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April 23, 2004

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

Re: *Notice of Ex Parte Presentation in ET Docket No. 02-305, Amendment of Parts 2, 25 and 87 of the Commission's Rules to Implement Decisions from World Radio Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz an to Otherwise Update the Rules in the Frequency Range.*

Dear Ms. Dortch:

The Wireless Communications Association International, Inc. ("WCA") hereby submits for filing in the above-referenced proceeding the enclosed Declaration of Harry W. Perlow. This Declaration is filed in response to the Technical Statement attached to AirTV, Inc.'s ("AirTV") March 17, 2004 Reply filing in this proceeding.

By way of background, the Commission has before it a Petition for Partial Reconsideration through which AirTV seeks reconsideration of the Commission's refusal to amend the United States Table of Frequency Allocations to permit AirTV to provide a Direct-to-Aircraft connectivity and entertainment service.[1] On March 3, 2004, WCA filed its Opposition to AirTV's Petition for Partial Reconsideration. WCA's filing included a declaration by Mr. Perlow, demonstrating that BSS systems operating in the United States would cause harmful interference to terrestrial systems. Mr. Perlow prepared two case studies of the potential interference from BSS systems into U.S. terrestrial systems. The first case was the QLP 130094/130135 model antenna, a 24 dBi parabolic antenna by California Amplifier ("CalAmp"),

[1] AirTV implies that refusal to grant reconsideration will somehow undermine its expectation that it would be able to deploy service in the United States. *See* AirTV Reply at 1-2, n.1. In fact, however, the services AirTV contemplates offering – television programming, email and internet access to long-haul commercial airplanes – were previously prohibited in the 2500-2690 MHz band. 47 C.F.R. § 2.106, NG101. Thus, to the extent AirTV has already undertaken significant development activities; it did so at its own risk.

and the second case was the Navini Networks ("Navini") Model Ripwave 2.5/2.6 antenna. In its Reply, AirTV criticizes Mr. Perlow's technical analysis and case studies, arguing that they were based upon faulty data and were "skewed . . . in an attempt to project a worst-case scenario." Technical Statement at 1. AirTV is wrong.

As demonstrated in the attached Declaration, the data Mr. Perlow presented in WCA's Opposition are not faulty and were not skewed to present a worst-case scenario. Indeed, CalAmp and Navini have confirmed the validity of the data and analysis used in WCA's Opposition. *See* Perlow Declaration, Exhibits 3 and 4. Simply put, WCA's Opposition accurately describes the potential interference to the CalAmp QLP 130094/130135 and Navini Model Ripwave 2.5/2.6 antennas from a BSS satellite.

Moreover, CalAmp has confirmed that it has sold and continues to sell hundreds of thousands of the QLP 130094/130135 antennas. *Id.* at Exhibit 3. In other words, this antenna is widely deployed throughout the United States and is, therefore, reasonably representative of a typical 24 dBi parabolic antenna. Similarly, this antenna is not a "worst-case" because, as CalAmp confirms, there are hundreds of thousands of different antennas with greater gain deployed throughout the United States. *Id.*

Finally, Mr. Perlow demonstrates that AirTV's criticism of WCA's case study of the Navini Model Ripwave 2.5/2.6 antenna is wholly baseless. Indeed, according to Navini, it appears that AirTV's analysis is based upon an entirely different antenna and thus has no bearing on Mr. Perlow's analysis. *See id.* at Exhibit 4.

In sum, AirTV's Technical Statement does not, in any way, refute the conclusions presented in WCA's Opposition to AirTV's Petition for Partial Reconsideration. In other words, BSS systems operating in the United States *will* cause interference to terrestrial systems. The Commission should, therefore, deny AirTV's Petition for Partial Reconsideration.

Respectfully submitted,

WIRELESS COMMUNICATIONS ASSOCIATION INTERNATIONAL, INC.

By: /s/ Paul J. Sinderbrand
Paul J. Sinderbrand
J. Wade Lindsay

Its attorneys

Enclosures
cc (w/enc.): Stephen D. Baruch
Leventhal Senter & Lerman PLLC

DECLARATION OF HARRY W. PERLOW

I, Harry W. Perlow, under penalty of perjury, hereby declare that the following is true and correct to the best of my information, knowledge and belief:

1. I am an employee of Sprint Corporation's Broadband Wireless Technology Group with 31 years experience in wireless technologies. I am qualified to provide the opinions and analyses presented in this Declaration.
2. I prepared a Declaration that was filed with the Wireless Communications Association International, Inc.'s ("WCA") March 3, 2004 Opposition to the Petition for Partial Reconsideration filed AirTV Limited ("AirTV") in *Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range; Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum For Government and Non-Government Use in the Radionavigation-Satellite Service*, 18 FCC Rcd 23429 (2003).
3. I have reviewed the Technical Statement attached to AirTV's Reply to Opposition filed on March 17, 2004. AirTV's Technical Statement criticizes the technical analysis and case studies I presented in my original declaration. In AirTV's view, my analysis was based upon faulty data and was "skewed . . . in an attempt to project a worst-case scenario." Technical Statement at 1. AirTV is gravely mistaken; my data are not faulty and my analysis does not represent a worst-case scenario.
4. At my request, California Amplifier ("CalAmp") and Navini Networks ("Navini"), the manufacturers of the antennas used in my case studies, reviewed my March 3 Declaration and the accompanying technical analysis. Both manufactures responded in writing, confirming that my technical analysis accurately represents the potential interference to the CalAmp QLP 130094/130135 and Navini Model Ripwave 2.5/2.6 antennas from a BSS satellite radiating from 86 degrees W longitude. The letters are appended hereto as Exhibits 3 and 4.
5. In short, my March 3 Declaration is true and correct to the best of my information, knowledge and belief. Further, AirTV's criticism of the March 3 Declaration contains numerous and significant erroneous assumptions and thus does not, in any way, refute the analysis or conclusions presented in my March 3 Declaration
6. For example, AirTV states that my analysis of the CalAmp QLP 130094/130135 antenna is "misleading and uses anomalous antenna performance data." Technical Statement at 1. According to AirTV, the elevation pattern shown in the March 3 Declaration is not consistent with a typical 24 dBi parabolic antenna or with the published data for this antenna. *Id.* AirTV is wrong on both counts.
7. CalAmp attached the tabular data for the QLP 130094/130135 to Exhibit 3. These data demonstrate that the gain for the QLP 130094/130135 antenna is the same in elevation as it is in the side lobes. In other words, as CalAmp has confirmed, this antenna is "round," and will have 8.77 dBi of gain at 20 degrees above the horizon at 2.588 GHz, not the 4 dBi suggested by AirTV. *See* Exhibit 3. (For convenience, the specific figures I used are highlighted at page 5 of the tabular data spreadsheet.) I believe that the discrepancy between AirTV's gain

figure and the one I used arises from the fact that AirTV utilized data available on CalAmp's website, rather than the specific antenna data I used. Typically information provided on websites represents an average while I used the specific data for a particular angle and frequency.

8. Further, AirTV's assertion that that the CalAmp QLP 130094/130135 is not a typical 24 dBi parabolic antenna and represents a "worst-case scenario" is patently false. Technical Statement at 1. Indeed, CalAmp has sold and continues to sell hundreds of thousands of these antennas in the United States. *See* Exhibit 3. Thus, the QLP 130049/130135 is widely deployed throughout the United States and can reasonably be viewed as a "typical" 24 dBi parabolic antenna. Moreover, CalAmp has sold and continues to sell hundreds of thousand of *other* antennas, such as the California Amplifier Yagi/Downconverter, which have wider beamwidths in the main lobe and therefore have greater gain than the QLP 130094/130135 side lobe at 20 degrees. *Id.* As an example, an antenna pattern for one such Yagi/Down-converter is attached to Exhibit 3. Simply put, there are a large number of legacy antennas deployed in the United States over the past 40 years that would suffer greater interference from a BSS satellite radiating from 86 degrees W longitude than the QLP 130094/130135. Thus, my March 3 Declaration does not, by any means, represent a worst-case scenario.

9. AirTV also criticizes my case study of the Navini Model Ripwave 2.5/2.6 antenna. Technical Statement at 3. AirTV's criticism, however, is misplaced. AirTV states that the Navini antenna is an "active array design that uses RF beamforming and digital signal processing technology to both electronically focus the radiation pattern of the base station antenna and to mitigate the impact of unwanted signals." *Id.* This description, however, appears to relate to a base-station antenna, not the customer premises equipment ("CPE") antenna I considered. Indeed, Navini has confirmed that AirTV's Technical Statement discusses a different antenna than the one I analyzed in my March 3 Declaration. *See* Exhibit 4.

10. The CPE antenna I considered is designed for outdoor use and receives signals from any direction as they reflect off of buildings and other structures. The antenna therefore *does not* utilize RF beamforming for receive as AirTV suggests. Moreover, when in use, the antenna is adjustable to any angle between horizontal and vertical and is usually oriented at 45 degrees for best reception. The antenna will therefore have clear view of the sky when used outdoors. Because it utilizes the wrong antenna, AirTV's Technical Statement fails to take these critical factors into account. AirTV's criticism of my analysis is therefore wholly without merit. Indeed, Navini has confirmed the accuracy of the potential interference figures presented in my case study of the Navini Model Ripwave 2.5/2/6 antenna to within ±1dB. *See* Exhibit 4.

11. In sum, my March 3 Declaration accurately and correctly demonstrates that, if allowed to operate in the United States, BSS systems will introduce interference into existing terrestrial systems. Further, after consultation with the relevant equipment manufacturers, I can confirm the analyses and conclusions presented in my March 3 Declaration are true and correct.

FURTHER DECLARANT SAYETH NAUGHT

Harry W. Perlow

Date: April 23, 2004

EXHIBIT 3

California Amplifier

April 14, 2004

Mr. Harry W. Perlow
Sprint Broadband Wireless
Technology Development Group
Sprint Corporation
747 Brittany Park Blvd.
Tarpon Springs, FL 34689

Dear Mr. Perlow:

At your request, I have reviewed your Declaration supporting the Opposition to Petition for Reconsideration the Wireless Communications Association International, Inc. ("WCA") filed with the Federal Communications Commission in ET Docket No. 02-305 on March 3, 2004. Your declaration included a study demonstrating the potential interference to California Amplifier ("CalAmp") antenna model (QLP 130094/130135) from a BSS satellite radiating from 86° W longitude. I am writing to confirm that the data presented in your study of the QLP 130094/130135 was correct. Indeed, the patterns for the QLP 130094/130135 demonstrate that the typical gain for this antenna is 8.77 dBi at 20° at 2.588 GHz. I have attached the relevant patterns for your convenience.

Further, I would like to emphasize that the QLP 130094/130135 does not represent a worst case scenario regarding the potential interference from a BSS satellite radiating from 86° W longitude. CalAmp has sold and continues to sell hundreds of thousands of other antennas which have gains *greater* than the QLP 130094/130135 such as the California Amplifier Yagi/Downconverter. In essence, the Yagi/Downcoverters have wider beamwidths in the main lobe and therefore have *greater gain* than the QLP 130094/130135 side lobe at 20 degrees. I have attached the patterns for one such antenna for your convenience.

Please let me know if I can be of any further assistance.

Sincerely,

Rick Moore

Product Manager

1401 N. Rice Avenue
Oxnard, CA 93030 USA
Tel: (805) 987-9000
Fax: (805) 419-8400
www.calamp.com

QLP 130094/130135

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
-178	-29.15	-29.86	-29.95	-29.15	-28.21	-26.8	-26.32	-26.94	-27.7
-177	-29.31	-29.38	-29.49	-29.03	-28.14	-26.73	-26.17	-26.72	-27.4
-176	-29.25	-28.46	-28.58	-28.55	-27.84	-26.53	-25.91	-26.28	-26.91
-175	-28.99	-27.39	-27.59	-27.92	-27.34	-26.18	-25.53	-25.77	-26.37
-174	-28.63	-26.36	-26.64	-27.26	-26.78	-25.75	-25.13	-25.2	-25.83
-173	-27.95	-25.41	-25.82	-26.59	-26.24	-25.36	-24.71	-24.74	-25.33
-172	-27.29	-24.68	-25.23	-26.05	-25.8	-24.98	-24.47	-24.41	-24.97
-171	-26.55	-24.15	-24.86	-25.72	-25.55	-24.77	-24.27	-24.24	-24.82
-170	-25.96	-23.94	-24.82	-25.62	-25.49	-24.72	-24.26	-24.29	-24.94
-169	-25.51	-24.03	-25.01	-25.88	-25.63	-24.83	-24.42	-24.6	-25.33
-168	-25.22	-24.45	-25.58	-26.35	-25.9	-25.14	-24.72	-25.13	-26.02
-167	-25.18	-25.2	-26.45	-27.12	-26.38	-25.59	-25.2	-25.93	-27
-166	-25.36	-26.33	-27.73	-27.89	-26.81	-26.06	-25.73	-26.89	-28.19
-165	-25.76	-27.85	-29.34	-28.53	-27.14	-26.48	-26.25	-27.9	-29.51
-164	-26.47	-29.82	-31.07	-28.59	-27.18	-26.74	-26.58	-28.81	-30.32
-163	-27.45	-31.53	-32.07	-27.95	-26.86	-26.63	-26.62	-29.24	-30.51
-162	-28.93	-32.28	-31.84	-27	-26.23	-26.31	-26.37	-29.25	-30.13
-161	-30.54	-31.21	-30.23	-25.95	-25.53	-25.86	-26.02	-28.89	-29.54
-160	-32.84	-29.57	-28.71	-25.08	-24.89	-25.41	-25.62	-28.64	-29.02
-159	-34.79	-28.02	-27.33	-24.42	-24.36	-25	-25.34	-28.48	-28.77
-158	-35.6	-26.97	-26.44	-23.99	-24.06	-24.79	-25.25	-28.66	-28.74
-157	-34.99	-26.24	-25.84	-23.76	-23.94	-24.76	-25.33	-29.11	-28.94
-156	-33.76	-25.86	-25.61	-23.73	-24	-24.92	-25.64	-29.7	-29.2
-155	-32.45	-25.8	-25.67	-23.9	-24.24	-25.27	-26.12	-30.28	-29.4
-154	-31.58	-25.99	-25.99	-24.19	-24.58	-25.8	-26.74	-30.62	-29.3
-153	-30.85	-26.45	-26.52	-24.64	-25.04	-26.42	-27.45	-30.5	-28.89
-152	-30.62	-27.01	-27.19	-25.15	-25.52	-27.09	-28.15	-30	-28.26
-151	-30.42	-27.86	-27.9	-25.69	-26.05	-27.73	-28.81	-29.23	-27.53
-150	-30.24	-28.74	-28.64	-26.17	-26.56	-28.22	-29.35	-28.47	-26.88
-149	-30.14	-29.67	-29.25	-26.64	-26.98	-28.62	-29.71	-27.79	-26.31
-148	-29.66	-30.41	-29.78	-26.91	-27.4	-28.86	-29.9	-27.21	-25.84
-147	-29.25	-30.93	-29.97	-27.12	-27.62	-28.93	-29.82	-26.76	-25.48
-146	-28.85	-31.06	-29.93	-27.11	-27.74	-28.93	-29.59	-26.41	-25.22
-145	-28.51	-30.88	-29.7	-27.01	-27.61	-28.79	-29.16	-26.1	-25.05
-144	-28.17	-30.43	-29.2	-26.74	-27.37	-28.47	-28.69	-25.86	-24.94
-143	-28.05	-29.59	-28.59	-26.38	-27.08	-28.07	-28.17	-25.72	-24.95
-142	-28.09	-28.82	-27.85	-26.02	-26.72	-27.66	-27.67	-25.56	-25.03
-141	-28.25	-27.96	-27.13	-25.69	-26.48	-27.29	-27.32	-25.6	-25.2
-140	-28.68	-27.25	-26.53	-25.39	-26.3	-26.97	-27.06	-25.72	-25.56
-139	-29.22	-26.67	-26	-25.29	-26.33	-26.83	-26.96	-26	-26.06
-138	-30.06	-26.25	-25.69	-25.36	-26.57	-26.92	-27.01	-26.41	-26.79
-137	-30.87	-26.01	-25.51	-25.71	-27.01	-27.1	-27.29	-27.01	-27.69
-136	-31.64	-26.02	-25.6	-26.35	-27.75	-27.52	-27.71	-27.75	-28.82
-135	-32.04	-26.26	-25.93	-27.31	-28.81	-28.12	-28.33	-28.6	-30.03
-134	-32.05	-26.77	-26.56	-28.78	-30.17	-28.8	-28.98	-29.59	-31.25
-133	-31.73	-27.61	-27.5	-30.83	-31.64	-29.36	-29.54	-30.46	-32.19
-132	-31.22	-28.84	-28.78	-33.5	-32.83	-29.65	-29.82	-31.24	-32.63
-131	-30.47	-30.47	-30.55	-36.8	-32.64	-29.53	-29.68	-31.63	-32.22
-130	-29.95	-32.54	-32.76	-36.83	-31.36	-28.9	-29.12	-31.67	-31.39
-129	-29.67	-34.54	-34.8	-33.5	-29.51	-28.05	-28.39	-31.41	-30.41

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
-128	-29.41	-35.09	-35.12	-30.38	-27.87	-27.19	-27.72	-30.82	-29.55
-127	-29.46	-33.8	-33.28	-28.05	-26.48	-26.48	-27.13	-30.28	-28.7
-126	-29.53	-31.4	-30.94	-26.36	-25.42	-25.93	-26.62	-29.63	-28.02
-125	-29.72	-29.47	-29.05	-25.13	-24.65	-25.6	-26.34	-29.05	-27.43
-124	-29.81	-27.95	-27.58	-24.27	-24.13	-25.45	-26.23	-28.4	-26.94
-123	-29.94	-26.75	-26.49	-23.72	-23.83	-25.47	-26.26	-27.81	-26.55
-122	-30.1	-25.93	-25.72	-23.45	-23.72	-25.67	-26.46	-27.25	-26.21
-121	-30.11	-25.38	-25.19	-23.41	-23.85	-25.99	-26.73	-26.68	-25.96
-120	-29.93	-25.07	-24.98	-23.55	-24.14	-26.39	-27.11	-26.16	-25.74
-119	-29.83	-24.96	-24.95	-23.96	-24.66	-26.87	-27.35	-25.77	-25.6
-118	-29.76	-25.09	-25.14	-24.52	-25.33	-27.37	-27.57	-25.43	-25.5
-117	-29.79	-25.38	-25.56	-25.3	-26.18	-27.74	-27.57	-25.16	-25.47
-116	-29.87	-25.9	-26.16	-26.29	-27.09	-27.99	-27.42	-25	-25.53
-115	-29.97	-26.58	-26.98	-27.41	-28.06	-28.05	-27.1	-24.9	-25.68
-114	-30.29	-27.46	-27.99	-28.62	-28.9	-27.84	-26.77	-24.95	-25.92
-113	-30.8	-28.53	-29.24	-29.67	-29.48	-27.46	-26.41	-25.08	-26.26
-112	-31.18	-29.86	-30.8	-30.55	-29.66	-27.01	-26.11	-25.29	-26.68
-111	-31.79	-31.41	-32.42	-30.78	-29.37	-26.58	-25.89	-25.67	-27.21
-110	-32.41	-33.09	-33.82	-30.39	-28.8	-26.14	-25.74	-26.14	-27.76
-109	-32.95	-34.84	-34.39	-29.63	-28.17	-25.86	-25.72	-26.74	-28.3
-108	-33.45	-35.91	-33.95	-28.91	-27.54	-25.62	-25.75	-27.39	-28.76
-107	-33.92	-35.34	-32.57	-28.12	-26.95	-25.53	-25.85	-28.13	-29.06
-106	-34.44	-34.24	-31.05	-27.5	-26.51	-25.53	-26.03	-28.95	-29.16
-105	-34.71	-32.56	-29.8	-27.06	-26.12	-25.66	-26.28	-29.67	-29.07
-104	-35.1	-31.08	-28.73	-26.77	-25.88	-25.86	-26.57	-30.37	-28.89
-103	-34.89	-29.82	-27.86	-26.62	-25.74	-26.14	-26.87	-30.75	-28.74
-102	-35.17	-28.79	-27.19	-26.57	-25.7	-26.51	-27.23	-31	-28.62
-101	-34.54	-27.99	-26.7	-26.67	-25.85	-26.94	-27.62	-31.14	-28.65
-100	-34.29	-27.44	-26.42	-26.93	-26.08	-27.38	-28.03	-31.2	-28.79
-99	-33.94	-27.04	-26.28	-27.26	-26.46	-27.91	-28.56	-31.29	-29.14
-98	-33.95	-26.89	-26.33	-27.75	-27.01	-28.51	-29.09	-31.33	-29.59
-97	-33.74	-26.93	-26.55	-28.41	-27.73	-29.12	-29.77	-31.54	-30.24
-96	-33.67	-27.14	-26.94	-29.33	-28.55	-29.85	-30.55	-31.81	-31.03
-95	-33.52	-27.55	-27.51	-30.31	-29.59	-30.76	-31.47	-32.21	-31.99
-94	-33.39	-28.1	-28.31	-31.56	-30.63	-31.69	-32.32	-32.67	-33.26
-93	-32.87	-28.99	-29.35	-33.1	-31.88	-32.92	-33.4	-33.27	-34.71
-92	-32.2	-30.02	-30.55	-34.85	-32.92	-34.05	-34.39	-34.08	-36.33
-91	-31.66	-31.37	-32.26	-36.37	-34.28	-35.03	-35.2	-35.06	-38.3
-90	-30.93	-33.1	-34.54	-37.43	-35.04	-36.09	-36.08	-35.99	-40.66
-89	-30.26	-35.53	-37.22	-37.14	-35.45	-36.7	-36.17	-37.79	-42.33
-88	-29.67	-38.28	-40.52	-36.18	-35.63	-36.37	-36.33	-39.65	-41.76
-87	-29.05	-41.03	-41.99	-34.59	-35.2	-36.05	-35.91	-41.48	-39.23
-86	-28.54	-40.45	-38.44	-33.34	-34.76	-35.26	-35.36	-41.98	-36.96
-85	-28.1	-37.7	-35.3	-32.3	-34.06	-34.67	-34.85	-39.94	-34.85
-84	-27.77	-34.71	-32.58	-31.57	-33.38	-33.98	-34.44	-37.27	-33.02
-83	-27.54	-32.43	-30.63	-31.01	-32.71	-33.49	-33.79	-35.37	-31.67
-82	-27.35	-30.47	-28.99	-30.69	-32.21	-33.09	-33.6	-33.73	-30.61
-81	-27.26	-28.85	-27.85	-30.52	-31.85	-32.92	-33.31	-32.36	-29.69
-80	-27.32	-27.53	-26.85	-30.5	-31.78	-32.72	-33.17	-31.32	-29.08

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
-79	-27.38	-26.49	-26.12	-30.76	-31.74	-32.62	-33.09	-30.53	-28.66
-78	-27.62	-25.66	-25.6	-31.18	-32.04	-32.72	-33.14	-30.01	-28.49
-77	-27.93	-25	-25.31	-31.9	-32.6	-32.87	-33.24	-29.66	-28.5
-76	-28.4	-24.52	-25.16	-32.66	-33.4	-33.18	-33.47	-29.58	-28.74
-75	-29.04	-24.29	-25.21	-33.79	-34.33	-33.64	-33.79	-29.72	-29.08
-74	-29.83	-24.26	-25.46	-35.31	-35.64	-34	-34.04	-29.97	-29.65
-73	-30.89	-24.38	-25.9	-36.9	-36.92	-34.36	-34.1	-30.46	-30.25
-72	-32.17	-24.69	-26.59	-38.76	-38.06	-34.43	-33.98	-31.08	-30.79
-71	-33.61	-25.22	-27.48	-40.85	-37.96	-34.47	-33.91	-31.85	-31.43
-70	-35.46	-26.01	-28.7	-42.3	-37.89	-34.28	-33.6	-32.32	-31.79
-69	-38.12	-26.99	-30.22	-40.51	-36.88	-33.86	-33.18	-32.83	-32.04
-68	-40.22	-28.26	-32.16	-39.46	-35.92	-33.15	-32.7	-33.06	-31.98
-67	-38.23	-29.8	-34.44	-38.52	-34.69	-32.55	-32.41	-32.95	-31.79
-66	-35.48	-31.55	-36.93	-37.92	-33.82	-32.04	-32.07	-32.61	-31.44
-65	-32.99	-33.36	-39.49	-37.29	-33.06	-31.57	-31.78	-32.11	-31.08
-64	-31.14	-35.1	-40.27	-37.27	-32.52	-31.28	-31.65	-31.57	-30.75
-63	-29.71	-36.22	-39.26	-37.06	-32.04	-31	-31.51	-31.03	-30.4
-62	-28.81	-36.13	-38.16	-36.99	-31.81	-30.89	-31.29	-30.38	-30.1
-61	-28.16	-35.58	-37.27	-36.4	-31.7	-30.74	-31	-29.9	-29.9
-60	-28.02	-34.82	-36.99	-36	-31.54	-30.57	-30.65	-29.48	-29.66
-59	-28.16	-34.17	-37.07	-35.07	-31.34	-30.32	-30.11	-28.98	-29.51
-58	-28.6	-33.79	-37.5	-33.94	-31.06	-29.89	-29.53	-28.65	-29.5
-57	-29.51	-33.51	-37.9	-33.15	-30.69	-29.41	-28.95	-28.39	-29.52
-56	-30.85	-33.45	-37.47	-32.3	-30.29	-28.88	-28.34	-28.14	-29.65
-55	-32.84	-33.06	-37.24	-31.61	-29.95	-28.27	-27.8	-28.06	-30.03
-54	-35.8	-32.93	-37.31	-31.21	-29.61	-27.83	-27.34	-28.11	-30.38
-53	-38.13	-32.96	-37.01	-30.97	-29.46	-27.47	-27.04	-28.37	-30.95
-52	-38.04	-33.17	-37.14	-31.09	-29.39	-27.28	-26.89	-28.7	-31.71
-51	-35	-33.19	-36.89	-31.58	-29.57	-27.26	-26.88	-29.32	-32.42
-50	-31.72	-33.46	-37.56	-32.52	-30.03	-27.48	-27.18	-30.07	-33.17
-49	-29.58	-33.35	-38.53	-33.75	-30.88	-27.95	-27.66	-31.04	-33.81
-48	-28.01	-33.01	-39.61	-35.98	-32.08	-28.73	-28.51	-31.93	-34.37
-47	-26.87	-32.07	-38.53	-39	-33.63	-29.76	-29.59	-32.93	-34.29
-46	-26.09	-30.97	-36.13	-41.78	-36.02	-31.11	-30.91	-33.3	-33.91
-45	-25.7	-29.59	-33.79	-39.93	-37.9	-32.39	-32.07	-33.04	-33.02
-44	-25.62	-28.37	-31.53	-35.97	-37.84	-33.15	-32.3	-32.11	-31.56
-43	-25.88	-27.21	-29.76	-33	-35.37	-32.55	-31.49	-30.6	-29.9
-42	-26.49	-26.3	-28.5	-30.86	-32.89	-31.1	-30.07	-29.03	-28.38
-41	-27.42	-25.58	-27.61	-29.36	-31.03	-29.43	-28.63	-27.59	-27.02
-40	-28.81	-25.18	-27.17	-28.42	-29.83	-28.09	-27.44	-26.37	-25.91
-39	-30.52	-25.01	-27.05	-28.05	-29.18	-27.09	-26.48	-25.34	-25.09
-38	-32.14	-25.12	-27.28	-28.17	-28.96	-26.53	-25.89	-24.64	-24.62
-37	-32.75	-25.45	-27.7	-28.94	-29.29	-26.32	-25.54	-24.21	-24.5
-36	-31.29	-25.77	-28.21	-30.32	-30.24	-26.57	-25.47	-24.18	-24.77
-35	-29.07	-25.95	-28.38	-32.54	-32.08	-27.12	-25.7	-24.57	-25.52
-34	-27.05	-25.72	-28.02	-34.81	-34.82	-28.01	-26.22	-25.49	-26.93
-33	-25.4	-25.03	-26.88	-34.8	-37.34	-29.18	-27.02	-27.12	-29.44
-32	-23.98	-24.01	-25.35	-31.82	-35	-30.24	-28.05	-29.88	-33.99
-31	-22.86	-22.88	-23.77	-28.72	-30.73	-30.77	-29.2	-34.63	-41.05

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
-30	-21.87	-21.82	-22.42	-26.43	-27.78	-30.32	-30.07	-40.11	-33.56
-29	-20.93	-20.89	-21.33	-24.66	-25.69	-29.24	-30.5	-33.53	-27.81
-28	-19.98	-20.2	-20.52	-23.42	-24.33	-28.2	-30.34	-28.4	-24.35
-27	-19.03	-19.76	-20.02	-22.65	-23.58	-27.52	-29.82	-25.35	-22.09
-26	-18.03	-19.53	-19.75	-22.25	-23.29	-27.25	-29.29	-23.29	-20.57
-25	-17.09	-19.48	-19.63	-22.11	-23.33	-27.21	-28.68	-21.95	-19.62
-24	-16.21	-19.48	-19.52	-22.05	-23.47	-27.13	-27.91	-21.09	-19.12
-23	-15.45	-19.36	-19.26	-21.83	-23.34	-26.4	-26.66	-20.55	-18.96
-22	-14.85	-18.98	-18.76	-21.16	-22.62	-24.78	-24.95	-20.17	-19.03
-21	-14.48	-18.41	-18.02	-20.05	-21.32	-22.78	-23.02	-19.79	-19.16
-20	-14.37	-17.72	-17.19	-18.74	-19.77	-20.8	-21.11	-19.21	-19.08
-19	-14.58	-17.13	-16.47	-17.53	-18.38	-19.21	-19.55	-18.52	-18.67
-18	-15.21	-16.79	-15.97	-16.51	-17.2	-17.93	-18.3	-17.73	-17.96
-17	-16.36	-16.83	-15.84	-15.87	-16.48	-17.17	-17.53	-17.15	-17.28
-16	-18.26	-17.51	-16.36	-15.73	-16.32	-16.96	-17.25	-16.94	-16.83
-15	-20.86	-18.77	-17.17	-15.86	-16.41	-17.1	-17.53	-17.17	-16.85
-14	-22.09	-21.14	-19.01	-16.56	-17.11	-17.85	-18.42	-18.21	-17.52
-13	-18.8	-23.67	-21.62	-17.55	-18.03	-18.85	-19.68	-20.37	-19.14
-12	-14.76	-21.11	-21.81	-17.95	-18.05	-18.83	-19.9	-23.66	-21.7
-11	-11.47	-16.25	-17.58	-16.42	-16.07	-16.53	-17.4	-22.32	-21.77
-10	-8.91	-12.4	-13.44	-13.57	-13.11	-13.32	-13.87	-16.83	-17.21
-9	-6.83	-9.42	-10.19	-10.65	-10.23	-10.33	-10.69	-12.48	-12.85
-8	-5.15	-7.09	-7.67	-8.17	-7.8	-7.83	-8.09	-9.25	-9.53
-7	-3.74	-5.18	-5.6	-6.07	-5.75	-5.74	-5.95	-6.73	-6.89
-6	-2.63	-3.67	-3.99	-4.37	-4.1	-4.06	-4.23	-4.77	-4.86
-5	-1.71	-2.44	-2.67	-2.99	-2.75	-2.7	-2.83	-3.2	-3.24
-4	-1.01	-1.49	-1.67	-1.92	-1.72	-1.68	-1.76	-2	-2.03
-3	-0.51	-0.81	-0.92	-1.1	-0.97	-0.93	-0.97	-1.11	-1.15
-2	-0.16	-0.33	-0.4	-0.52	-0.43	-0.41	-0.42	-0.49	-0.52
-1	0	-0.06	-0.1	-0.15	-0.12	-0.11	-0.1	-0.12	-0.15
0	0	0	0	0	0	0	0	0	0
1	-0.17	-0.13	-0.11	-0.07	-0.1	-0.11	-0.12	-0.1	-0.08
2	-0.53	-0.48	-0.42	-0.35	-0.4	-0.43	-0.46	-0.43	-0.38
3	-1.06	-1.04	-0.95	-0.84	-0.93	-0.98	-1.04	-1.02	-0.93
4	-1.78	-1.84	-1.72	-1.58	-1.71	-1.78	-1.91	-1.88	-1.73
5	-2.69	-2.86	-2.72	-2.58	-2.77	-2.89	-3.06	-3.03	-2.8
6	-3.83	-4.17	-4.01	-3.87	-4.16	-4.35	-4.56	-4.52	-4.24
7	-5.21	-5.79	-5.64	-5.53	-5.95	-6.25	-6.51	-6.43	-6.08
8	-6.88	-7.78	-7.64	-7.59	-8.2	-8.67	-8.96	-8.79	-8.35
9	-8.95	-10.25	-10.13	-10.23	-11.14	-11.91	-12.27	-11.83	-11.23
10	-11.52	-13.49	-13.41	-13.81	-15.3	-16.67	-17.17	-15.92	-15
11	-14.79	-17.82	-17.83	-18.95	-21.84	-25.29	-26.24	-21.54	-19.97
12	-19.55	-25.03	-25.31	-28.89	-32.1	-29.9	-30.12	-26.96	-25.91
13	-27.35	-31.82	-31.34	-26.89	-22.47	-20.52	-20.91	-23.85	-25.22
14	-31.06	-24.16	-23.67	-20.57	-18.11	-16.94	-17.47	-21.02	-22.35
15	-23.9	-20.5	-20.2	-17.8	-16.02	-15.17	-15.83	-19.87	-21.11
16	-20.54	-18.67	-18.51	-16.38	-14.95	-14.26	-15.01	-19.77	-21.11
17	-18.78	-17.77	-17.76	-15.78	-14.54	-13.9	-14.73	-20.36	-22.1
18	-17.88	-17.44	-17.58	-15.69	-14.56	-13.9	-14.75	-21.29	-23.87

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
19	-17.44	-17.45	-17.75	-15.94	-14.9	-14.14	-14.96	-21.91	-25.47
20	-17.27	-17.65	-18.06	-16.43	-15.47	-14.53	-15.23	-21.57	-25.05
21	-17.2	-17.94	-18.4	-17.05	-16.19	-15.02	-15.54	-20.49	-22.96
22	-17.12	-18.19	-18.63	-17.71	-16.97	-15.55	-15.85	-19.31	-20.92
23	-16.93	-18.38	-18.78	-18.35	-17.81	-16.16	-16.23	-18.37	-19.38
24	-16.7	-18.54	-18.88	-18.93	-18.65	-16.86	-16.73	-17.82	-18.42
25	-16.44	-18.77	-19.04	-19.51	-19.57	-17.73	-17.46	-17.68	-17.93
26	-16.22	-19.08	-19.33	-20.12	-20.58	-18.77	-18.41	-17.95	-17.86
27	-16.12	-19.55	-19.78	-20.88	-21.78	-20.13	-19.76	-18.64	-18.16
28	-16.14	-20.18	-20.46	-21.86	-23.23	-21.81	-21.54	-19.76	-18.79
29	-16.34	-21.08	-21.41	-23.21	-25.12	-24.06	-24.05	-21.45	-19.8
30	-16.74	-22.2	-22.6	-24.86	-27.27	-26.79	-27.21	-23.57	-21.03
31	-17.35	-23.56	-24.12	-26.99	-30.01	-30.11	-31.08	-26.18	-22.52
32	-18.21	-25.14	-25.99	-29.54	-33.08	-32.55	-32.86	-28.45	-24.04
33	-19.3	-26.56	-28.05	-32.18	-36.02	-31.78	-30.54	-28.63	-25.22
34	-20.68	-27.41	-29.81	-33.95	-37.14	-29.82	-28.15	-27.13	-25.69
35	-22.25	-27.43	-30.48	-34.37	-36.08	-28.38	-26.7	-25.59	-25.51
36	-23.97	-27.05	-30.04	-34.36	-35.16	-27.64	-25.87	-24.46	-25
37	-25.59	-26.65	-29.11	-34.66	-34.94	-27.61	-25.7	-23.84	-24.56
38	-26.52	-26.49	-28.42	-35.58	-35.5	-28.19	-26	-23.63	-24.32
39	-26.61	-26.55	-28.13	-37.62	-37.46	-29.48	-26.84	-23.74	-24.33
40	-25.98	-27.02	-28.33	-39.56	-40.76	-31.58	-28.06	-24.22	-24.6
41	-25.16	-27.72	-29	-41.45	-41.84	-34.03	-29.71	-24.91	-25.09
42	-24.45	-28.75	-30.18	-39.56	-37.97	-35.35	-31.3	-25.88	-25.84
43	-23.99	-30.16	-31.82	-36.5	-34.01	-33.42	-31.59	-26.97	-26.73
44	-23.78	-32.01	-34.25	-33.89	-31.13	-30.47	-30.35	-28.11	-27.76
45	-23.78	-34.38	-37.23	-32.04	-29.21	-28.14	-28.53	-28.97	-28.78
46	-24.03	-37.2	-40.38	-30.65	-27.83	-26.36	-26.78	-29.32	-29.65
47	-24.52	-38.71	-42.08	-29.71	-26.86	-25.11	-25.38	-28.97	-30.11
48	-25.18	-38.51	-40.84	-29.25	-26.27	-24.19	-24.3	-28.22	-30.01
49	-26.04	-36.47	-37.17	-29.12	-26.07	-23.6	-23.54	-27.23	-29.51
50	-27.08	-34.68	-35.99	-29.43	-26.13	-23.26	-23.05	-26.3	-28.77
51	-28.34	-33.54	-35.05	-29.97	-26.53	-23.23	-22.8	-25.52	-27.98
52	-29.51	-32.89	-34.64	-30.86	-27.21	-23.41	-22.75	-24.89	-27.25
53	-30.78	-32.67	-34.71	-32.19	-28.22	-23.83	-22.92	-24.41	-26.66
54	-31.83	-32.62	-35.26	-33.54	-29.47	-24.45	-23.28	-24.11	-26.21
55	-32.75	-33.28	-36.29	-34.85	-30.94	-25.32	-23.82	-23.96	-25.94
56	-33.28	-34.2	-37.24	-34.72	-32.27	-26.35	-24.56	-23.93	-25.81
57	-33.63	-35.32	-39.46	-33.59	-32.72	-27.54	-25.39	-24.06	-25.81
58	-33.61	-36.87	-40.85	-32.06	-32.03	-28.57	-26.38	-24.26	-25.94
59	-33.53	-38.14	-42.5	-30.53	-30.75	-29.33	-27.39	-24.62	-26.2
60	-33.3	-39.8	-41.59	-29.52	-29.48	-29.46	-28.23	-25.09	-26.52
61	-32.94	-40.53	-39.86	-28.63	-28.39	-28.97	-28.71	-25.63	-26.91
62	-32.78	-41.33	-38.5	-28.13	-27.62	-28.24	-28.71	-26.27	-27.34
63	-32.5	-41.64	-37.91	-27.98	-27.12	-27.45	-28.37	-26.97	-27.84
64	-32.19	-40.87	-37.55	-28.13	-26.93	-26.83	-27.73	-27.62	-28.25
65	-31.9	-40.32	-37.83	-28.62	-27.03	-26.37	-27.2	-28.26	-28.69
66	-31.65	-40.3	-38.13	-29.52	-27.46	-26.14	-26.72	-28.78	-29.07
67	-31.1	-39.29	-38.86	-30.73	-28.15	-26.15	-26.41	-29.1	-29.36

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
68	-30.7	-38.89	-39.65	-32.6	-29.27	-26.35	-26.31	-29.33	-29.66
69	-30.26	-37.9	-39.77	-35.06	-30.77	-26.86	-26.4	-29.37	-29.79
70	-29.89	-35.82	-38.55	-39.01	-32.99	-27.58	-26.68	-29.29	-29.89
71	-29.47	-34.22	-36.53	-41.57	-35.97	-28.57	-27.15	-29.15	-30.02
72	-29.21	-32.61	-34.47	-38.83	-40.57	-30.01	-27.86	-28.93	-29.97
73	-29.01	-31.21	-32.49	-34.91	-42.4	-31.83	-28.79	-28.82	-29.92
74	-28.92	-30.03	-30.93	-32.2	-38.64	-34.44	-29.93	-28.66	-29.85
75	-28.93	-28.94	-29.49	-30.14	-35.21	-37.83	-31.42	-28.51	-29.75
76	-29.02	-28.06	-28.36	-28.66	-32.51	-41.93	-33.29	-28.46	-29.69
77	-29.22	-27.39	-27.51	-27.54	-30.59	-41.98	-35.57	-28.44	-29.6
78	-29.55	-26.86	-26.82	-26.7	-29.23	-38.29	-38.33	-28.52	-29.48
79	-30	-26.51	-26.36	-26.1	-28.2	-35.27	-40.31	-28.66	-29.46
80	-30.48	-26.3	-26.08	-25.74	-27.46	-33	-40.9	-28.89	-29.4
81	-31.1	-26.24	-25.93	-25.53	-26.94	-31.47	-38.18	-29.23	-29.38
82	-31.84	-26.37	-26	-25.47	-26.7	-30.32	-36.16	-29.76	-29.49
83	-32.3	-26.69	-26.19	-25.58	-26.61	-29.62	-34.44	-30.43	-29.68
84	-33.11	-27.15	-26.53	-25.81	-26.71	-29.19	-33.19	-31.34	-29.99
85	-33.39	-27.72	-27.15	-26.23	-27.04	-29.01	-32.2	-32.48	-30.56
86	-33.42	-28.51	-27.89	-26.8	-27.55	-29.1	-31.69	-34.12	-31.37
87	-33.54	-29.5	-28.92	-27.57	-28.23	-29.26	-31.48	-35.82	-32.5
88	-33.06	-30.67	-30.29	-28.68	-29.16	-29.7	-31.53	-37.83	-34.01
89	-32.89	-31.96	-31.94	-30.03	-30.47	-30.29	-31.75	-39.76	-35.99
90	-32.45	-33.08	-33.79	-31.87	-31.91	-31.01	-31.98	-40.39	-38.62
91	-32.32	-34.13	-35.66	-34.41	-33.62	-31.82	-32.41	-38.84	-40.86
92	-32.1	-34.34	-36.4	-37.97	-35.56	-32.45	-32.57	-36.88	-41.63
93	-31.98	-33.8	-35.56	-41.12	-36.69	-32.95	-32.76	-34.8	-40.42
94	-32.05	-32.62	-33.78	-38.65	-36.21	-32.86	-32.6	-33.27	-37.79
95	-32.17	-31.36	-31.87	-34.85	-34.45	-32.44	-32.21	-31.98	-35.72
96	-32.54	-30.07	-30.26	-31.95	-32.54	-31.67	-31.79	-30.82	-33.89
97	-32.88	-28.92	-28.91	-29.82	-30.87	-30.89	-31.3	-30.2	-32.5
98	-33.43	-27.97	-27.86	-28.24	-29.56	-30.13	-30.8	-29.47	-31.43
99	-33.85	-27.19	-26.97	-27.09	-28.57	-29.59	-30.33	-29.05	-30.53
100	-34.44	-26.5	-26.27	-26.25	-27.86	-29.16	-29.96	-28.75	-29.7
101	-34.53	-25.95	-25.74	-25.7	-27.39	-28.94	-29.74	-28.49	-29.03
102	-35.03	-25.51	-25.32	-25.3	-27.12	-28.88	-29.62	-28.28	-28.43
103	-35.13	-25.2	-25.02	-25.15	-27.06	-28.91	-29.55	-28.14	-27.94
104	-34.75	-25.01	-24.85	-25.13	-27.12	-28.99	-29.52	-28.06	-27.49
105	-34.36	-24.86	-24.77	-25.27	-27.34	-29.24	-29.62	-27.99	-27.1
106	-34.07	-24.86	-24.82	-25.52	-27.63	-29.35	-29.69	-27.95	-26.81
107	-33.2	-24.94	-24.95	-25.94	-27.97	-29.5	-29.59	-27.91	-26.6
108	-32.22	-25.19	-25.22	-26.43	-28.35	-29.57	-29.61	-27.96	-26.53
109	-31.38	-25.53	-25.63	-26.97	-28.72	-29.65	-29.58	-28.1	-26.55
110	-30.58	-26.08	-26.24	-27.62	-29.06	-29.66	-29.54	-28.34	-26.7
111	-29.68	-26.81	-27.05	-28.32	-29.35	-29.7	-29.64	-28.78	-26.98
112	-28.96	-27.82	-28.08	-29.04	-29.78	-29.85	-29.93	-29.31	-27.48
113	-28.38	-29.24	-29.52	-30.02	-30.25	-30.17	-30.2	-30.15	-28.18
114	-27.92	-31.06	-31.49	-31.12	-30.9	-30.72	-30.87	-31.24	-29.08
115	-27.49	-33.57	-34.12	-32.64	-31.91	-31.53	-31.83	-32.48	-30.3
116	-27.32	-36.5	-37.49	-34.52	-33.28	-32.66	-32.81	-34.04	-31.95

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
117	-27.24	-38.88	-40.48	-36.98	-35.55	-33.96	-34.3	-35.41	-34.1
118	-27.33	-37.01	-38.46	-39.21	-38.16	-35.57	-35.44	-35.77	-36.42
119	-27.4	-33.77	-34.27	-39.33	-41.89	-36.4	-35.7	-34.38	-37.38
120	-27.69	-31.27	-31.7	-36.47	-41.14	-35.32	-34.6	-32.47	-35.61
121	-27.75	-29.33	-29.66	-33.61	-37.43	-33.73	-32.74	-30.49	-33.01
122	-27.84	-28.01	-28.18	-31.32	-34.21	-31.82	-31.03	-28.83	-30.54
123	-27.67	-27.02	-27.13	-29.67	-31.96	-30.21	-29.51	-27.45	-28.62
124	-27.29	-26.37	-26.37	-28.4	-30.42	-28.93	-28.34	-26.38	-27.18
125	-26.7	-25.96	-25.98	-27.53	-29.4	-28.09	-27.47	-25.57	-25.99
126	-26.03	-25.72	-25.8	-27.01	-28.67	-27.48	-26.99	-25.03	-25.13
127	-25.28	-25.65	-25.83	-26.78	-28.32	-27.24	-26.71	-24.69	-24.57
128	-24.64	-25.72	-26.05	-26.82	-28.27	-27.29	-26.79	-24.58	-24.26
129	-24.11	-25.76	-26.38	-27.07	-28.5	-27.62	-27.12	-24.73	-24.21
130	-23.7	-25.88	-26.81	-27.57	-28.9	-28.3	-27.79	-25.16	-24.39
131	-23.48	-25.88	-27.16	-28.17	-29.48	-29.3	-28.81	-25.87	-24.87
132	-23.42	-25.91	-27.47	-28.84	-30.06	-30.6	-30.2	-26.96	-25.66
133	-23.51	-25.9	-27.56	-29.53	-30.6	-32.2	-31.75	-28.57	-26.77
134	-23.79	-25.88	-27.48	-29.91	-30.7	-33.6	-33.48	-30.78	-28.34
135	-24.29	-25.97	-27.37	-29.99	-30.71	-34.11	-34.59	-33.84	-30.43
136	-24.98	-26.13	-27.26	-29.97	-30.37	-33.51	-34.41	-37.78	-33.37
137	-25.78	-26.54	-27.28	-29.72	-30.02	-32.19	-33.05	-40.6	-37.18
138	-26.92	-27.13	-27.4	-29.67	-29.67	-30.86	-31.55	-36.77	-39.86
139	-28.28	-27.99	-27.73	-29.72	-29.45	-29.76	-30.42	-33.24	-37.36
140	-29.57	-29.15	-28.29	-29.95	-29.45	-29.02	-29.45	-30.74	-34.03
141	-30.75	-30.6	-29.2	-30.52	-29.62	-28.52	-28.93	-29.04	-31.64
142	-31.86	-32.7	-30.36	-31.3	-29.96	-28.28	-28.58	-27.9	-30
143	-32.24	-35.18	-31.81	-32.11	-30.39	-28.33	-28.48	-27.11	-28.9
144	-32.52	-38.1	-33.87	-33.24	-30.86	-28.5	-28.56	-26.62	-28.2
145	-32.56	-40.45	-36.11	-34.3	-31.46	-28.79	-28.67	-26.39	-27.78
146	-32.78	-40.14	-37.89	-35.13	-31.97	-29.18	-28.95	-26.31	-27.55
147	-33.06	-38.81	-39.5	-35.89	-32.53	-29.61	-29.16	-26.41	-27.55
148	-33.42	-38.13	-40.19	-36.52	-33.16	-30.13	-29.48	-26.56	-27.59
149	-34.12	-37.69	-40.89	-37.35	-33.85	-30.61	-29.84	-26.78	-27.71
150	-34.06	-37.92	-40.8	-38.89	-34.6	-31.07	-30.19	-27.09	-27.89
151	-34.1	-38.11	-41.59	-40.41	-35.43	-31.43	-30.51	-27.39	-28.16
152	-33.75	-37.38	-40.81	-41.21	-36.16	-31.6	-30.68	-27.67	-28.38
153	-33.11	-36.07	-38.3	-39.82	-36.18	-31.61	-30.49	-27.76	-28.51
154	-32.27	-34.35	-35.44	-37.16	-34.92	-31.16	-30.02	-27.7	-28.37
155	-31.63	-32.39	-33.21	-34.23	-33.52	-30.54	-29.38	-27.31	-27.95
156	-31.35	-30.95	-31.57	-32.34	-32.17	-29.76	-28.59	-26.84	-27.36
157	-31.28	-29.84	-30.28	-30.83	-30.93	-28.98	-27.9	-26.25	-26.64
158	-31.51	-29.13	-29.39	-29.91	-30.12	-28.42	-27.53	-25.79	-26.01
159	-32.09	-28.86	-28.93	-29.48	-29.67	-28.06	-27.4	-25.5	-25.51
160	-32.79	-28.83	-28.73	-29.38	-29.53	-28.01	-27.54	-25.44	-25.24
161	-33.41	-29.23	-28.84	-29.77	-29.84	-28.26	-27.94	-25.61	-25.26
162	-33.27	-29.87	-29.15	-30.34	-30.37	-28.85	-28.71	-26.23	-25.58
163	-32.64	-30.24	-29.41	-30.94	-31.07	-29.62	-29.61	-27.22	-26.31
164	-31.21	-30.16	-29.31	-31.03	-31.6	-30.29	-30.56	-28.35	-27.24
165	-29.69	-29.33	-28.81	-30.42	-31.37	-30.46	-31.04	-29.85	-28.57

Az\Fr	2.156gHz	2.399gHz	2.426gHz	2.48gHz	2.507gHz	2.561gHz	2.588gHz	2.669gHz	2.696gHz
166	-28.36	-28.07	-27.81	-29.1	-30.28	-29.85	-30.5	-31.04	-29.73
167	-27.29	-26.68	-26.6	-27.67	-28.83	-28.67	-29.19	-31.22	-30.12
168	-26.47	-25.44	-25.52	-26.37	-27.45	-27.32	-27.7	-30.3	-29.75
169	-25.89	-24.51	-24.62	-25.39	-26.34	-26.19	-26.41	-28.84	-28.77
170	-25.61	-23.84	-23.98	-24.65	-25.48	-25.28	-25.39	-27.58	-27.73
171	-25.54	-23.48	-23.62	-24.25	-24.92	-24.66	-24.7	-26.6	-26.92
172	-25.63	-23.41	-23.54	-24.14	-24.66	-24.27	-24.29	-25.96	-26.4
173	-25.91	-23.62	-23.69	-24.28	-24.6	-24.15	-24.17	-25.66	-26.16
174	-26.33	-24.07	-24.11	-24.66	-24.82	-24.21	-24.22	-25.66	-26.18
175	-26.82	-24.74	-24.72	-25.22	-25.18	-24.46	-24.45	-25.86	-26.4
176	-27.35	-25.61	-25.53	-25.89	-25.69	-24.81	-24.81	-26.2	-26.76
177	-27.83	-26.58	-26.46	-26.66	-26.31	-25.28	-25.22	-26.56	-27.16
178	-28.18	-27.47	-27.38	-27.34	-26.86	-25.7	-25.58	-26.85	-27.47

YAGI/DOWNCONVERTER

File: TEST001.DAT
Date: 03-May-99
Time: 13:48
Operator: F.K.
Ser. no.: 3
Channel: test

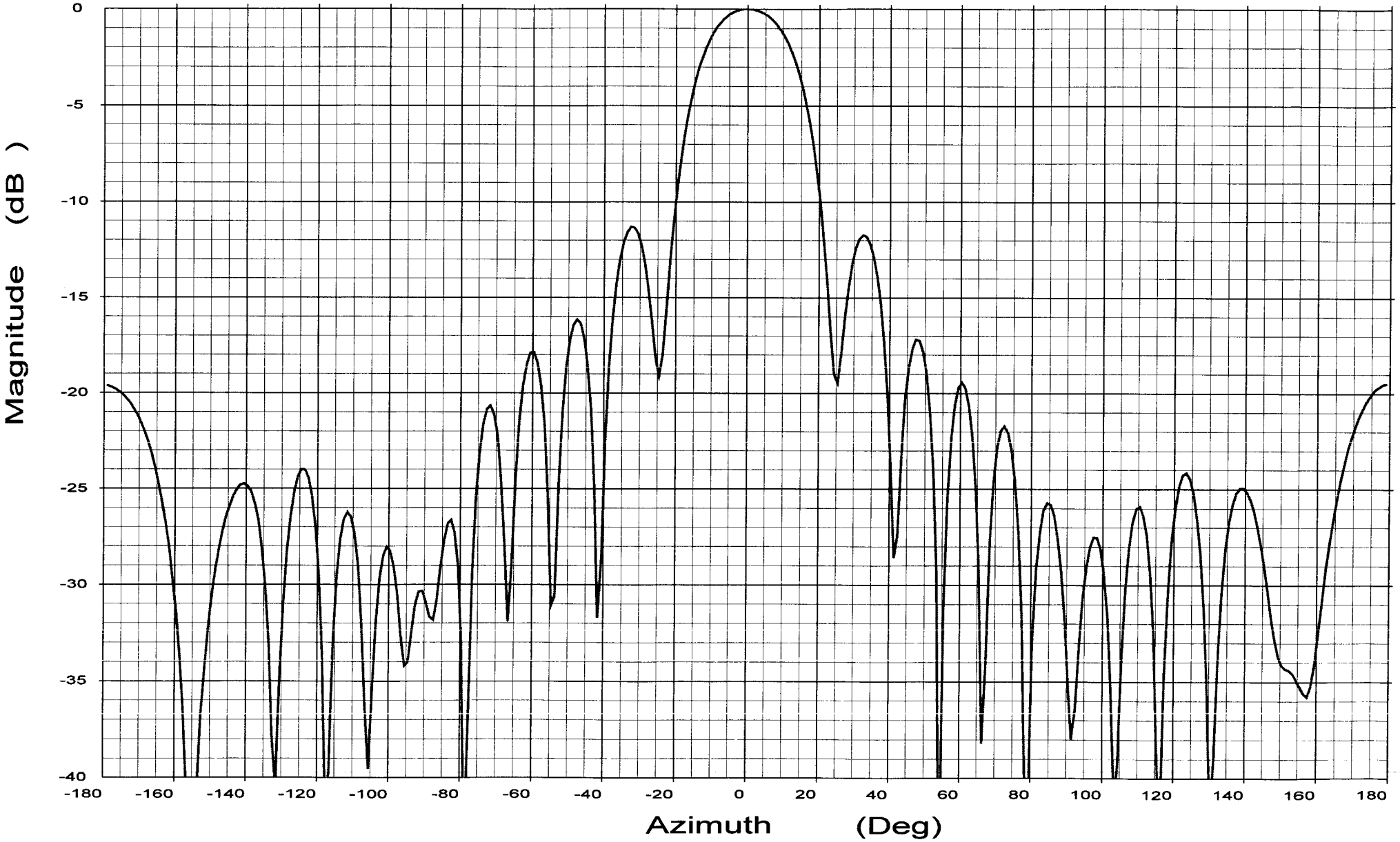
131534
Q.A. qualifications

Calibration: OFF

Frequency : 2.600 GHz

Tx pol: Vert.

Rx pol: Vert.



California Amplifier, Inc.
Antenna Department Lab.

EXHIBIT 4

Navini NETWORKS

Internet at the speed of thought™

Exhibit 4

April 14, 2004

Mr. Harry W. Perlow
Sprint Broadband Wireless
Technology Development Group
Sprint Corporation
747 Brittany Park Blvd.
Tarpon Springs, FL 34689

Dear Mr. Perlow:

At your request, I have reviewed the Opposition to Petition for Reconsideration the Wireless Communications Association International, Inc. ("WCA") filed with the Federal Communications Commission in ET Docket No. 02-305 on March 3, 2004 as well as the Reply filed by AirTV, Inc. on March 17, 2004. As part of the WCA Opposition, you prepared a study demonstrating the potential interference to a Navini Model Ripwave 2.5/2.6 antenna from a satellite located at 86° W longitude. On Reply, AirTV states that the Navini antenna you used in the study is an "active array design that uses RF beamforming and digital signal processing technology to both electronically focus the radiation pattern of the base station antenna and to mitigate the impact of unwanted signals." Technical Statement at 3.

I cannot discuss the specific characteristics of the Navini Model Ripwave 2.5/2.6 antenna because such information is proprietary and commercially sensitive. I can, however, verify that the description at page 3 of the AirTV Technical Statement does not accurately depict the Navini Model Ripwave 2.5/2.6 antenna. Indeed, the language AirTV quotes from the Navini website relates to a base station antenna, not the customer premises equipment antenna in your study. I can also confirm that the potential interference figures presented in your interference study for the Navini antenna are accurate within ±1dB.

Please let me know if I can be of any further assistance.

Sincerely,

S. Sai Ram

Sai Subramanian,
VP Product Management and Strategic Marketing
Navini Networks

2240 Campbell Creek Blvd. • Suite 110 • Richardson, TX 75082 • (972) 852-4200 phone • (214) 261-6382 fax • info@navini.com • www.navini.com