EXHIBIT 1

Technical Description of the SKYLink[SM] Broadband System Proposed for Limited Market Study

The following document describes the current state of development of the SKYLink[SM] Aeronautical Mobile Satellite Earth Stations for bi-directional, broadband data transfer.

1.0 Introduction

Commercial airlines, business aircraft operators, the government and the defense community have expressed a need for two-way, broadband, high data rate, satellite communications with mobile aeronautical platforms. In addition to bi-directional streaming video, two-way broadband satellite services would provide passengers and crew with constant access to information via data services, e-mail, and Internet web access using laptop computers and other personal electronic devices. Extending broadband data services to mobile aeronautical platforms would improve efficiency and security for airlines, businesses, government and defense agencies.

ARINC proposes to employ the Ku band fixed satellite service (FSS) to achieve a two-way, broadband, high data rate, satellite communications system for aeronautical mobile satellite (AMSS) platforms. Of presently fielded satellite systems, the Ku band FSS offers the radiated power and bandwidth to achieve high data rates.

Within the Continental United States (CONUS), the uplink band is allocated as “Primary” for the Fixed Satellite Service (FSS) with a “Secondary” allocation to Mobile-Satellite Services, with an exclusion of Aeronautical Mobile Satellite Service (AMSS). The downlink band is also allocated as Primary for the FSS with no provision for mobile-satellite services.

In the ARINC system, the Network Operations Center (NOC)-to-satellite and mobile platforms-to-satellite links comprise the “uplinks”. The satellite-to-mobile platforms and satellite-to-NOC links comprise the “downlinks.” Because the ARINC system does not fall into any of the allocated services in the FSS bands, a waiver from the FCC must be obtained to use Ku-Band satellite service in the United States. A condition of any such waiver is that the ARINC system must not cause interference to, and must accept interference from, stations licensed in the Primary and Secondary Services.

Because ARINC will lease transponders from an existing U.S. FSS operator, the two downlinks present no real licensing issues, provided that the FCC will allow the links to be used for mobile-satellite service. The NOC-to-satellite and satellite-to-NOC links will use an existing teleport facility in Carlsbad, California. CONUS transponders will be leased from SES Americom with access controlled by their Woodbine, Maryland earth station.

The regulatory environment under which the ARINC system will operate is primarily governed by Title 47 (Telecommunications), Part 25 (Satellite Communications) of the

Code of Federal Regulations ("CFR"), and by the International Telecommunication Union ("ITU") Regulations, Appendix S8 (formerly Appendix 29). The ARINC system will use currently available antenna technology coupled with Code Reuse Multiple Access (CRMA) and Gaussian Minimum Shift Keying (GMSK) spread spectrum modulation, under strict NOC control, to enable the aircraft-to-satellite uplink to operate below the ITU/FCC interference thresholds. Further, the aircraft-to-satellite uplink uses a Paired Carrier Multiple Access technique to conserve spectrum by using the same transponder spectrum for both forward and return links.

Two important precedents have already been set which serve to support licensing for the ARINC system. First, Qualcomm, Inc. ("Qualcomm") was granted blanket authority to construct and operate a 12/14 GHz network of up to 20,600 mobile and transportable earth stations and a fixed hub station. Second, the Boeing Company ("Boeing") was granted an operational license, valid through December, 2011, under Part 25 of Title 47 CFR. This license was issued for transmitting mobile platforms throughout CONUS at 14.0-14.5 GHz.

2.0 Objective

The object of this deployment is to field a broadband, high data rate, satellite communication system for transmission to and from mobile aeronautical platforms that meets the interference requirements of the Ku band fixed satellite service (FSS).

3.0 Approach

The ARINC operational system will implement the two-way broadband satellite communications system shown in Figure 1, between the Airborne and Ground systems. In the Forward Link direction, to the mobile aeronautical platforms (aircraft), an Offset Quadrature Phase Shift Keyed, Direct Sequence Spread Spectrum signal containing the encoded data will be transmitted. In the Return Link direction, the waveform is direct sequence spread Gaussian Minimum Shift Keyed, with Forward Error Correction encoding and interleaving, that will return the data or data request from the aircraft to the NOC. Individual aircraft access the shared link using a random access burst Code Reuse Multiple Access (CRMA) protocol. The same transponder frequencies will be used for both uplink segments in the 14.0 – 14.5 GHz spectrum. Similarly, the same transponder frequencies will be used for both downlink segments in the 11.7 – 12.2 GHz spectrum. ARINC will protect radio astronomy at 14.47-14.50 GHz and space research systems at 14.0 –14.05 GHz from harmful interference from its airborne platforms by preventing transmission on those frequencies.

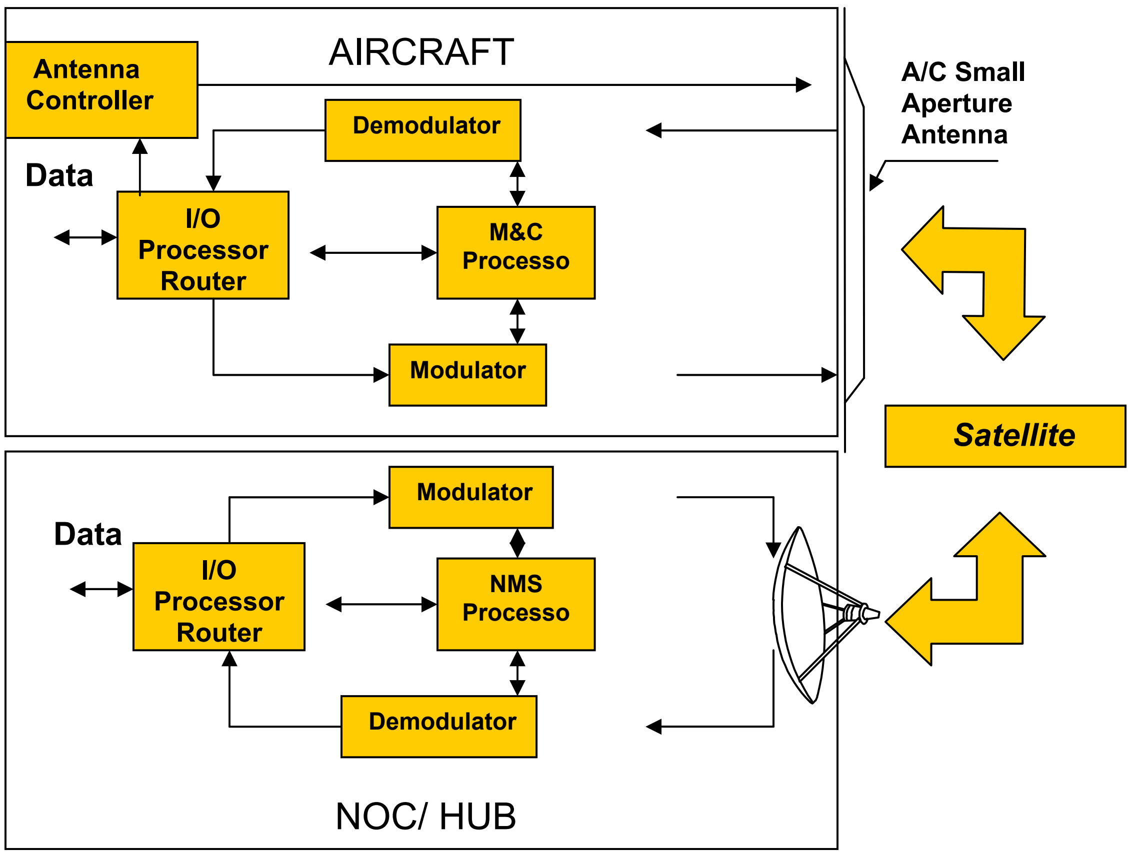

Figure 1. Two - Way Broadband Satellite System

4.0 Technical Description

4.1 Forward Link

The Forward Link (ground-to-aircraft) provides the satellite connection from the Network Operations Center (NOC) to the aircraft. It is a high data rate, single carrier broadcast transmission utilizing 1/3Turbo Code Forward Error Correction, OQPSK, direct sequence spread spectrum modulation using 32.4 MHz of a 36 MHz transponder. In the transceiver, the receiver card demodulates and decodes the Forward channel signal, provides IP data to the I/O processor and control data to the Monitor and Control Processor (M&C). The M&C processor implements the network management functions acting as the airborne agent for the NOC Network Management System. The I/O processor formats the data for interface to the Ethernet LAN router.

The Forward Link data rate is scalable from 0.5 Mbps to 10 Mbps of video and data. Also, the NOC's Network Management System (NMS) uses the Forward Uplink to control the Return Link. This includes the authorization to transmit, and control of frequency, transmit power and data rate to manage adjacent satellite interference and provide bandwidth on demand. It also provides the transmit shutdown function when system out-of-tolerance conditions are detected.

4.2 Return Link

The Return Link (aircraft-to-ground) provides the satellite connection from the aircraft to the NOC. The Return Link design uses spread spectrum techniques to mitigate interference to adjacent satellites and to enable aircraft to simultaneously access the satellite. The I/O Processor receives IP packets from the router and formats them for delivery to the modulator card. The modulator card generates the spread waveform for transmitting the packets to the NOC. The I/O processor also receives ARINC 429 bus (inertial navigation system) data and passes it to the antenna control function. ARINC will use a single carrier per satellite transponder and will limit the return link transmission rates from each aircraft to128 kbps, with an aggregate return link capacity from all aircraft simultaneously, not to exceed 2.048 Mbps.

The return channel waveform includes the following key features:

- Shared access using random access burst Code Reuse Multiple Access
- Direct Sequence Spread Spectrum, GMSK
- Forward Error Correction encoding and interleaving
- Use of short block length Turbo codes
- Flexible chip rates (bandwidth) and data rates
- Ability of the NMS to control the power and flow rate of the return-channel traffic on an individual aircraft basis and at a network level.

The return channel NMS will monitor the aggregate return channel transmit power to ensure that mutual interference levels among the individual transmissions remain at an acceptable level. The data rate of individual return channel transmissions can be flexibly assigned to control throughput for the individual aircraft and for the aggregate network to operate below the ITU/FCC interference thresholds. Supported return-channel burst information rates are: 32 kbps, 64 kbps or 128 kbps. The network can be operated with a mix of return-channel data rates, allowing each airborne platform to achieve the level of throughput appropriate for demand.

4.3 Aircraft Antenna

The airborne antenna system will use a broadband aperture with the ability to operate over the full frequency range of the Ku-band Fixed Satellite Service (FSS), 11.7 – 12.2 GHz for receive and 14.05 – 14.47 GHz for transmit. It will simultaneously transmit and receive through one Ku-band satellite using one of the transponders leased on that satellite, and can be steered to operate on any FSS Ku-band satellite selected for operations. The antenna design enables seamless growth of the system to meet increased demand and expanded airborne services through both the addition of transponders and the addition of satellites.

Performance characteristics of the on-board antenna system support bi-directional broadband communications and meet the FCC's interference requirements for mobile use. Specific capabilities of the antenna include:

- A prime focus parabolic antenna to operate in a 12 inch swept volume at temperatures, pressures and vibrations typical of those on a business jet aircraft.
- Pointing and/or tracking error does not exceed 0.25 degrees with a 3D tracking rate of 30 degrees per second. This provides sufficient accuracy to meet satellite link performance and adjacent satellite interference requirements with functional accuracy throughout the typical business aviation aircraft maneuver envelope.
- Polarization adjustment of more than 200° rotation provides a linear phase match with the satellite transponder throughout the flight route of the aircraft. This mitigates cross-polarization and co-polarization interference.
- G/T is no less than 7.8 dBi/K and the transmit EIRP is no greater than 34.3 dBW EIRP throughout the operating bandwidth and over the full beam steering range.
- Beam steering range is 360° in azimuth and 80° in elevation starting at 10° above the horizon and extending to the 90° zenith.
- Although the antenna sidelobe gain exceeds the mask defined by 25.209(a)(1), the maximum aggregate input level per 25.134(a) (-14dBW/4KHz) will be backed down by the amount of excess gain so that the EIRP due to the antenna sidelobe gain combined with the maximum aggregate input level will meet the requirement imposed by the combination of 25.134(a) and 25.209(a)(1).

4.3.1 Antenna Patterns

Figure 2. shows the transmit antenna E-plane and H-plane patterns with respect to the 29-25 log (θ) envelope for main beam offset angles from 1° to 20°. The aperture combined with tightly controlled EIRP maintains a good peak sidelobe level, satisfactory for the maximum sidelobe level generated along the geostationary satellite orbit (GSO) by aircraft in the CONUS. Note that the antenna patterns shown reflect the required backoff, $\Delta \sim= 8.25$ dB, described in Section 4.3, above.

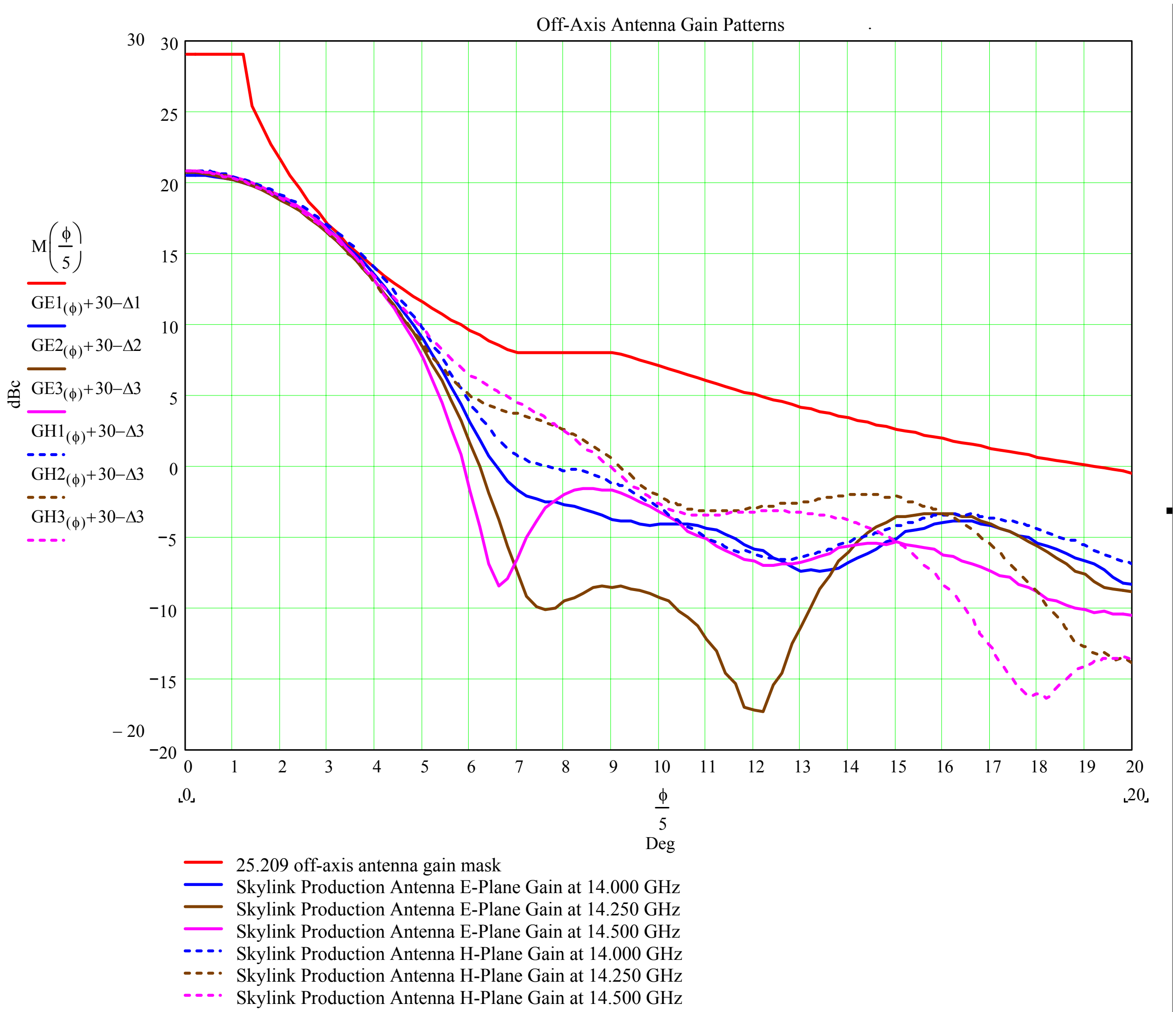

Figure 2. Transmit Antenna Pattern

4.4 Aircraft Integrated Transceiver Router

The Aircraft Integrated Transceiver Router (AITR) serves as the system controller for the airborne terminal. Its primary functions include the following:

- Satellite network communications and control with the Network Operations Center
- Control of the Antenna Control Unit and Antenna
- Implementation of power and frequency control algorithms
- Forward link continuous demodulation and decoding
- Return link encoding and burst modulation
- IP data encapsulation and recovery at the satellite interface
- Packet routing at the LAN Ethernet interface
- User data transport

In addition, the AITR generates a precision reference frequency for the System and has multiple input and output discrete interfaces with the aircraft.

4.5 Network Management System (NMS)

The SKYLink Broadband system has centrally controlled protocols for aircraft entry into the network, controlled authorization for the aircraft to transmit, controlled authorization to change transmit power or data rates and the ability to terminate any or all transmissions. One of the major functions of the NMS is to ensure compliance with CFR 47 Part 25 regulations 25.134(b), 25.202(f), 25.209(a)(1) and 25.271(c).

The NMS will allow access to the network of only those aircraft with mobile terminals that have been successfully commissioned as compliant with FCC regulations for over-the-air transmissions in the Ku-band FSS. Aircraft joining the network must first acquire the assigned satellite transponder and then receive and recognize the forward data stream. The total commissioned aircraft will not exceed 15 for the Limited Market Study.

4.6 Waveforms

4.6.1 Out of Band Emissions

With respect to spurious emissions, the Forward link signal of the SKYLink System meets the limits of Section 25.202(f) and the Return link signal meets the intent of the requirement.

The Return link waveform by itself exceeds the 25.202(f) mask by up to 5dB-PSD at the authorized bandwidth, however based on the link budgets and the use of PCMA, the aggregate Return link spectrum will always be at least approximately 20dB below the Forward link spectrum. Consequently, the spectral density of the aggregate Return links will be approximately 15dB-PSD below the level required at the authorized bandwidth and thus indirectly satisfies 25.202(f).

Figure 3 illustrates the expected uplink spectrum as it would be observed at the satellite.

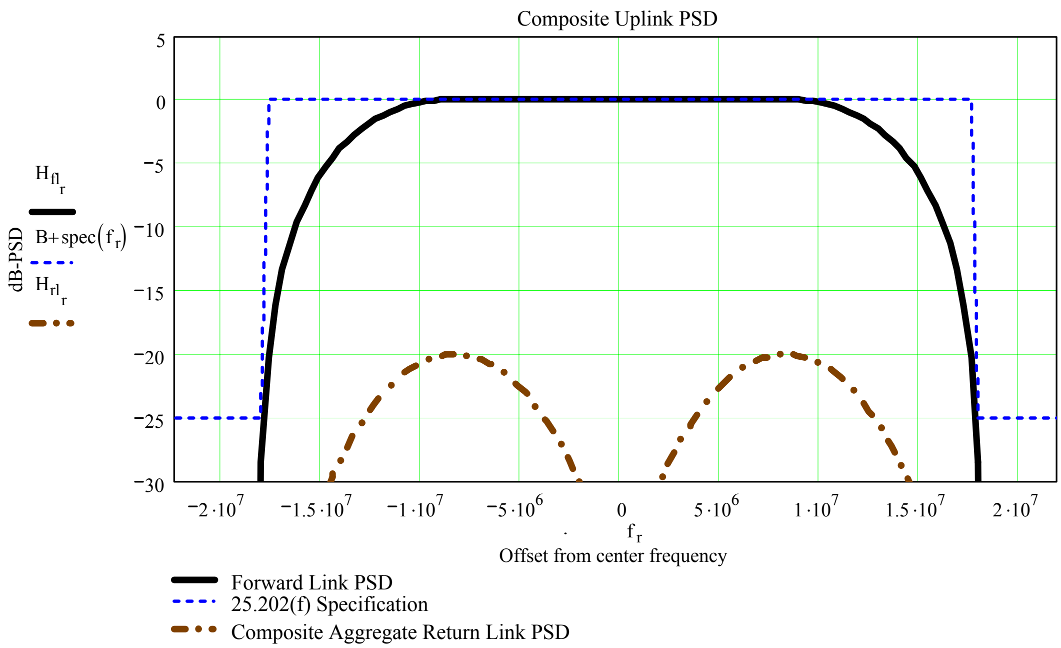

Figure 3 Forward and Return Links in the Authorized Bandwidth

4.6.3 Forward Link Spectrum

In Figure 3, the Forward link spectral mask is used to determine the symbol rate limits per 25.202(f). The composite Forward and Return link spectrum (single-sided) outside the authorized bandwidth is depicted in Figure 4.

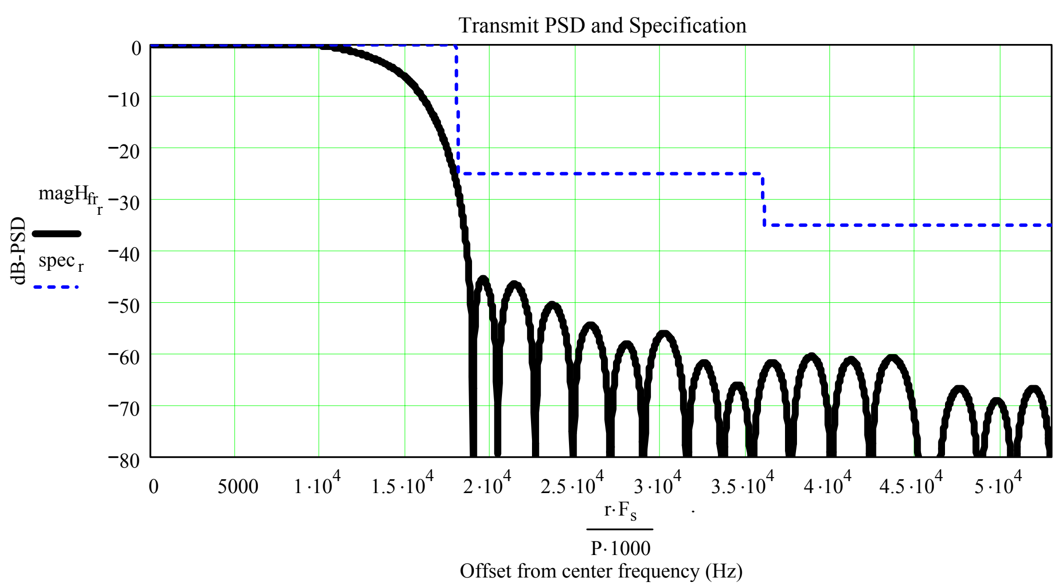

Figure 4 Forward Link Spectrum

5.0 Link Budgets

5.1 Return Link Budget

Table 1, Return Link Budget (aircraft to satellite to earth station), shows the experimental case for 38 mobile terminals each operating at 32 kbps with a spreading bandwidth of 14.4 MHz via the AMC-1 satellite (formerly GE-1) which has been selected by the satellite provider to conduct the Limited Market Study of the SKYLink system.

Since the antenna gain exceeds the 25.209(a)(1) mask by Δ~=8.25 dB, the aggregate input level defined by 25.134(a) is reduced to –22.25 dBW/4kHz.

Based on the Return Link Budget, a single terminal will have an input antenna flange density of –37.07 dBW/4kHz. Therefore the maximum aggregate input antenna flange density due to 15 terminals will be

$$-37.07 + 10\log(15) = -25.30 \text{ dBW/4kHz}$$

which is 3.05 dB less than –22.25 dBW/4kHz.

Table 1. Return Link Budget

Satellite Name	AMC-1		Data Rate	32000	bps	
Satellite Location	103	Deg W	Packet Error Rate	1 x 10E-3		
Satellite Center Beam EIRP	49.84	dBW	Eb/No Required	2.25	dB	
Satellite EIRP in direction of DL ES	48.00	dBW	C/No Required	47.30	dB-Hz	
Satellite SFD in direction of UL ES	-94.00	dBW/m^2	Availability Required	N/A		
Satellite Input Attenuator	6	dB	ITU Uplink Rain Zone	N/A		
Operating SFD (NCS Value)	-88.00	dBW/m^2	ITU Downlink Rain Zone	N/A		
Satellite G/T in direction of UL ES	2.00	dB/K	Modulation Type	CRMA-GMSK		
Satellite Input Back Off	2.5	dB	FEC Factor	Rate 1/3 TC		
Satellite Output Back Off	0.5	dB	Spread Factor : Bandwidth	293		14400
Transponder BW	36	MHz	Carrier Spacing	1		
Satellite Translation Frequency	2,300	MHz	Spread Bandwidth : Signal Bandwidtl	14400.0		49.2

Uplink Name	Aircraft - Worcester, MA		Downlink Name	Hub	
Uplink Location Latitude	42.27	Deg N	Downlink Location Latitude	33.12	Deg N
Uplink Location Longitude	71.80	Deg W	Downlink Location Longitude	117.24	Deg W
Uplink Frequency	14250	MHz	Downlink Frequency	11950.00	MHz
Uplink Antenna Size	0.2921	m	Downlink Antenna Size	4.5	m
Uplink Antenna Efficiency	0.4		Downlink Antenna Efficiency	0.65	
Uplink Antenna Gain	28.81	dBi	Downlink Antenna Gain	53.14	dBi
Uplink EIRP	27.30	dBW	Downlink Antenna LNA Temp	70	K
Uplink Output Circuit Loss	3.6	dB	Downlink Antenna Noise Temp	35	K
Uplink PA Output Power	1.620	Watts	Downlink Rain Noise	36.30	K
Uplink PA Output Power	2.09	dBW	Downlink Earth Station G/T	31.44	dB/K
Uplink Rain Attenuation	0.00	dB	Downlink Rain Attenuation	0.65	dB
Uplink Misc Losses	1.5	dB	Downlink Misc Losses	1	dB
Uplink Elevation Look Angle	31.91	Deg	Downlink Elevation Look Angle	48.54	Deg
Uplink Azimuth Look Angle	222.00	Deg	Downlink Azimuth Look Angle	155.09	Deg
Uplink Slant Range	38454.61	km	Downlink Slant Range	37184.79	km
Uplink m^2 Antenna Gain	44.53	dBi	Downlink m^2 Antenna Gain	43.00	dBi
Uplink Spreading Loss	162.69	dB(m^2)	Downlink Spreading Loss	162.40	dB(m^2)
Uplink Path Loss	207.22	dB	Downlink Path Loss	205.40	dB

Satellite Input level	-136.89	dBW/m^2	Satellite Input level	-181.41	dBW
Satellite Input Back Off	48.89	dB	Uplink C/No	49.19	dB-Hz
Satellite Output Back Off	46.89	dB	Uplink C/Io	55.87	dB-Hz
Satellite Downlink EIRP	1.11	dBW	Uplink C/(No+Io)	48.34	dB-Hz
			Uplink Margin	1.04	dB
<u>Interference Calculations</u>			Satellite Downlink EIRP	1.11	dBW
Adjacent Satellite Uplink	79.17	dB-Hz	Downlink C/No	54.11	dB-Hz
Adjacent Satellite Downlink	89.05	dB-Hz	Downlink C/Io	81.20	dB-Hz
Cross-Polarization Uplink	81.97	dB-Hz	Downlink C/(No+Io)	54.10	dB-Hz
Cross-Polarization Downlink	81.97	dB-Hz	Downlink Margin	6.80	dB
E.S. HPA Intermodulation	150.00	dB-Hz	Total Link C/(No+Io)	47.32	dB-Hz
Transponder Intermodulation	150.00	dB-Hz	Margin	0.02	dB

Number of active CDMA carriers	38	N
Self interference contribution	55.90	dB-Hz
Antenna gain at 2 deg off-axis	27.26	dBi

C/Io Uplink	55.87	dB-Hz	Antenna Flange Power Density	-37.07	dBW/4 kHz
C/Io Downlink	81.20	dB-Hz	Uplink Off-Axis EIRP Power Density	15.99	dBW/40 kH
			Downlink EIRP Power Density	-32.61	dBW/4 kHz

Transponder Bandwidth Utilization	40.00	%	Installed HPA Size	4.0	Watts
Transponder Bandwidth Utilization	14400.00	kHz	Installed HPA Size	6.02	dBW
Transponder Power Utilization	0.00	%	Required HPA Power	2.09	dBW
Transponder Power Equiv. Bandwidtl	0.83	kHz	Operating HPA Single Carrier OBO	3.93	dB
Number of like carriers supported	43534.00				
Actual transponder Utilization for N	0.09	%			

5.2 Forward Link Budget

The Forward Link Budget shows that 32.4 MHz of a 36 MHz bandwidth transponder is used to deliver a data rate of up to 3.51 megabits per second to the aircraft within CONUS at a satellite downlink EIRP of 43 dBW with a downlink margin of 3.07 dB. The Forward Link is shared among the Limited Market Study aircraft.

Reception and recognition of the Forward Link by an aircraft is essential to establishing a Return Link. The Network Management System periodically broadcasts a configuration message over the Forward Link that indicates to the AITR, among other things, the Return link assigned frequency and data rate. The AITR must recognize the NMS configuration message prior to transmitting on the Return Link.

Table 2. Forward Link Budget

Satellite Name	AMC-1	Data Rate	3510000 bps
Satellite Location	103.0 Deg W	Bit Error Rate	1 x 10E-7
Satellite Center Beam EIRP	49.84 dBW	Eb/No Required	1.7 dB
Satellite EIRP in direction of DL ES	45.00 dBW	C/No Required	67.15 dB-Hz
Satellite SFD in direction of UL ES	-98.00 dBW/m^2	Availability Required	N/A
Satellite Input Attenuator	6.0 dB	ITU Uplink Rain Zone	N/A
Operating SFD (NCS value)	-92.00 dBW/m^2	ITU Downlink Rain Zone	N/A
Satellite G/T in direction of UL ES	6.0 dB/K	Modulation Type	QPSK - DSSS
Satellite Input Back Off	2.5 dB	FEC Factor	Rate 1/3 TC
Satellite Output Back Off	0.5 dB	Spread Factor : Bandwidth	6.000 32400
Satellite Transponder BW	36 MHz	Carrier Spacing	1
Satellite Translation Frequency	2,300 MHz	Spread Bandwidth : Signal Bandwidtl	32400.0 5400.0

Uplink Name	Hub	Downlink Name	Aircraft - Worcester, MA
Uplink Location Latitude	33.1 Deg N	Downlink Location Latitude	42.3 Deg N
Uplink Location Longitude	117.2 Deg W	Downlink Location Longitude	71.8 Deg W
Uplink Frequency	14250.0 MHz	Downlink Frequency	11950.0 MHz
Uplink Antenna Size	4.5 m	Downlink Antenna Size	0.2921 m
Uplink Antenna Efficiency	0.65	Downlink Antenna Efficiency	0.58
Uplink Antenna Gain	54.67 dBi	Downlink Antenna Gain	28.89 dBi
Uplink EIRP	68.40 dBW	Downlink Antenna LNA Temp	90 K
Uplink Output Circuit Loss	0.5 dB	Downlink Antenna Noise Temp	37 K
Uplink PA Output Power	26.480 Watts	Downlink Rain Noise	0.00 K
Uplink PA Output Power	14.23 dBW	Downlink Earth Station G/T	7.85 dB/K
Uplink Rain Attenuation	1.00 dB	Downlink Rain Attenuation	0.00 dB
Uplink Misc Losses	1 dB	Downlink Misc Losses	1.5 dB
Uplink Elevation Look Angle	48.54 Deg	Downlink Elevation Look Angle	31.91 Deg
Uplink Azimuth Look Angle	155.09 Deg	Downlink Azimuth Look Angle	222.00 Deg
Uplink Slant Range	37184.79 km	Downlink Slant Range	38454.61 km
Uplink m^2 Antenna Gain	44.53 dBi	Downlink m^2 Antenna Gain	43.00 dBi
Uplink Spreading Loss	162.40 dB(m^2)	Downlink Spreading Loss	162.69 dB(m^2)
Uplink Path Loss	206.93 dB	Downlink Path Loss	205.69 dB

Satellite Input level	-96.00 dBW/m^2	Satellite Input level	-140.53 dBW
Satellite Input Back Off	4.00 dB	Uplink C/No	94.07 dB-Hz
Satellite Output Back Off	2.00 dB	Uplink C/Io	95.61 dB-Hz
Satellite Downlink EIRP	43.00 dBW	Uplink C/(No+Io)	91.76 dB-Hz
		Uplink Margin	24.61 dB
Interference Calculations		Satellite Downlink EIRP	43.00 dBW
Adjacent Satellite Uplink	99.40 dB-Hz	Downlink C/No	72.27 dB-Hz
Adjacent Satellite Downlink	74.81 dB-Hz	Downlink C/Io	74.55 dB-Hz
Cross-Polarization Uplink	102.20 dB-Hz	Downlink C/(No+Io)	70.25 dB-Hz
Cross-Polarization Downlink	87.27 dB-Hz	Downlink Margin	3.10 dB
E.S. HPA Intermodulation	100.00 dB-Hz	Total Link C/(No+Io)	70.22 dB-Hz
Transponder Intermodulation	100.00 dB-Hz	Margin	3.07 dB

Calculate Interference Values?	Calculate Rain Fade For?
Yes No	Neither

C/Io Uplink	95.61 dB-Hz	Antenna Flange Power Density	-25.36 dBW/4 kHz
C/Io Downlink	74.55 dB-Hz	Uplink Off-Axis EIRP Power Density	6.14 dBW/40 kHz
		Downlink EIRP Power Density	8.76 dBW/4 kHz

Transponder Bandwidth Utilization	90.00 %	Installed HPA Size	300.0 Watts
Transponder Bandwidth Utilization	32400.00 kHz	Installed HPA Size	24.77 dBW
Transponder Power Utilization	70.79 %	Required HPA Power	14.23 dBW
Transponder Power Equiv. Bandwidtl	25486.05 kHz	Operating HPA Single Carrier OBO	10.54 dB

Duplex Bandwidth Required	32400.00 kHz		
Duplex Power Equiv. Bandwidth	25486.88 kHz		
Lease Bandwidth Required	32400.00 kHz	CRMA in Use	

6.0 Summary

ARINC has redesigned their wideband communications system to meet the needs of the executive owners/operators of business jet aircraft. A Limited Market Study will enable us to obtain data on how individuals will actually use the system. In turn, this will allow us to refine our models of system usage to better predict how many active users can be served on a single transponder without exceeding the FCC VSAT mask. Further, it will identify patterns of usage that consume excessive system resources (e.g., bandwidth) and enable us to better apportion our service offering equitably among users.