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September 26, 2008

**VIA ELECTRONIC FILING**

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

**Re: *Ex Parte* Notice**
**WT Docket Nos. 07-195 and 04-356**
**Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band**

Dear Ms. Dortch:

T-Mobile USA, Inc. ("T-Mobile") submits this response to the recent filing in the above-captioned proceedings by M2Z Networks, Inc. ("M2Z"). [1/]

M2Z characterizes its filing as a critique of recently-concluded empirical testing at the Boeing labs, but it is in fact little more than a rehash of M2Z's discredited arguments about the coexistence of AWS-3 and AWS-1 operations. To these recycled claims, M2Z adds a hodgepodge of complaints about the testing procedures and a few new assertions – involving irrelevant issues like interference from microwave ovens – that bear no relationship to reality, let alone the test results. M2Z sent two engineers to the testing and had every opportunity to make suggestions or otherwise contribute to the testing process. Undoubtedly, M2Z would be touting the accuracy of the testing if it had shown no interference. Its attack now of the testing after having participated with no objections is both desperate and disingenuous.

No amount of distractions from M2Z should be allowed to obscure the fact that the most recent testing (and all previous testing) confirms that M2Z's proposal to operate high-powered mobile transmitters in the AWS-3 band will cause harmful interference to mobile devices in the adjacent AWS-1 bands. Every observer of the testing other than M2Z concluded that the tests demonstrated the existence of this interference.[2/] Indeed, M2Z itself admits that there will be harmful interference from AWS-3 operations to AWS-1 licensees and now for the first time

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[1/] *See Ex Parte Communication* of M2Z Networks, Inc., WT Dkt. Nos. 07-195 & 04-356 (filed Sept. 23, 2008) ("M2Z Ex Parte").

[2/] *See Ex Parte Communication* of AT&T, CTIA, MetroPCS Communications, Inc., Nokia Inc., and T-Mobile USA, Inc., WT Dkt. No. 07-195 (filed Sept. 10, 2008).

admits that out-of-band emissions ("OOBE") is the dominant interference source.[3/] Now that M2Z has finally admitted that OOBE is the predominant interference source, all debate about M2Z's myth that "better filters" in AWS-1 handsets could somehow protect against AWS-3 interference (as AWS-1 filters cannot affect OOBE in any fashion) should be put to rest.

M2Z's conclusion that this interference will not be harmful is based on a persistent and fundamental misunderstanding of the power levels at which AWS-1 devices operate,[4/] casting further doubt on the soundness of M2Z's technical arguments. On T-Mobile's *real* broadband network, 26 percent of customers receive service at or below the pilot receive signal strength levels tested. In essence, M2Z would consign nearly a quarter of T-Mobile's customers to serious, ongoing service degradation.

M2Z also ignores the fact that the testing examined the impact of AWS-3 devices on AWS-1 handsets operating on a range of receive strengths, specified by Commission staff and including at a level M2Z itself acknowledges to be relevant. At every tested signal strength, there was harmful interference.

In the face of the test results, the only gambit M2Z has left is to attack the testing procedures themselves. But to the extent M2Z's filing actually analyzes the tests themselves, its criticisms are without foundation:

- M2Z fails to comprehend what receive signal strengths were actually tested, confuses the signal strength of control channels, traffic channels and total power, and is just plain wrong when it argues that the received signal strengths for which T-Mobile seeks protection is inconsistent with the protected signal strengths under other Commission rules;

- M2Z improperly characterizes the results of the tests in order to make specious claims regarding the impact of WiFi and other low-power devices on AWS-1 handsets;

- M2Z fails to understand that the adjacent channel interference tests were completely valid and actually more forgiving to AWS-3 OOBE levels than real-world standards and devices;

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[3/] *See* M2Z Ex Parte at 12 ("There is general agreement that the OOBE are the dominant interference mechanism in nearby coupling situations….").

[4/] *See* M2Z Networks Further Notice Reply Comments, WT Dkt. Nos. 07-195 & 04-356, at 23 (filed August 11, 2006) ("T-Mobile's study included tests of some handsets at -105 dBm. This means that T-Mobile likely tested units below the noise floor, where no reliable reception of the desired signal could be expected, and thus where supposed 'harmful interference' from adjacent bands would not be an issue.").

- M2Z asserts conclusions about the transmit power of AWS-3 mobile devices that do not exist and therefore have *never* been tested; and

- M2Z argues inaccurately that the drive test data provided by T-Mobile was based on a "partially constructed" AWS-1 network.

In fact, as described in more detail in the attached white paper, the testing was carefully designed and followed recognized parameters. Because M2Z has not yet produced a prototype device – which most proponents of new services would have done by this point – T-Mobile had to utilize interference simulators. But those simulators were carefully calibrated to match the technical standards proposed in the *Further Notice* in this proceeding, and if anything were more forgiving of interference from AWS-3 than the performance of real-world handsets using UMTS or WiMAX.

We are confident that any professionally performed set of interference tests will confirm the results of the Boeing labs tests. And we are open to additional testing in the Boeing lab or a recognized professionally certified lab of M2Z's choosing. Of course, any such testing should be observed by the FCC and open to other interested parties, as the testing at the Boeing labs was.

We also believe, in the interest of a fair and informed process, that the Office of Engineering and Technology ("OET") should put its tentative conclusions regarding the Boeing lab tests on the record and provide an opportunity for public comment on those conclusions, as the FCC has done in other proceedings involving complex technical concerns. We appreciate the OET's willingness to engage in testing and the fact that OET staff publicly released its data from the tests, but a full record should include the engineers' views on whether they think the tests show that the proposed rules will create harmful interference and why or why not. A reasonable comment period would give the public a chance to review those conclusions *before* the Commission acts in reliance on them.

Contrary to M2Z's rhetoric, T-Mobile does not fear competition. We face competition every day from larger, well-established national providers. We believe the AWS-3 spectrum can be used to promote wireless broadband competition – but not if the Commission adopts M2Z's ill-considered proposal and thereby enables M2Z to impose harmful interference on the real wireless broadband services that we and others are already offering in the adjacent AWS-1 band. As Chairman Martin himself has recognized, permitting harmful interference to incumbent users is not the norm of FCC interference policy.[5/] The issues raised in this proceeding are too

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[5/] *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, Statement of Commissioner Kevin J. Martin Dissenting in Part and Approving in Part, 17 FCC Rcd 9614, 9820 (2002) (objecting to the Commission's departure from "the established principle that new users of spectrum must not impede or interfere with existing uses that serve the public interest" and the "'first in time, first in right' doctrine" that is a "'mainstay of interference protection'") (internal footnotes omitted).

important to consumers and the future of wireless broadband competition to be decided on the basis of ill-informed rhetoric. We urge the Commission to revise its proposed rules to reflect the results of the testing.[6/]

Sincerely,

/s/

Thomas J. Sugrue
Vice President, Government Affairs

cc: Charles Mathias
Bruce L. Gottlieb
Renee R. Crittendon
Wayne Leighton
Angela E. Giancarlo
Julius Knapp
James Schlichting

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[6/] *Cf. Aircell, Inc. Petition, Pursuant to Section 7 of the Act, for a Waiver of the Airborne Cellular Rule, or, in the Alternative, for a Declaratory Ruling*, Separate Statement of Commissioner Kevin J. Martin, Concurring, 18 FCC Rcd 1926, 1940 (2003) (expressing concern about an "*ad hoc* approach" to analyzing harmful interference because "[n]ot only does this approach cause a great deal of uncertainty for spectrum users and markets alike, it also creates another problem: the appearance of results-oriented decisionmaking").

# THE BOEING LAB TESTS CONFIRM THAT THE PROPOSED RULES WILL CREATE HARMFUL INTERFERENCE TO AWS-1 HANDSETS

## I. M2Z Did Not Understand The Receive Signal Test Parameters

M2Z argues that the receive signal levels that T-Mobile demonstrated at the tests – -105 dBm, -100 dBm, -90 dBm and -85 dBm – are too weak to warrant interference protection and weaker than the -96 dBm/1.25 MHz PCS signal level afforded protection previously by the Commission.[7/] Neither of those claims is correct.

*First*, as T-Mobile made clear to all observers at the test site, including M2Z, the tested receive signal strengths were for the pilot (or control channel) signal used to set up a communications path and establish a call or data connection.[8/] By contrast, the FCC affords interference protection based on the total received signal,[9/] which is 7 to 10 dB stronger than the pilot signal. The total receive signal of the AWS-1 devices tested in the lab were -97 dBm/3.84 MHz, which is nearly identical to the -96 dBm/1.25 MHz level found by the Commission previously to be a reasonable receive signal level for CDMA networks warranting protection. T-Mobile has consistently stated that the receive signal levels it has tested are conservative and not at the limit of operational capability — a point with which M2Z now apparently agrees.

*Second*, testing was conducted not only for the -105 dBm pilot receive signal case, but also the -100 dBm level, the -90 dBm level and the -85 dBm level. *Fully 26 percent of T-Mobile's AWS-1 customers obtain service with receive signals at these levels and would be adversely affected by interference from AWS-3 devices if M2Z's proposed technical rules were adopted.* That interference could result in dropped call rates worse than the current industry average by a factor of many multiples.

M2Z's lack of comprehension of the testing parameters, despite an extensive discussion and description of them during the joint testing, calls into question all of M2Z's analyses concerning the test results.

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7/ *See* M2Z Ex Parte, Attachment A at 7.

8/ The pilot channel is the channel used by the UMTS handset to confirm that it is within reach of a base station. The signal strength "bars" on UMTS handsets are related to the strength of the pilot channel.

9/ The total received signal is the aggregate signal level of all of the channels received by a UMTS handset from a cell sector, including the pilot channel, other controls channels, and the channels used to receive voice and data traffic.

## II. T-Mobile's Proposed OOBE Protection Limit Is Necessary to Protect UMTS Operations and Consistent with the Value Proposed by the Commission to Protect PCS from Adjacent Band H Block Interference

M2Z misunderstands and mischaracterizes the out-of-band emissions (OOBE) interference that would result if the rules proposed in the *Further Notice* were adopted.

*First*, M2Z's argument that T-Mobile's proposed AWS-3 OOBE limit of 60 + 10 log (P) dB is much more stringent than required is based wholly on its faulty assertion that receive signal levels below -90 dBm on a UMTS network are otherwise unusable anyway.[10/] M2Z is simply wrong when it claims that -105 dBm is too weak a signal to warrant protection. As explained above, a significant number of T-Mobile UMTS subscribers receive service with a pilot channel receive signal at that level. That is not surprising. As numerous publications, other FCC filings[11/] and T-Mobile's network measurements demonstrate, UMTS networks routinely operate at received pilot power levels at or below -105 dBm. This is an undeniable fact, backed by decades of research and development in CDMA technologies, which can be easily proven by observing UMTS network operations with an instrumented phone. It is further supported by UMTS standards, which support a pilot channel receive signal down to levels as low as -120 dBm,[12/] 15 dB *lower* than the lowest signal (-105 dBm) tested at the Boeing lab. It is telling that no experienced wireless service provider, infrastructure equipment vendor or handset manufacturer who has commented in this proceeding has supported M2Z's repeated erroneous assertions that UMTS networks cannot operate at received pilot powers in the -105 dBm range.

*Second*, M2Z's claims regarding wireless network operations once again demonstrate a fundamental misunderstanding of spread spectrum techniques and the performance of Wideband Code Division Multiple Access (WCDMA) systems. UMTS WCDMA networks are tightly power controlled to operate at or below the noise-interference floor, relying on processing gain to achieve the necessary signal-to-interference ratio for demodulation.

Further undermining M2Z's radical position that OOBE limits can be relaxed is the Commission's own proposals for the H Block. In this proceeding, the Commission has proposed that H Block mobiles attenuate OOBE by 90 + 10 log (P) dB in the PCS band to protect incumbent PCS operations.[13/] To compare, T-Mobile has asserted that AWS-3 mobiles must attenuate OOBE by 96 + 10 log (P) dB into the AWS-1 band. Clearly, the Commission's

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[10/] *See* M2Z Ex Parte at 6.

[11/] *See, e.g.*, Qualcomm, Inc., Petition for Reconsideration, ET Dkt. 98-153, at 7-9 and Figure 1, (filed June 17, 2002).

[12/] *See* 3GPP, TS 25.133, "Requirements for support of radio resource management (FDD)" in Section 9.1.1.3, "CPICH RSCP measurement report mapping."

[13/] *See Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band; Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, and 2175-2180 MHz Bands*, WT Dkt. Nos. 07-195 & 04-356; *Further Notice of Proposed Rulemaking*, FCC 08-158, at 3 (rel. June 20, 2008) ("FCC FNPRM").

proposal for H Block OOBE attenuation is much more similar to T-Mobile's request and must have some technical basis – and is completely inconsistent with the positions taken by M2Z.

## III. T-Mobile is Not Asserting the Need for Protection Against WiFi and Microwave Ovens

In what must surely be the most bizarre claim raised by M2Z in this proceeding, M2Z asserts that the receive signal levels for which T-Mobile seeks protection are so low that WiFi, Bluetooth and microwave ovens would interfere with AWS-1 handsets. This claim is as irrelevant as it is strange. The amount of interference power leaked from such spectrally removed sources into the AWS-1 band is far lower than the interference from adjacent band higher power operations in AWS-3. If emissions existed at such far removed frequencies from these devices, they would be spurious emissions, which are not the same interference mechanisms (OOBE and Blocking) at play with AWS-3. T-Mobile's concern – grounded in multiple rounds of testing – is that AWS-3 operations *in adjacent channel bands* present interference concerns at power levels much less than the Commission proposed limits. This is a reality supported by all other parties in attendance at the joint testing who have extensive experience in wireless device and equipment testing.

## IV. The Test Equipment Properly Emulated Interference From Devices Transmitting at the Levels Proposed in the *Further Notice*

M2Z claims that the test equipment used for AWS-3 signal generation was "improper" or "flawed." In fact, the test equipment was demonstrated to meet or exceed all relevant specifications and accurately depicted operations under the rules proposed in the *Further Notice*. Indeed, the test equipment exhibited *better* overall performance than the commercial UMTS handsets reported by ERA Technologies to Ofcom. "Better" in this instance means that the signal generators used to model AWS-3 operations attenuated adjacent band emissions by 5 to 6 dB more than an actual UMTS or WiMAX handset could operating in the AWS-3 band – meaning that the testing values used were more conservative and favorable to AWS-3 operations than should be expected in the real-world.

### A. The test equipment met the Commission's proposed OOBE limits.

The lab test objective was clearly defined to establish whether interference occurred at the limits specified in the *Further Notice*. As demonstrated by the spectrum analyzer trace in Figure 1 captured during the lab testing, the OOBE emissions from the test equipment signal generator are better than the *Further Notice*'s OOBE specification (attenuation of 60 + 10 log (P) dB with P in W/MHz).

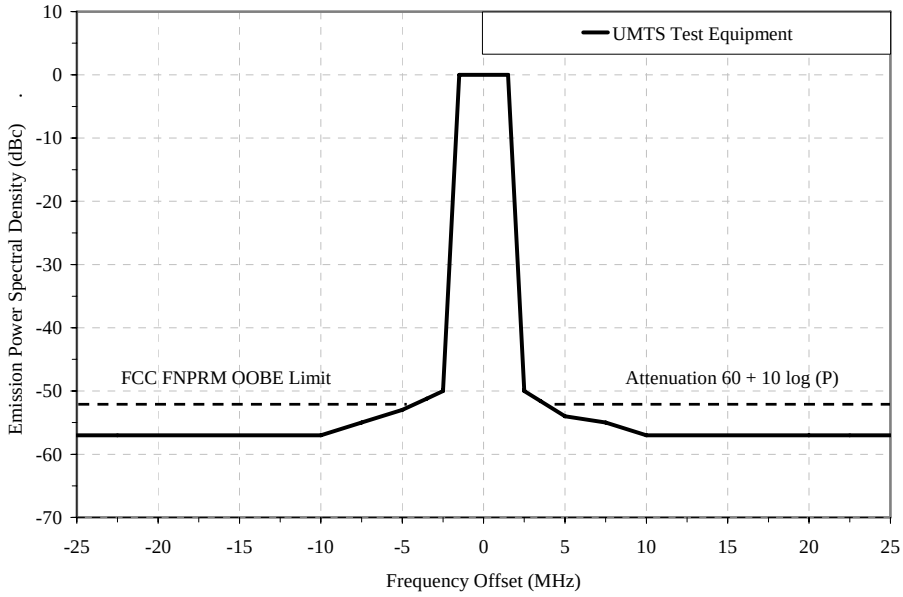


**Figure 1. Comparison of spectrum emissions from test equipment against FCC *Further Notice* proposed OOBE limit.**

### B. The test equipment performs far better than 3GPP UMTS emission mask specifications.

The test equipment emissions[14/] also conform to the 3GPP UMTS standards emission mask specifications.[15/] In fact, as Figure 2 demonstrates, the test equipment emissions are *far better* than the mask defined in the 3GPP specifications, beating the 3GPP limits by a dramatic 15 to 20 dB margin within the roll off region.[16/] The so-called "flat" response of the test equipment

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[14/] For the AWS-3 interfering signal using 3GPP UMTS, the signal generator was a Rohde & Schwarz Model CMU-200 communications tester.

[15/] 3GPP, TS 25.101, "User Equipment (UE) radio transmission and reception (FDD)" in Section 6.6.2, "Out of band emission." An emissions mask is the upper limit on the spectrum emissions power placed at particular frequencies by standards or regulatory bodies. A spectrum mask typically exhibits a convex shape with a peak in the desired band and tapers to lower values in the undesired adjacent bands, hence the term "mask." This allows more power in the desired band and lower leakage powers into undesired bands further away in frequency from the desired band.

[16/] "Roll off" refers to the degree to which a spectrum emission or spectrum mask tapers to lower powers away from the desired band. "Sharper" roll off indicates more taper, while 'flat' roll off indicates less or no taper.

represents better performance compared to an emissions response with "shoulders."[17/] That means the test simulated an AWS-3 device that produced less interference than predicted by the international standards body – and yet even such a better performing device created harmful interference – not worse performance as alleged by M2Z.

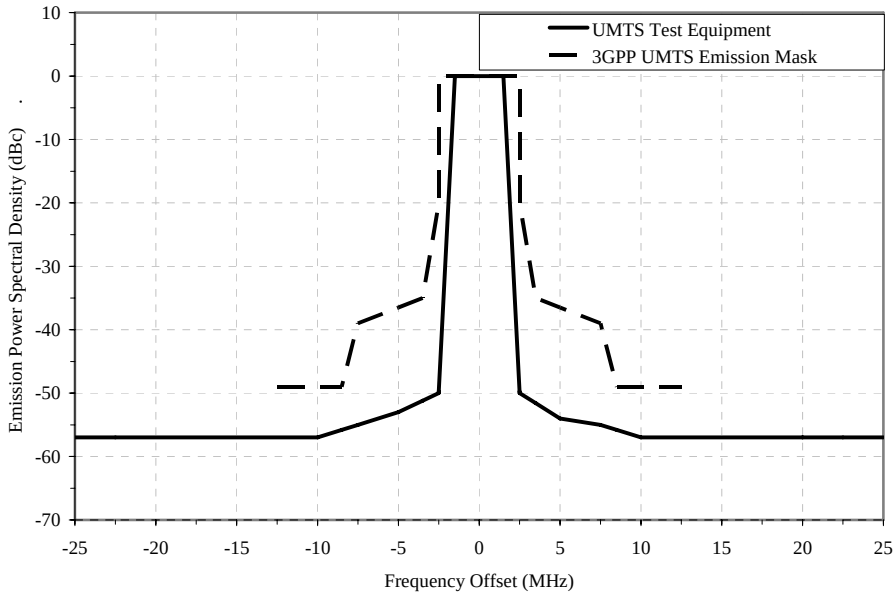


**Figure 2. Comparison of spectrum emissions from test equipment versus 3GPP UMTS spectrum mask specifications.**

### C. The test equipment performs far better than IEEE WiMAX emission mask specifications.

The test equipment emissions[18/] also conform to the IEEE 802.16 WiMAX standards emission mask specifications for unlicensed band operations.[19/] The IEEE 802.16 specifications do not provide emission mask requirements for licensed band operations, because these are assumed to be defined by local regulatory bodies. Figure 3 shows test equipment emissions compared

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[17/] The engineering reason for this is due to the widely-studied effects of spectral re-growth. When transmit power amplifiers are operated near their saturation point, spectral re-growth causes "shoulders" to be created in the emissions due to the amplifier non-linearities. As the amount of transmitter back-off is increased (lower transmit power levels relative to the saturation point of the power amplifier), these "shoulders" become less pronounced. The actual transmitter emissions characteristics, whether for handsets or test equipment, depend on these transmitter design parameters and the transmit power levels.

[18/] For the AWS-3 interfering signal using IEEE 802.16 WiMAX, the signal generator was a Rohde & Schwarz Model SMJ-100 communications tester.

[19/] IEEE Standard 802.16 – 2004, Section 8.5.2 (Transmit Spectral Mask), Figure 265 and Table 341.

against the IEEE WiMAX mask specification for unlicensed band operations. Once again, note that the test equipment is significantly better than the IEEE emissions mask in the roll off region.

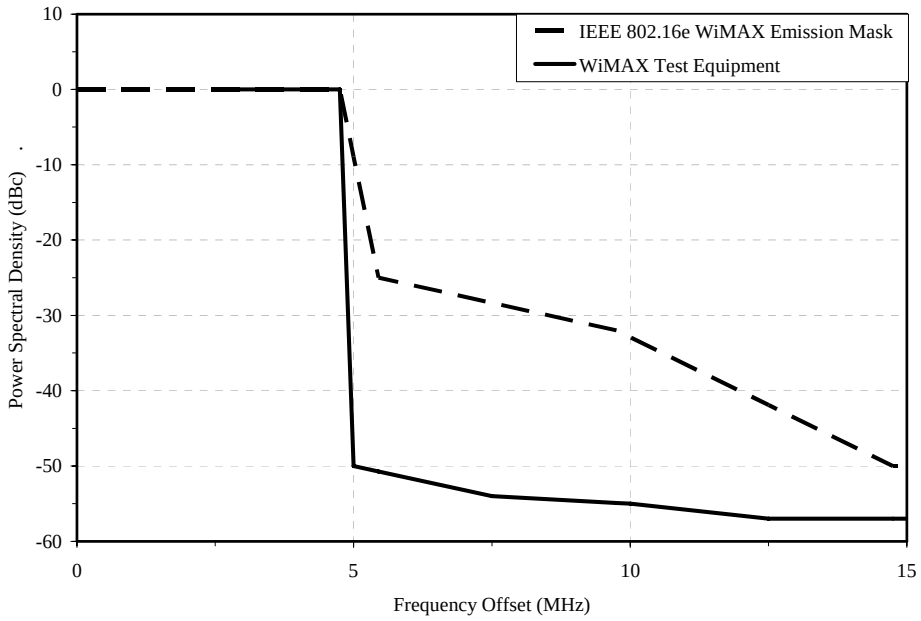


**Figure 3. Comparison of emissions from test equipment emissions against IEEE 802.16e WiMAX emission mask specifications for unlicensed band operations (no IEEE emissions mask is specified for licensed band operations).**

Not only is the test equipment performance better than the IEEE WiMAX specifications, it is also similar to the emissions publicly reported by WiMAX vendors for actual WiMAX equipment. An example WiMAX emission response is shown at Figure 4, which compares the IEEE spectrum mask (labeled "IEEE Spectrum Mask") against the measured emissions from a WiMAX transmitter (labeled "WiMAX Transmitter Emissions") from an applications note on WiMAX power amplifier testing.[20/] Observe that the WiMAX transmitter emissions exhibit "flat" emissions outside of the desired channel. Such a "flat" emissions response is not unusual, unexpected or flawed in any way, as can be seen from these public WiMAX documents.

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[20/] *See* "WiMAX Power Amplifier Testing," Application Note RAC0611-0025, Rohde & Schwarz, *available at* http://www.wimaxforum.org/documents/downloads/rac_0611_0025.pdf.

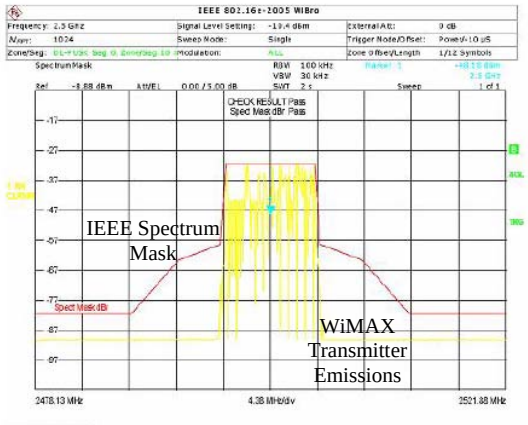


**Figure 4. Sample IEEE 802.16e WiMAX transmitter emissions ("WiMAX Transmitter Emissions") and IEEE WiMAX spectral emissions mask ("IEEE Spectrum Mask") (from source in footnote 20)**

### D. The test equipment performs far better than Ofcom's measured handset performance.

Ofcom had ERA Technologies test the spectrum emissions performance of different European UMTS handsets.[21/] The highest emissions from the sample handsets tested by ERA compared against the test equipment emissions and 3GPP spectrum emissions mask specifications are shown in Figure 5. Note that the UMTS handset emissions have extremely small margins relative to the 3GPP UMTS spectrum mask specifications — at some frequencies the handset measurements come within a couple of decibels from the mask. In contrast, the test equipment emissions have much greater margins relative to the 3GPP mask specifications — ranging between 8 dB and as much as 20 dB better. Again, while the Boeing lab tests simulated equipment that exhibited better performance – and more forgiving to M2Z – than the Ofcom simulation, the tests nonetheless demonstrated harmful interference to AWS-1 handsets.

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21/ "Measurements of UTRA FDD User Equipment Characteristics in the 2.1 GHz Band," Final Report, ERA Technology Ltd., Apr. 2008, *available at* http://www.ofcom.org.uk/consult/condocs/2ghzregsnotice/era.pdf.

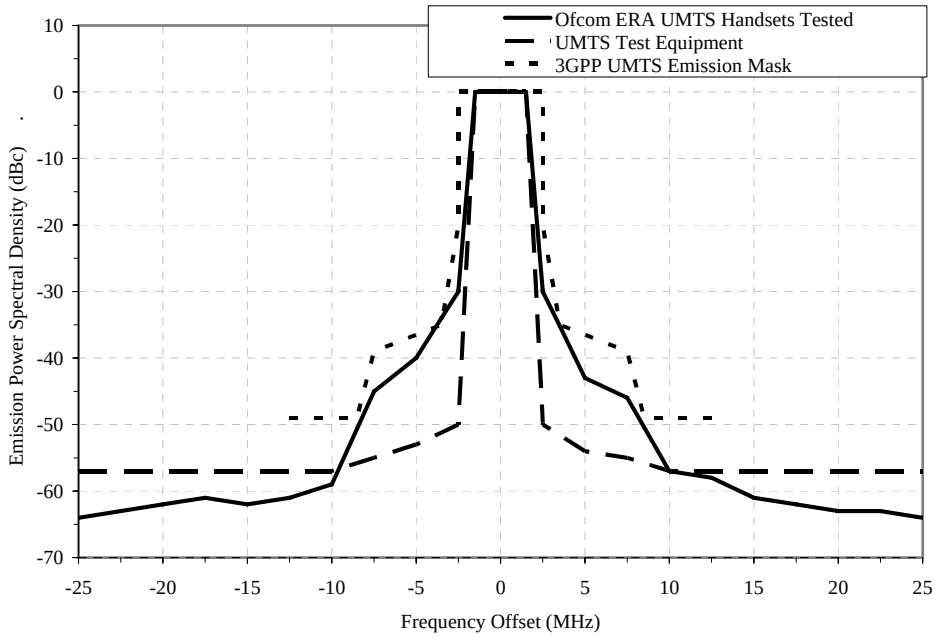


**Figure 5. Comparison of Ofcom UMTS handset emissions measurements against test equipment emissions and 3GPP UMTS emission mask specifications.**

### E. Typical handset emissions are far worse than the test equipment.

As Figure 5 demonstrates, UMTS test equipment emissions were drastically lower than actual UMTS handset emissions within about 10 MHz from the carrier frequency, with as much as 20 dB reduction in the spectral "shoulders." Unquestionably, the test equipment exhibits a far more ideal spectral emissions response in this respect, making the lab tests optimistic rather than pessimistic in terms of AWS-3 interference. Beyond 10 MHz of carrier offset, the test equipment emissions are close to the handset emissions, typically within about 5 dB. This means that the test equipment emits far lower total OOBE power into adjacent bands than would have occurred had the handsets tested by ERA been used. M2Z's claim that the test equipment overstated interference from AWS-3 handsets is completely contrary to the facts.

### F. Lab testing with the external filter did remove OOBE to allow separate receiver overload testing.

Based on the lab test results with and without the external filter, the OOBE power densities used during the different tests (with different guard bands) were all compliant with the Commission's proposed rules of 60 + 10 log (P) dB. Furthermore, when the external filter was placed in the test setup, the OOBE power densities were low enough to eliminate the threat from OOBE interference. The external filter's frequency response was measured and reported with the test results. The filter allowed the effects of receiver overload to be separately tested, despite M2Z's erroneous claims to the contrary.

The AWS-3 testing demonstrated conclusively that power levels vastly lower than 23 dBm/MHz would cause interference. In contrast, absolutely no testing was done at any AWS-3 transmit power level higher than 22 dBm/MHz — so any conclusions about the effects of power levels above this level (as supported by M2Z) are purely speculative.[22/]

### G. OOBE and receiver overload were both properly tested.

M2Z argues that receiver overload was not – and could not be – tested separately from OOBE, and asserts that T-Mobile's "receiver overload" tests resulted in the same level of interference regardless of whether there was a 10 or 250 MHz separation. M2Z is wrong again, on several grounds.

*First*, T-Mobile used a custom filter to conduct overload testing – specifically in order to eliminate OOBE effects. M2Z's observer at the testing was apparently unaware of this fact. With this filter in place and OOBE effects eliminated, the tests demonstrated that overload contributed to interference.

*Second*, the interference observed at a 250 MHz separation was indisputably caused by OOBE and not overload. At such a wide frequency separation, there is no possible effect from receiver overload. More to the point, the OOBE interference observed at that separation was due solely to the flat response from the signal simulator after the custom filter had been removed.[23/] Indeed, this factor was explained in great detail during the testing at the Boeing lab. The signal simulator used in the tests generated a long tail, but neither T-Mobile nor anyone else familiar with lab tests would claim that a flat response at such a separation is indicative of harmful interference that would occur in a real-world environment. M2Z's efforts to suggest that the simulator's long tail somehow compromises the test results for the frequency range of interest (within 0 to 15 MHz from the AWS-1 band) are either disingenuous or reflective of an inadequate understanding of signal simulators used for device testing.

## V. The Markets Used for AWS-1 Drive Testing Were Fully Constructed.

M2Z argues that the T-Mobile AWS-1 network is "partially constructed" and drive test data provided to demonstrate receive signal level data were distorted.[24/] T-Mobile's AWS-1 network is fully constructed where the drive test data were gathered; indeed, T-Mobile has placed its

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[22/] *See* M2Z Ex Parte at 13. M2Z asserts, without any empirical testing or other data, that AWS-3 handsets can safely operate at a transmit power level of 33 dBm.

[23/] It is possible to confirm this point based on the measurements obtained during the tests, which showed that call setup failed when the interference level at the antenna port of the device was -25.2 dBm, for a received total power of -83 dBm and a pilot signal at -90 dBm. Considering the OOBE attenuation of the test equipment, the total power of the emission in the AWS-1 band was -78.2 dBm. With such data it is possible to conclude that the Ec/(No+I) due to purely OOBE was -13.2 dB, very close to the measured -13.5 dB value at the point where the call failure occurred. There could not possibly be an overload interference component to this calculation – demonstrating conclusively that OOBE was the sole contributing factor.

[24/] *See* M2Z Ex Parte at 8.

AWS-1 base station transmitters in the exact same tower locations as its PCS operations and has added additional tower facilities to supplement coverage due to the propagation characteristics differences between the 2.1 GHz band (AWS-1) and the 1.9 GHz band (PCS). M2Z apparently falsely believes that a market launch can be "partial" in today's competitive marketplace — an observation that completely misunderstands the business imperatives, quality of service requirements and customer expectations in the marketplace. In sum, despite M2Z's uninformed opinions about the drive test data, the data is representative of real-world operational AWS-1 networks that are fully constructed and providing service to customers today.

**Conclusion**

As every observer at the testing other than M2Z has stated on the record, the testing at the Boeing labs was conducted appropriately and confirms that AWS-3 operations under the Commission's proposed limits would harmfully affect AWS-1 systems. Unlike M2Z, these observers have actual and extensive experience and knowledge in the testing of wireless devices and compatibility.