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**UPS Aviation Technologies**

February 22, 2002

William F. Caton, Acting Secretary  
Federal Communications Commission  
Washington, D.C. 20554

**RE: Comments on Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service, WT Docket No. 01-289; FCC 01-303**

Submitted by: Electronic Comment Filing System (ECFS)

Attached are the comments of UPS Aviation Technologies, Inc., in the matter of docket no. 01-289 referenced above. Our comments primarily propose alternations to Parts 2 and 87 in order to create rules for the Universal Access Transceiver (UAT) technology, which supports the newly developed Automatic Dependent Surveillance – Broadcast service at a frequency of 978 MHz. The standardization effort for UAT is nearing completion within the RTCA. Stage 3 spectrum certification has been approved by the NTIA after working in close cooperation between the US Department of Defense, the FAA Spectrum Office, and aviation industry participants. These factors create a near-term need for rules that would allow a Grant of Authorization for UAT transmitting equipment.

Thank you for your attention this matter. If you should have any follow up questions, please call, email, or write us at the coordinates listed below. Our primary contact person is Tom Mosher. If unable to reach Tom, please use George Cooley as an alternate.

Sincerely,

A handwritten signature in black ink that reads "John Macnab".

John Macnab  
General Manager

gxc

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In the matter of )  
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Review of Part 87 of the Commission's Rules ) WT Docket No. 01-289  
Concerning the Aviation Radio Service ) FCC 01-303

## Comments regarding the Review of 47 CFR Parts 2 and 87

February 22, 2002

UPS Aviation Technology (UPS AT) hereby offers comments on Docket No. 01-289, referenced above. UPS AT proposes adding new rules to Parts 2 and 87 that will create a new type of datalink for use in the Automatic Dependent Surveillance – Broadcast service.

### Background:

The Universal Access Transceiver (UAT) is a datalink technology that has been developed to provide Automatic Dependent Surveillance – Broadcast service (and other services) to the Aviation community. The UAT technology has been field-tested in the FAA Alaska Region over the last two years, using approximately 150 airborne and ground stations. In addition, several sites within the Continental U.S. have hosted UAT trials. These include the FAA Technical Center in Atlantic City, NJ, NASA's Runway Incursion Prevention System test bed at Langley, VA, and the Dallas-Ft. Worth airport.

In December of 2000, the RTCA created Working Group 5 of Special Committee 186, to develop and approve the Minimum Operational Performance Standards for the UAT datalink. This effort is scheduled to be complete in June of 2002. As part of this effort, the NTIA has granted Stage 3 spectrum certification for use of the UAT datalink using a radio frequency of 978 MHz.

The UAT datalink signaling characteristics are summarized below:

Frequency: 978 MHz  
Modulation: Continuous-phase FM, Binary FSK  
FM Modulation Index: 0.6  
Data Rate: 1.041667 Megabits per second.  
Occupied bandwidth (99% power, measured in 100 kHz BW): 1.3 MHz  
Transmitter duty cycle: Airborne units transmit one message of at most 420 microseconds duration each second. Ground units transmit messages of 4,274 microseconds duration multiple times per second, using same emission type as airborne units.  
Transmitter Power: Depends on equipment classification.

The following comments reflect UPS AT's recommendations for modifications to 47CFR87 and 47CFR2.201 to add the UAT datalink as an Aviation Service. The revisions or additions to each regulation are listed below.

## **47 CFR Part 2**

### 47CFR2.201:

No changes required. UAT already qualifies as an Aid to Navigation.

### 47CFR2.201: Emissions

#### *Commentary:*

The UAT emissions type is F1D (FM modulated, one digital channel).

The emissions type can be derived using the following formula:

$$B_n = 2(B + 1)F_m, \text{ with } B = 0.6 \text{ (the modulation index) and } F_m = 520 \text{ KHz.}$$

$$B_n = 1.66 \text{ MHz,}$$

This gives a full emissions designator of 1M70F1D

### 47CFR2.303 Station identification

Station ID for UAT Uplink is provided by geographic position provided in the transmitted message content.

Geographic position data or flight ID or call sign provides station ID for airborne stations.

## **47 CFR Part 87**

### 47CFR87.131 Power and Emissions

No modification to the table is necessary, since UAT falls under the "Radionavigation" classification.

### 47CFR87.133 Frequency Stability

No modifications are necessary, as UAT already specifies the same 20 PPM that is called-out for radionavigation equipment in the 960 to 1215 band (section 7 of the table).

### 47CFR87.137 a

Add F1D to the class of emissions, with 1M70F1D as the emission designator, with authorized bandwidth of 1800 kHz, frequency deviation of 312.5 kHz. Reference a new note "17 Authorized only for UAT service at 978 MHz."

### 47CFR87.139 Emission limitations.

Add a new section (i) (1): For UAT transmitters, the average emissions measured in a 100 kHz bandwidth must be attenuated below the maximum emission level by at least:

Freq. Offset (MHz)	Attenuation (dB)
+/- 0.5	0
+/- 1.0	18
+/- 2.25	50
+/- 3.25	60

The mask shall be defined by drawing straight lines through the above points.

Add new section (i) (2): UAT transmitters with an output power of 5 Watts or more, must limit their emissions by at least  $43 + 10 \log(P)$  dB on any frequency removed from the assigned frequency by more than 250% of the occupied bandwidth. Occupied bandwidth is defined as 99% of the signal power measured with a bandwidth of 100 kHz. P in the above equation is the average transmitter power measured in Watts.

Add new section (i) (3): UAT transmitters with less than 5 Watts of output power, must limit their emissions by at least 40 dB relative to the carrier peak on any frequency removed from the assigned frequency by more than 250% of the occupied bandwidth. Occupied bandwidth is defined as 99% of the signal power measured with a bandwidth of 100 kHz.

47CFR87.141 Modulation requirements:

Add new section (k): UAT transmitters must use F1D modulation without phase discontinuities.

47CFR87.171 Class of station symbols

Support paragraph 37 of the Part 87 NPRM, regarding elimination of station class codes from Part 87. If class codes are retained in Part 87, add a suitable code UAT stations (includes Uplink, airborne, and surface vehicles).

47CFR87.173 Frequencies

To the table add 978.0 MHz, subparts F, I, L, M, N, Q, and the UAT station class from Part 87.171 above.

47CFR87.187 (Aircraft Station) Frequencies.

Add new section (dd) The frequency 978.0 MHz is authorized for transmission of ADS-B, TIS-B, FIS-B and other future uses per the applicable RTCA documents.

47CFR87.163 (Aeronautical Enroute Stations) Frequencies

Add new section (g) The frequency 978.0 MHz is authorized for UAT transmission of ADS-B, TIS-B, FIS-B and other future uses per the applicable RTCA documents.

47CFR87.345 (Aeronautical Utility Mobile Stations) Scope of service

Add new section (f) Transmissions by aeronautical utility mobile stations for UAT service are authorized.

47CFR87. 349 (Aeronautical Utility Mobile Stations) Frequencies

Add new section (e) The frequency 978.0 MHz is authorized for UAT transmission of ADS-B.

47CFR87. 375 (Aeronautical Search and Rescue Stations) Frequencies

Add new section (e) The frequency 978.0 MHz is authorized for UAT transmission of ADS-B.

47CFR417 (Airport Control Tower Stations)

Add here the same provisions as for Aeronautical Enroute Stations above (47CFR87.163).

47CFR87.471 (Radiodetermination Service) Scope of service

Modify section (a) to allow Uplink of FIS-B products.

47CFR87.475 (Radiodetermination Service) Frequencies.

Add new section (b) (9) 978.0 MHz is authorized for UAT service.

Modify section (c) (1) to add reference to 87.187(dd) allowing use of UAT for radionavigation land test stations.

Modify section (c) (2) to all 978.0 to list of available frequencies for testing airborne UAT receiving equipment.