base stations.

[‡] It is noted that in addition to over-the-air, NJTV is available throughout the State of New Jersey on cable systems AT&T U-Verse, Cablevision, Comcast, Time Warner, RCN, Service Electric and Verizon FiOS. NJTV is also available on Direct Broadcast Satellite via DirecTV and Dish Network.

In addition, all of the 700 MHz Block A deployments will be done initially in clusters, which will allow for any issues to be identified and addressed before a full-scale deployment is undertaken.

T-Mobile will implement the *Long-Term Evolution* (LTE) standard for mobile broadband communications within the lower 700-MHz Block A spectrum. The LTE system was developed by the *Third Generation Partnership Project* (3GPP) and it is governed by the standards released by the 3GPP. The LTE system features the use of orthogonal frequency division multiplex (OFDM) for transmission, which allows for spectral efficiency with many channel bandwidth options.

The 700 MHz Block A LTE system implemented by T-Mobile will be operate with its uplink (UL) carriers shifted to the upper edge of the 698-704 MHz channel spectrum. Given the total additional 500 kHz guard band within the LTE UL channel itself[§], there will be a guard band of 1.25 MHz provided to the upper edge of the Channel 51 spectrum. This is illustrated in the attached figure entitled ‘Illustration of Guard Band to TV Channel 51 from Standard Block A Uplink Spectrum.’

The LTE system standards include options related to modulation, data rates, transmit power control and emission limits.** T-Mobile will have the ability to use alternative signaling schemes within the LTE standard on UE handset transmissions to reduce the out-of-band (OOB) emissions from the 700 MHz A Block into TV Channel 51.

In the event of interference complaints from over-the-air viewers of WNJN, T-Mobile will take additional actions to mitigate such issues. Examples of such solutions include the following:

[§] 250 kHz above and below the transmission channel.

** See 3GPP, Third Generation Partnership Project, Technical specification group radio access network, Evolved universal terrestrial radio access (E-UTRA), User Equipment (UE) radio transmission and reception, 3GPP TS 36.101.

1. Deployment of a Wi-Fi router or localized Band 2/4 repeaters, which would result in the subject UE handsets to cease the need for 700 MHz Block A spectrum.
2. Improvement of existing Band 4 coverage, which would result in UE handsets acquiring Band 4 instead of 700 MHz Block A spectrum.
3. Improvement in the coverage of existing 700 MHz Block A base stations to optimize coverage, which would result in reduced UE handset effective radiated power requirements and, thus, lesser interference potential.
4. Enabling of UL control channel transmissions (PUCCH overdimensioning) and UL resource blocking, which will result in an increase in the UE handsets UL transmissions guard band to Channel 51 to be increased to 1.97 MHz. This feature is shown graphically in the attached figure entitled 'Illustration of Guard Band to TV Channel 51 under Option of PUCCH Overdimensioning and UL Resource Block Blanking.'
5. Deployment of new Band 4 and 700 MHz Block A base station sites that will improve the UE handset prioritization of Band 4; and lessen UE handset required transmission levels through improved 700 MHz Block A reception.

These tools will reduce the potential for harmful interference between the two adjacent systems to acceptable levels. T-Mobile anticipates discontinuing any particular mitigation techniques after the conclusion of the Incentive Auction and clearing of Channel 51 spectrum from the television broadcasting band.



Louis R. du Treil, Jr., P.E.

du Treil, Lundin & Rackley, Inc.
201 Fletcher Ave.
Sarasota, Florida 34237-6019

Phone: 941-329-6004

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FCC ENGINEERING DATABASE SPECIFICATIONS
FOR TELEVISION STATION WNJN, MONTCLAIR,
NEW JERSEY, CHANNEL 51

TV Inquiry

du Treil, Lundin, & Rackley, Inc., Sarasota, Florida



Callsign: WNJN **Service:** DT **Status:** LIC **App. Status:** GRANT **Border Code:** C **Rec. Type:** C
Channel: 51 **Offset:** **Zone:** 1 **Docket Number:** **DTV Type:**
Fac. ID: 48477 **Assoc. ID:** **Application File No.:** BLEDT-20061121ADG **DT Emission Mask:**
City: MONTCLAIR **State:** NJ **Country:** US **CP Expiration Date:**
Party Name: NEW JERSEY PUBLIC BROADCASTING AUTHORITY **Last Change Date:** 2/19/2008

Latitude (NAD 27): 40-51-53	HAAT (m): 233	Polarization: H
Longitude (NAD 27): 074-12-03	Maximum HAAT (m): 281	Electrical Tilt (°): 0.5
Latitude (NAD 83): 040-51-53.4	Height AGL (m): 180	Mechanical Tilt (°):
Longitude (NAD 83): 074-12-01.5	Overall Height AGL (m): 200	Mechanical Tilt Azimuth (°):
RCAMSL (m): 300	ERP (kW): 200	Degrees True (°):
Site Elevation AMSL (m): 120	Maximum ERP (kW):	Antenna Make: DIE
Frequency (MHz): 692	Maximum ERP (dBk): 23	Antenna Model: TFU-30GBH-R 08 DC
Visual Frequency (MHz):	Maximum ERP at any Angle (kW):	Multiplexor Loss (dB):
Aural Frequency (MHz):	Visual Power Output (kW): 9.36	Transmission Line Loss (dB): 0.69
Carrier Frequency (MHz):	Visual Power Output (dBk): 9.72	Input to Transmission Line (dBk):
Upper Band Frequency (MHz):	Analog Channel: 50	Maximum Antenna Power Gain (dB): 13.98
Pred. Coverage Area (km):		

Antenna Type: N **Antenna ID:** 72873 **Rotation (°):**

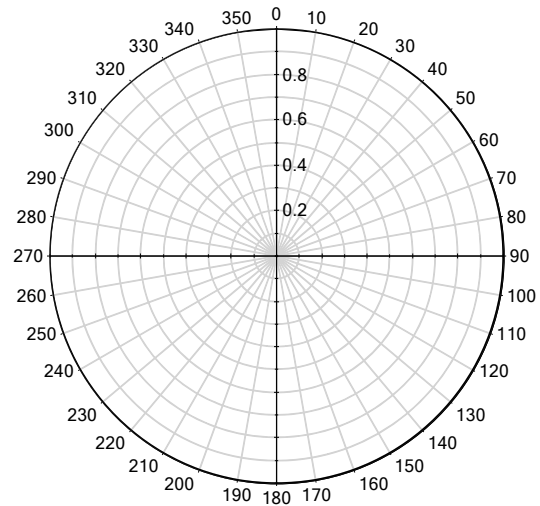
0° 1.000	90° 1.000	180° 1.000	270° 1.000
10° 1.000	100° 1.000	190° 1.000	280° 1.000
20° 1.000	110° 1.000	200° 1.000	290° 1.000
30° 1.000	120° 1.000	210° 1.000	300° 1.000
40° 1.000	130° 1.000	220° 1.000	310° 1.000
50° 1.000	140° 1.000	230° 1.000	320° 1.000
60° 1.000	150° 1.000	240° 1.000	330° 1.000
70° 1.000	160° 1.000	250° 1.000	340° 1.000
80° 1.000	170° 1.000	260° 1.000	350° 1.000

Standard Pattern:

Antenna Make: DIE

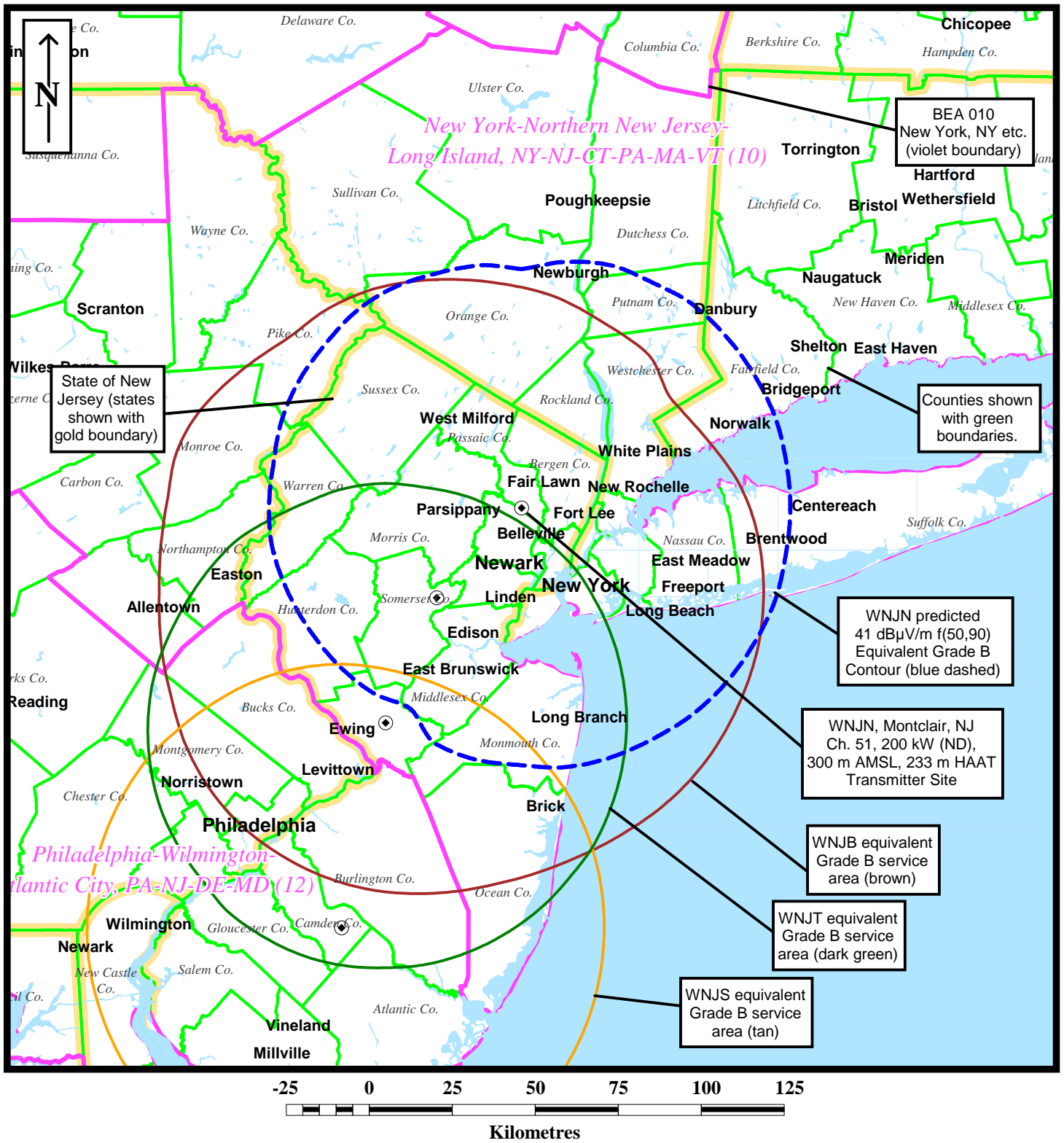
Antenna Model: TFU-30GBH-R 08 DC

Last Change Date:



Note: Rotation or tilt is not applied to the pattern shown

<u>Callsign</u>	<u>Begin Date</u>	<u>Record Change Date</u>
WNJN	6/1/1994	
WNJN-TV	5/1/1994	
WNJM		



WNJN (CHANNEL 51) 41 dBµV/m f(50,90) EQUIVALENT GRADE B CONTOUR

duTreil, Lundin & Rackley, Inc. Sarasota, Florida

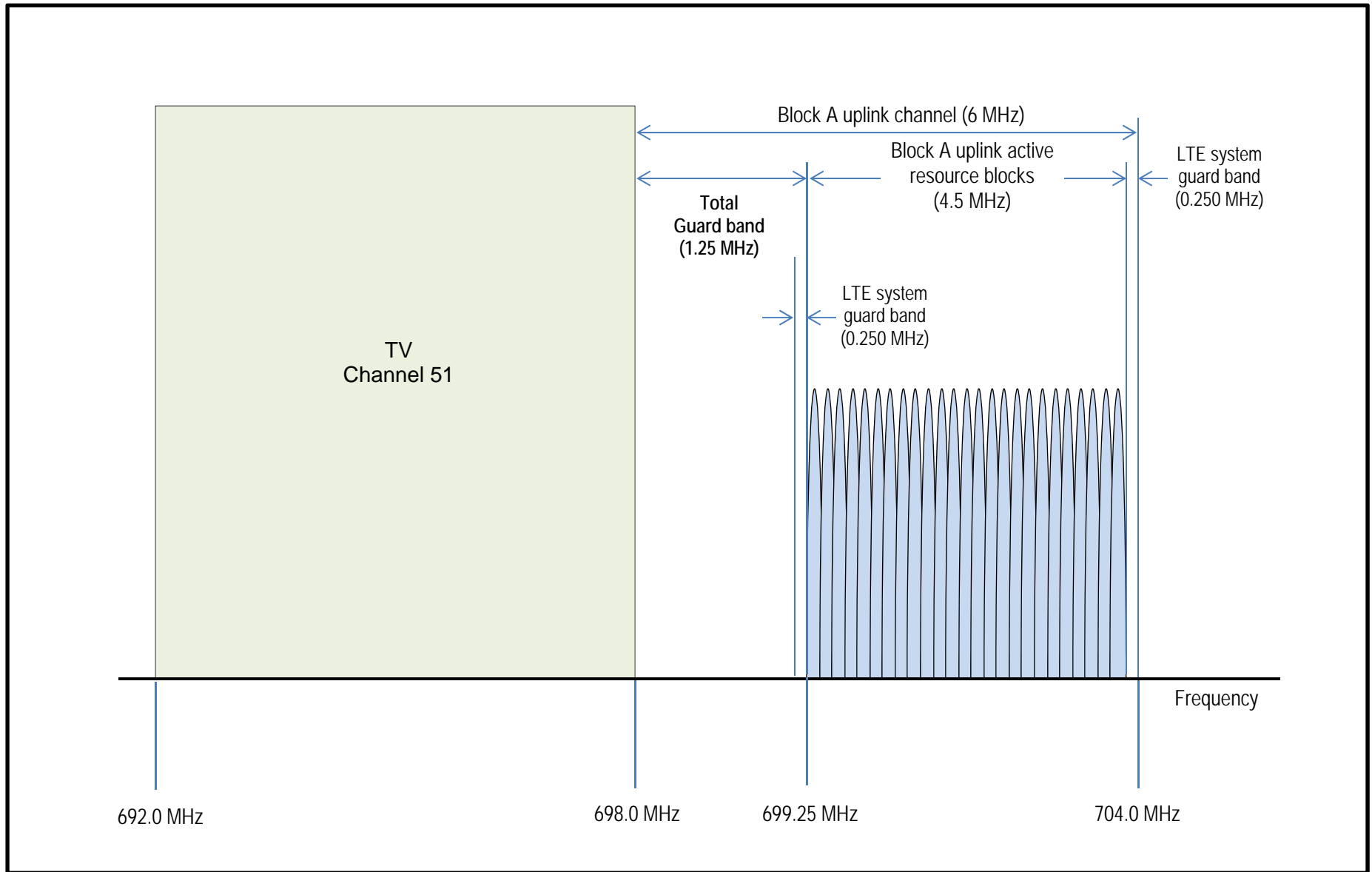


ILLUSTRATION OF GUARD BAND TO TV CHANNEL 51 FROM STANDARD BLOCK A LTE UPLINK SPECTRUM

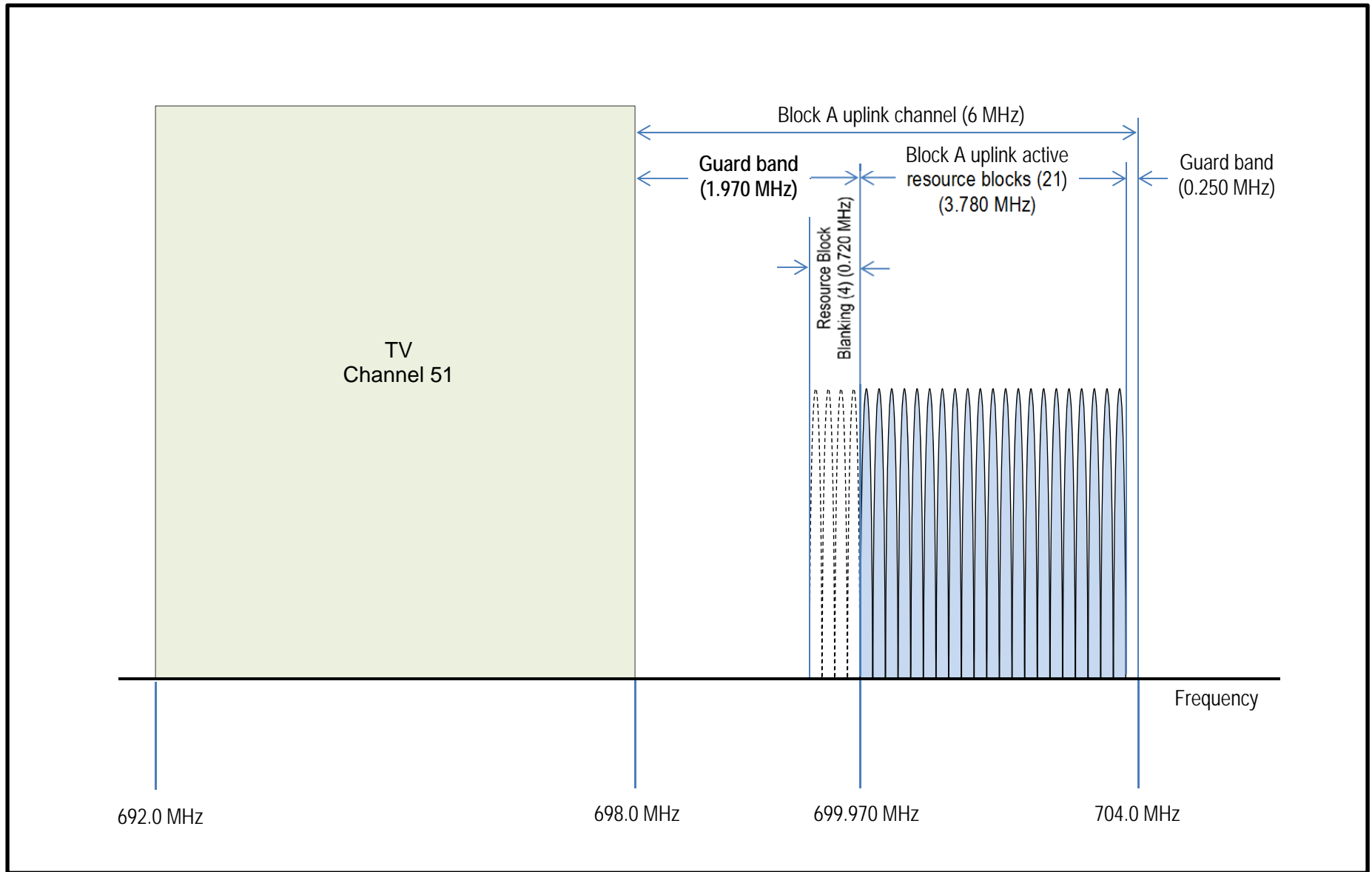


ILLUSTRATION OF GUARD BAND TO TV CHANNEL 51 UNDER OPTION OF PUCCH OVERDIMENSIONING AND UL RESOURCE BLOCK BLANKING