Table A-3.a

Ku Band BSS

Signal Characteristics

| | |
|---|---|
| Signal description | Digital MCPC |
| Information rate | 27.6 Mbps |
| Convolutional coding rate | 3/4 |
| Modulation | QPSK |
| Bandwidth | 24 MHz |

Transponder Characteristics

| | |
|---|---|
| Frequency | Ku band |
| Bandwidth | 24 MHz |
| Single carrier saturated EIRP | 53.0 dBW |
| G/T | 1.0 dB/K |
| Input Backoff (Output Backoff) | 0.0 dB (0.0 dB) |

Transmit Earth Station

| | |
|---|---|
| Antenna Diameter | 7.1m |

Receive Earth Station

| | |
|---|---|
| Antenna Diameter | 0.6 m |
| LNA Noise Temperature | 100K |
| Minimum Required $E_b/N_o$ | 5.3 dB |

Performance Objectives

| | |
|---|---|
| End-to-end availability | 99.7% |
| Bit Error Rate | $1 \times 10^{-10}$ |

**Table A-3.b Link Budget for Ku Band BSS**

| | LINK PERFORMANCE | Cl Sky | Up Fade | Dn Fade | Unit |
|---|---|---|---|---|---|
| UPLINK BUDGET | Satellite SFD | -88.0 | -88.0 | -88.0 | $dBW/m^2$ |
| | Agg Input B.O. | 0.0 | 0.0 | 0.0 | dB |
| | Input Backoff/Crr | 0.0 | 0.0 | 0.0 | dB |
| | Crr Flux Density | -88.0 | -90.4 | -88.0 | $dBW/m^2$ |
| | Gain of a Sq meter | 46.3 | 46.3 | 46.3 | dBi |
| | Uplink Path Losses | 209.5 | 224.0 | 209.5 | dB |
| | Tx Pointing Losses | 1.0 | 1.0 | 1.0 | dB |
| | Carrier Up EIRP | 76.2 | 88.2 | 76.2 | dBW |
| | Satellite G/T | 1.0 | 1.0 | 1.0 | dB/K |
| | C/N Uplink | 20.8 | 18.4 | 20.8 | dB |
| DOWNLINK BUDGET | Saturation EIRP | 53.0 | 53.0 | 53.0 | dBW |
| | Agg Output B.O. | 0.0 | 0.0 | 0.0 | dB |
| | Output Backoff/Crr | 0.0 | 0.5 | 0.0 | dB |
| | Carrier Dn EIRP | 53.0 | 52.5 | 53.0 | dBW |
| | Dnlink Path Losses | 206.0 | 206.0 | 208.0 | dB |
| | Rx Pointing Losses | 0.0 | 0.0 | 0.0 | dB |
| | Cl Sky E/S G/T | 15.0 | 15.0 | 15.0 | dB/K |
| | Degradation in G/T | 0.0 | 0.0 | 2.6 | dB |
| | C/N Downlink | 16.1 | 15.6 | 11.6 | dB |
| COMPOSITE LINK | C/N Uplink | 20.8 | 18.4 | 20.8 | dB |
| | C/N Downlink | 16.1 | 15.6 | 11.6 | dB |
| | C/I Intermod (S/C) | 29.0 | 26.6 | 29.0 | dB |
| | C/I Uplink Adj Sat | 29.6 | 27.1 | 29.6 | dB |
| | C/I Dnlink Adj Sat | 11.0 | 8.6 | 11.0 | dB |
| | C/I Xpol | 22.3 | 13.0 | 21.1 | dB |
| | C/I Intermod (E/S) | 53.0 | 29.0 | 53.0 | dB |
| | C/(Nu,d) | 14.8 | 13.8 | 11.1 | dB |
| | C/(Nu,d,ims/c) | 14.7 | 13.5 | 11.0 | dB |
| | C/(Nu,d,im,i)Total | 9.2 | 6.3 | 7.8 | dB |
| | Minimum Reqd C/N | 5.3 | 5.3 | 5.3 | dB |
| | LINK MARGIN | 3.9 | 1.0 | 2.5 | dB |

Table A-4.a

Ka Band FSS (FMTV) (Wide Area Coverage)

Signal Characteristics

| | |
|---|---|
| Modulation | FMTV |
| Signals per transponder | 1 |
| Video Bandwidth | 4.2 MHz |
| Peak FM Deviation | 10.75 MHz |
| Pre-emphasis & weighting | 12.8 dB |

Transponder Characteristics

| | |
|---|---|
| Frequency | Ka band |
| Bandwidth | 36 MHz |
| Single carrier saturated EIRP | 50.0 dBW |
| G/T | 1.0 dB/K |
| Input Backoff (Output Backoff) | 0.0 dB (0.0 dB) |

Transmit Earth Station

| | |
|---|---|
| Antenna Diameter | 6.1 m |

Receive Earth Station

| | |
|---|---|
| Antenna Diameter | 3.0 m |
| LNA Noise Temperature | 100K |
| Threshold C/N | 12.0 dB |
| Pre-detection Bandwidth | 30 MHz |

Performance Objectives

| | |
|---|---|
| End-to-end availability | 99.5% |
| S/N (minimum) | 49 dB |

Table A-4.b Link Budget for Ka Band FSS (FMTV) (Wide Area Coverage)

| | LINK PERFORMANCE | Cl Sky | Up Fade | Dn Fade | Unit |
|---|---|---|---|---|---|
| UPLINK BUDGET | Satellite SFD | -80.5 | -80.5 | -80.5 | $dBW/m^2$ |
| | Agg Input B.O. | 0.0 | 0.0 | 0.0 | dB |
| | Input Backoff/Crr | 0.0 | 5.4 | 0.0 | dB |
| | Crr Flux Density | -80.5 | -85.9 | -80.5 | $dBW/m^2$ |
| | Gain of a Sq meter | 50.9 | 50.9 | 50.9 | dBi |
| | Uplink Path Losses | 215.3 | 232.8 | 215.3 | dB |
| | Tx Pointing Losses | 1.0 | 1.0 | 1.0 | dB |
| | Carrier Up EIRP | 83.9 | 95.9 | 83.9 | dBW |
| | Satellite G/T | 1.0 | 1.0 | 1.0 | dB/K |
| | C/N Uplink | 23.4 | 18.0 | 23.4 | dB |
| DOWNLINK BUDGET | Saturation EIRP | 50.0 | 50.0 | 50.0 | dBW |
| | Agg Output B.O. | 0.0 | 0.0 | 0.00 | dB |
| | Output Backoff/Crr | 0.0 | 1.2 | 0.0 | dB |
| | Carrier Dn EIRP | 50.0 | 48.8 | 50.0 | dBW |
| | Dnlink Path Losses | 211.1 | 211.1 | 215.7 | dB |
| | Rx Pointing Losses | 1.1 | 1.1 | 1.1 | dB |
| | Cl Sky E/S G/T | 33.1 | 33.1 | 33.1 | dB/K |
| | Degradation in G/T | 0.0 | 0.0 | 4.0 | dB |
| | C/N Downlink | 24.7 | 23.5 | 16.1 | dB |
| COMPOSITE LINK | C/N Uplink | 23.4 | 18.0 | 23.4 | dB |
| | C/N Downlink | 24.7 | 23.5 | 16.1 | dB |
| | C/I Intermod (S/C) | 29.0 | 23.6 | 29.0 | dB |
| | C/I Uplink Adj Sat | 42.3 | 36.9 | 42.3 | dB |
| | C/I Dnlink Adj Sat | 28.4 | 23.0 | 28.4 | dB |
| | C/I Xpol | 22.3 | 17.6 | 21.6 | dB |
| | C/I Intermod (E/S) | 123.0 | 99.0 | 123.0 | dB |
| | C/(Nu,d) | 21.0 | 16.9 | 15.4 | dB |
| | C/(Nu,d,ims/c) | 20.4 | 16.0 | 15.2 | dB |
| | C/(Nu,d,im,i)Total | 17.8 | 13.2 | 14.1 | dB |
| | Minimum Reqd C/N | 12.0 | 12.0 | 12.0 | dB |
| | LINK MARGIN | 5.8 | 1.2 | 2.1 | dB |
| Video S/N (w/o Interference) | | 57.6 | 53.3 | 52.5 | dB |
| Video S/N (w/o Interference) | | 55.1 | 50.5 | 51.4 | dB |

Table A-5.a

Ka Band FSS (Cable) (Wide Area Coverage)

Signal Characteristics

| | |
|---|---|
| Signal description | Digital MCPC |
| Information rate | 41.5 Mbps |
| Convolutional coding rate | 3/4 |
| Modulation | QPSK |
| Bandwidth | 36 MHz |

Transponder Characteristics

| | |
|---|---|
| Frequency | Ka band |
| Bandwidth | 36 MHz |
| Single carrier saturated EIRP | 50.0 dBW |
| G/T | 1.0 dB/K |
| Input Backoff (Output Backoff) | 0.0 dB (0.0 dB) |

Transmit Earth Station

| | |
|---|---|
| Antenna Diameter | 6.1m |

Receive Earth Station

| | |
|---|---|
| Antenna Diameter | 3.0 m |
| LNA Noise Temperature | 100K |
| Minimum Required $E_b/N_o$ | 5.3 dB |

Performance Objectives

| | |
|---|---|
| End-to-end availability | 99.7% |
| Bit Error Rate | $1 \times 10^{-10}$ |

**Table A-5.b Link Budget for Ka Band FSS (Cable)** (Wide Area Coverage)

| | LINK PERFORMANCE | Cl Sky | Up Fade | Dn Fade | Unit |
|---|---|---|---|---|---|
| UPLINK BUDGET | Satellite SFD | -80.5 | -80.5 | -80.5 | $dBW/m^2$ |
| | Agg Input B.O. | 0.0 | 0.0 | 0.0 | dB |
| | Input Backoff/Crr | 0.0 | 7.6 | 0.0 | dB |
| | Crr Flux Density | -80.5 | -88.1 | -80.5 | $dBW/m^2$ |
| | Gain of a Sq meter | 50.9 | 50.9 | 50.9 | dBi |
| | Uplink Path Losses | 215.3 | 235.0 | 215.3 | dB |
| | Tx Pointing Losses | 1.0 | 1.0 | 1.0 | dB |
| | Carrier Up EIRP | 84.9 | 96.9 | 84.9 | dBW |
| | Satellite G/T | 1.0 | 1.0 | 1.0 | dB/K |
| | C/N Uplink | 21.9 | 14.3 | 21.9 | dB |
| DOWNLINK BUDGET | Saturation EIRP | 50.0 | 50.0 | 50.0 | dBW |
| | Agg Output B.O. | 0.0 | 0.0 | 0.0 | dB |
| | Output Backoff/Crr | 0.0 | 2.2 | 0.0 | dB |
| | Carrier Dn EIRP | 50.0 | 47.8 | 50.0 | dBW |
| | Dnlink Path Losses | 211.1 | 211.1 | 218.7 | dB |
| | Rx Pointing Losses | 0.5 | 0.5 | 0.5 | dB |
| | Cl Sky E/S G/T | 33.1 | 33.1 | 33.1 | dB/K |
| | Degradation in G/T | 0.0 | 0.0 | 4.6 | dB |
| | C/N Downlink | 23.8 | 21.6 | 11.7 | dB |
| COMPOSITE LINK | C/N Uplink | 21.9 | 14.3 | 21.9 | dB |
| | C/N Downlink | 23.8 | 21.6 | 11.7 | dB |
| | C/I Intermod (S/C) | 29.0 | 21.4 | 29.0 | dB |
| | C/I Uplink Adj Sat | 42.3 | 34.7 | 42.3 | dB |
| | C/I Dnlink Adj Sat | 28.4 | 20.8 | 28.4 | dB |
| | C/I Xpol | 22.3 | 15.6 | 19.6 | dB |
| | C/I Intermod (E/S) | 53.0 | 29.0 | 53.0 | dB |
| | C/(Nu,d) | 19.8 | 13.6 | 11.3 | dB |
| | C/(Nu,d,ims/c) | 19.3 | 12.9 | 11.2 | dB |
| | C/(Nu,d,im,i)Total | 17.2 | 10.5 | 10.6 | dB |
| | Minimum Reqd C/N | 5.3 | 5.3 | 5.3 | dB |
| | LINK MARGIN | 11.9 | 5.2 | 5.3 | dB |

Table A-6.a

Ka Band FSS (DTH) (Wide Area Coverage)

Signal Characteristics

| | |
|---|---|
| Signal description | Digital SCPC |
| Information rate | 5.7 Mbps |
| Convolutional coding rate | 3/4 |
| Modulation | QPSK |
| Bandwidth | 6 MHz |
| Signals per transponder | 6 |

Transponder Characteristics

| | |
|---|---|
| Frequency | Ka band |
| Bandwidth | 36 MHz |
| Single carrier saturated EIRP | 50.0 dBW |
| G/T | 1.0 dB/K |
| Input Backoff (Output Backoff) | 7.0 dB (2.0 dB) |

Transmit Earth Station

| | |
|---|---|
| Antenna Diameter | 6.1m |

Receive Earth Station

| | |
|---|---|
| Antenna Diameter | 1.2 m |
| LNA Noise Temperature | 100K |
| Minimum Required $E_b/N_o$ | 5.3 dB |

Performance Objectives

| | |
|---|---|
| End-to-end availability | 99.5% |
| Bit Error Rate | $1 \times 10^{-10}$ |

**Table A-6.b Link Budget for Ka Band FSS (DTH)** (Wide Area Coverage)

| | LINK PERFORMANCE | Cl Sky | Up Fade | Dn Fade | Unit |
|---|---|---|---|---|---|
| UPLINK BUDGET | Satellite SFD | -80.5 | -80.5 | -80.5 | $dBW/m^2$ |
| | Agg Input B.O. | 7.0 | 7.0 | 7.0 | dB |
| | Input Backoff/Crr | 14.8 | 19.7 | 14.8 | dB |
| | Crr Flux Density | -95.3 | -100.2 | -95.3 | $dBW/m^2$ |
| | Gain of a Sq meter | 50.9 | 50.9 | 50.9 | dBi |
| | Uplink Path Losses | 215.3 | 232.3 | 215.3 | dB |
| | Tx Pointing Losses | 1.0 | 1.0 | 1.0 | dB |
| | Carrier Up EIRP | 70.1 | 82.1 | 70.1 | dBW |
| | Satellite G/T | 1.0 | 1.0 | 1.0 | dB/K |
| | C/N Uplink | 15.8 | 10.8 | 15.8 | dB |
| DOWNLINK BUDGET | Saturation EIRP | 50.0 | 50.0 | 50.0 | dBW |
| | Agg Output B.O. | 2.0 | 2.0 | 2.0 | dB |
| | Output Backoff/Crr | 9.8 | 14.7 | 9.8 | dB |
| | Carrier Dn EIRP | 40.2 | 35.3 | 40.2 | dBW |
| | Dnlink Path Losses | 211.1 | 211.1 | 215.7 | dB |
| | Rx Pointing Losses | 0.1 | 0.1 | 0.1 | dB |
| | Cl Sky E/S G/T | 25.1 | 25.1 | 25.1 | dB/K |
| | Degradation in G/T | 0.0 | 0.0 | 4.0 | dB |
| | C/N Downlink | 15.2 | 10.2 | 6.5 | dB |
| COMPOSITE LINK | C/N Uplink | 15.8 | 10.8 | 15.8 | dB |
| | C/N Downlink | 15.2 | 10.2 | 6.5 | dB |
| | C/I Intermod (S/C) | 20.2 | 15.2 | 20.2 | dB |
| | C/I Uplink Adj Sat | 35.5 | 30.5 | 35.5 | dB |
| | C/I Dnlink Adj Sat | 18.6 | 13.6 | 18.6 | dB |
| | C/I Xpol | 22.3 | 16.3 | 20.7 | dB |
| | C/I Intermod (E/S) | 53.0 | 29.0 | 53.0 | dB |
| | C/(Nu,d) | 12.5 | 7.5 | 6.0 | dB |
| | C/(Nu,d,ims/c) | 11.8 | 6.8 | 5.8 | dB |
| | C/(Nu,d,im,i)Total | 10.6 | 5.6 | 5.5 | dB |
| | Minimum Reqd C/N | 5.3 | 5.3 | 5.3 | dB |
| | LINK MARGIN | 5.4 | 0.3 | 0.2 | dB |

Table A-7.a

Ka Band FSS (SNG) (Wide Area Coverage)

Signal Characteristics

| | |
|---|---|
| Signal description | Digital SCPC |
| Information rate | 5.7 Mbps |
| Convolutional coding rate | 3/4 |
| Modulation | QPSK |
| Bandwidth | 6 MHz |
| Signals per transponder | 6 |

Transponder Characteristics

| | |
|---|---|
| Frequency | Ka band |
| Bandwidth | 36 MHz |
| Single carrier saturated EIRP | 50.0 dBW |
| G/T | 1.0 dB/K |
| Input Backoff (Output Backoff) | 7.0 dB (2.0 dB) |

Transmit Earth Station

| | |
|---|---|
| Antenna Diameter | 2.4 m |

Receive Earth Station

| | |
|---|---|
| Antenna Diameter | 6.1 m |
| LNA Noise Temperature | 100K |
| Minimum Required $E_b/N_o$ | 5.3 dB |

Performance Objectives

| | |
|---|---|
| End-to-end availability | 99.5% |
| Bit Error Rate | $1 \times 10^{-10}$ |

**Table A-7.b Link Budget for Ka Band FSS (SNG)** **(Wide Area Coverage)**

| | LINK PERFORMANCE | Cl Sky | Up Fade | Dn Fade | Unit |
|---|---|---|---|---|---|
| UPLINK BUDGET | Satellite SFD | -80.5 | -80.5 | -80.5 | $dBW/m^2$ |
| | Agg Input B.O. | 7.0 | 7.0 | 7.0 | dB |
| | Input Backoff/Crr | 14.8 | 16.3 | 14.8 | dB |
| | Crr Flux Density | -95.3 | -96.8 | -95.3 | $dBW/m^2$ |
| | Gain of a Sq meter | 50.9 | 50.9 | 50.9 | dBi |
| | Uplink Path Losses | 215.3 | 228.9 | 215.3 | dB |
| | Tx Pointing Losses | 0.7 | 0.7 | 0.7 | dB |
| | Carrier Up EIRP | 69.8 | 81.8 | 69.8 | dBW |
| | Satellite G/T | 1.0 | 1.0 | 1.0 | dB/K |
| | C/N Uplink | 15.8 | 14.3 | 15.8 | dB |
| DOWNLINK BUDGET | Saturation EIRP | 50.0 | 50.0 | 50.0 | dBW |
| | Agg Output B.O. | 2.0 | 2.0 | 2.0 | dB |
| | Output Backoff/Crr | 9.8 | 11.3 | 9.8 | dB |
| | Carrier Dn EIRP | 40.2 | 38.7 | 40.2 | dBW |
| | Dnlink Path Losses | 211.1 | 211.1 | 217.2 | dB |
| | Rx Pointing Losses | 2.0 | 2.0 | 2.0 | dB |
| | Cl Sky E/S G/T | 39.3 | 39.3 | 39.3 | dB/K |
| | Degradation in G/T | 0.0 | 0.0 | 4.4 | dB |
| | C/N Downlink | 27.3 | 25.8 | 16.9 | dB |
| COMPOSITE LINK | C/N Uplink | 15.8 | 14.3 | 15.8 | dB |
| | C/N Downlink | 27.3 | 25.8 | 16.9 | dB |
| | C/I Intermod (S/C) | 20.2 | 18.6 | 20.2 | dB |
| | C/I Uplink Adj Sat | 35.5 | 34.0 | 35.5 | dB |
| | C/I Dnlink Adj Sat | 42.5 | 41.0 | 42.5 | dB |
| | C/I Xpol | 22.3 | 17.3 | 20.2 | dB |
| | C/I Intermod (E/S) | 53.0 | 29.0 | 53.0 | dB |
| | C/(Nu,d) | 15.5 | 14.0 | 13.3 | dB |
| | C/(Nu,d,ims/c) | 14.2 | 12.7 | 12.5 | dB |
| | C/(Nu,d,im,i)Total | 13.6 | 11.3 | 11.8 | dB |
| | Minimum Reqd C/N | 5.3 | 5.3 | 5.3 | dB |
| | LINK MARGIN | 8.3 | 6.0 | 6.5 | dB |

# APPENDIX B

# GALAXY/SPACEWAY™

# Orbital Position Selection Rationale

## Protection Margin Results for Proposed New BSS Beams in Region 1 & 3

The Spectrum Orbit Utilization Program (SOUP) was modified to handle protection margin computations for Regions 1 and 3 and the ITU BSS data base for these regions was then used to determine the baseline protection margins for the current BSS plan and existing BSS systems. With the baseline protection margins in hand, each proposed beam was introduced into the scenario file and the resulting impact on administrations in the BSS plan was observed. In each case the most severely affected beam was identified, and the resulting protection margin degradation determined by comparing the baseline protection margin with the margin resulting when the proposed beam was introduced.

The results from the computer analysis are given for each proposed beam that is anticipated and reflect the most severely affected existing beam from the proposed beam. The results are identified according to whether they are existing or proposed beams, with proposed beams identified by service area, orbital longitude, and downlink EIRP level. A summary of the service areas and corresponding orbital locations can be found in Table App. B-1.

## Simulation Results for Proposed Western Europe Beam at 36° E.L. With 55 dBW EIRP

The simulation results for Regions 1 and 3 BSS plans can be compared with the results when the Western European Beam is added to the scenario file. The proposed Western European beam serves England, Scotland, Ireland, Portugal, Spain, France, Belgium, and the Netherlands from an orbital position of 36° E.L. From this orbital position, the nearest BSS plan assigned orbital locations are Iran at 34° E.L. and Pakistan at 38° E.L. Since all the Western Europe allocations are more than 50° in longitude removed from the 36° E.L. orbital location, there is essentially no impact observed on any Western European beam.

**Table App. B-1 GALAXY/SPACEWAY™ Service Areas and Orbital Locations**

| Service Area | Orbital Location |
|---|---|
| Europe & Africa (Ka band Only) | 25° E |
| Western Europe & Scandinavia | 36° E |
| Africa, Turkey, & Arabian Peninsula | 41° E |
| Eastern Europe | 48° E |
| Western Russia | 54° E |
| Iran, India, & Pakistan | 101° E |
| Asia-Pacific (Ka band only) | 110° E |
| China | 125° E |
| Philippines, Indonesia, & Southeast Asia | 149° E |
| Japan, Korea, Taiwan | 164° E |
| Papua New Guinea, Australia, New Zealand | 173° E |
| North America (Ka band Only) | 101° W |
| North America (Ka band Only) | 99° W |
| Central & South America | 67° W |
| Central & South America | 49° W |

Consequently, the most severe impact of the proposed beam occurs on the Iran and Pakistan existing planned beams IRN10900 and PAK28200. On comparing the total protection margins for the standard BSS plan with the total protection margins when the proposed Western European beam is introduced, it is found that protection margin degradations in IRN10900 in the range of 0 dB to 4.0 dB occur. The positive degradations, however, are all found to occur on channels for which the protection margin remains well positive, so the interference introduced by the proposed beam is acceptable.

Likewise it is found all protection margin degradations for PAK 28200 is 0.1 dB; and all degradation for PAK 28300 leave a remaining protection margin that is substantially positive. Since these impacts are within the bounds of acceptability, the interference introduced by the proposed beam is acceptable.

**Simulation Results for Proposed Scandinavian Beam at 36° E.L. with 55 dBW EIRP**

The proposed Scandinavian beam is designed to serve Norway, Sweden, Finland, Latvia, Estonia, and Denmark from an orbital position of 36° E.L. The Scandinavian countries have BSS plan orbital allocations at 5° E.L., more than 30° in longitude removed from the 36° E.L. position, so it is not surprising that no perceptible impact on the existing planned beams from the proposed beam was found.

A slight impact was seen from the proposed Scandinavian beam at 55 dBW EIRP into the ASTRA beam DBLUX1 (having an orbital position of 19.2E) as revealed by comparing the total protection margin for the standard BSS plan with the margins resulting when the proposed beam is added. For example, channels 11 through 31, test point (62.0, 6.0); and channels 13 through 31, test point (60.0, 19.0) exhibit a total protection margin degradation of 0.1 dB. In no case does the total protection margin of any channel in DBLUX1 degrade by more than 0.1 dB, which is well within the acceptable limits of interference introduced by proposed beam.

**Simulation Results for Proposed African Beams at 41° E.L. with 55 dBW EIRP**

The African continent coverage was subdivided into five regions for purposes of convenience in using the SOUP program: a Northwest beam, a North central beam (covering Libya-Egypt), a West African beam, East African beam, and a South African beam. The orbital position selected for the proposed African coverage beam is 41° E.L. The interference results for all five cases are given below.

The most severe interference for the proposed East African beam at 55 dBW EIRP was recorded in beam SOM31200, where degradation of total protection margin in the range 0.1-0.3 dB are found. Since this degradation occurs with protection margins that are positive to begin with and remain positive on experiencing degradation, these interference levels are acceptable.

The most severe interference for the proposed Northwest African beam at 55 dBW EIRP was found to be negligible, since the total protection margins are the same for the standard BSS plan and for the proposed beam.

The most severe interference for the proposed North Central African beam at 55 dBW EIRP was found to be negligible for negative total protection margins and only

0.2 dB for a handful of positive protection margins (0.1 dB degradation in LBY28000, channel 1, test point (22.5, 18.0), for example). This result demonstrates that the interference level introduced by the proposed beam is acceptable.

The most severe interference for the proposed West African beam at 55 dBW EIRP was recorded in beam LBR24400, channel 3, test point (7.6, -8.6), where a degradation of 0.1 dB in the total protection margin was found; and channels 3 and 7, test point (5.1, -9.8), where a degradation of 0.1 dB was also found. Since 0.1 dB of degradation is well within the 0.25 degradation permitted, the interference levels introduced by the proposed beam are acceptable.

The most severe interference for the proposed South African beam at 55 dBW EIRP was recorded in beam BOT29700, channels 2, 6, 10, 14 and 18, test point (-27.0, 20.6), where a degradation in the total protection margin of 0.1 dB was found. Since this 0.1 dB degradation is well within the acceptable 0.25 dB limit, the interference introduced by the proposed beam is acceptable.

**Simulation Results for Proposed Arabian Peninsula Beam at 41° E.L. with 55 dBW EIRP**

The proposed Arabian Peninsula area beam has an orbital position of 41° E.L., while the BSS existing planned beam position for Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE is 17° E.L. The impact of the proposed beam on the beams ARS00300, ARS27500, and ARS34000 may be summarized as follows: when the planned beam total protection margin is positive, any protection margin degradation leaves the net protection margin positive (defined as 0.00001 dB); when the planned beam total protection margin is negative, no observed change occurs. Similar results apply to all Arabian Peninsula area administrations, so the degradation introduced by the proposed beam is acceptable.

Essentially identical results were obtained with the proposed Turkey beam at 41° E.

**Simulation Results for Proposed Eastern European Beam at 48° E.L. with 55 dBW EIRP**

The Eastern European Beam is an elliptical-shaped beam encompassing Germany, Austria, Switzerland, Italy, Greece, Bulgaria, Romania and Poland. Selecting 48° E.L. as the position from which to illuminate the Eastern European region, may affect the BSS Regions 1 and 3 planned position at 50° E.L. (which includes Afghanistan, Nepal and Sri Lanka (Ceylon).

Comparing the simulation results for Regions 1 and 3 BSS plan with the results of the proposed Eastern European beam, shows that with the existing Afghanistan beams AFG24500 & AFG24600, the Sri Lanka beam CLN21900, and the Nepal beam NPL12200 total protection margins are all degraded by the proposed Eastern European beam, but the margins remain well positive. In a similar manner it may be seen that the planned Eastern European beams for Hungary (HNG10600) and Czechoslovakia (THC14400) remain virtually unaffected by the proposed beam. Similar results hold for the other Eastern European countries.

**Simulation Results for Proposed Russian Beams at 54° E.L. with 55 dBW EIRP**

The Russian coverage was subdivided into two regions for purposes of convenience in using the SOUP program: one region encompassing the Ukraine and Belarus (called the proposed Southern Russian beam) and the other region encompassing St. Petersburg, Samara, Moscow and Volgograd (called the proposed Northern Russian beam). The orbital position selected for the proposed Russian beam is 59° E.L. The interference results for these two cases are given below.

The most severe interference introduced by the proposed Southern Russian beam at 55 dBW EIRP was recorded in beam URS06400, channel 17, which exhibited 0.1 dB total protection margin degradation. Likewise the most severe interference introduced by the proposed Northern Russian beam at 55 dBW EIRP was recorded in beam URS 05902, which exhibited 0.1 dB protection margin for previously negative margins (channels 35 and 39, test point 63.2, 33.0) and a degradation of 0.4 dB for positive margins which remained positive (channels 35 and 39, test point 23.0, 51.7). Since these protection margin degradations are acceptable, the proposed Russian beam is compliant with the intersatellite interference standards set forth in Appendix 30 (ORB85) Annex 1.para.1.

### Simulation Results for the Proposed India-Pakistan Beam at 101° E.L. with 55 dBW EIRP

The proposed India-Pakistan beam has an orbital position of 101° E.L., while the BSS planned orbital positions for India are 56° E.L. and 68° E.L. The worst impact of the proposed beam on the planned beams may be seen in three instances as follows:

| beam | channel | test point | observed PM degradation |
|---|---|---|---|
| IND04000 | 8 | 15.7, 73.6 | 0.1 dB |
| IND04200 | 20 | 30.2, 81.0 | 0.1 dB |
| IND04400 | 5 | 17.8, 81.2 | 0.1 dB |

Since these total protection margins are well within the 0.25 dB degradation that is permitted, the observed degradations are acceptable.

Essentially identical results were obtained for the Iranian beam at 101° E.

### Simulation Results for Proposed China Beams at 125° E.L. with 55 dBW EIRP

The China coverage was subdivided into three regions for purposes of convenience in using the modified SOUP program: an Eastern China beam, a Western China beam, and a Northern China beam. The orbital position selected for the proposed China coverage is 125° E.L., while the orbital locations for China under the BSS plan are 62° E.L., 80° E.L., and 92° E.L. It is necessary to restrict channel use to channels 1-27 to avoid interference with USASAT-14M at 126° E.L., which uses downlink frequencies 12.25 - 12.5 GHz. The interference results for the above three proposed beams are given below.

The worst case interference introduced by the proposed Eastern China beam at 55 dBW EIRP was recorded in beam CHN18700 where a 0.1 dB degradation in the total protection margin was observed in channel 10, test point (24.6, 104.7) (from -0.9 dB to -1.0 dB), and a 0.2 dB degradation was observed in channel 10, test point (25.5, 109.0) (from 6.7 dB to 6.5 dB).

The worst case interference introduced by the proposed Western China beam at 55 dBW EIRP was likewise recorded in the beam CHN18700, where a 0.1 dB degradation in the total protection margin was observed in channel 10, test point (24.6, 104.7) (from -0.9 dB to -1.0 dB); a 0.2 dB degradation was observed in channel 10, test point (29.2, 107.5) (from 6.7 dB to 6.5 dB); a 0.3 dB degradation was observed in channel 10, test point (27.0, 109.5) (from 9.0 dB to 8.7 dB).

The most severe interference introduced by the proposed Northern China beam at 55 dBW EIRP was recorded in beams CHN18400, CHN18500, CHN15800, CHN16300 and CHN16500. The degradations in total protection margin are seen to be in the range 0.1 - 0.9 dB, but in all cases the resulting protection margins remain well positive, so the interference introduced by the proposed beam is well within the permissible limits set by Appendix 30 (ORB85) Annex1.para.1 of the Radio Regulations.

**Simulation Results for Proposed Thailand/Laos/Cambodia/Vietnam Beam at 149° E.L. with 55 dBW EIRP**

The proposed beam at 149° E.L. encompasses Thailand, Laos, Cambodia, and Vietnam. The Regions 1 and 3 BSS planned position for Cambodia is 68° E.L., for Laos 74° E.L., for Thailand 74° E.L., and for Vietnam 86° E.L. Consequently the existing planned beam for Thailand is the closest to the proposed beam for those service areas covered by the proposed beam. The impact of the proposed beam on the existing planned beam THAI4200 may be seen by comparing the BSS plan protection margin printout with the new margin when the proposed beam is added. This impact is negligible since the total protection margins of the standard BSS plan are identical with the protection margins when the proposed beam is added. Similar results apply to the Marshall Islands beam at 146° E.L. and the Fiji beam at 152° E.L.

**Simulation Results for Proposed Indonesia-Singapore Beam at 149° E.L. with 55 dBW EIRP**

The proposed Indonesia-Singapore Beam has an orbital position of 149° E.L., while the existing BSS planned positions for Indonesia are 80° E.L. and 104° E.L., and for Singapore is 74° E.L. The impact of the proposed beam on Fiji (152° E) and the Marshall Islands (146° E) is to slightly reduce the total protection margins which nevertheless remain well positive.

In the case of the Indonesian beams INSO3000, INSO35000, and INSO3600, there are several instances of 0.1 dB protection margin degradation, and one instance

(INSO3600, Channel 19, test point (-8.5, 140.3)) where a positive margin was reduced by 0.3 dB, but remained well positive. Since all these degradations are well within tolerable bounds, the interference introduced by this proposed beam is acceptable.

**Simulation Results for Proposed Philippines Beam at 149° E.L. with 55 dBW EIRP**

The proposed Philippines beam has an orbital position of 149° E.L., while the BSS planned beam position for the Philippines is 98° E.L. By comparing the standard BSS plan protection margins with those margins resulting when the proposed beam is introduced, it may be seen that the impact on the Philippines existing planned beam PHL28500 is negligible. Likewise the impact of the proposed beam on Fiji (152° E) and the Marshall Islands (146° E) is to slightly reduce the BSS plan protection margins, nevertheless keeping the resulting margins well positive. Consequently the interference introduced by the proposed beam is acceptable.

**Simulation Results for Proposed Japanese Beam at 164° E.L. with 54.5 dBW EIRP**

The proposed Japanese beam has an orbital position of 164° E.L., and the BSS planned orbital position for Japan is 110° E.L. The existing planned beams in the vicinity of 164° E.L. are the Cook Islands (CKH) and New Zealand beams at 158° E.L., and the Palmyra Islands (PLM) and Tonga (TON) beams at 170° E.L. All total protection margins which were originally positive in the standard BSS plan remain positive with the addition of the proposed Japanese beam with the single exception of the existing planned Japanese beam J11100, channel 1, test point (45.5, 141.9), which had a total protection margin of 0.4 dB and was degraded to 0.0 dB with the addition of the proposed beam.

The negative protection margins of PLM33701 and TON 21500 were either degraded by 0.1 dB or remained unaffected by the addition of the proposed beam. The most pronounced effect of the proposed beam is seen in the beam J11100, where protection margin degradation from the standard BSS plan to the added proposed Japanese beam of 0.1 and 0.2 dB can be seen. In one case - Channel 5, test point (45.5, 141.9) - the protection margin degradation is seen to be 0.3 dB for J11100. This degradation can be maintained with the allowable degradation of 0.25 by reducing the downlink EIRP to 54.5 dB.

**Simulation Results for Proposed Korean Beam at 164° E.L. with 55 dBW EIRP**

The proposed Korean beam has an orbital position of 164° E.L., and the BSS planned orbital position for both North and South Korea is 110° E.L. The impact of the proposed beam with 55 dBW EIRP on the existing plan beam KOR11200 is negligible since the total protection margins with the proposed beam added match those of the standard BSS plan. The beam KRE28600 experiences protection margin degradation (from 0 dB on channel 18 up to 6.3 dB on channel 20), but since all significant degradation left the resulting protection margins positive, the degradation observed remained acceptable.

**Simulation Results for Proposed Taiwan Beam at 164° E.L. with 55 dBW EIRP**

The proposed Taiwan beam has an orbital position of 164° E.L., and the BSS planned orbital position for Taiwan is 92° E.L. for the beam CHN 17900. The impact of the proposed beam with 55 dBW EIRP on the existing planned beam CHN 17900 ranges from 0.1 dB degradation to 0.8 dB degradation to the total protection margin. Since the degraded protection margins remain positive (from 11.2 dB to 15.7 dB), the observed degradation remains acceptable.

**Simulation Results for Proposed New Zealand Beam at 173° E.L. with 55 dBW EIRP**

The proposed New Zealand beam has an orbital position of 173° E.L., while the BSS planned orbital positions for New Zealand coverage are 128° E.L. and 158° E.L. The worst impact of the proposed beam having 55 dBW EIRP may be seen on the existing Palmyra beam PLM33701 (which has an orbital position of 170° E), where a degradation in the total protection margin of 0.1 dB occurs on channel 17 (two test points). Since this degree of degradation is well within the 0.25 dB limit permitted, the degradation observed is acceptable.

The impact of the proposed New Zealand beam on the existing BSS plan New Zealand beams NZL05500 and NZL28700 is also seen to be within acceptable limits. All protection margins which are originally positive remain positive. In only one case (NZL28700, channel 13, test point (-34.1, 171.8)) the original protection margin was reduced from 0.1 dB to zero after introduction of the proposed beam.

### Simulation Results for Proposed Australian Beams at 173° E.L. with 55 dBW EIRP

The proposed Australian beam (comprised of the Eastern Australian beam and the Western Australian beam) has an orbital position of 173° E.L., while the BSS planned orbital positions for Australia are 98° E.L. and 128° E.L. The worst impact of the proposed beam having 55 dBW EIRP may be seen in the beams AUS00700 and AUS00800. For the beam AUS00700, the degradation in total protection margin on channels 3, 7, 11, 15, 19 and 23 ranges from 0.1 dB to 0.2 dB, well within the acceptable bound of 0.25 dB. For the beam AUS00800, the degradation in total protection margin on channels 2, 6, 10, 14, 18, and 22 ranges from 0.1 dB (on channel 10, test point (-21.2, 149.2) to 1.3 dB (on channel 22, test point (-14.5, 142.8)). No protection margin that was originally negative is degraded by more than 0.2 dB, and all degradation greater than 0.25 dB occurs with channels whose total protection margins remain well positive. Since these degradations are all well within the limits of acceptability, the interference introduced by the proposed Australian beam is also acceptable.

### Simulation Results for Proposed Papua New Guinea Beam at 173° E.L. with 55 dBW EIRP

The proposed Papua New Guinea beam has an orbital position of 173° E.L., while the BSS planned orbital position for Papua New Guinea coverage is 128° E.L. The proposed Papua New Guinea beam with 55 dBW EIRP has essentially no impact on the existing plan Papua New Guinea beams PNG13100 and PNG27100 since the total protection margins both with and without the proposed Papua New Guinea beam remain exactly the same.

### Simulation Results for Proposed Bermuda Beam at 67° W.L. with 55 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed beam - both odd and even channels - illuminating the Bermuda Island area, the most severe case of beam interference occurs for BERBERMU where total protection margin degradations of 0.1 dB can be found to occur. Because this degree of protection margin degradation is well within the 0.25 dB degradation limit permitted for any non-planned beam, the introduction of this proposed beam is acceptable.

### Simulation Results for Proposed Caribbean Beam at 67° W.L. with 53 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed beam illuminating the Caribbean area, it is seen that the most severe interference occurs for the beam MEXO1SUR and the test point (21.8, -86.0), which is located in the Caribbean off the coast of Cancun. Using only the even-numbered channels with LHC polarization, limiting the downlink EIRP to 53 dBW and using a fast roll-off antenna, the degradation in total protection margin for the above noted beam and test point is 0.2 dB which is well within the 0.25 dB limit for acceptable interference levels.

### Simulation Results for Proposed South America Southern Beam at 67° W.L. with 53.5 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed beam illuminating the Southern portion of South America, it is seen that the total protection margin for Brazilian beams BOOCE311, 411, and 511 degrade by 0.1 dB. The most serious degradation, however, occurs within the Uruguayan beam URG00001 where numerous instances of protection margin degradation of 0.2 dB occur, and one test point (-34.5, -57.9) registers a degradation of 0.3 dB. Lowering the downlink EIRP to 53.5 dBW would bring the impact of the proposed beam to within the 0.25 dB degradation permitted for any non-planned beams as long as even numbered channels only are used and the downlink EIRP is restricted to 53.5 dBW.

### Simulation Results for Proposed South America Central Beam at 67° W.L. with 55 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed beam illuminating the Central section of South America, it is seen that there are numerous instances where the total protection margin degradation on existing beams MEXO2NTE, BOOCE311, BOOCE411 and BOOCE511 amounts to 0.1 dB. In the case of BOOCE411, channel 32, the protection margin degradation for all test points is -0.2 dB which is still well within the allowable degradation of 0.25 dB so long as even numbered channels only are used.

## Simulation Results for Proposed South America Northern Beam at 67° W.L. with 54.5 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed beam at 67° W.L. illuminating the Northern section of South America, it is seen that there are numerous instances where the total protection margin is degraded, especially when all channels (both odd and even) are included in the proposed beam. For example, the total protection margins for the beam ATNBEAM1 are degraded by 0.2 dB, but the margins remain well positive in every case.

Likewise the total protection margin degradation in the beams BOOCE311, BOOCE411, BOOCE511, BOON0611, and URG00001 amounts to 0.1 dB (well within the 0.25 dB degradation permitted for non-planned beams). The most severe case of interference occurs for MEXO1SUR at 69.2° W.L. since all channels, both odd and even, are present in the proposed beam, and MEXO1SUR is a beam carrying odd-numbered channels. The total protection margin degradation experienced by MEXO1SUR in almost every instance is 0.2 dB; however, at the test point (21.8, -86.0), for channels 25, 29 and 31, the observed degradation is 0.3 dB. This 0.3 dB observed degradation probably reflects round-off error from 0.25 dB, but in any case can be brought within the allowable 0.25 dB degradation by reducing the downlink EIRP to 54.5 dBW. This proposed beam should use RHC polarization for even channels and LHC polarization for odd channels.

## Simulation Results for Proposed Mexican Beam at 67° W.L. with 55 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed Mexican beam, it is seen that there are numerous instances where the total protection margin degradation in the beams MEXO1NTE, MEXO1SUR, and MEXO2NTE is 0.1 dB. In no case is a protection margin which was negative under the Region 2 BSS plan degraded by more than 0.1 dB (well within the 0.25 dB degradation which is permitted), so long as even channels only are utilized having LHC polarization.

### Simulation Results for Proposed Central American Beam at 67° W.L. with 55 dBW EIRP

On comparing the SOUP simulation results for the Region 2 BSS plan with the results for the proposed Central American beam, it is seen that the total protection margins in all six Central American countries (Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama) remain positive when the proposed beam in introduced. Consequently, the level of interference generated by the proposed beam is acceptable provided only even-numbered channels are used.

### Simulation Results for Proposed South America Southern Beam at 49° W.L. with 55 dBW EIRP

Observing the orbital restrictions on spectrum use by using only channels 1-19 at 49° W.L., the simulation results for the Region 2 BSS plan can be compared with the results for the proposed South America Southern beam. It will be seen that the most severely impacted beam is the southern Brazilian beam BOOSU112 at 44.8° W.L. and 45.2° W.L. which registers numerous total protection margin degradations of 0.1 dB. Since this degradation is well within the 0.25 dB degradation permitted for introduction of a non-planned beam, the level of interference introduced by the proposed beam is acceptable.

### Simulation Results for Proposed South America Central Beam at 49° W.L. with 55 dBW EIRP

Observing the orbital restrictions on spectrum use by using only channels 1-19 at 49° W.L., the simulation results for the Region 2 BSS plan and the results for the proposed South America Central beam can be compared. It is seen that the Brazilian beams BOOCE312, BOOCE412, and BOOSU112 experience numerous instances of total protection margin degradation amounting to 0.1 dB. The most severely impacted beam is BOOSU212, which experiences several instances of total protection margin degradation amounting to 0.2 dB. Since these protection margin degradations are well within the 0.25 dB degradation permitted for non-planned beams, the interference introduced by the proposed beam is acceptable.

**Simulation Results for Proposed South America Northern Beam at 49° W.L. with 51 dBW EIRP**

Observing the orbital restrictions on spectrum use by using only channels 1-19 at 49° W.L., the simulation results for the Region 2 BSS plan alone can be compared with the results for the proposed South America Northern beam. The Brazilian beams BOOCE312,412 and BOOSU112,212 are not noticeably affected by the proposed beam. The Antillian beam ATNBEAM1 is affected by the proposed beam, but the total protection margins for the Antillian beam remain well positive. The beam GUFMGG02 is the most severely affected, and the downlink EIRP of the proposed beam must be restricted to 51 dBW to ensure that the total protection margins on channels 4, 8, and 16 at test point (2.2, -54.2) will not be degraded below 0 dB.

**Simulation Results for Proposed Central American Beam at 49° W.L. with 55 dBW EIRP**

The orbital restrictions on spectrum use prohibit utilizing 12.5-12.7 GHz further east than 54° W.L., so that only channels 1-19 can be exploited from the 49° W.L. orbital position. On comparing the SOUP simulation results for the Region 2 BSS plan with the results including the proposed Central American beam, it is seen that the total protection margins in all six Central American countries (Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama) remain well positive when the proposed beam is introduced. Consequently, the level of interference generated by the proposed beam is acceptable.

**Simulation Results for Proposed Mexican Beam at 49° W.L. with 55 dBW EIRP**

Observing the orbital restriction on spectrum use by using only channels 1-19 at 49° W.L., the simulation results for the Region 2 BSS plan can be compared with the results for the proposed Mexican beam. It is seen that the two beams ANTBEAM1 and GUFMGG02 at 52.8° W.L. are affected, but their total protection margins remain well positive. Likewise the Brazilian beams BOOCE312, B00412, B00SU112, and B00SU212 at 44.8° W.L. are not noticeably affected. The Mexican beams MEXO1NTE, MEXO1SUR, and MEXO2NTE register mild total protection margin degradations of 0.1 dB, which is well within the limit of 0.25 dB for acceptable interference levels.

# APPENDIX C

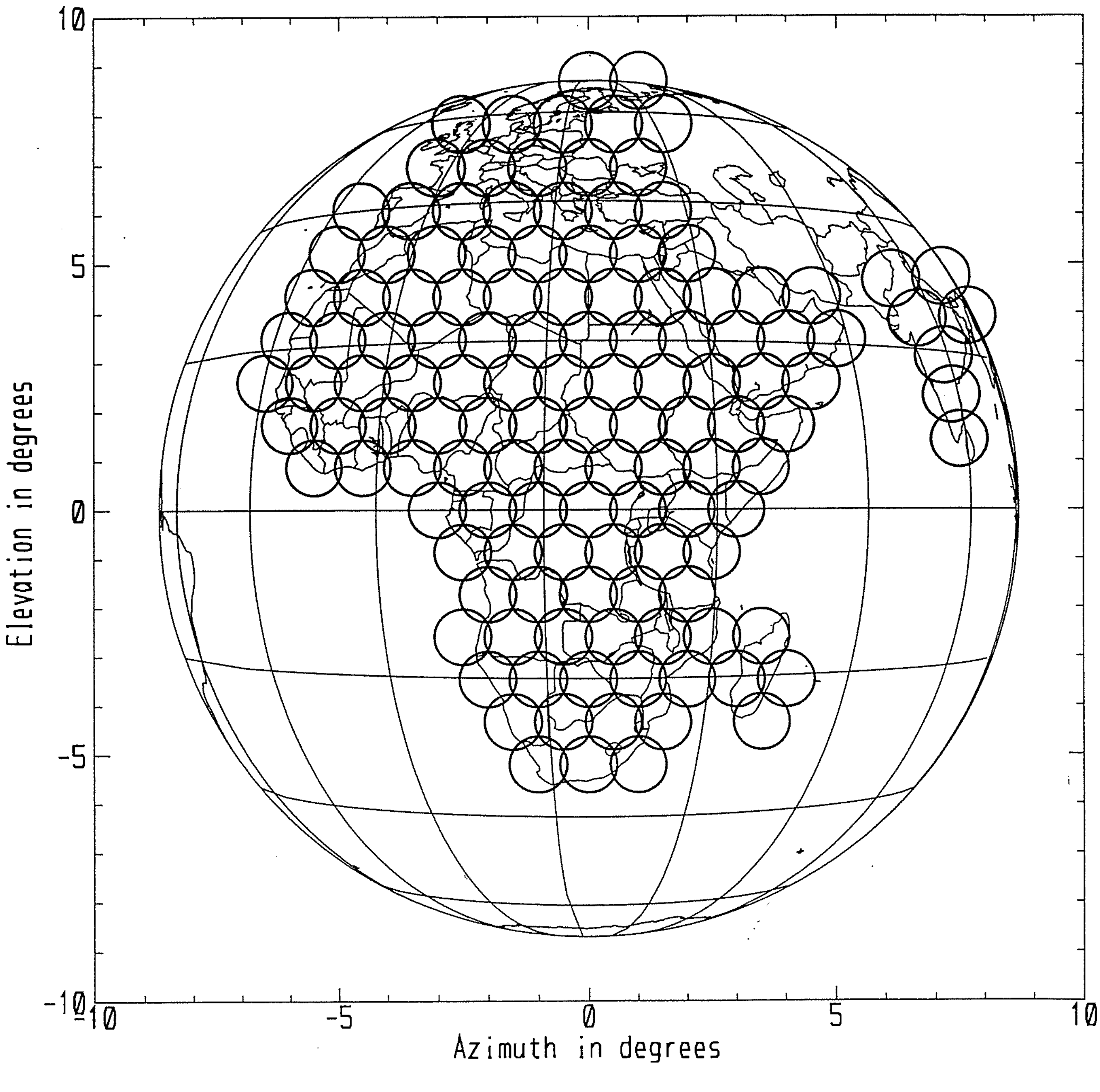
## GALAXY/SPACEWAY™

## Uplink and Downlink Coverage

## Per Orbital Location

**Figure C-1a**

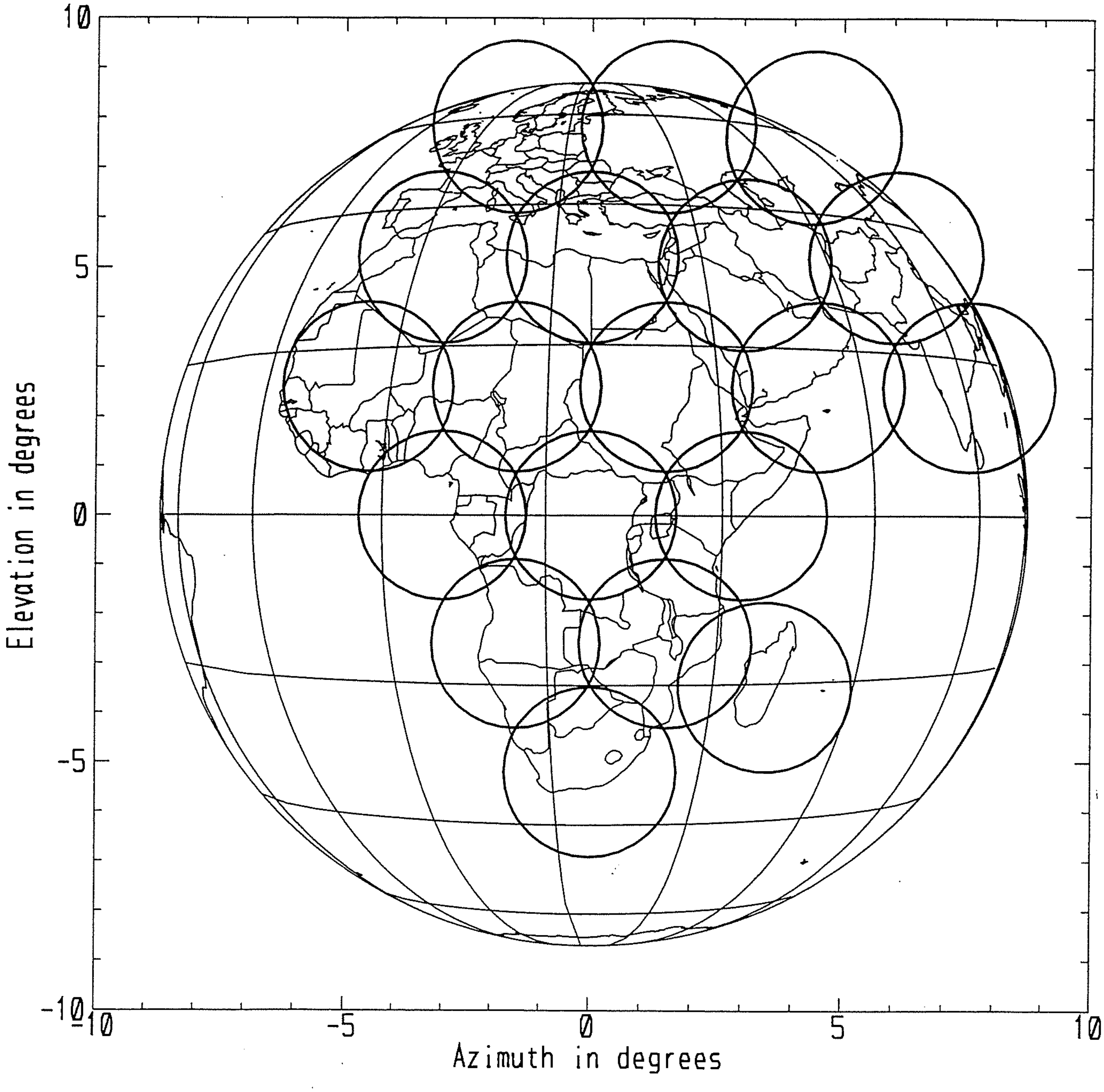
**GALAXY/SPACEWAY™**
**Ka FSS High-Powered Narrow Spot Beams at 25° E Longitude**




**PEAK EIRP= 48 - 60 dBW**
**LHCP, RHCP**

**Figure C-1b**

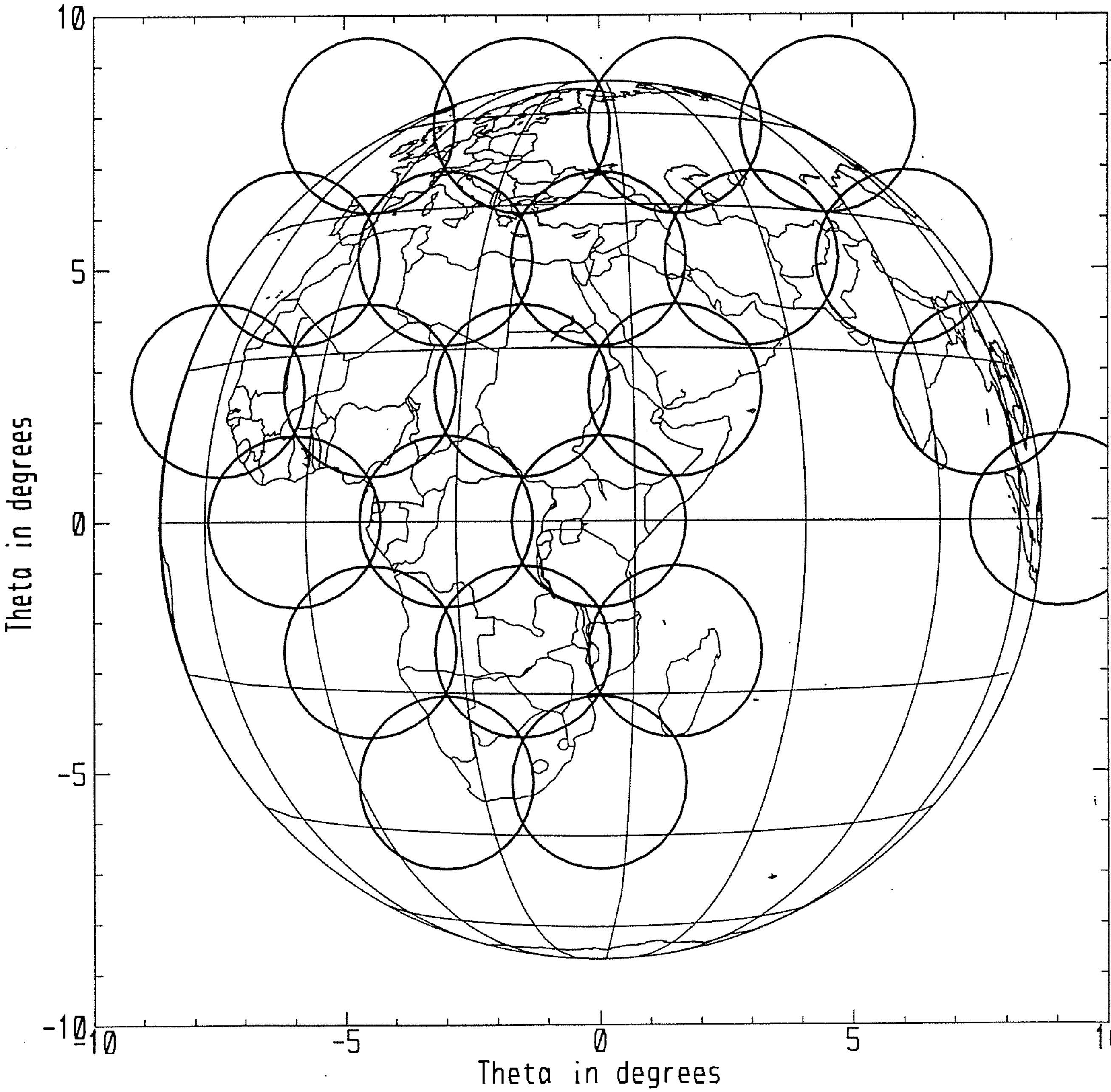
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 25° E Longitude**




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

**Figure C-2a**

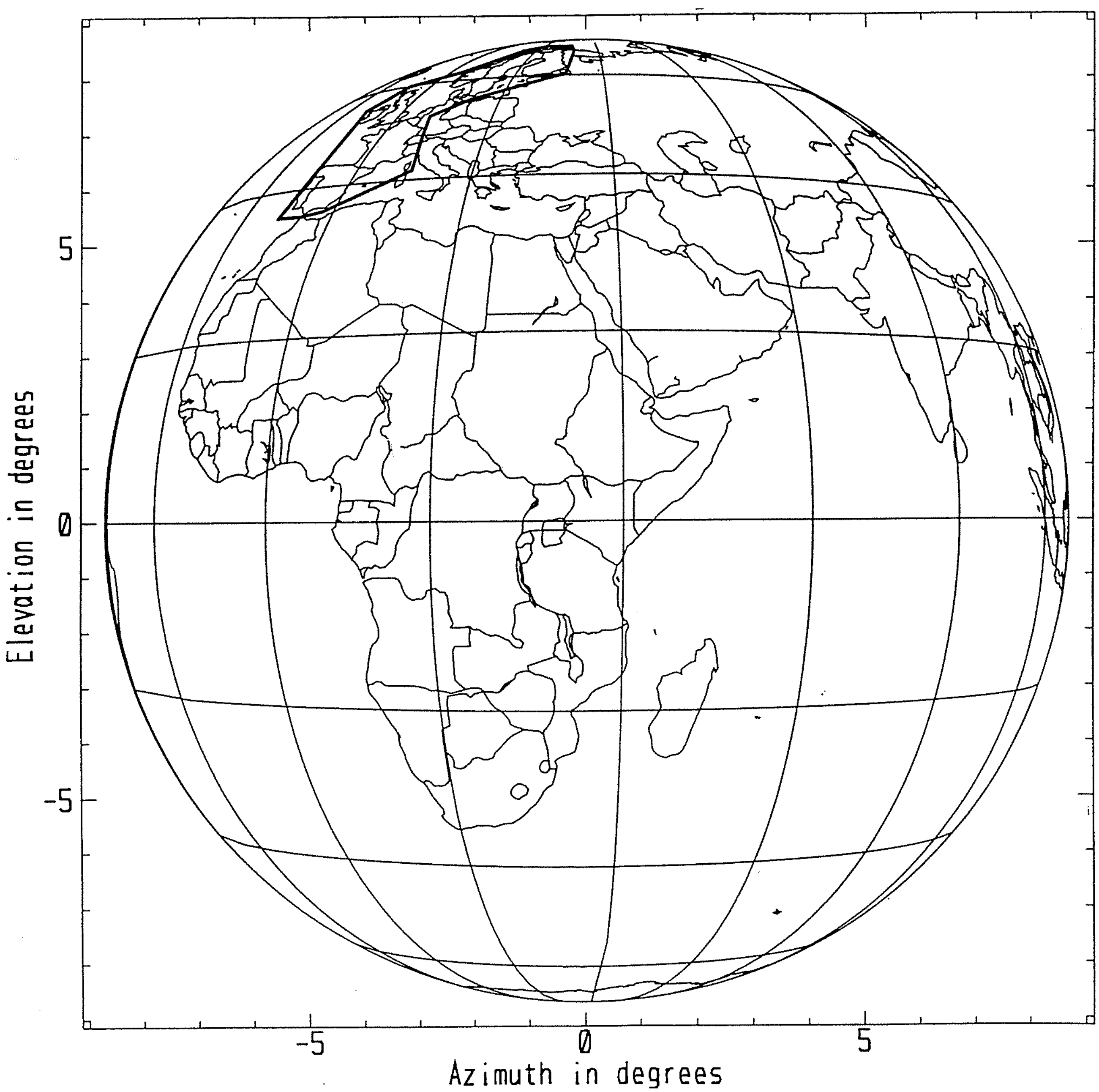
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 36° E Longitude**




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

**Figure C-2b**

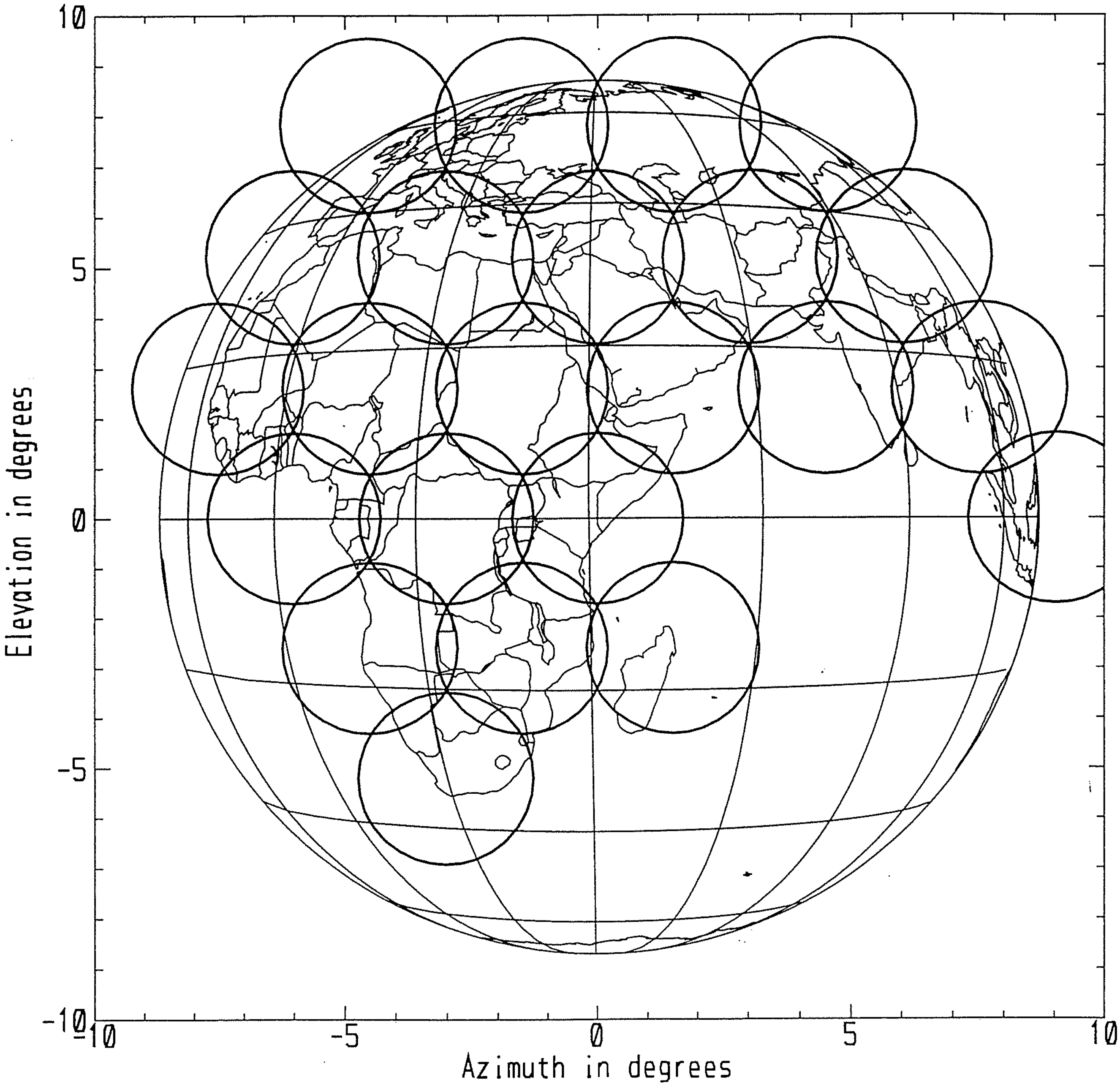
**GALAXY/SPACEWAY™**
**Ku BSS Coverage at 36° E Longitude**




**PEAK EIRP= 50 - 55 dBW**
**LHCP, RHCP**

**Figure C-3a**

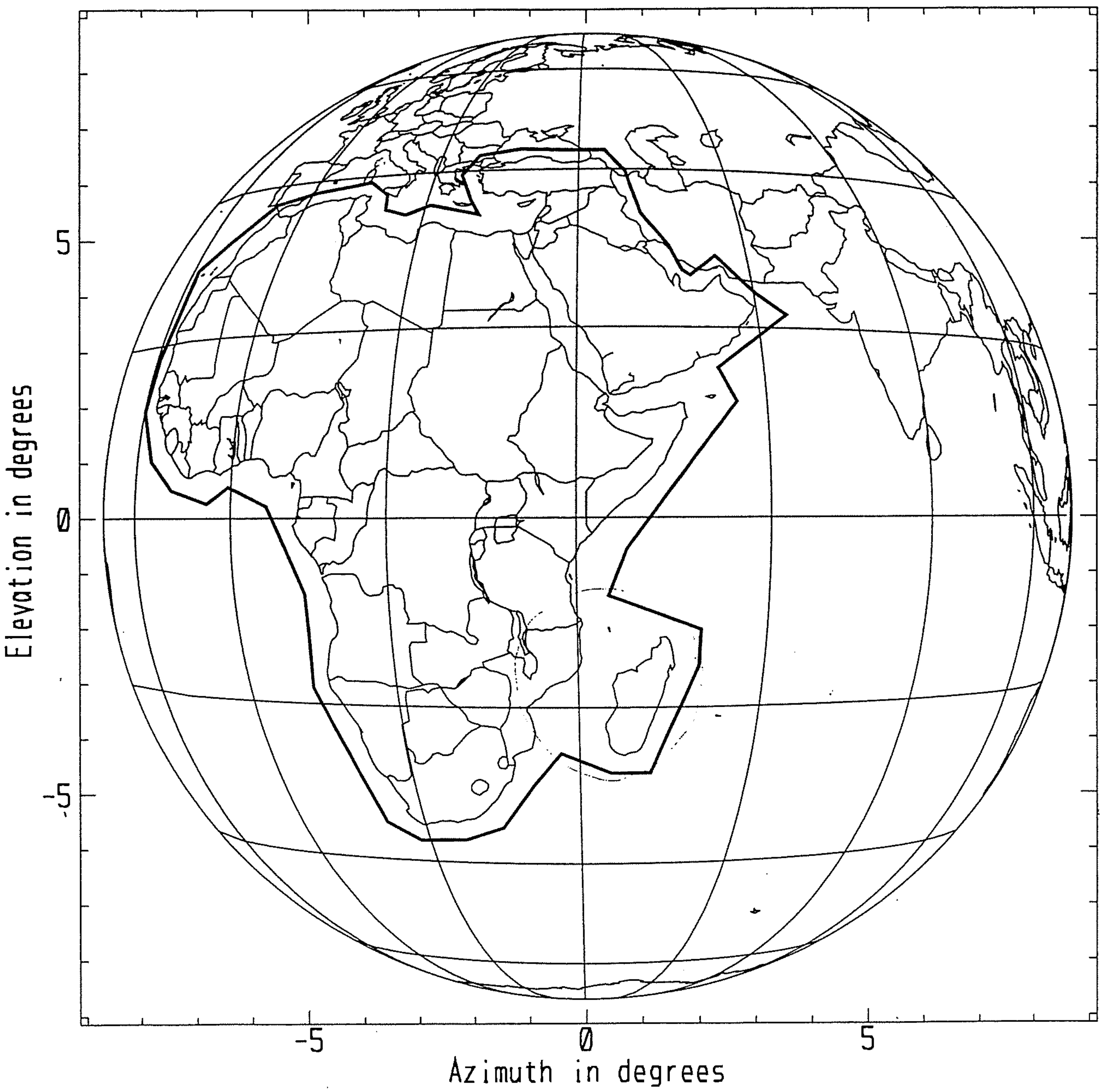
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 41° E Longitude**




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

Figure C-3b

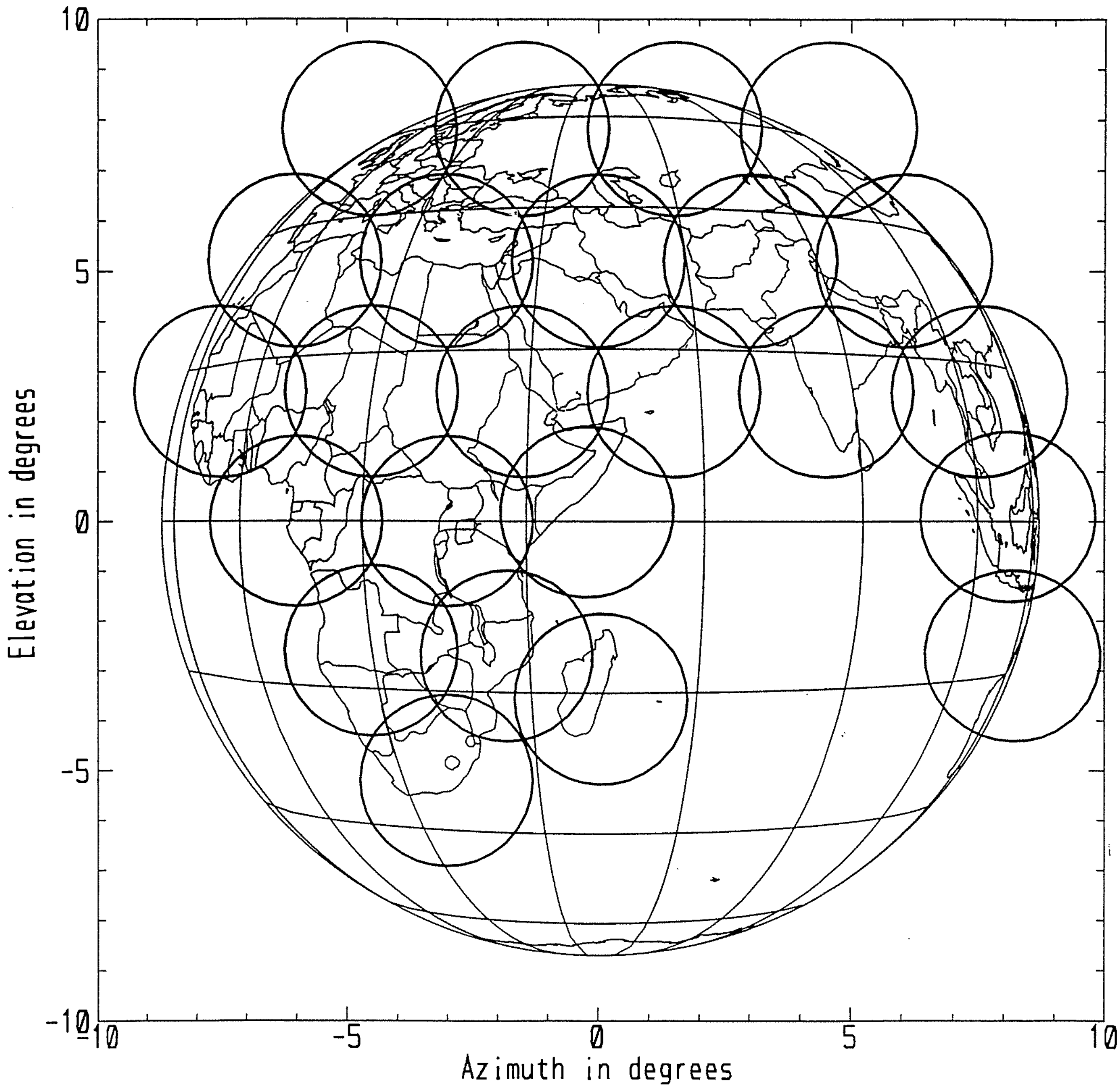
GALAXY/SPACEWAY™
Ku BSS Coverage at 41° E Longitude




**PEAK EIRP= 50 - 55 dBW**
**LHCP, RHCP**

**Figure C-4a**

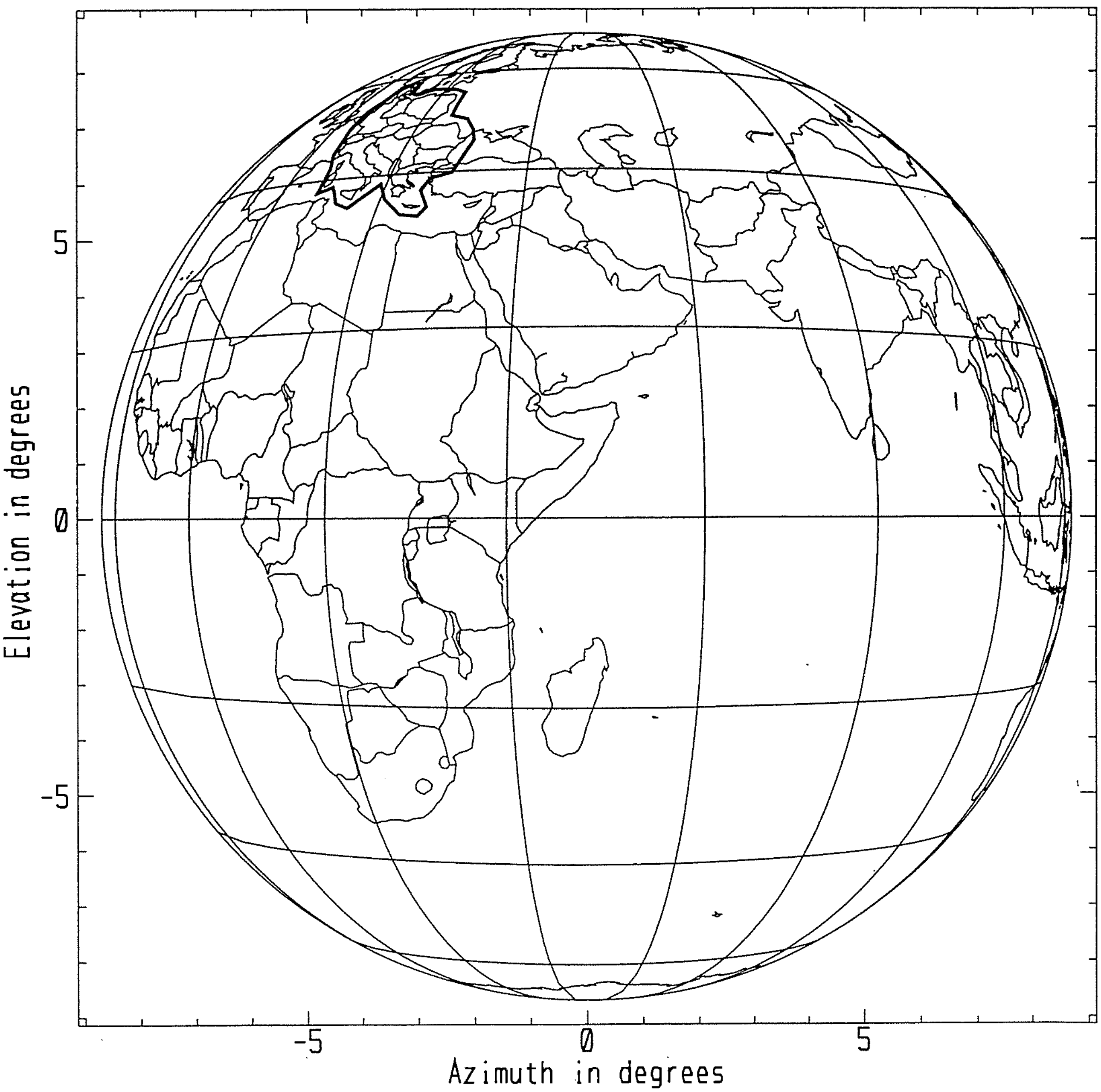
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 48° E Longitude**




**PEAK EIRP = 48 - 55 dBW**
**LHCP, RHCP**

Figure C-4b

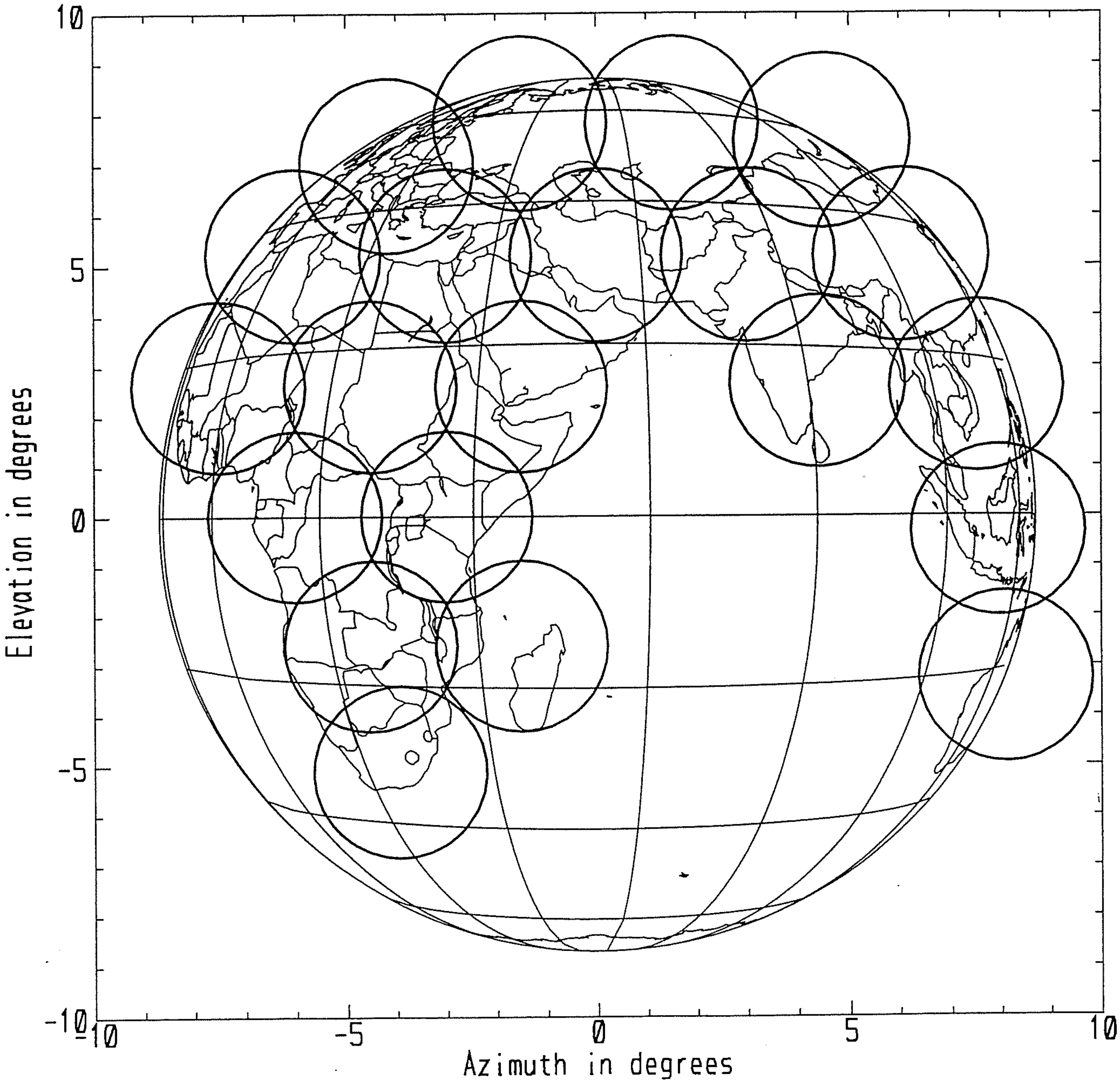
**GALAXY/SPACEWAY™**
**Ku BSS Coverage at 48° E Longitude**




**PEAK EIRP= 50 - 55 dBW**
**LHCP, RHCP**

**Figure C-5a**

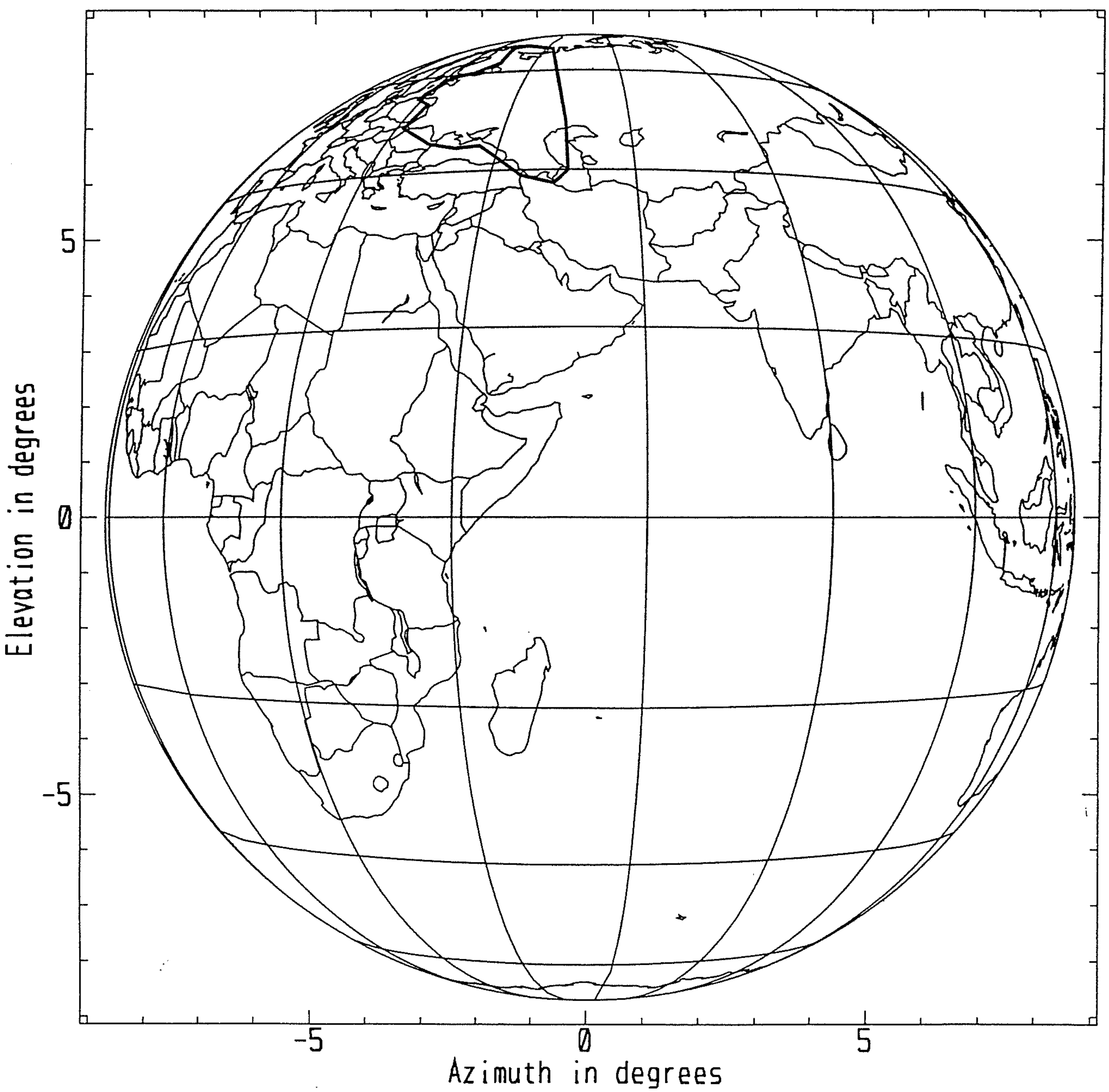
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 54° E Longitude**




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

Figure C-5b

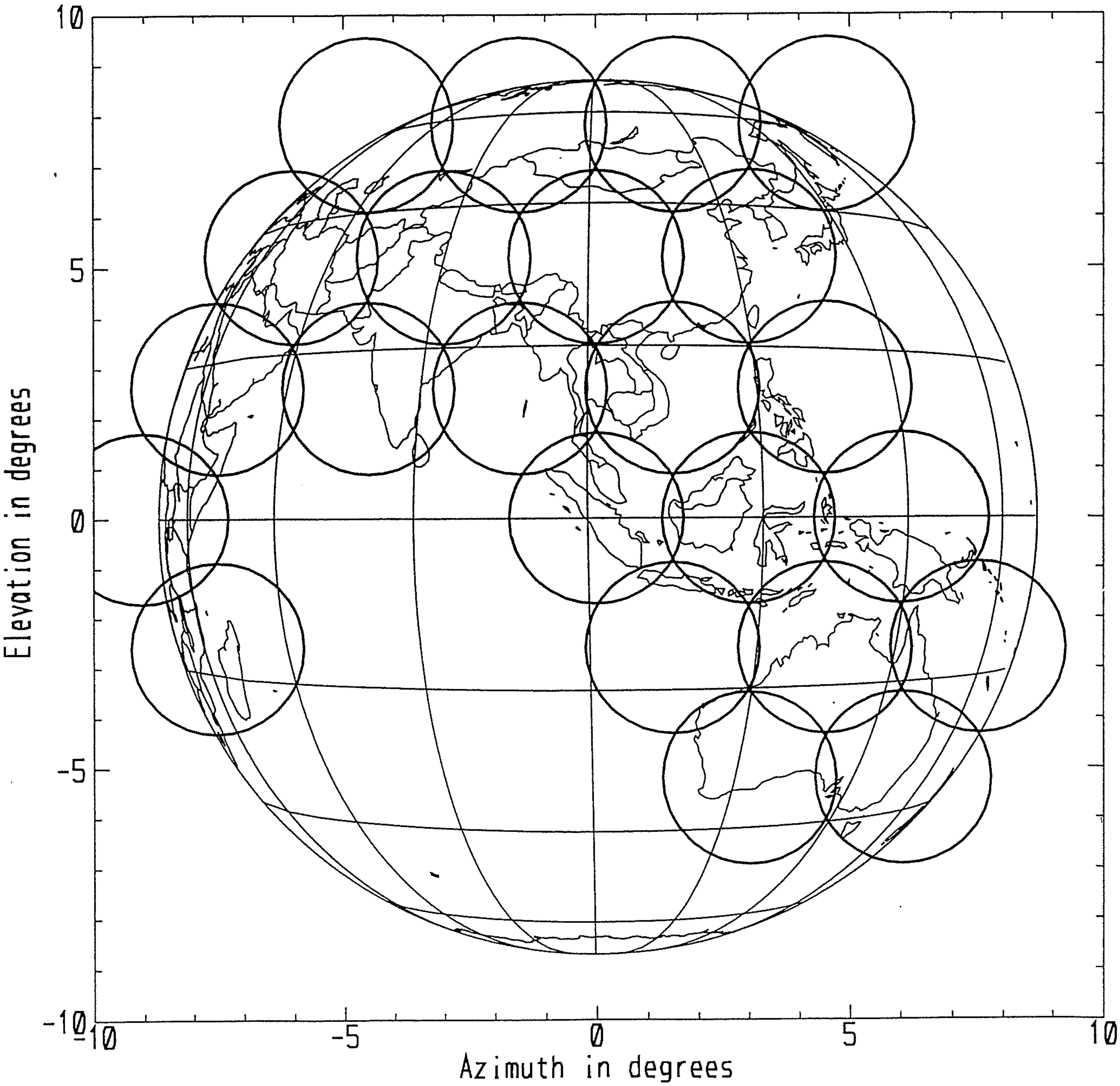
GALAXY/SPACEWAY™
Ku BSS Coverage at 54° E Longitude




**PEAK EIRP= 50 - 55 dBW**
**LHCP, RHCP**

**Figure C-6a**

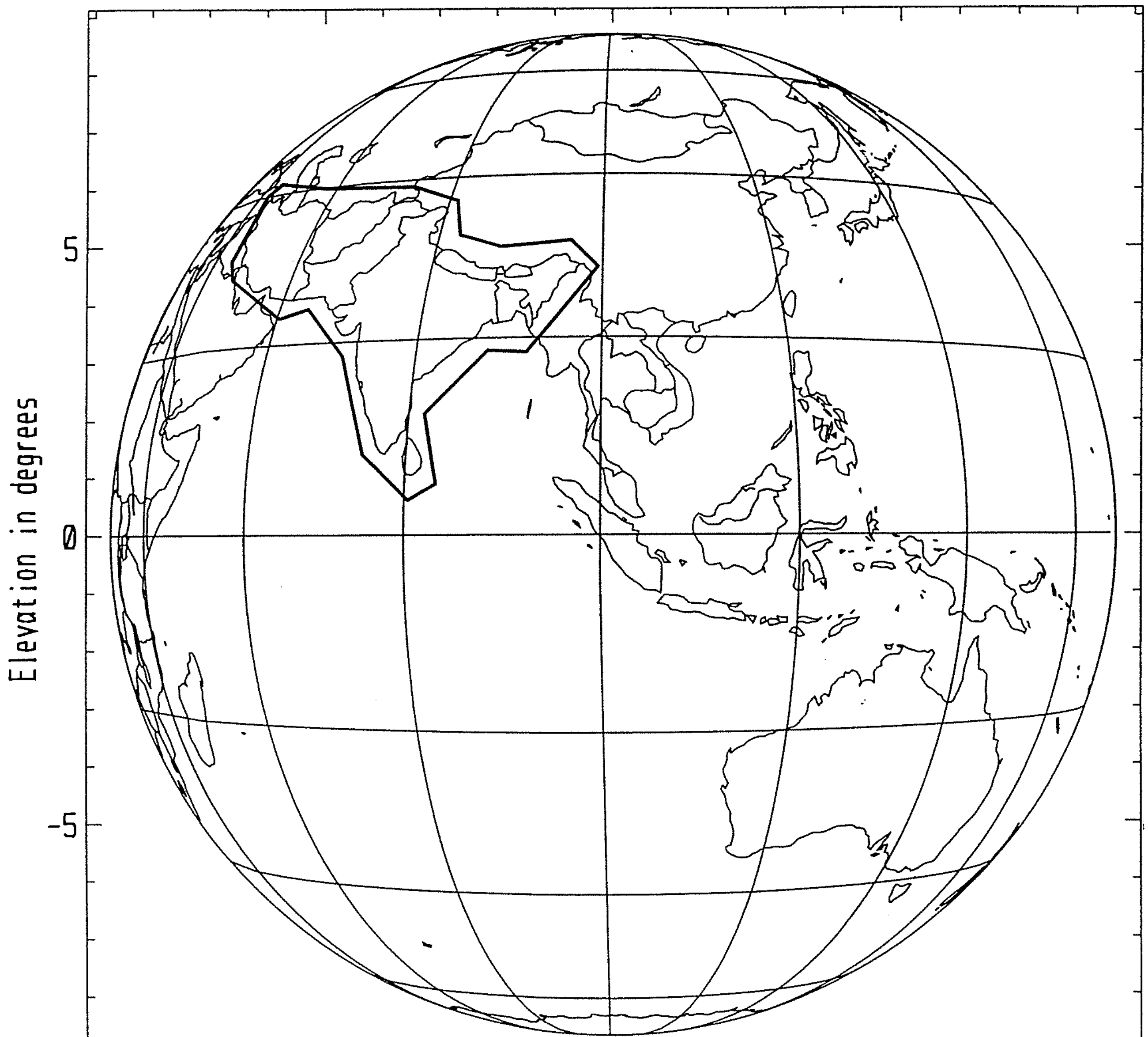
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 101° E Longitude**




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

**Figure C-6b**

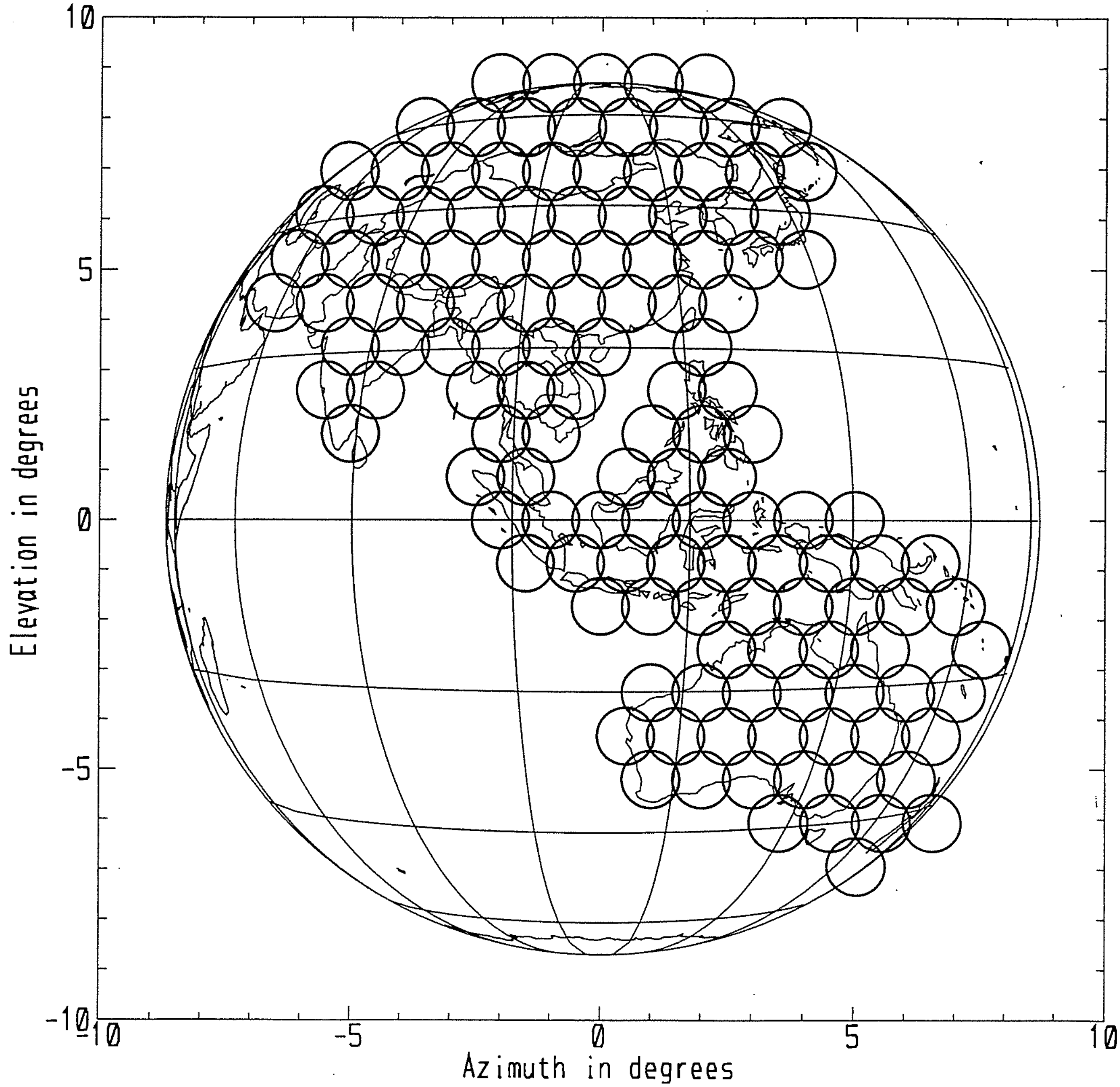
**GALAXY/SPACEWAY™**
**Ku BSS Coverage at 101° E Longitude**




**PEAK EIRP= 50 - 55 dBW**
**LHCP, RHCP**

**Figure C-7a**

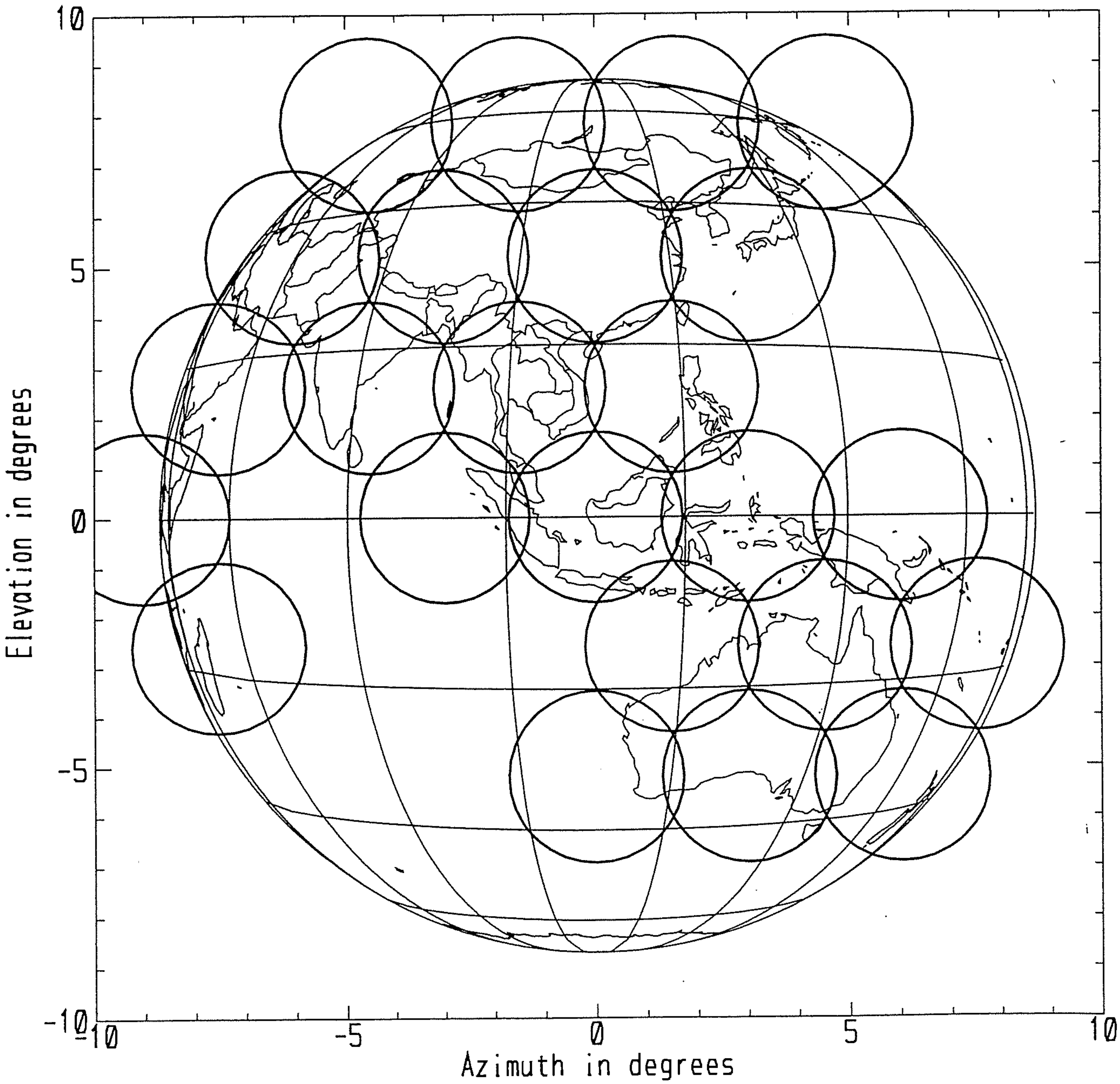
**GALAXY/SPACEWAY™**
**Ka FSS High-Powered Narrow Spot Beams at 110° E Longitude**




**PEAK EIRP= 48 - 60 dBW**
**LHCP, RHCP**

Figure C-7b

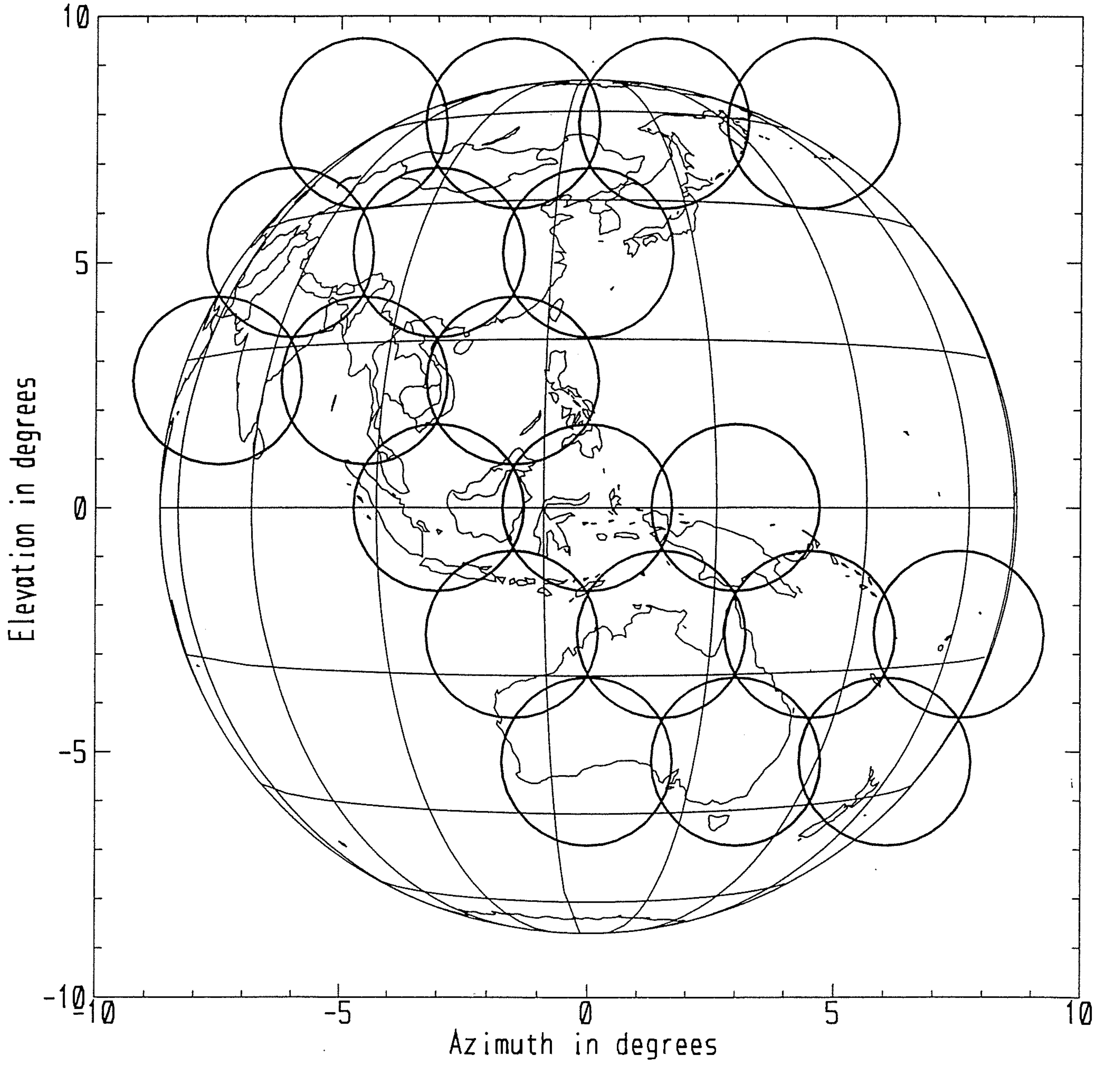
GALAXY/SPACEWAY™
Ka FSS Wide Area Beams at 110° E Longitude




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

Figure C-8a

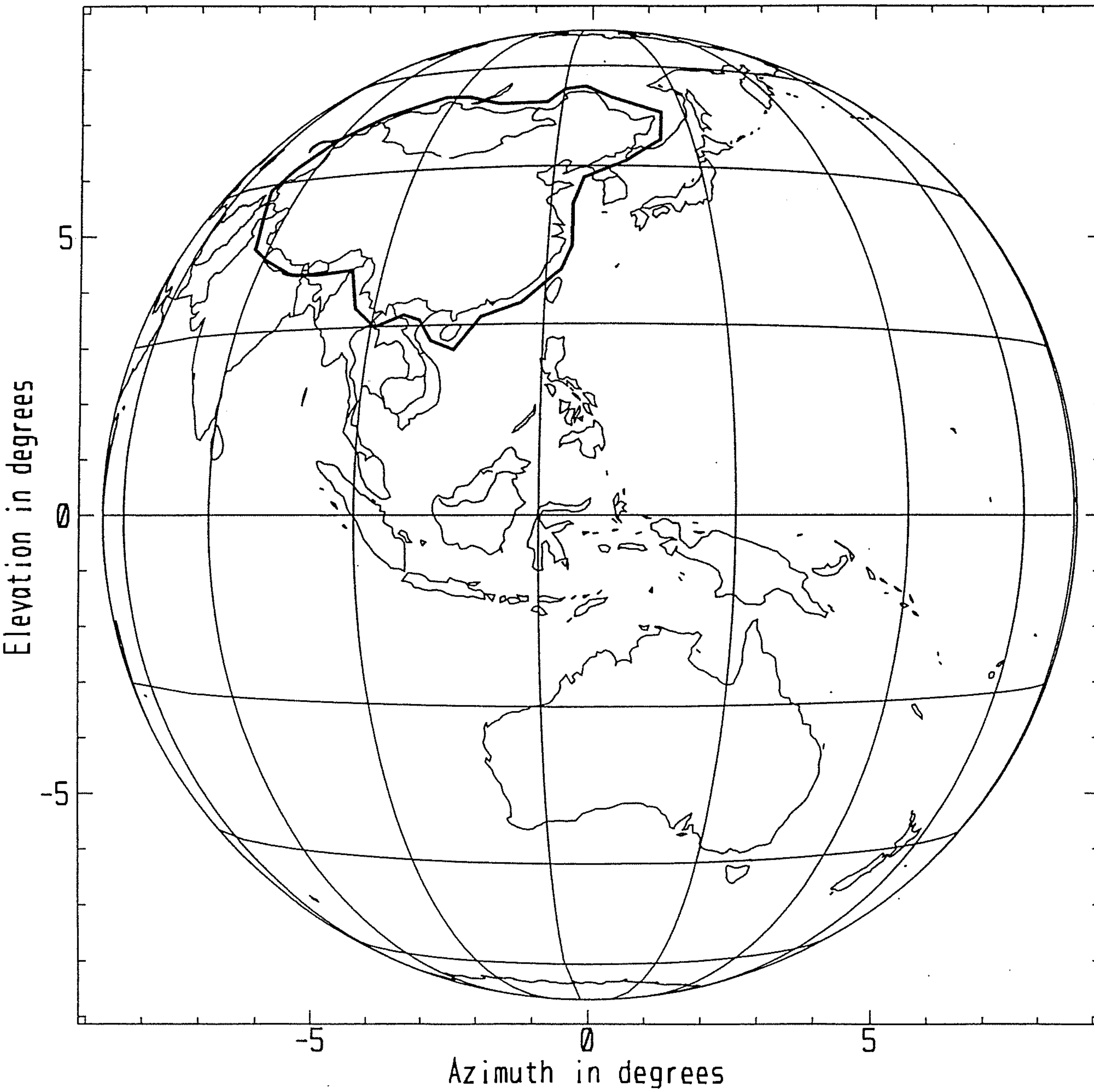
GALAXY/SPACEWAY™
Ka FSS Wide Area Beams at 125° E Longitude




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

**Figure C-8b**

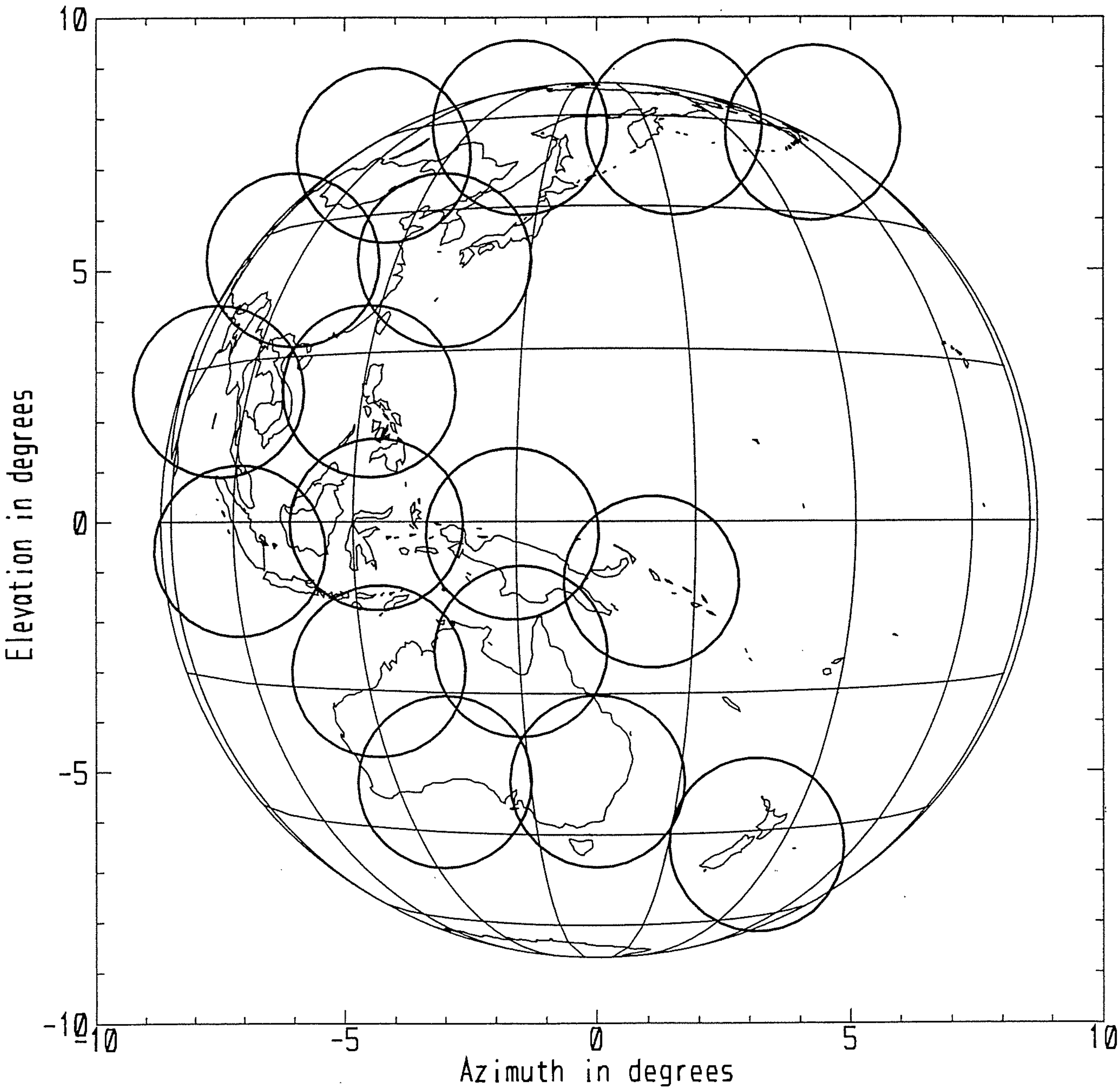
**GALAXY/SPACEWAY™**
**Ku BSS Coverage at 125° E Longitude**




**PEAK EIRP= 50 - 55 dBW**
**LHCP, RHCP**

**Figure C-9a**

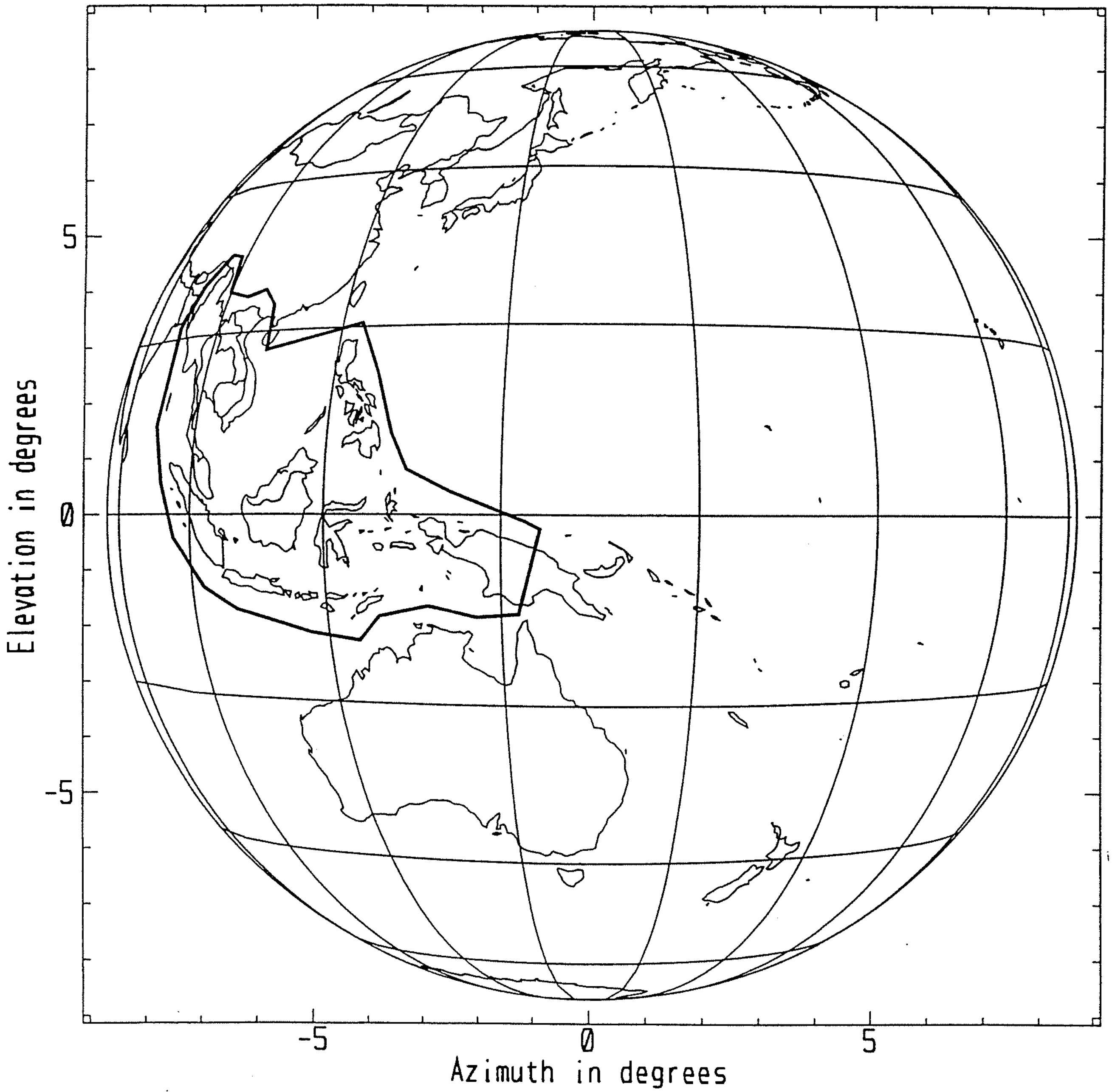
**GALAXY/SPACEWAY™**
**Ka FSS Wide Area Beams at 149° E Longitude**




**PEAK EIRP= 48 - 55 dBW**
**LHCP, RHCP**

**Figure C-9b**

**GALAXY/SPACEWAY™**
**Ku BSS Coverage at 149° E Longitude**




**PEAK EIRP = 50 - 55 dBW**
**LHCP, RHCP**