Federal Communications Commission
Washington, D.C. 20554

UNITED STATES GOVERNMENT

Memorandum

DATE: September 12, 2008

TO: WT Docket No. 07-195 & WT Docket No. 04-356

FROM: Julius P. Knapp
Chief, Office of Engineering and Technology

SUBJECT: Results of Advance Wireless Service (AWS) Interference Tests Performed on Sept. 3 – 5, 2008

On September 3 – 5, 2008, a team of FCC Engineers conducted joint testing with industry of to assess potential interference from proposed AWS-3 operations in the 2155 – 2180 MHz band to AWS-1 operations in the 2110 – 2155 MHz band. The tests were performed at Boeing's test facility in Seattle Washington. The tests were open to the public. The list of participants and test results are attached.

The tests generally followed the procedures outlined in T-Mobile's report submitted into the above captioned dockets on July 28, 2008 AWS-3 to AWS-1 Interference Laboratory Test Report.[1] The tests investigated potential interference between two mobile devices due to out-of-band emissions from the AWS-3 transmitter into the AWS-1 receiver and potential interference due to overload of the AWS-1 receiver from AWS-3 transmissions.

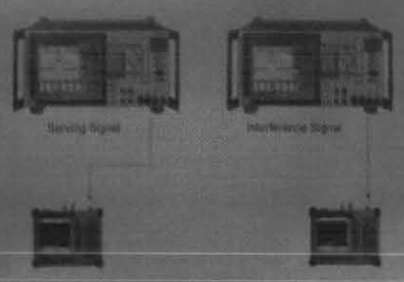
The tests were performed by connecting signal generators representing the desired and interfering signals through appropriate couplers to the antenna connector on AWS-1 mobile device. The interference was examined under the conditions of either a failed call setup or a dropped call as reported. The signal levels at which interference occurred were recorded for each of the various combinations of desired and interfering signal levels and frequency separations. UMTS and WiMAX signals as generated by the test equipment were used for the interference sources.

The tests examined the characteristics of a custom filter that was fixed tuned just above the AWS-1 frequency band. The filter was used to examine the effect of reducing out-of-band emissions from the AWS-3 devices. Tests were conducted to examine the AWS-1 receiver filters and their ability to reject overload interference at various frequency separations.

The test results are shown in the attached tables and charts. These test results will be considered along with all of the other information that is submitted into the record in this proceeding as the Commission considers appropriate action in the above captioned rule making proceeding.

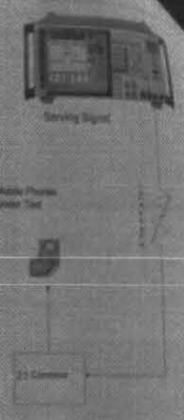
[1] See http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6520035719

CALIBRATION



Step 1

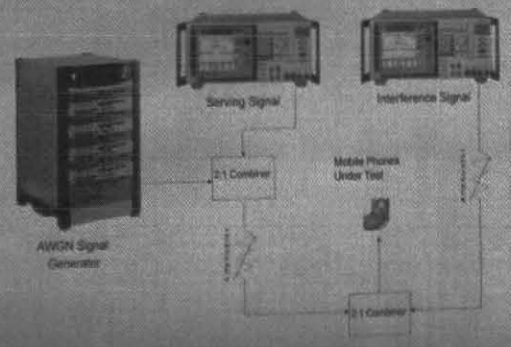
Step 2



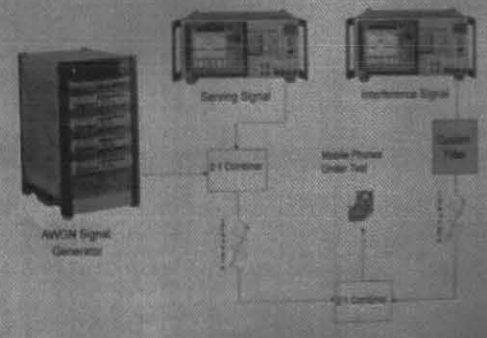
Step 3

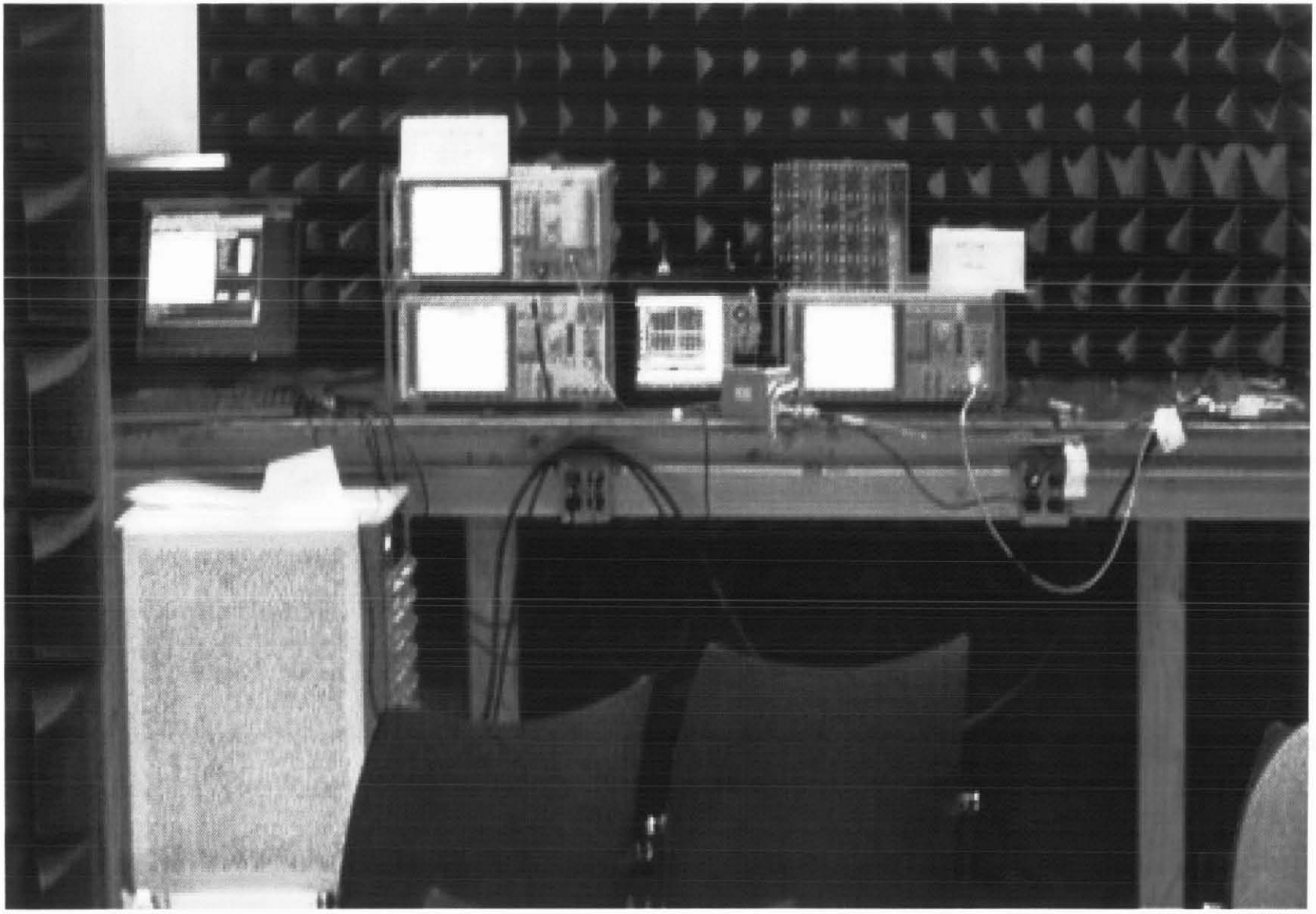
TEST SETUPS

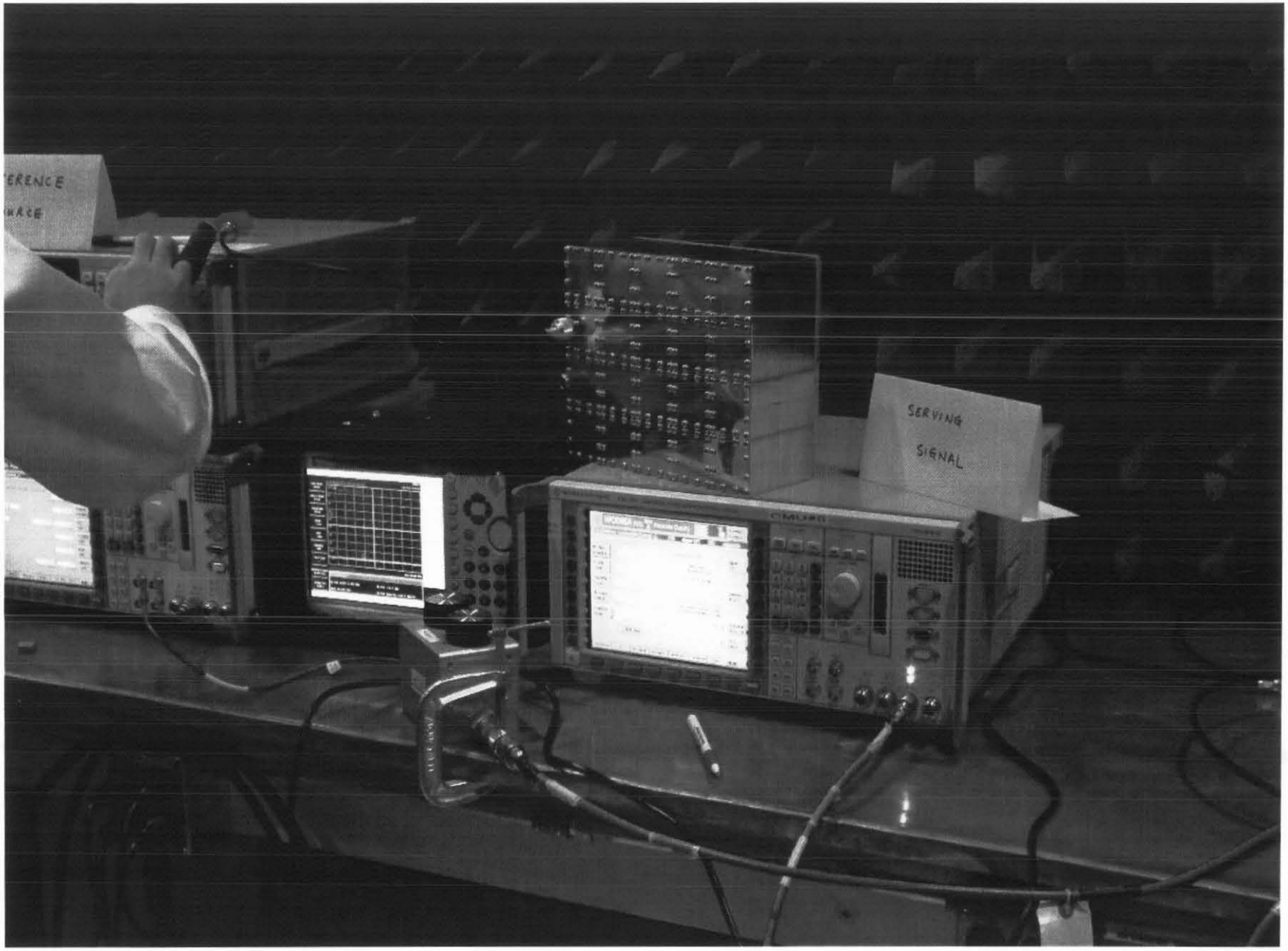
Combined OOBE & Overload
Pure OOBE



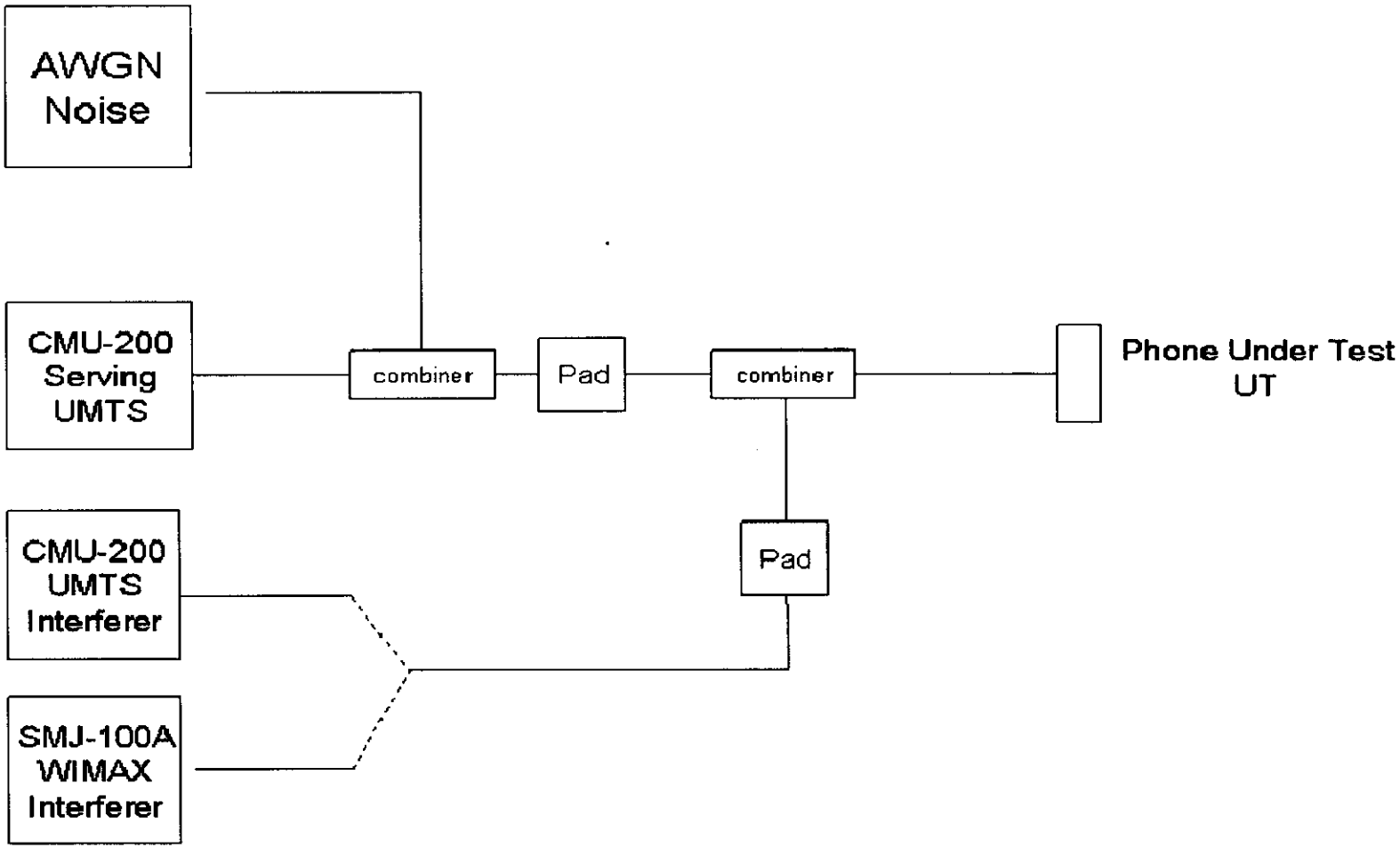
Pure Overload






SERVING
SIGNAL

Block Diagram



FCC Public Testing for AWS-3 Interference to Adjacent Band AWS-1 Operations
Sept. 3-5, 2008
Boeing Company EMC Laboratory in Seattle, Washington

Testing Schedule

9/3/2008 (Wednesday) 8:00am to 4:00pm

1 Lab Set Up Calibration
2 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm, -85dBm and -75dBm; Interference: 5MHz UMTS centered at 2157.5MHz)
3 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2142.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2157.5MHz)
4 Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2157.5MHz)
5 Rx Overload Tests (Serving: 5MHz UMTS centered at 2142.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2157.5MHz)
6 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2112.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -90dBm; Interference: 5MHz UMTS centered at 2107.5MHz)

9/4/2008 (Thursday) 8:00am to 4:00pm

1 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2112.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2105MHz)
2 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2112.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2102.5MHz)
3 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2162.5MHz)
4 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2172.5MHz)
5 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2177.5MHz)
6 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm, -85dBm and -75dBm; Interference: 20MHz WiMAX 1:1, 100% activity factor at 2167.5MHz)
7 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 20MHz WiMAX 1:1, 25% activity factor at 2167.5MHz)
8 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz WiMAX 1:1, 100% activity factor at 2167.5MHz)
9 OOBE Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm, -100dBm, -90dBm and -85dBm; Interference: 5MHz UMTS centered at 2152.5MHz)

9/5/2008 (Friday) 8:00am to 10:00am

1 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -105dBm and -90dBm; Interference: 5MHz UMTS centered at 2182.5MHz)
2 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -90dBm with and without AWGN; Interference: 5MHz UMTS centered at 2197.5MHz)
3 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -90dBm; Interference: 5MHz UMTS centered at 2315MHz)
4 Combined OOBE and Rx Overload Tests (Serving: 5MHz UMTS centered at 2152.5MHz AWS-1 Mobile Received Signal Code Power (RSCP) -90dBm; Interference: 5MHz UMTS centered at 2412MHz)

FCC Public Testing for AWS-3 Interference to Adjacent Band AWS-1 Operations

Test Facility Location:

Boeing Company EMC Laboratory
7701 Fourteenth Avenue South
Building # 2-122
Seattle, WA 98108

Participants:

FCC
- Julius Knapp
- Ahmed Lahjouji
- Jim Szeliga
- Steve Zak

T-Mobile
- Yasmin Karimli
- Patrick Welsh
- Sara Liebman
- Pablo Tapia
- Nelson Ueng
- Jun Liu
- Peter Kwok

Wiley-Rein (representing T-Mobile)
- Tom Dombrowsky

AT&T
- David Shively
- Scott Prather

Sirius/XM
- Douglas Ayerst
- Dr. Riza Akturan

MetroPCS
- Ahmad Armand

M2Z
- Paul Kolodzy
- William (Chuck) Beam

Nokia
- Randy Leenerts

CTIA
- Chuck Jackson

FCC Public Testing for AWS-3 Interference to Adjacent Band AWS-1 Operations

Summary of Results

Combined OOBE and Rx Overload Tests (without external AWS-3 Transmit Filter)
Table lists AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)
Results for fixed serving signal frequency at 2152.5 MHz vs different interference signals (UMTS and WiMAX) at various frequencies

Serving Signal: 5 MHz UMTS centered at 2152.5MHz

Received Serving Pilot RSCP levels (dBm)	5 MHz UMTS Interference Signal				20 MHz WiMAX 5 ms frame duration (2.5 ms for uplink)		5 MHz WiMAX 5 ms frame duration (2.5 ms uplink)
	0 MHz Guard Band (2157.5MHz)	5 MHz Guard Band (2162.5MHz)	15 MHz Guard Band (2172.5MHz)	20 MHz Guard Band (2177.5MHz)	2.5 MHz Guard Band (2167.5MHz) 100% Activity Factor	2.5 MHz Guard Band (2167.5MHz) 25% Activity Factor	2.5 MHz Guard Band (2160MHz) 100% Activity Factor
-105 dBm	-44.2	-43.2	-43.2	-45.2	-33.2	-31.2	-30.2
-100 dBm	-37.2	-34.2	-34.2	-35.2	-28.2	-28.2	-25.2
-90 dBm	-29.2	-23.2	-24.2	-25.2	-24.2	-24.2	-21.2
-85 dBm	-27.2	-20.2	-18.2	-20.2	-22.2	-22.2	-19.2
-75 dBm	-11.2				> -11.2		

Combined OOBE and Rx Overload Tests (without external AWS-3 Transmit Filter)
Table lists AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)
Results for fixed serving signal frequency vs various interference signal frequencies

Serving Signal: 5 MHz UMTS centered at 2112.5MHz

Received Serving Pilot RSCP levels (dBm)	5 MHz UMTS Interference Signal		
	0 MHz Guard Band (2107.5MHz)	2.5 MHz Guard Band (2105MHz)	5 MHz Guard Band (2102.5MHz)
-105 dBm	-43.2	-44.2	-44.2
-100 dBm			
-90 dBm	-26.2	-24.2	-23.2
-85 dBm		-20.2	-18.2
-75 dBm			

Combined OOBE and Rx Overload Tests (without external AWS-3 Transmit Filter)
Table lists AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)
Results for fixed interference signal frequency vs various serving signal frequencies

Received Serving Pilot RSCP levels (dBm)	5 MHz UMTS Interference Signal		
	0 MHz Guard Band (Serving at 2112.5MHz; Interference at 2107.5MHz)	0 MHz Guard Band (Serving at 2152.5MHz; Interference at 2157.5MHz)	10 MHz Guard Band (Serving at 2142.5MHz; Interference at 2157.5MHz)
-105 dBm	-43.2	-44.2	-43.2
-100 dBm		-37.2	-35.2
-90 dBm	-26.2	-29.2	-23.2
-85 dBm		-27.2	-19.2
-75 dBm		-11.2	

(with external AWS-3 Transmit Filter)

Received Serving Pilot RSCP levels (dBm)	5 MHz UMTS Interference Signal	
	0 MHz Guard Band (Serving at 2152.5MHz; Interference at 2157.5MHz)	10 MHz Guard Band (Serving at 2142.5MHz; Interference at 2157.5MHz)
-105 dBm	-34.2	-27.2
-100 dBm	-30.2	-23.2
-90 dBm	-26.2	-16.2
-85 dBm	-25.2	N/A
-75 dBm		

OOBE (without external AWS-3 Tx Filter)

Serving = 2152.5 MHz and Interference = 2152.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)
-105 dBm	-96.2	-14
-100 dBm	-89.2	-14
-90 dBm	-77.2	-14
-85 dBm	-72.2	-14

AWGN noise power : -93.2 dBm / 5 MHz

Test Type: Combined OOBE & Rx Overload Tests
Date and time: 09/04/08, 2-4 pm
Serving Signal: 5 MHz UMTS
Interfering Signal: 5 MHz UMTS
Interfering Bandwidth: 5 MHz
External AWS-3 TX Filter: No

Combined OOBE and Rx Overload Tests (without external AWS-3 Tx Filter)

Serving = 2152.5 MHz (F2) Interference = 2157.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm				
-100 dBm				
-90 dBm				
-85 dBm				
-75 dBm				

Zero guardband scenarios were done on 9/3 (Refer to Tab "Vary Serving High Freq")

Serving = 2152.5 MHz (F2) Interference = 2162.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-43.2	-13.5		
-100 dBm	-34.2	-13.5		
-90 dBm	-23.2	-14		
-85 dBm	-20.2	-13.5		

Skip drop call test due to time constraint. Agreed with FCC.

Serving = 2152.5 MHz (F2) Interference = 2172.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-43.2	-14		
-100 dBm	-34.2	-14		
-90 dBm	-24.2	-13.5		
-85 dBm	-18.2	-14.5		

Skip drop call test due to time constraint. Agreed with FCC.

Serving = 2152.5 MHz (F2) Interference = 2177.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-45.2	-13.5		
-100 dBm	-35.2	-13.5		
-90 dBm	-25.2	-13.5		
-85 dBm	-20.2	-12.5		

Skip drop call test due to time constraint. Agreed with FCC.

Tests documented below were performed on 9/5/2008

Serving = 2152.5 MHz (F2) Interference = 2182.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	
-105 dBm	-44.2	-13.5			Skip drop call test due to time constraint. Agreed with FCC.
-105 dBm					
-90 dBm	-24.2	-13.5			
-90 dBm					

Serving = 2152.5 MHz (F2) Interference = 2197.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	
-105 dBm					Skip drop call test due to time constraint. Agreed with FCC.
-100 dBm					
-90 dBm	-23.2	-14			
-85 dBm					
-90 dBm	-23.2	-14			Without AWGN. (AWGN source turned off as requested by FCC)

Serving = 2152.5 MHz (F2) Interference = 2315 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	
-105 dBm					Skip drop call test due to time constraint. Agreed with FCC.
-100 dBm					
-90 dBm	-25.2	-14			Without AWGN. (AWGN source turned off as requested by FCC)
-85 dBm					

Serving = 2152.5 MHz (F2) Interference = 2412 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	
-105 dBm					Skip drop call test due to time constraint. Agreed with FCC.
-100 dBm					
-90 dBm	-25.2	-13.5			Without AWGN. (AWGN source turned off as requested by FCC)
-85 dBm					

Test Type: Combined OOBE & Rx Overload Tests
Date and time: 09/03/08, 2-4 pm and 09/04/08, 8-10 am
Serving Signal: 5 MHz UMTS
Interfering Signal: 5MHz UMTS
Interfering Bandwidth: 5 MHz
External AWS-3 TX Filter: No

Combined OOBE and Rx Overload Tests (without external AWS-3 Tx Filter)

Serving = 2112.5 MHz (A1) Interference = 2107.5 MHz Tests were performed on 9/3

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-43.2	-14	-37.2	-18
-100 dBm				
-90 dBm	-26.2	-14	-23.2	-18
-85 dBm				
-75 dBm				

Serving = 2112.5 MHz (A1) Interference = 2105 MHz Tests were performed on 9/4

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-44.2	-14	-34.2	-18.5
-100 dBm				
-90 dBm	-24.2	-13.5	-20.2	-18.5
-85 dBm	-20.2	-14.5	-19.2	-18

Serving = 2112.5 MHz (A1) Interference = 2102.5 MHz Tests were performed on 9/4

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-44.2	-13.5	-33.2	-18
-100 dBm				
-90 dBm	-23.2	-14	-18.2	-18
-85 dBm	-18.2	-13.5	-14.2	-20

Test Type: Combined OOBE & Rx Overload Tests
Date and time: 09/03/08, 2-4pm
Serving Signal: 5MHz UMTS
Interfering Signal: 5MHz UMTS
Interfering Bandwidth: 5 MHz
External AWS-3 TX Filter: No

Combined OOBE and Rx Overload Tests (without Filter)

Serving = 2152.5 MHz (F2) Interference = 2157.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS 1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx	AWS 1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx
-105 dBm	-44.2	-14	-6.2 - 5 - 33 = -44.2	-38.2	-18	-6.2 - 5 - 27 = -38.2
-100 dBm	-37.2	-14	-6.2 - 5 - 26 = -37.2	-32.2	-18	-6.2 - 5 - 21 = -32.2
-90 dBm	-29.2	-13.5	-6.2 - 5 - 18 = -29.2	-27.2	-18	-6.2 - 5 - 16 = -27.2
-85 dBm	-27.2	-14	-6.2 - 5 - 16 = -27.2	-24.2	-18	-6.2 - 5 - 13 = -24.2
-75 dBm	-11.2	-14	-6.2 - 5 - 0 = -11.2	N/A	Ran out of attenuation	

Serving = 2142.5 MHz (E) Interference = 2157.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx
-105 dBm	-43.2	-14	-6.2 - 5 - 32 = -43.2	-34.2	-18.5	-6.2 - 5 - 23 = -34.2
-100 dBm	-35.2	-13	-6.2 - 5 - 24 = -35.2	-28.2	-18	-6.2 - 5 - 17 = -28.2
-90 dBm	-23.2	-14	-6.2 - 5 - 12 = -23.2	-19.2	-18.5	-6.2 - 5 - 8 = -19.2
-85 dBm	-19.2	-13.5	-6.2 - 5 - 8 = -19.2	-15.2	-18	-6.2 - 5 - 4 = -15.2

Test Type: Receive Overload Tests
Date and time: 09/03/08, 2-4pm
Serving Signal: 5MHz UMTS
Interfering Signal: 5MHz UMTS
Interfering Bandwidth: 5 MHz
External AWS-3 TX Filter: Yes

Rx Overload Tests (with external AWS-3 Tx Filter)

Serving = 2152.5 MHz (F2) Interference = 2157.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx
-105 dBm	-34.2	-14.5	-6.2 - 5 - 3 - 20 = -34.2	-32.2	-17.5	-6.2 - 5 - 3 - 18 = -32.2
-100 dBm	-30.2	-14.5	-6.2 - 5 - 3 - 16 = -30.2	-28.2	-18.5	-6.2 - 5 - 3 - 14 = -28.2
-90 dBm	-26.2	-14	-6.2 - 5 - 3 - 12 = -26.2	-25.2	-17.5	-6.2 - 5 - 3 - 11 = -25.2
-85 dBm	-25.2	-13.5	-6.2 - 5 - 3 - 11 = -25.2	-23.2	-17.5	-6.2 - 5 - 3 - 9 = -23.2

Serving = 2142.5MHz (E) Interference = 2157.5MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)	Formula used: -6.2 dBm is the SigGen Interference Tx Pwr 5 dB is the Interference Pathloss between the SigGen and the AWS-1 Mobile Under Test -6.2 - 5 - Attenuation = AWS-1 Mobile Rx
-105 dBm	-27.2	-14	-6.2 - 5 - 3 - 13 = -27.2	-23.2	-17.5	-6.2 - 5 - 3 - 9 = -23.2
-100 dBm	-23.2	-13.5	-6.2 - 5 - 3 - 9 = -23.2	-18.2	-18	-6.2 - 5 - 3 - 4 = -18.2
-90 dBm	-16.2	-13.5	-6.2 - 5 - 3 - 2 = -16.2	-14.2	-18	-6.2 - 5 - 3 - 0 = -14.2
-85 dBm	N/A	Ran out of attenuation		N/A	Ran out of attenuation	

Test Type: Combined OOBE & Rx Overload Tests
Date and time: 09/03/08, 2-4 pm
Serving Signal: 5 MHz UMTS
Interfering Signal: 5 MHz UMTS
Interfering Bandwidth: 5 MHz
External AWS-3 TX Filter: No

Combined OOBE and Rx Overload Tests (without external AWS-3 Tx Filter)
Serving = 2112.5 MHz (A1) Interference = 2107.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	Rx Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	Rx Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-43.2	-14	-37.2	-18
-100 dBm				
-90 dBm	-26.2	-14	-23.2	-18
-85 dBm				
-75 dBm				

Test Type: Combined OOBE & Rx Overload Tests
Date and time: 09/04/08, 11am-2pm
Serving Signal: 5MHz UMTS
Interfering Signal: WiMAX
Interfering Bandwidth: 20 MHz and 5 MHz
Activity Factor: 100% and 25% with 5ms frame duration (1:1 uplink to downlink ratio)
External AWS-3 TX Filter: No

Combined OOBE and Rx Overload Tests (without external AWS-3 Tx Filter)
Interfering signal: WiMAX, 20 MHz bandwidth, 100% activity factor, 1:1 uplink:downlink
Note: bandwidth conversion factor = 10*LOG(20/5), should be included in later analysis
Serving = 2152.5 MHz (F2) Interference = 2167.5 MHz, SMJ100 OOBE level = -55 dBc

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-33.2	-13	-27.2	-18
-100 dBm	-28.2	-13.5		
-90 dBm	-24.2	-13		
-85 dBm	-22.2	-13.5		
-75 dBm	N/A or greater than -11.2	N/A		

Skip drop call tests due to time constraint. Agreed with FCC.

Interfering signal: WiMAX, 20 MHz bandwidth, 25% activity factor, 1:1 uplink:downlink
Note: bandwidth conversion factor = 10*LOG(20/5), should be included in later analysis
Serving = 2152.5 MHz (F2) Interference = 2167.5 MHz, SMJ100 OOBE level = -55 dBc

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-31.2	-14.5	-27.2	-18
-100 dBm	-28.2	-14	-25.2	-18
-90 dBm	-24.2	-13.5		
-85 dBm	-22.2	-13.5		

Skip drop call tests due to time constraint. Agreed with FCC.

Interfering signal: WiMAX, 5 MHz bandwidth, 100% activity factor, 1:1 uplink:downlink
Note: bandwidth conversion factor = 10*LOG(5/5), should be included in later analysis
Serving = 2152.5 MHz (F2) Interference = 2160 MHz, SMJ100 OOBE level = -63 dBc

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)	AWS-1 Mobile received Interference Signal Strength when Call Drop occurred (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Call Drop occured (dB)
-105 dBm	-30.2	-12.5	-24.2	-19
-100 dBm	-25.2	-12		
-90 dBm	-21.2	-9 to -14		
-85 dBm	-19.2	-7 to -15		

Skip drop call tests due to time constraint. Agreed with FCC.

Test Type: OOBE
Date and time: 09/04/08, 2-4 pm
Serving Signal: 5 MHz UMTS
Interfering Signal: 5 MHz UMTS
Interfering Bandwidth: 5 MHz
External AWS-3 TX Filter: No

OOBE (without external AWS-3 Tx Filter)
Serving = 2152.5 MHz and Interference = 2152.5 MHz

Serving Pilot Received Signal Code Power (RSCP) (dBm)	AWS-1 Mobile received Interference Signal Strength when Setup Failure occured (dBm)	Pilot Channel (CPICH) Ec/Io Reported at the Mobile when Setup Failure occured (dB)
-105 dBm	-96.2	-14
-100 dBm	-89.2	-14
-90 dBm	-77.2	-14
-85 dBm	-72.2	-14

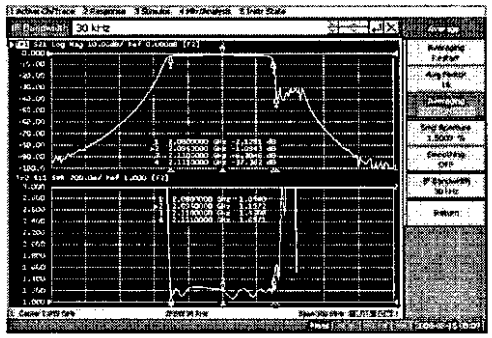
A 5 MHz UMTS Signal from the Rohde & Schwarz CMU-200 Radio Communication Tester was transmitted at -5 dBm at various frequency and was fed to the external AWS-3 transmit filter. The filtered signal was then fed to the spectrum analyzer to measure the signal power.

Lower Band Edge (2107.5 MHz):

Frequency Separation	0 MHz 2107.5MHz	5 MHz 2112.5MHz	10 MHz 2117.5MHz	15 MHz 2122.5MHz
Received Signal Strength with the filter (dBm)	-7.4	-36.4	-39.6	-61.8

Received Signal Strength without the filter (dBm) -5.8

External AWS-3 Transmit Filter Insertion loss (dB) 1.6



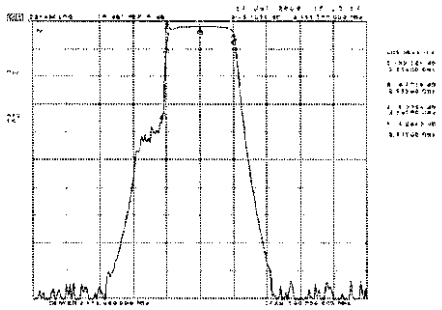
Filter Response for the External AWS-3 Transmit Filter for the Lower Band Edge

Upper Band Edge (2157.5 MHz):

Frequency Separation	0 MHz 2157.5MHz	5 MHz 2152.5MHz	10 MHz 2147.5MHz	15 MHz 2142.5MHz
Received Signal Strength with the filter (dBm)	-9.3	-39.3	-56.9	-72.7

Received Signal Strength without the filter (dBm) -5.8

External AWS-3 Transmit Filter Insertion loss (dB) 3.5



Filter Response for the External AWS-3 Transmit Filter for the Upper Band Edge