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Before the
Federal Communications Commission
Washington DC 20554

Federal Communications Commission
Office of the Secretary

In the Matter of)	
)	
Aviat Networks, Request for Waiver of)	No. _____
Certain Antenna Requirements in the)	
71-76 and 81-86 GHz Bands)	

REQUEST FOR WAIVER

Mitchell Lazarus
FLETCHER, HEALD & HILDRETH, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
703-812-0400
Counsel for Aviat U.S., Inc.

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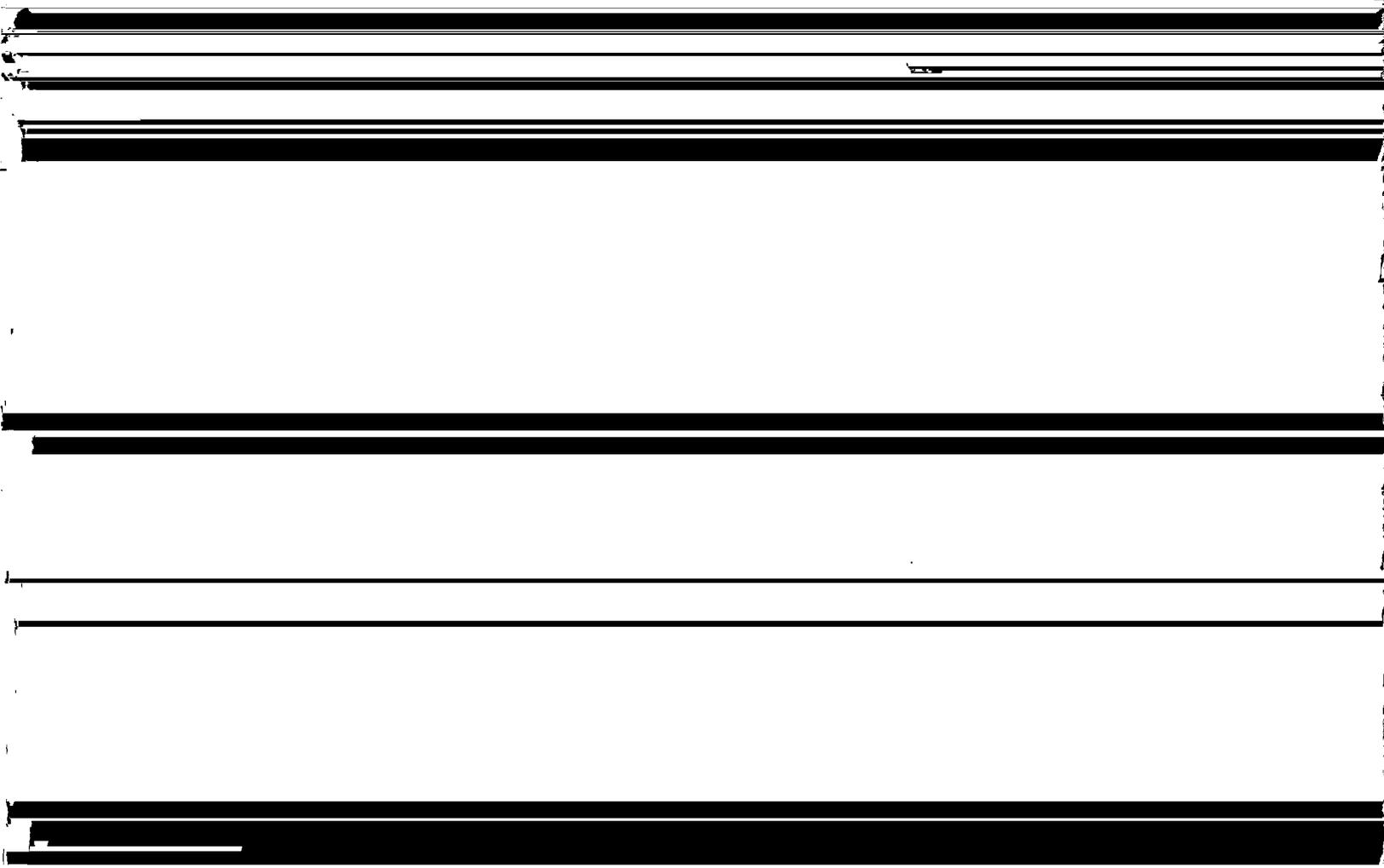
REQUEST FOR WAIVER

Pursuant to Section 1.3 of the Commission's rules. Aviat Networks, through its affiliate

Aviat Networks is a leading global provider of microwave networking solutions. The company equips public and private operators with communications networks capable of handling the exploding growth of IP-centric, multi-gigabit data services. Its microwave backhaul products

has seen customers' needs evolve. Today there is a growing demand for systems that cover shorter distances at lower capacity and which operate closer to street level, and thus call for antennas that are smaller, thinner, lighter, and aesthetically less objectionable than those considered in the original rulemaking.

The Fixed Wireless Communications Coalition (FWCC), of which Aviat Networks is an active member, has asked the Commission to amend certain provisions of Section 101.115 to permit smaller antennas at 71-76/81-86 GHz. But the rulemaking will probably take years, while the matter is urgent. Aviat Network accordingly requests a waiver of the same provisions, so as



The FWCC subsequently filed an *ex parte* request that the Commission apply the co-polar discrimination (CPD) requirement to the range of angles 2.5-5 degrees from the centerline, rather than the 1.2-5 degrees presently required, and reduce the 25 dB cross-polarization discrimination (XPD) requirement to 21 dB.³

Aviat Networks believes that these FWCC initiatives are in the public interest. Even assuming the Commission ultimately agrees, however, the delays occasioned by the Administrative Procedure Act and the press of the Commission's other business are likely to postpone a rule amendment for a period of years.⁴ Aviat Networks submits that the benefits of the change, and the absence of harm to any spectrum user, justify the Commission's granting a waiver pending the rulemaking.

C. DEVELOPMENTS NECESSITATING THIS REQUEST

Predicting future developments in technology is notoriously difficult. Even harder is predicting the ultimate uses of an emerging technology. Some people in the 1970s saw the coming of pocket-sized wireless phones, but few then foresaw how wireless phones would eventually exploit broadband connectivity for the sophisticated apps we now use every day.

Something similar is happening with the 71-76/81-86 GHz bands. The Commission

application described by the original petitioner for the 71-76/81-86 GHz rules,⁵ which called the technology “virtual fiber.”⁶ Ten years ago, the relatively high cost of equipment for these bands limited applications to those having very high traffic demands, typically among rooftops and towers.

Since then, however, as costs have dropped, the 71-76/81-86 GHz bands have become more attractive for applications that carry less data over shorter distances, and require antennas closer to the ground. The increasing density of sites that serve public mobile networks is changing the nature of “backhaul” connections—*i.e.*, the connections between network facilities and cell towers. Backhaul distances are declining from kilometers to a few hundred meters.⁷

Small cell deployment will accelerate this trend.

1. Network developments

The firm Mobile Experts predicts that small cell backhaul alone will grow from near zero today to over a million links by 2017 (Figure 1). Wireless will be the predominant technology used, making up between 60 and 70 percent of small cell backhaul deployments through 2017 (Figure 2).

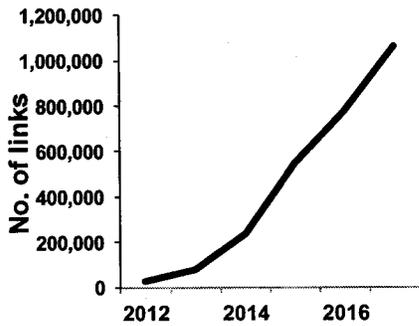


Figure 1
Projected Backhaul Links for
Outdoor Small Cells

Source: Mobile Experts

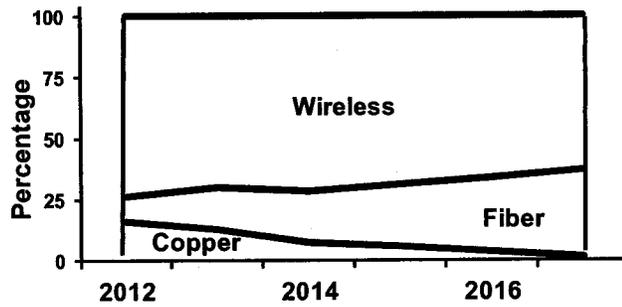


Figure 2
Percentages of Outdoor Small
Cells Backhauled by Various
Technologies

Source: Mobile Experts

These developments will bring mobile network base stations and associated infrastructure, including backhaul, into locations that are physically closer to the consumer. Conventional macrocells are typically deployed with cell radii of 1 km or so. The radii of small cells are typically in the 100 m to 400 m range, and sometimes as short as 70 m.

deployment, and dampen the broad economic momentum normally associated with a new network build-out.

2. *Antenna developments; reduced costs*

The ongoing quest for smaller, lighter, less expensive antennas has resulted in metalized plastic planar antennas



- reduced packaging and shipping costs, warehouse requirements, and waste disposal;
- additional antennas easily collocated;
- spectrum congestion relief for more “traditional” urban microwave at 18-38 GHz; and
- antenna congestion relief on crowded towers and rooftops.

Waivered antennas will also provide a very significant reduction in tower lease costs, for applications that use towers. Tables 1-3 compare compliant (parabolic) and waived (planar) antennas as to size, weight, tower occupancy, and tower costs. According to the consulting firm Steel in the Air, Inc., the factors affecting tower leasing fees include the size of the lease area required, weight and size of antennas, and availability of space.⁹ Small planar antennas decrease the costs associated with each of these.

	Dimensions				
	H (In)	W (in)	D (in)	Volume (cubic ft)	Weight (lbs)
Parabolic 1 ft antenna	13.8	13.8	7.9	0.86	8.8
Planar antenna	5.1	5.1	0.6	0.01	1.1

Table 1 – Parabolic 1 ft. vs. Small Planar Antennas

Infrastructure gains	
Volume reduction	98.96 %
Weight reduction	87.53 %

Table 2 – Space/weight gains with small planar antenna

Antenna	Vertical height (inches)	Lease cost (per month)	Cost reduction
Parabolic 1 ft	12	\$100.00	
Planar	5.1	\$42.50	57.7%

Table 3 – Potential Operator TCO Benefit (typical vertical height-based fees)

⁹ Source: <http://www.steelintheair.com/Tower-Collocation-Leases.html>

3. *Implications for antenna standards*

The Commission has said its rules do not mandate the use of parabolic antennas.¹⁰ In fact, however, the rules were developed during a period when parabolic antennas were the only practical way to achieve high directionality. The Commission acknowledged the introduction of planar array antennas by allowing manufacturers to meet a maximum 3 dB bandwidth requirement as an alternative to the minimum gain requirement.¹¹ But the remainder of the standards, including the envelope pattern and the CPD and XPD requirements, continue to favor parabolics.

Achievement of the marked reduction in antenna dimensions shown in Figure 2 and

Table 1, and the advantages that follow from smaller size, weight, and cost, will require minor departures from the Commission's antenna standards. Antenna manufacturers worldwide,

D. SPECIFIC WAIVER REQUESTS

In view of the foregoing, Aviat Networks requests a waiver having these three elements:

- (1) the option of compliance with the antenna standards shown in Table 4;
- (2) application of the co-polar discrimination requirement to a range of angles 2.5-5 degrees from the centerline; and
- (3) reduction of the required cross-polar discrimination from 25 dB to 21 dB.¹²

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
71,000 to 76,000 (co-polar)	A	2.2	38	22	28	32	35	37	55	55
81,000 to 86,000 (co-polar)	A	2.2	38	22	28	32	35	37	55	55
71,000 to 76,000 (cross-polar)	A	2.2	38	35	35	40	42	47	55	55
81,000 to 86,000 (cross-polar)	A	2.2	38	35	35	40	42	47	55	55
71,000 to 76,000 (co-polar)	B	2.2	38	13	20	28	31	32	48	48
81,000 to 86,000 (co-polar)	B	2.2	38	13	20	28	31	32	48	48
71,000 to 76,000 (cross-polar)	B	2.2	38	33	33	33	38	40	48	48
81,000 to 86,000 (cross-polar)	B	2.2	38	33	33	33	38	40	48	48

Table 4 – Proposed Antenna Standards under Waiver

¹² Compare with 47 C.F.R. § 101.115(b)(2) (table) note 15.

Waivered antennas will have to comply with all other provisions, including the provision that antenna gain below 50 dBi be accompanied by a reduction in maximum EIRP

in the ratio of 2 dB of power cut per 1 dB of antenna gain below 50 dBi.¹³ The proposed minimum antenna gain of 38 dBi would reduce the maximum power by 24 dB. In practice, though, because these antennas are intended specifically for short links, the actual power used in the large majority of cases will be far below the maximum.

E. PROTECTION OF OTHER USERS

Although other allocations are listed in the table,¹⁴ the services actually needing protection under the waiver will be other Fixed Service licensees at 71-76/81-86 GHz and the radio astronomy service (RAS) at 81-86 GHz.¹⁵

Waivered operation will rely on the same link-by-link frequency coordination system and

Similarly, application of the CPD requirement over a narrower range of angles and a slight reduction in the XPD requirement from 25 dB to 21 dB will not impede frequency coordination. No other fixed service band has either CPD or XPD requirements. The original rules for 71-76/81-86 GHz likewise had no such requirement. The Commission added them on reconsideration, at the request of Wireless Communications Association International (WCAI), with no explanation other than mention of WCAI's reconsideration petition.¹⁷ That petition, while terse, appears to seek the requirements as an aid in frequency coordinating multiple links that share the same geographic path, *e.g.*, between the same two rooftops.¹⁸ The applications best suited to waived antennas, however, will not entail shared high-capacity shared paths, and hence will not be adversely affected by adjustment of the CPD angle range or a small reduction in the XPD requirement.

RAS protection requirements will remain unchanged under the waiver. That is, the frequency coordination process will ensure that waived antennas provide no less protection to any RAS site than do Section 101.115-compliant antennas.

F. PUBLIC INTEREST

A grant of the requested waiver will facilitate the provision of wireless service to the public at lower cost, while reducing visual clutter and limiting the aesthetic offense of large antennas. The waiver will also stimulate activity in the underused 71-76/81-86 GHz bands while

taking pressure off other fixed service frequencies used for urban applications, particularly 18

¹⁷ *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Memorandum Opinion and Order, 20 FCC Rcd 4889 at ¶ 34 n.103 (2005).

¹⁸ *See* Petition for Reconsideration of Wireless Communications Association International in WT Docket No. 02-146 at 16-18 (filed Feb. 23, 2004) (addressing the “need to control interference to a narrow, spatial pipe”).

and 23 GHz. The waiver will achieve these advantages with no incremental risk of interference to other users.

Moreover, with the waiver in place, the same antenna will meet both Commission and ETSI requirements.¹⁹ This will give U.S. licensees inexpensive access to antennas mass-produced for the European market, and will simultaneously benefit U.S. manufacturers by enabling them to produce the same equipment for the U.S. and European markets.

G. WAIVER CONDITIONS

Aviat Networks proposes the following conditions on the waiver:

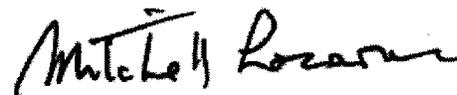
1. Licensees using waived antennas must comply with all Commission rules not expressly waived, including but not limited to the requirements relating to power/antenna gain trade-off, frequency coordination, and protection of RAS sites.
2. If an RAS operator reasonably suspects a waived 81-86 GHz antenna of causing harmful interference, the licensee will cooperate with the RAS operator in investigating and resolving the interference.
3. The waiver is subject to the outcome of the ongoing rulemaking in WT Docket No. 10-153 and any other rulemaking proceeding affecting 71-76/81-86 GHz antenna standards. In the event the Commission ultimately rules against relaxation of the standards for these antennas, the waiver will expire as of the effective date of that ruling (or after 30 days, if the ruling takes effect in a shorter time). Aviat Networks will not manufacture, import, or install a noncompliant antenna after the waiver expires.

¹⁹ The ETSI rules do not have CPD or XD requirements.

CONCLUSION

An early grant of the requested waiver will reduce costs, further broadband deployment, and benefit U.S. providers and manufacturers, with no adverse effect on any party. We urge the Commission to grant the waiver promptly.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mitchell Lazarus". The signature is written in a cursive style with a prominent initial "M".

Mitchell Lazarus
FLETCHER, HEALD & HILDRETH, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
703-812-0400
Counsel for Aviat U.S., Inc.

April 5, 2013

TECHNICAL CERTIFICATION

I am a technically qualified person who reviewed the foregoing Request for Waiver. I certify that the technical statements therein are correct to the best of my knowledge.

[Handwritten signature]

COURTESY SERVICE LIST

Chairman Julius Genachowski
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Robert McDowell
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Mignon Clyburn
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Jessica Rosenworcel
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Ajit V. Pai
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Ruth Milkman, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

James Schlichting, Senior Deputy Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

John S. Leibovitz, Deputy Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Tom Peters, Chief Engineer
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Melissa Glidden Tye, Legal Advisor
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Blaise Scinto, Chief
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

John Schauble, Deputy Chief
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Charles Oliver, Attorney Advisor
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Brian Wondrack, Attorney Advisor
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Stephen Buenzow, Deputy Chief
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
1280 Fairfield Road
Gettysburg, PA 17325