- **Noise Budget Reference**

Transmission characteristics for CONUS and spot beam services are based on the following parameters:

Modulation	QPSK
Coding	Reed Soloman concatenated with Viterbi Rate 1/2 (or equivalent Turbo code)
Channel Bandwidth	
CONUS Beam Service	27 MHz
Spot Beam Service	27MHz
Channel Data Rate	
CONUS Beam Service/ per transponder	32 Mbps
Spot Beam Service, per transponder	32 Mbps
Threshold Eb/No	3.1 dB @ BER = 10^{-9}
Redundancy of Active Components	Minimum of 3:2
TDM Access Method	DVB
Satellite Noise Figure/Temperature	3 dB/920K
Spot Beam Antennas	
Transmit	1.7 meters
Receive	1.1 meters
CONUS Beam Antenna	1.7 meters
Automatic Transmitter Power Control	On all uplinks
Automatic Level Control	On all uplinks
Command Attenuator Settings	15 dB in 1 dB steps
Interbeam Co-channel Interference	19 dB, average
Linearizer	At each TWTA input
Spot Beam Link Availability	99.5%
CONUS Uplink Availability	>99.9%
CONUS Downlink Availability	99.7% (99.6% in southeast)
Feederlink Spot Beam Co-Ch C/I, dB	30
Feederlink & Gateway ES Crosspol	35 dB
Subscriber Terminal Crosspol	30 dB
Feederlink & Gateway ES, meters	5
Feederlink & Gateway ES Gain, dBi	60.5
Satellite Spot Beam Antenna Gain, peak, dBi	49.4
Subscriber ES, meters	0.45
Subscriber ES Gain, dBi	36.8
Nominal Transponder Gain, dB	152
Earth Station Frequency Tolerance	0.002%

CONUS Beam

The overall transmission characteristics for the CONUS beam for five examples are given in Figure C-1 for the 101°W orbital position. The same design is used for 110°W, and 91°W orbital slots, but slant range and elevation angle slightly alters some parameters. The uplink has fixed rain margin, however automatic level control ("ALC") enables the uplink to fade even further, until the downlink threshhold is exceeded at a subscriber earth station. This method of operation enables the availability to exceed 99.98%, before the service is interrupted. It is assumed that the feederlink is located within spot beam. Pegasus tentatively plans to have two feederlink stations, one near Los Angeles and another near Las Vegas.

ES Location	Seattle	New York	Miami	Dallas	Los Angeles
Latitude, degrees north	47.62	40.78	25.77	32.77	34.05
Longitude, degrees west	122.33	73.97	80.2	96.77	118.25
ES Elevation, degrees	31.5	35.3	52.0	37.0	46.3
Uplink					
Feederlink ES Power, Maximum, dBW/ch	13.1	13.1	13.1	13.1	13.1
Loss, dB	-3	-3	-3	-3	-3
Eirp, peak, dBW	70.6	70.6	70.6	70.6	70.6
Total Uplink C/I, dB	28.7	28.7	28.7	28.7	28.7
.Uplink C/N+I, dB	24.0	24.0	24.0	24.0	24.0
SFD, dBW/m^2	-80.9	-80.9	-80.9	-80.9	-80.9
Downlink					
Satellite Transmitter Power, dBW/ch	23.2	23.2	23.2	23.2	23.2
Loss, dB	-2.5	-2.5	-2.5	-2.5	-2.5
Satellite Antennna Gain, dBi	32.5	33.0	34.0	33.5	32.0
Eirp, dBW	53.2	52.7	54.7	54.2	52.7
Eirp Density, dBW/MHz	-17.1	-16.6	-15.6	-16.1	-17.6
Downlink C/I, dB	21.5	21.5	21.8	21.8	21.7
CNR Threshold, dB	4.2	4.2	4.2	4.2	4.2
PFD, dBW/MHz/m^2	-119.8	-119.2	-118.0	-118.5	-120.0
Rain Availability, %	0.1	0.15	0.45	-.15	0.1

Figure C-1. 25/17 GHz CONUS Link Data, 5 Meter Feederlink ES Antenna and

Spot Beam

The overall transmission characteristics for the spot beams for five examples are given in Figure C-2. When applicable, values are given for 110°W, 101°W and 91°W, respectively. The latitude and longitudes give the spot beam boresight (not an earth station location). The same design is used for each of the three orbital slots, but slant range and elevation angle slightly alters some parameters. Each uplink has a fixed rain margin. However, automatic level control ("ALC") enables the uplink to fade even further, until the downlink threshold is exceeded at a subscriber earth station. This method of operation enables the uplink availability to exceed 99.98%. Each spot beam has a Gateway earth station.

The downlink examples in Figure C-2 are based on circular spot beams and an availability due to rain of 99.5%

Spot Beam Number	27	1	24	34	17
Latitude, degrees north	48.76	39.73	23.95	30.65	34.59
Longitude, degrees west	125.76	73.44	80.25	100.14	119.21
ES Elevation (at boresight)	32.0, 29.2, 24.9	30.7, 36.0, 40.6	46.5, 53.6, 59.5	52.7, 54.3, 52.9	48.63, 45.4, 39.9
Uplink					
Feederlink ES Power, Maximum, dBW/ch	20.1, 21.0, 22.9	25.4, 23.3, 22.0	45.4, 42.3, 40.4	25.3, 25.0, 25.2	14.9, 15.3, 16.0
Loss, dB	-3	-3	-3	-3	-3
Eirp, peak, dBW	77.9, 78.8, 80.6	83.2, 81.1, 79.8	103.2, 100.0, 98.2	83.0, 82.7, 83.0	72.7, 73.0, 73.7
Total Uplink C/I, dB	18.9	18.9	18.9	18.9	18.9
Uplink C/N+I, dB	17.7	17.7	17.7	17.7	17.7
SFD, dBW/m^2	-73.9, -73.0, -71.3	-68.2, -70.6, -71.8	-48.3, -51.4, -53.2	-68.4, -68.7, -68.5	-78.8, -78.5, -77.9
Downlink					
Satellite Transmitter Power, dBW/ch	6.3, 6.7, 7.3	7.9, 7.2, 6.7	12.5, 11.6, 11.1	7.5, 7.3, 7.4	4.3, 4.4, 4.7
Loss, dB	-2.5	-2.5	-2.5	-2.5	-2.5
Satellite Antenna Gain, peak, dBi	49.4	49.4	49.4	49.4	49.4
Eirp, EOC, dBW	49.2, 49.6, 50.2	50.8, 50.1, 49.6	55.4, 54.5, 54.0	50.4, 50.2, 50.3	47.2, 47.3, 47.6
Eirp Density, dBW/m^2	-21.1, -20.8, -20.1	-19.6, -20.2, -20.7	-15.0, -15.8, -16.3	-20.0, -20.1, -20.0	-23.1, -23.0, -22.7
Downlink C/I,dB	17.1, 17.0, 17.0	17.0, 17.1, 17.1	17.2, 17.2, 17.2	17.2, 17.2, 17.2	17.2, 17.1, 17.1
CNR Threshold, dB	4.2	4.2	4.2	4.2	4.2
PFD, dBW/MHz/m^2	-123.8, -123.5, -122.9	-122.3, -122.8, -123.2	-117.4, -118.1, -118.6	-122.3,-122.4,-122.3	- 125.5,-125.4,125.2
Rain Availability, %	0.5	0.5	0.5	0.5	0.5

Figure C-2. 25/17 GHz BSS Spot Beam Link Data, 5 meter Gateway ES, 0.45 meter