



**TECHNICAL ANNEX**

**NEW ECHOSTAR 1 (USABSS-16)**

**SYSTEM DESCRIPTION AND INTERFERENCE ANALYSES**

**February 2002**

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# NEW ECHOSTAR 1 SYSTEM DESCRIPTION

## OVERVIEW

This section provides a brief technical description of the NEW ECHOSTAR 1 satellite for the 110° W.L. orbital position. NEW ECHOSTAR 1 (USABSS-16) is a 3-axis stabilized 10 kW class spacecraft available from Boeing, Lockheed or Loral designed to provide U.S. domestic broadcast satellite service. NEW ECHOSTAR 1 contains an active attitude and position control subsystem, a telemetry, command and ranging subsystem, a thermal control subsystem, and an electrical power subsystem.

The repeater consists of 54 spot-beam transponders, each with 24 MHz of usable bandwidth. Uplink frequencies will be in the 17.3-17.8 GHz band, and downlink frequencies in the 12.2-12.7 GHz band. When paired with existing and planned satellites, Echostar 7 and Echostar 8, DIRECTV 4S and DIRECTV 7S, NEW ECHOSTAR 1 will enable New Echostar to make the most efficient use of its existing capacity in order to deliver local broadcast channels to all DMAs in the United States. During the time period between the approval of the merger and the transition to one service platform, the satellites will continue to serve the currently existing and planned markets. After the service rationalization and before the launch of NEW ECHOSTAR 1, additional markets can begin to be rolled out taking best advantage of the redundant coverage of the existing satellites.

The NEW ECHOSTAR 1 satellite will use QPSK modulation in either the DIRECTV or DVB format (see Rec. ITU-R B.O.1294 System A or System B). Receivers will use 45 cm antennas or 45 x 56 cm antennas, except as noted. Transmissions will consist of multiplexed video, audio, and data services in each transponder. All transponders will have a 24 MHz bandwidth.

NEW ECHOSTAR 1 will be placed in the 110° W.L. orbital position collocated with other existing satellite assets of New EchoStar. The satellite design will meet its performance requirements for an operational lifetime of more than 15 years including 100% eclipse operation. The satellite will comply with all international laws and regulations pertaining to the operation of such a space system.

## COMMUNICATIONS PAYLOAD

The NEW ECHOSTAR 1 payload uses 38 separate spot beams on eight frequencies (channels) to provide up to 54 RF transponders to selected geographic regions. Depending on the particular characteristics of the region, the power in the spot-beam transponders varies from approximately 46 watts to 65 watts. The 54 transponders reuse eight of the defined 32 channels in the BSS Region 2 Plan. The average reuse of frequencies is approximately seven.

Frequency reuse is also employed on the feeder link. Programming material to feed the spot beams is transmitted on up to 32 BSS feeder link channels. Programming is transmitted

**TECHNICAL SUPPLEMENT**

Received

APR 2 2002

Satellite Policy Branch  
International Bureau

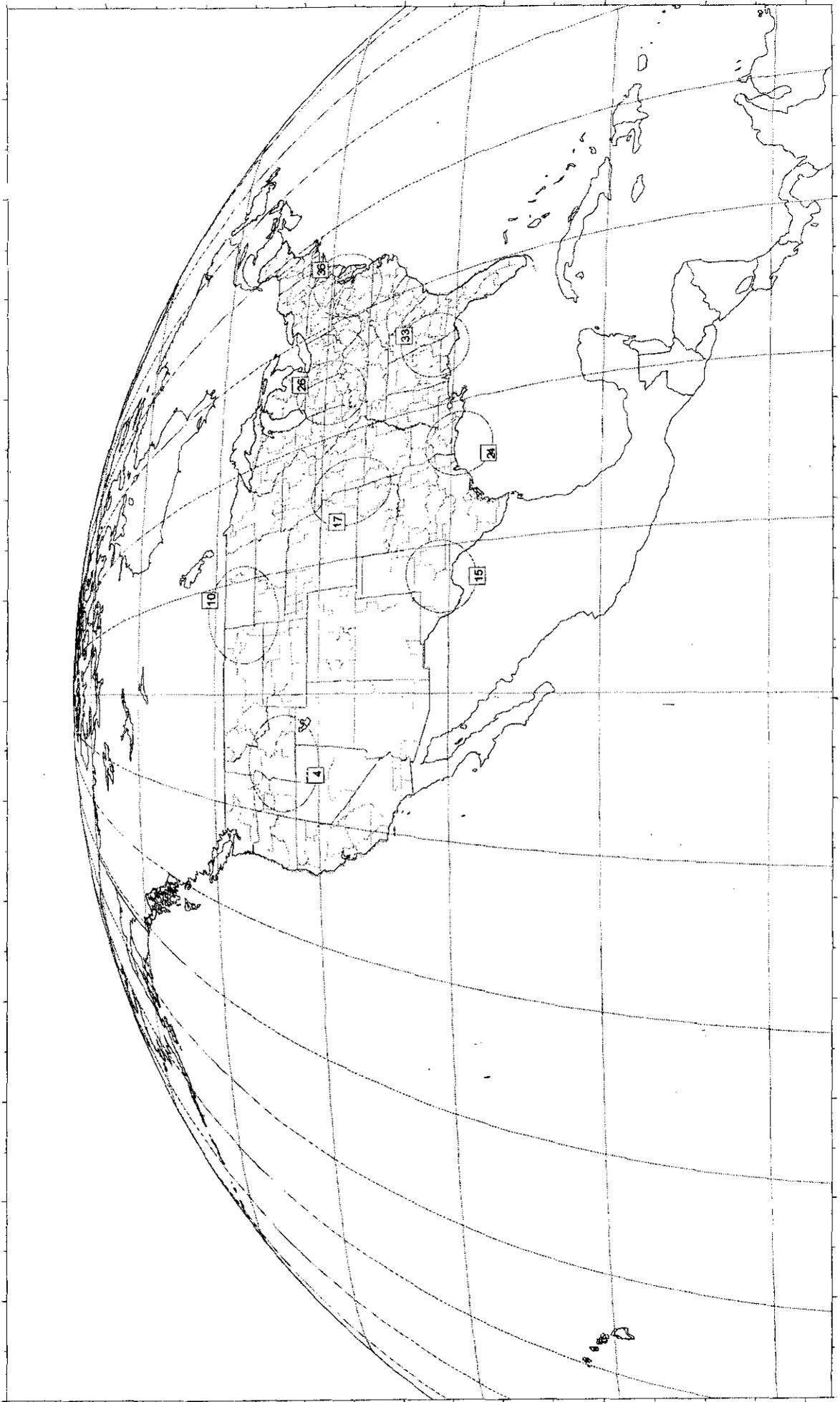
**NEW ECHOSTAR-1 (USABSS-16)**

**INTERFERENCE ANALYSES**

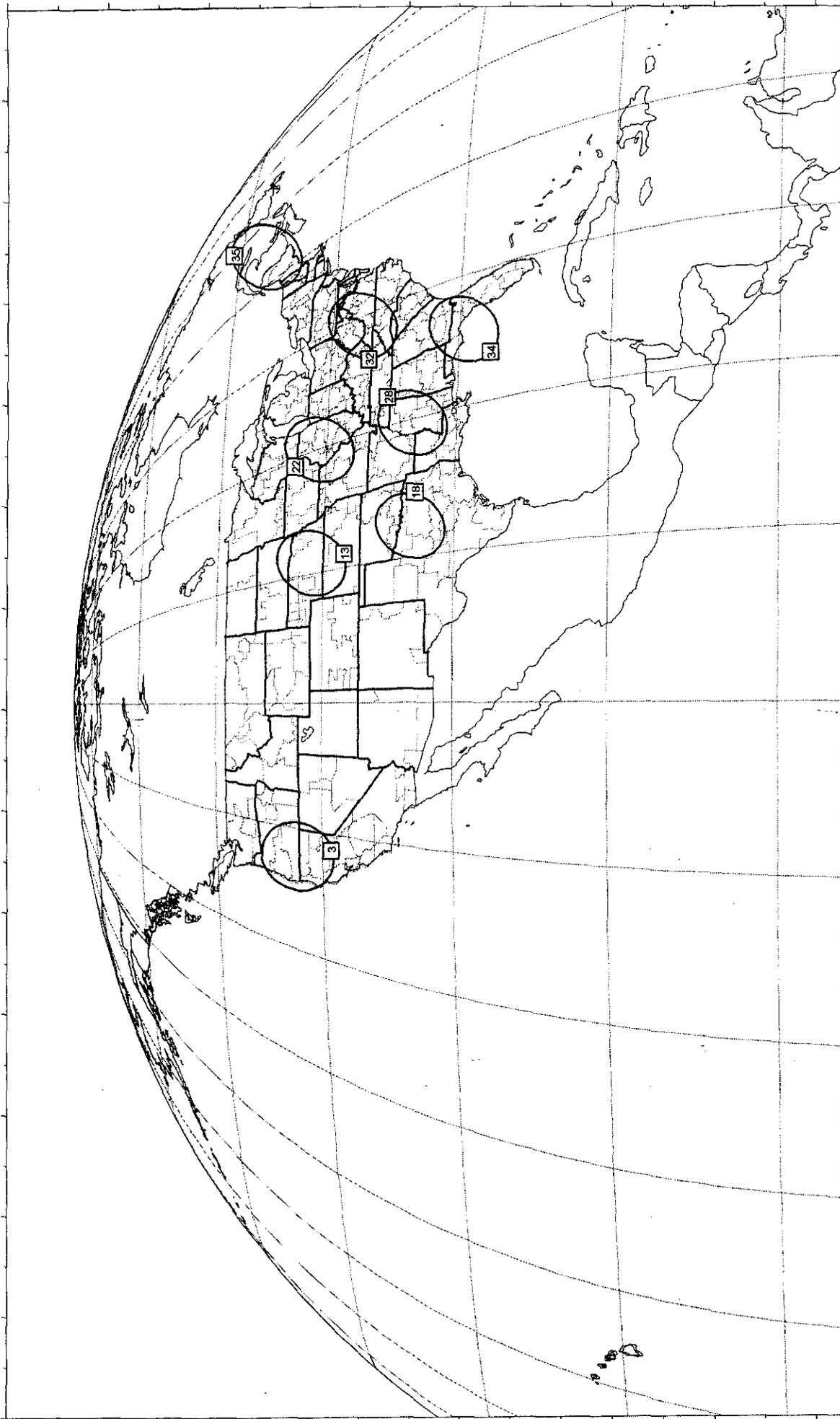
Docket CS 01-348

March 2002

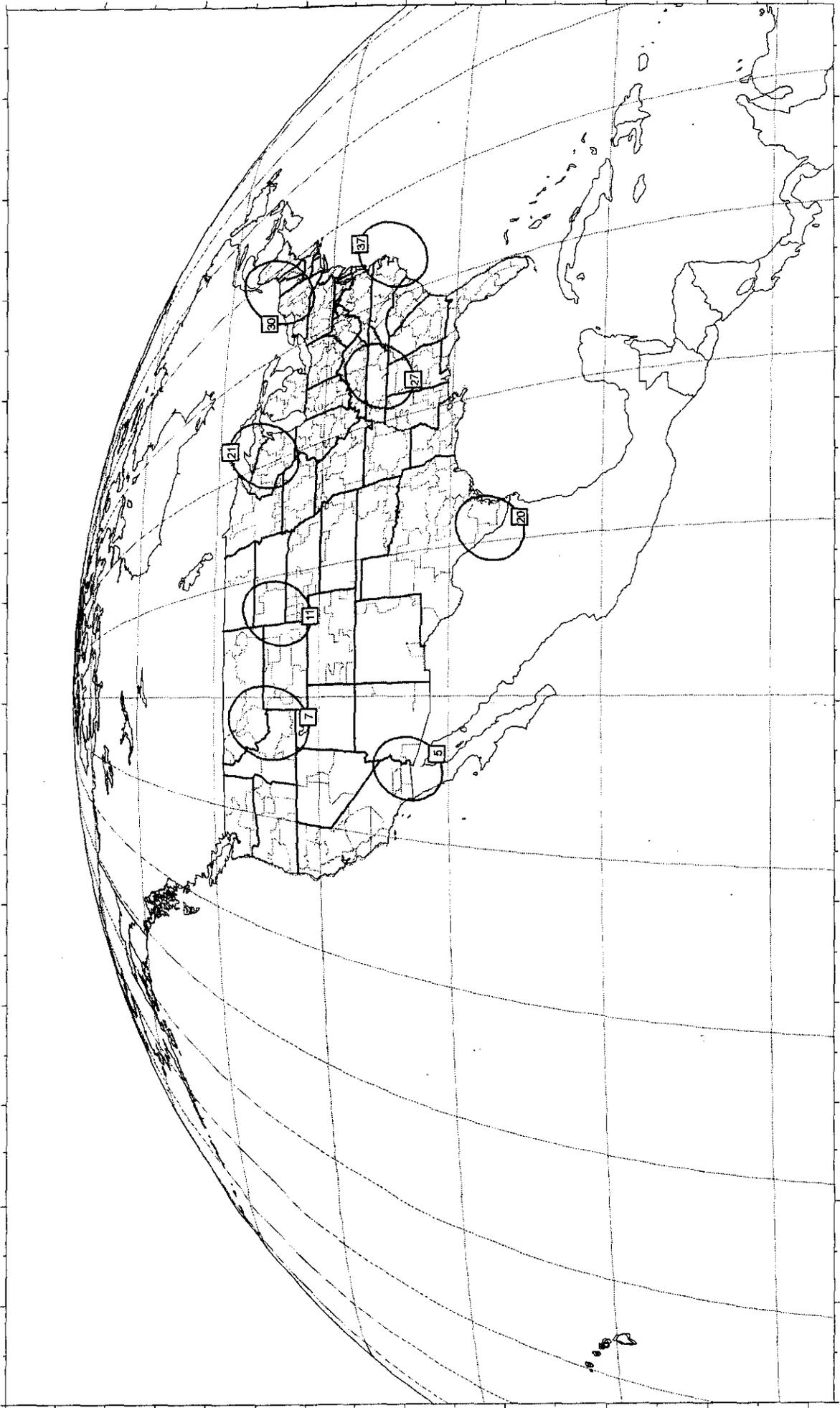
Beams 4, 10, 15, 17, 24, 26, 33, 36



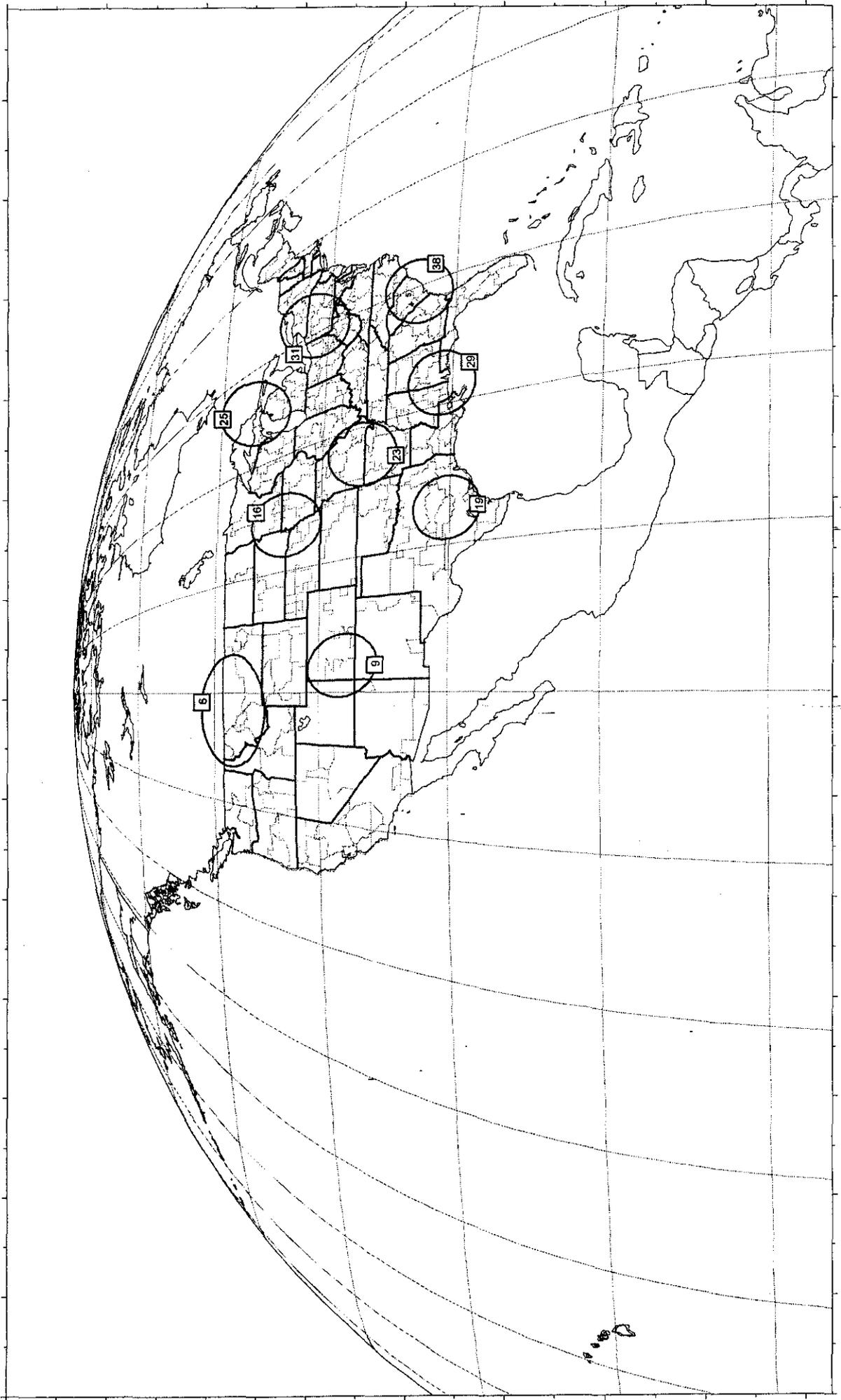
Beams 3, 13, 18, 22, 28, 32, 34, 35



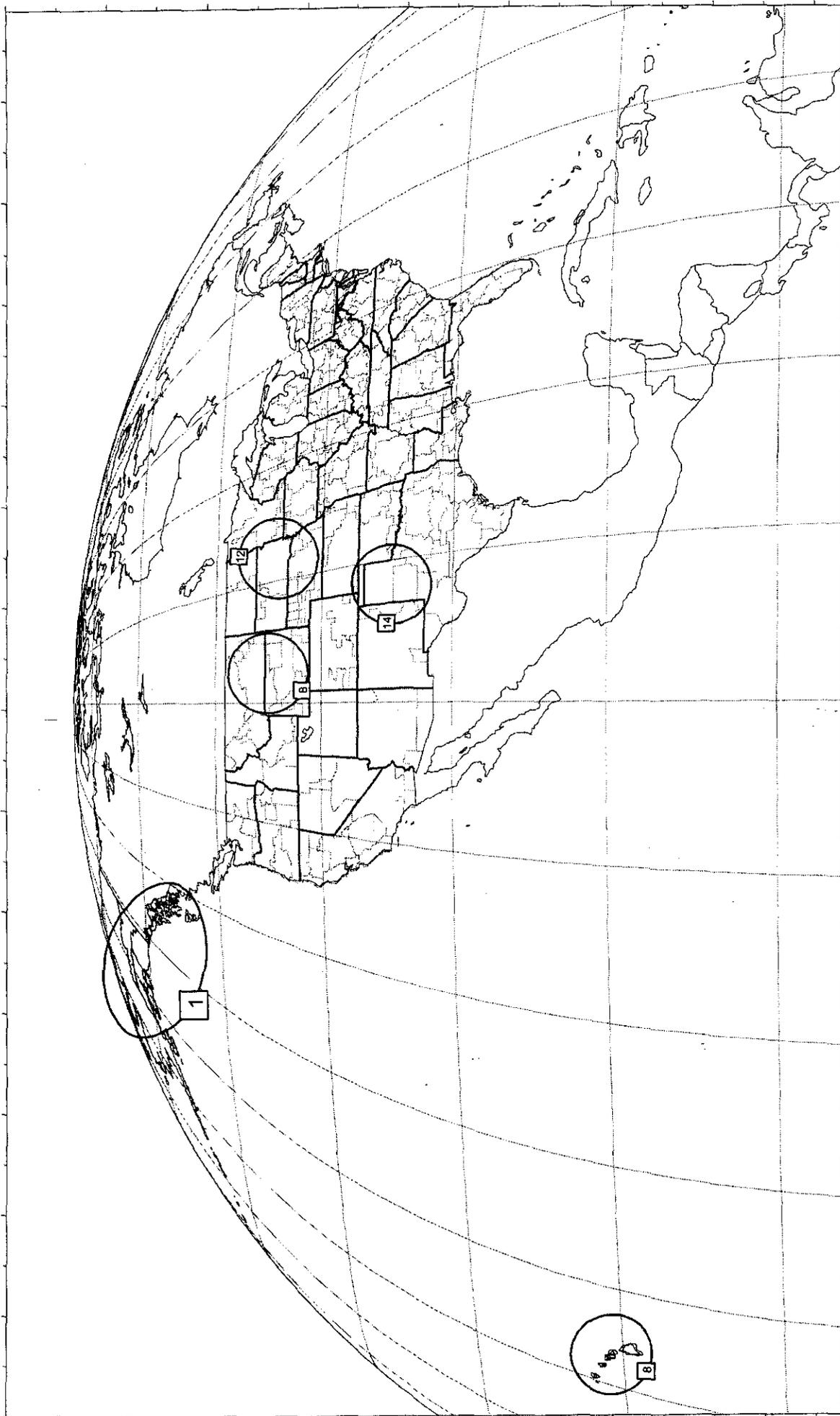
Beams 5, 7, 11, 20, 21, 27, 30, 37



Beams 6, 9, 16, 19, 23, 25, 29, 31, 38



Beams 1, 2, 8, 8, 12, 14



**APPENDIX 1**

**ANNEX 2 TO APPENDIX S30**

**APPENDIX S4 INFORMATION FOR USABSS-16**

**BASIC CHARACTERISTICS TO BE FURNISHED IN NOTICES RELATING TO  
SPACE STATIONS IN THE BROADCASTING-SATELLITE SERVICE**

## APPENDIX S4 INFORMATION FOR USABSS-16

### A.1 Identity of the satellite network

a) Identity of a satellite network: USABSS-16

b) Country: USA

Beam Identification: US16BS01, US16BS02, US16BS03, US16BS04, US16BS05, US16BS06, US16BS07, US16BS08, US16BS09, US16BS10, US16BS11, US16BS12, US16BS13, US16BS14, US16BS15, US16BS16, US16BS17, US16BS18, US16BS19, US16BS20, US16BS21, US16BS22, US16BS23, US16BS24, US16BS25, US16BS26, US16BS27, US16BS28, US16BS29, US16BS30, US16BS31, US16BS32, US16BS33, US16BS34, US16BS35, US16BS36, US16BS37, US16BS38

f) Country symbol of the notifying administration: USA

### A.2 Date of Bringing Into Use

a) Date of Bringing into Use: February 2005

### A.3 Operation administration or agency

A.3 Operating administration or agency: 120 (USA)

### A.4 Orbital information

a) For the case of a space station onboard a GSO satellite:

1) nominal geographical longitude on the geostationary-satellite orbit: 110° W.L.

2) planned longitudinal tolerance and inclination excursion:  $\pm 0.05^\circ$  E-W;  $\pm 0.05^\circ$  N-S

### A.5 Coordination

### A.6 Agreements

### A.8 Rain Climatic Zones:

A.8 Rain climatic zones consistent with Figure 3 of Annex 5 of Appendix 30

### A.11 Regular Hours of Operation

A.11 Regular Hours of Operation: 24 hrs./day; 365 days/year

### B.1 Designation of the satellite antenna beam

US16BS01, US16BS02, US16BS03, US16BS04, US16BS05, US16BS06, US16BS07, US16BS08, US16BS09, US16BS10, US16BS11, US16BS12, US16BS13, US16BS14, US16BS15, US16BS16, US16BS17, US16BS18, US16BS19, US16BS20, US16BS21,

US16BS22, US16BS23, US16BS24, US16BS25, US16BS26, US16BS27, US16BS28, US16BS29, US16BS30, US16BS31, US16BS32, US16BS33, US16BS34, US16BS35, US16BS36, US16BS37, US16BS38

### B.3 Geostationary Space Station Antenna Characteristics

- d) Pointing accuracy of the antenna: 0.1 degree in any direction
- g) For the case of a space station submitted in accordance with Appendix S30:
  - 1) co-polar and cross-polar gain of antenna: see Table 1
  - 2) shape of the beam: all beams shaped
  - 3) for circular beams: not applicable
  - 4) for elliptical beams: not applicable
  - 5) for beams other than circular or elliptical shape:
    - co-polar and cross-polar gain contours: co-polar and cross-polar beam contours in GIMS format are provided on CD-ROM accompanying this Technical Annex
    - beam aim point longitude and latitude: see Table 1

**Table 1. USABSS-16 Beam Information**

Beam	Co-pol Gain, dB	X-pol Gain, dB	Aim Point Long., W	Aim Point Lat., N	Beam	Co-pol Gain, dB	X-pol Gain, dB	Aim Point Long., W	Aim Point Lat., N
US16BS01	36.6	8.6	143.0	59.9	US16BS21	44.1	16.1	89.3	45.6
US16BS02	36.7	8.7	158.0	21.0	US16BS22	44.1	16.1	90.0	40.7
US16BS03	36.6	8.6	121.1	42.1	US16BS23	44.1	16.1	92.7	36.5
US16BS04	40.6	12.6	116.0	43.5	US16BS24	44.6	16.6	93.7	29.8
US16BS05	44.8	16.8	114.7	33.2	US16BS25	43.6	15.6	83.9	46.7
US16BS06	40.6	12.6	110.6	48.1	US16BS26	44.6	16.6	86.3	39.9
US16BS07	40.6	12.6	112.4	44.3	US16BS27	44.6	16.6	85.6	36.4
US16BS08	40.9	12.9	107.8	44.7	US16BS28	44.6	16.6	90.5	33.7
US16BS09	40.6	12.6	108.4	38.7	US16BS29	44.6	16.6	89.9	30.7
US16BS10	39.6	11.6	102.4	47.2	US16BS30	44.56	16.6	72.5	44.9
US16BS11	41.1	13.1	103.3	43.7	US16BS31	44.6	16.6	78.5	41.0
US16BS12	40.6	12.6	98.8	44.3	US16BS32	45.1	17.1	80.2	38.0
US16BS13	41.6	13.6	99.5	41.0	US16BS33	45.1	17.1	85.8	31.6
US16BS14	42.1	14.1	102.4	34.7	US16BS34	45.1	17.1	84.6	29.7
US16BS15	41.6	13.6	102.1	30.9	US16BS35	44.6	16.6	62.6	48.4
US16BS16	42.6	14.6	96.0	43.4	US16BS36	45.1	17.1	75.8	39.5
US16BS17	42.6	14.6	95.5	37.0	US16BS37	44.6	16.6	74.8	36.1
US16BS18	41.6	13.6	97.9	33.2	US16BS38	45.1	17.1	80.1	33.1
US16BS19	43.4	15.4	97.2	30.5					
US16BS20	42.6	14.6	99.3	27.5					

**C.2 Assigned frequency (frequencies)**

- a) In accordance with Appendix S30, channel numbers 18, 20, 22, 24, 26, 28, 30, 32

NOTE: Channels will not be operated simultaneously with any other BSS space stations in the 110 degree W.L. cluster

**C.4 Class of station(s) and Nature of service**

Class of Station: EV

Nature of Service: CR

**C.6 Polarization**

Type of Polarization: Circular

Sense of Polarization: Left-hand

**C.7 Class of Emission**

- a) Class of emission and necessary bandwidth:

Class of Emission: 24M0G7W

Necessary Bandwidth: 24 MHz

**C.8 Power characteristics of the transmission**

- h) Table 2 lists the power supplied to the antenna for each beam and each channel. Also provided for each beam and channel is the maximum power density per Hz.

Maximum power density per Hz for 24M0G7W emission: see Table 2

**Table 2. USABSS-16 Transmission Characteristics**

Beam	BSS CH.	Power to Antenna dBW	Max. Power Density per Hz			Beam	BSS CH.	Power to Antenna dBW	Max. Power Density per Hz		
			5 MHz	40 kHz	4 kHz				5 MHz	40 kHz	4 kHz
US16BS01	30	11.1	-62.7	-62.7	-62.7	US16BS23	18	17.2	-56.6	-56.6	-56.6
US16BS01	24	10.0	-63.8	-63.8	-63.8	US16BS24	28	19.6	-54.2	-54.2	-54.2
US16BS02	18	9.9	-63.9	-63.9	-63.9	US16BS25	24	12.1	-61.7	-61.7	-61.7
US16BS02	20	9.9	-63.9	-63.9	-63.9	US16BS26	20	14.9	-58.9	-58.9	-58.9
US16BS03	20	12.0	-61.8	-61.8	-61.8	US16BS26	28	13.1	-60.7	-60.7	-60.7
US16BS04	28	12.6	-61.2	-61.2	-61.2	US16BS26	22	13.3	-60.5	-60.5	-60.5
US16BS05	18	9.4	-64.4	-64.4	-64.4	US16BS27	26	15.5	-58.3	-58.3	-58.3
US16BS06	32	12.6	-61.2	-61.2	-61.2	US16BS27	24	17.1	-56.7	-56.7	-56.7
US16BS07	26	15.0	-58.8	-58.8	-58.8	US16BS28	32	17.3	-56.5	-56.5	-56.5
US16BS08	24	12.6	-61.2	-61.2	-61.2	US16BS28	20	17.1	-56.7	-56.7	-56.7
US16BS09	30	9.8	-64.0	-64.0	-64.0	US16BS29	22	17.3	-56.5	-56.5	-56.5

Beam	BSS CH.	Power to Antenna dBW	Max. Power Density per Hz			Beam	BSS CH.	Power to Antenna dBW	Max. Power Density per Hz		
US16BS10	30	12.7	-61.1	-61.1	-61.1	US16BS30	24	15.8	-58.0	-58.0	-58.0
US16BS11	22	15.1	-58.7	-58.7	-58.7	US16BS30	22	15.7	-58.1	-58.1	-58.1
US16BS12	32	14.0	-59.8	-59.8	-59.8	US16BS31	32	15.1	-58.7	-58.7	-58.7
US16BS13	26	13.8	-60.0	-60.0	-60.0	US16BS31	30	15.0	-58.8	-58.8	-58.8
US16BS14	18	15.2	-58.6	-58.6	-58.6	US16BS31	18	14.5	-59.3	-59.3	-59.3
US16BS15	26	14.6	-59.2	-59.2	-59.2	US16BS32	28	16.2	-57.6	-57.6	-57.6
US16BS16	18	12.1	-61.7	-61.7	-61.7	US16BS33	30	20.0	-53.8	-53.8	-53.8
US16BS17	24	18.0	-55.8	-55.8	-55.8	US16BS33	18	19.7	-54.1	-54.1	-54.1
US16BS18	22	19.4	-54.4	-54.4	-54.4	US16BS34	20	19.7	-54.1	-54.1	-54.1
US16BS19	32	16.0	-57.8	-57.8	-57.8	US16BS34	28	15.8	-58.0	-58.0	-58.0
US16BS20	18	8.9	-64.9	-64.9	-64.9	US16BS35	28	13.2	-60.6	-60.6	-60.6
US16BS21	20	11.0	-62.8	-62.8	-62.8	US16BS36	26	15.9	-57.9	-57.9	-57.9
US16BS21	22	14.6	-59.2	-59.2	-59.2	US16BS36	20	13.5	-60.3	-60.3	-60.3
US16BS21	28	14.5	-59.3	-59.3	-59.3	US16BS37	24	17.5	-56.3	-56.3	-56.3
US16BS22	26	15.6	-58.2	-58.2	-58.2	US16BS38	32	18.2	-55.6	-55.6	-55.6
US16BS22	32	14.3	-59.5	-59.5	-59.5	US16BS38	22	20.1	-53.7	-53.7	-53.7
US16BS22	30	16.0	-57.8	-57.8	-57.8						

### C.9 Information on modulation characteristics

- b) In the case of a space station submitted in accordance with Appendix S30:
- 1) type of modulation: QPSK
  - 2) pre-emphasis characteristics: not applicable
  - 3) TV standard: not applicable
  - 4) sound-broadcasting characteristics: time division multiplexed compressed digital data
  - 5) frequency deviation: not applicable
  - 6) composition of the baseband: time division multiplexed compressed video and audio
  - 7) type of multiplexing of the video and sound signal: time division multiplex
  - 8) energy dispersal characteristics: carrier will always be modulated
  - 9) digital modulation: effective bit rate: 30.32 Mbps (6/7 code rate), 23.58 Mbps (2/3 code rate); transmitted bit rate: 40 Mbps
  - 10) roll-off factor of the filter of the receiver: in accordance with ITU-R BO1293-1
- d) For stations operating in a frequency band subject to Nos. S22.5C, S22.5D or S22.5F provide:
- the type of mask;
  - the mask identification code.

Not applicable

**C.11 Service Area**

- c) Spot beams provide local coverage to several cities within the contiguous U.S. plus Hawaii and portions of Alaska (see Figure 1)

Test points

Beam	Test Point	Lat., N	Long., W
US16BS01	1	143.0	59.9
US16BS02	1	158.0	21.0
US16BS03	1	121.1	42.1
US16BS04	1	116.0	43.5
US16BS05	1	114.7	33.2
US16BS06	1	110.6	48.1
US16BS07	1	112.4	44.3
US16BS08	1	107.8	44.7
US16BS09	1	108.4	38.7
US16BS10	1	102.4	47.2
US16BS11	1	103.3	43.7
US16BS12	1	98.8	44.3
US16BS13	1	99.5	41.0
US16BS14	1	102.4	34.7
US16BS15	1	102.1	30.9
US16BS16	1	96.0	43.4
US16BS17	1	95.5	37.0
US16BS18	1	97.9	33.2
US16BS19	1	97.2	30.5
US16BS20	1	99.3	27.5

Beam	Test Point	Lat., N	Long., W
US16BS21	1	89.3	45.6
US16BS22	1	90.0	40.7
US16BS23	1	92.7	36.5
US16BS24	1	93.7	29.8
US16BS25	1	83.9	46.7
US16BS26	1	86.3	39.9
US16BS27	1	85.6	36.4
US16BS28	1	90.5	33.7
US16BS29	1	89.9	30.7
US16BS30	1	72.5	44.9
US16BS31	1	78.5	41.0
US16BS32	1	80.2	38.0
US16BS33	1	85.8	31.6
US16BS34	1	84.6	29.7
US16BS35	1	62.6	48.4
US16BS36	1	75.8	39.5
US16BS37	1	74.8	36.1
US16BS38	1	80.1	33.1

**C.15 Description of the group(s) required in the case of non-simultaneous emissions**

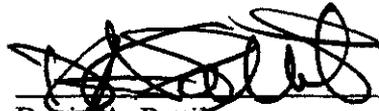
USABSS-16's spot beams (US16BS01 – US16BS38) are grouped in Group 21 with the Plan beam USAEH003. The USABSS-16 beams will not be operated simultaneously on the same channel with any other space station in Group 21.

**EXPEDITED PROCESSING REQUESTED**

**CERTIFICATION OF PERSON RESPONSIBLE  
FOR PREPARING ENGINEERING INFORMATION  
SUBMITTED IN THIS APPLICATION**

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this Application, that I am familiar with Parts 25 and 100 of the Commission's Rules, that I have either prepared or reviewed the engineering information submitted in this Application, and that it is complete and accurate to the best of my knowledge.

By: \_\_\_\_\_



David A. Pattillo

Sr. Manager, Communications Systems  
DIRECTV, Inc.

February 28, 2002

**EXPEDITED PROCESSING REQUESTED****CERTIFICATION OF PERSON RESPONSIBLE  
FOR PREPARING ENGINEERING INFORMATION  
SUBMITTED IN THIS APPLICATION**

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this Application, that I am familiar with Parts 25 and 100 of the Commission's Rules, that I have either prepared or reviewed the engineering information submitted in this Application, and that it is complete and accurate to the best of my knowledge.

By:



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March 27, 2002