

HiSeasNet – Following Footprints *Switching from one satellite to another for ships a sea*

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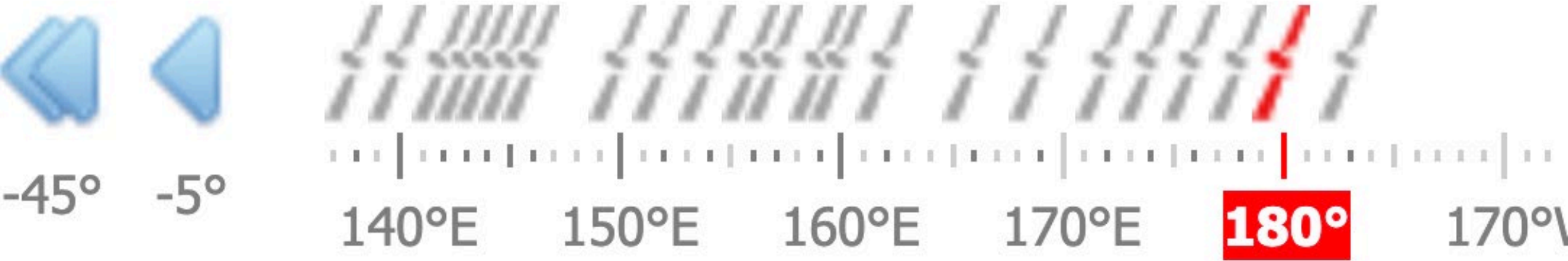
You get what you measure



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- **Satellite Link analysis (Link Budget)** - Satellite, Transponder,
 - TX and RX stations, Desired Payload and Circuit Availability.
 - Desired Payload consists of desired Information, overhead, modulation and coding (ModCod).
 - A link should use the least amount of transponder resource needed to successfully transmit the desired information to the receive earth station.
 - More MHz and more power cost more money.
- **Effective Isotropic Radiated Power (EIRP)** – the measurement of transmitted power
- **Footprint** - the signal level expected to be received in different geographic locations within the area of coverage. When ships move to edge of footprint, the signal level decreases. When signal level too low, we change satellites to achieve a better signal level and adequate coverage.
- **Output Power** – HPA/BUC and modem L band output power
- **EbNo** – the measure of signal to noise ratio – measured at the input to the receiver – a basic measure of how strong the signal is

Geosynchronous satellite positions



Intelsat 18



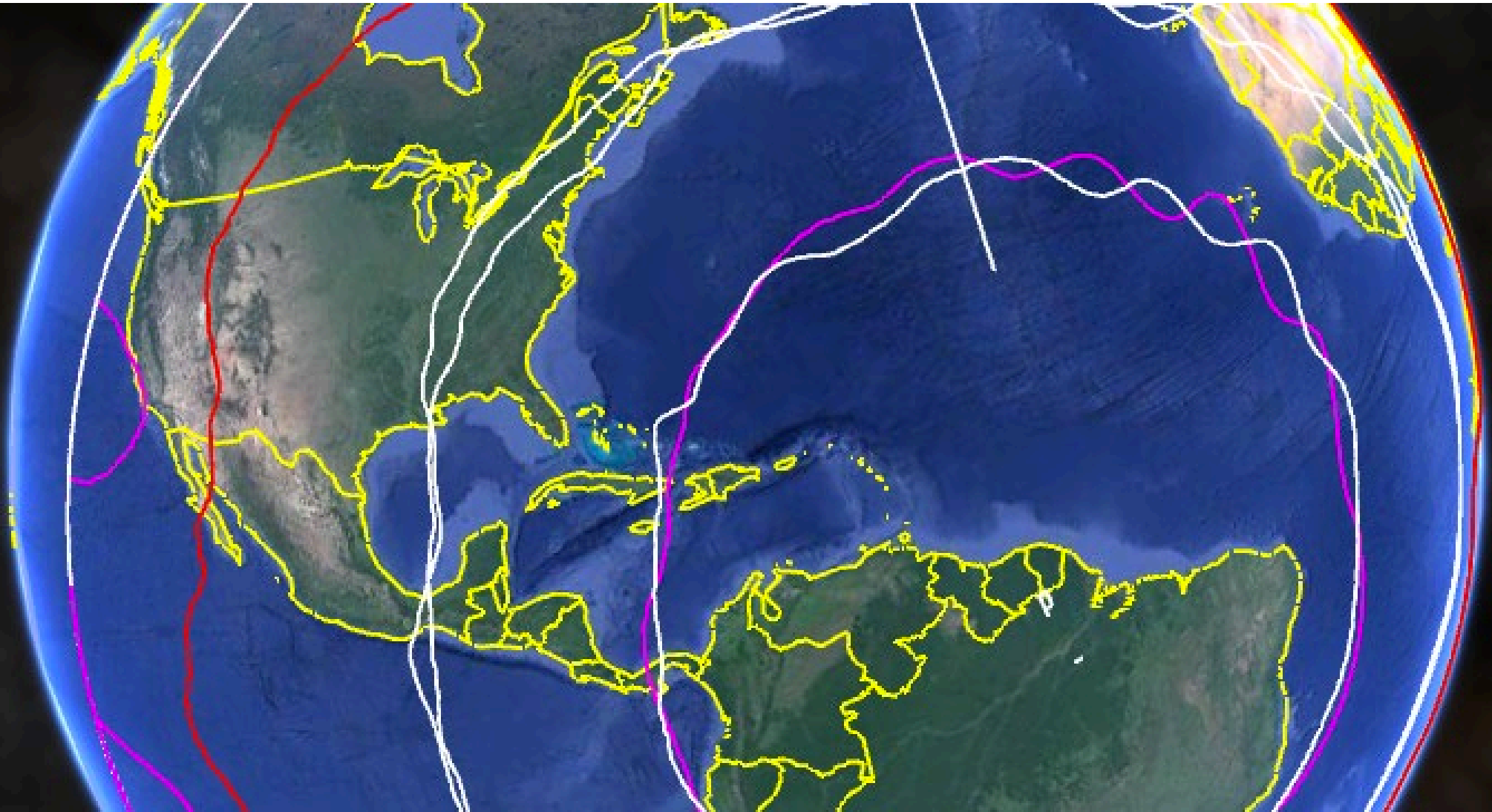
You are here

Intelsat's Global Infrastructure



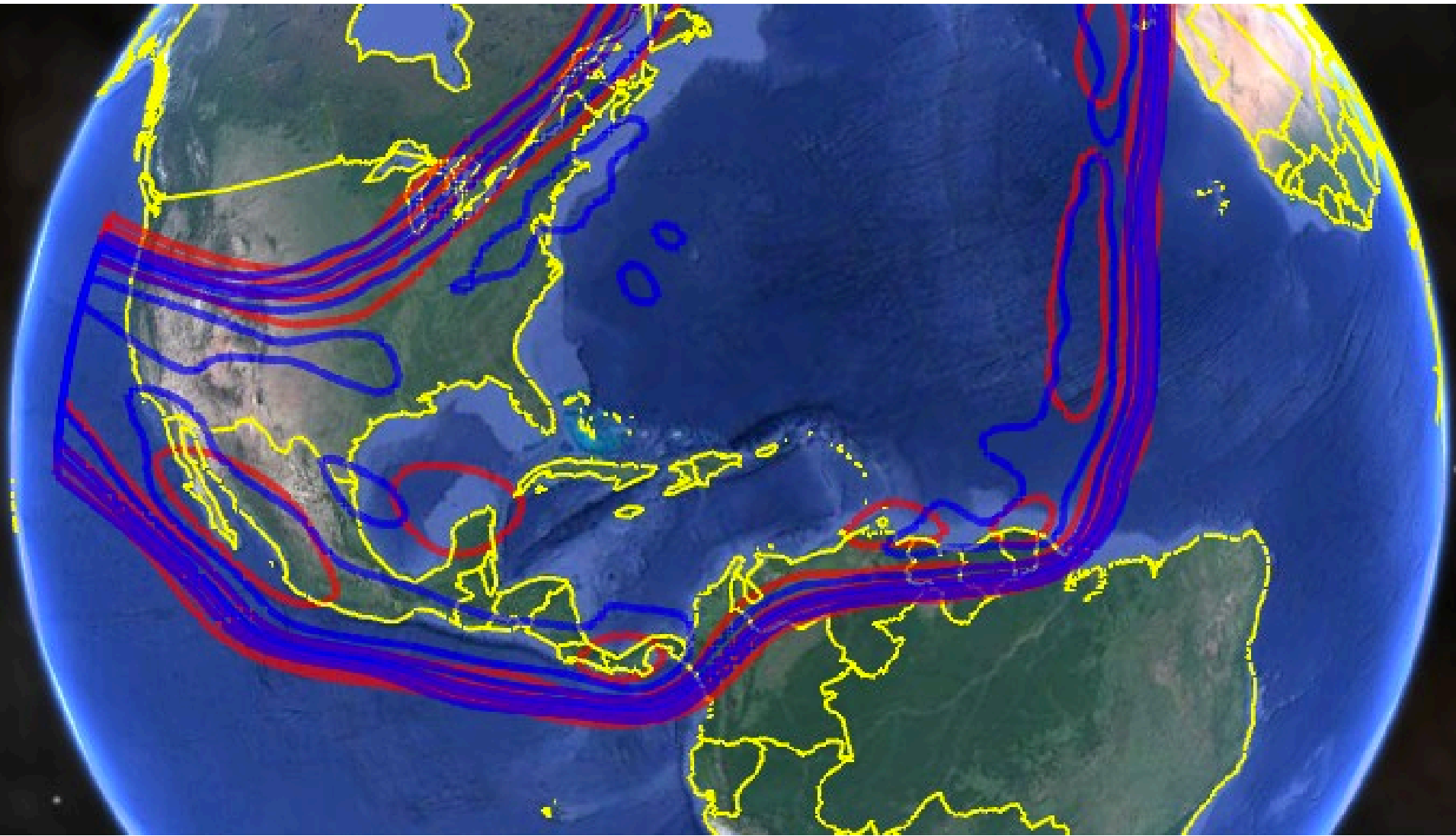
Intelsat Geostationary Satellites

AOR – IS-23 Global C band



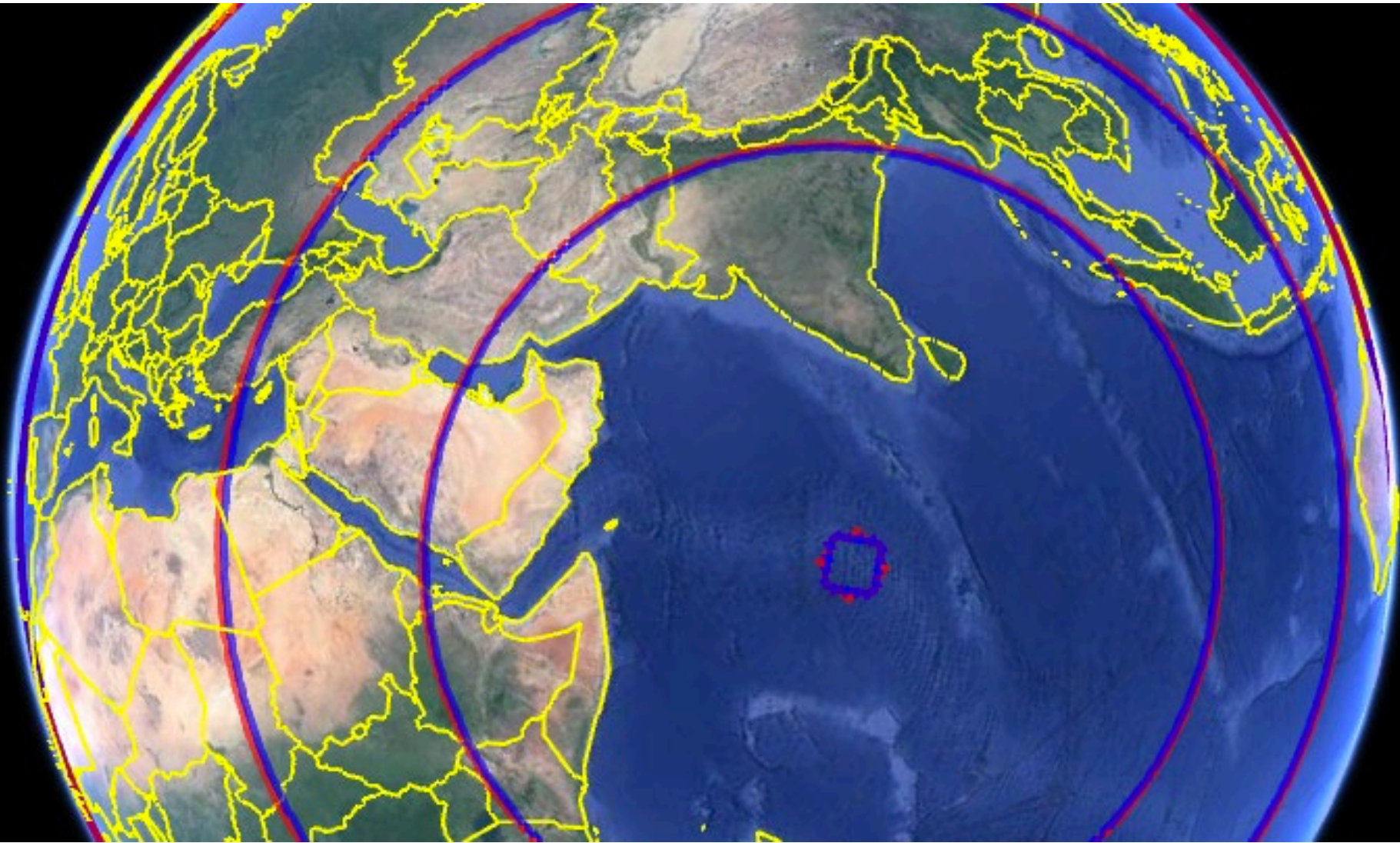
IS-23 footprint EIRP contours

IS-34 Transatlantic Ku



IS-34 Ku footprint EIRP contours

IOR IS-17 Global C band



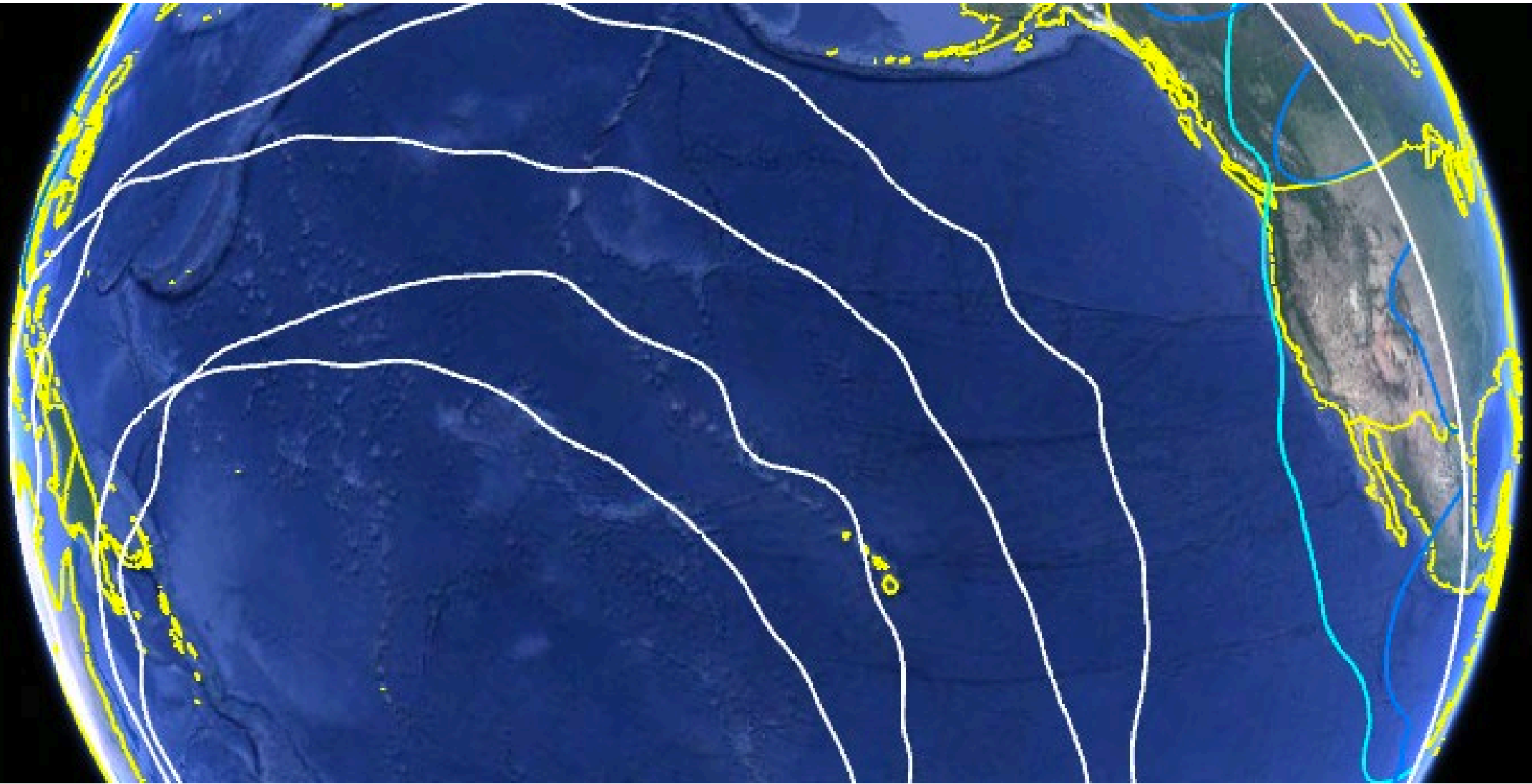
IS-17 Global footprint contours

IS-18 South Hemi C band



IS-18 South Hemi footprint contours

POR IS-18 Global C band



IS-18 Global footprint contours

POR IS-18 North Hemi



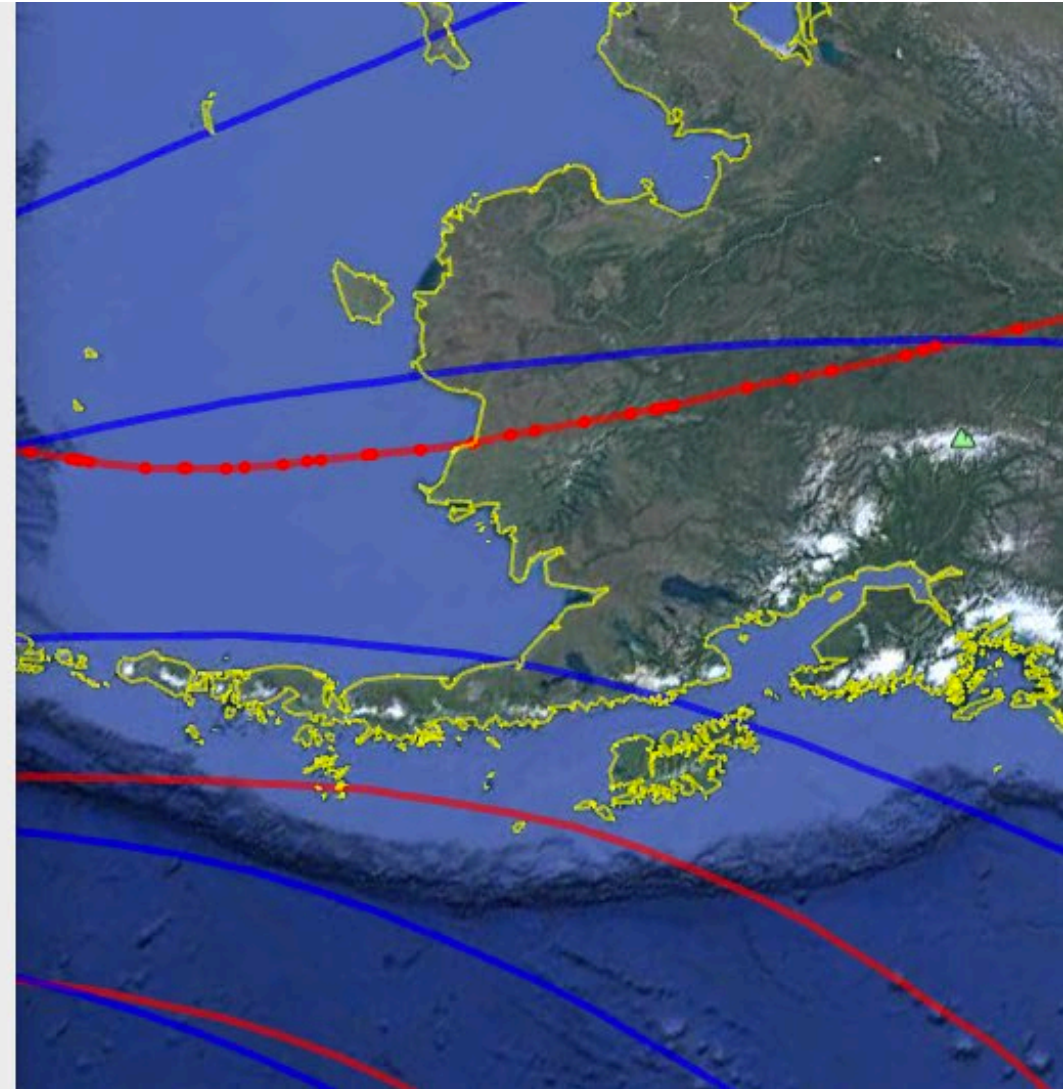
ink... Add web image... Add local image...

IntelSat 18

NHCR downlink

DL = -3 dB

Countour count = 17



IS-18 NH contour detail



- **Automatic beam switching architecture** – iDirect hub example. Earth station operations center tracks ships and automatically switches based on location in footprint. Oceanus currently auto beam switching on Marlink. Inmarsat FX also auto beam switching.
- **Manual switching architecture** – HiSeasNet is currently point to multipoint with single carrier per channel. HiSeasNet operations center tracks ships and manually switches based on location in footprint in coordination with sailing technicians



- **Manual switching**– ChangeDoc sent to sailing technicians outlining:
 - Satellite orbital position, 180 W, 53W, Calculated Az and El to help find bird for non-IMA systems for change
 - Frequencies for Tx and Rx
 - Tracking frequency
 - Process to adjust power in coordination with Intelsat NOC
 - EbNo and Constellation signal quality indicators
 - Save and monitor



Ship Name: CRUISE 325 150 155 Relative: 0
Logout Signal

Track

Satellite Search

Auto

Configuration

- Interfaces
- System
- Reflector
- Satellite
- Profile

Status

Graphs

Satellite Signal Automatic Search

Ship Position

Latitude 0.00000 N

Longitude 0.00000 W

Satellite Selection

Select Satellite
Select Satellite
MY FAVORITE SATELLITE

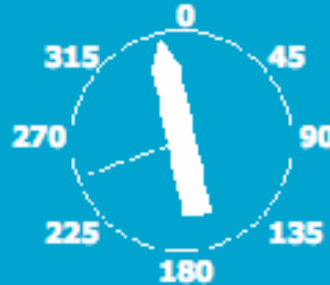


MXP Antenna Controller Tracking



Sea Tel COBHAM

Log Id: Dealer
Ship Name: SALLY RIDE PORT ANTENNA
Logout



Sat Lon: 180.0 W
Heading: 347.9
Azimuth: 251.8
Elevation: 15.3
Relative: 263.8
Lpolang: 52.6

Status ● Tracking
● Tx Enabled
Modem ● Locked



Track

Wizard

Commission

Satellite Search

Auto

Configuration

Interfaces

System

Reflector

Satellite

Profile

System Status

System

- Modem Rx Lock: LOCKED
- Tx Enabled
- Error: NONE
- Search Delay: 60 seconds
- Sat Reference: OFF
- System lock: DISABLED

Front Panel Led

- Error
- Target
- Initializing
- Search
- Power
- Tracking

Satellite

Ship

Teledyne Modem TxRx parameters



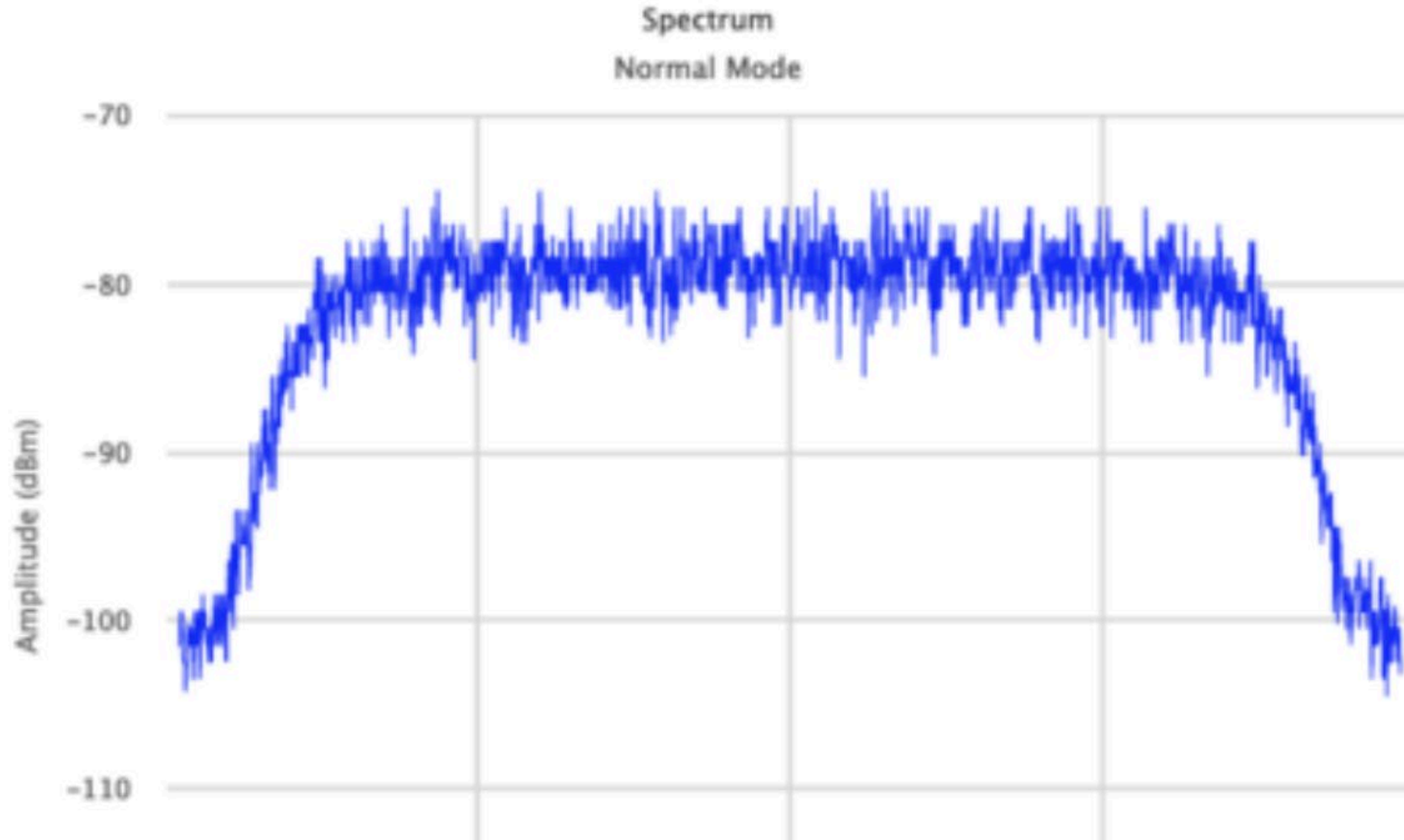
- STATUS
- TRAFFIC
- TRAFFIC
- T MODE
- CARRIER

cursor over an
el for help.

Terrestrial interface	IP	Rx values track Tx	<input type="checkbox"/>
Tx service	Closed network	Rx service	Closed network
Tx rate control	Data rate	Rx rate control	Data rate
Tx data rate	0.512000 Mbps	Rx data rate	0.768000 Mbps
Tx symbol rate	0.231019 Msps	Rx symbol rate	0.583933 Msps
Tx clock source	Internal	Rx clock source	Satellite
Modulation and Coding			
Tx FEC type	SmartLink	Rx FEC type	SmartLink
Tx modulation	8PSK	Rx modulation	QPSK
Tx FEC code rate	3/4	Rx FEC code rate	2/3
Carrier			
Tx frequency band	L-band	Rx frequency band	L-band
Tx carrier frequency	1468.9635 MHz	Rx carrier frequency	1006.5187 MHz
BUC carrier frequency	6.3689635 GHz	LNB carrier frequency	4.1434813 GHz
Tx spectral roll-off	20%	Rx spectral roll-off	20%
Tx spectral inversion	<input type="checkbox"/>	Rx spectral inversion	<input checked="" type="checkbox"/>

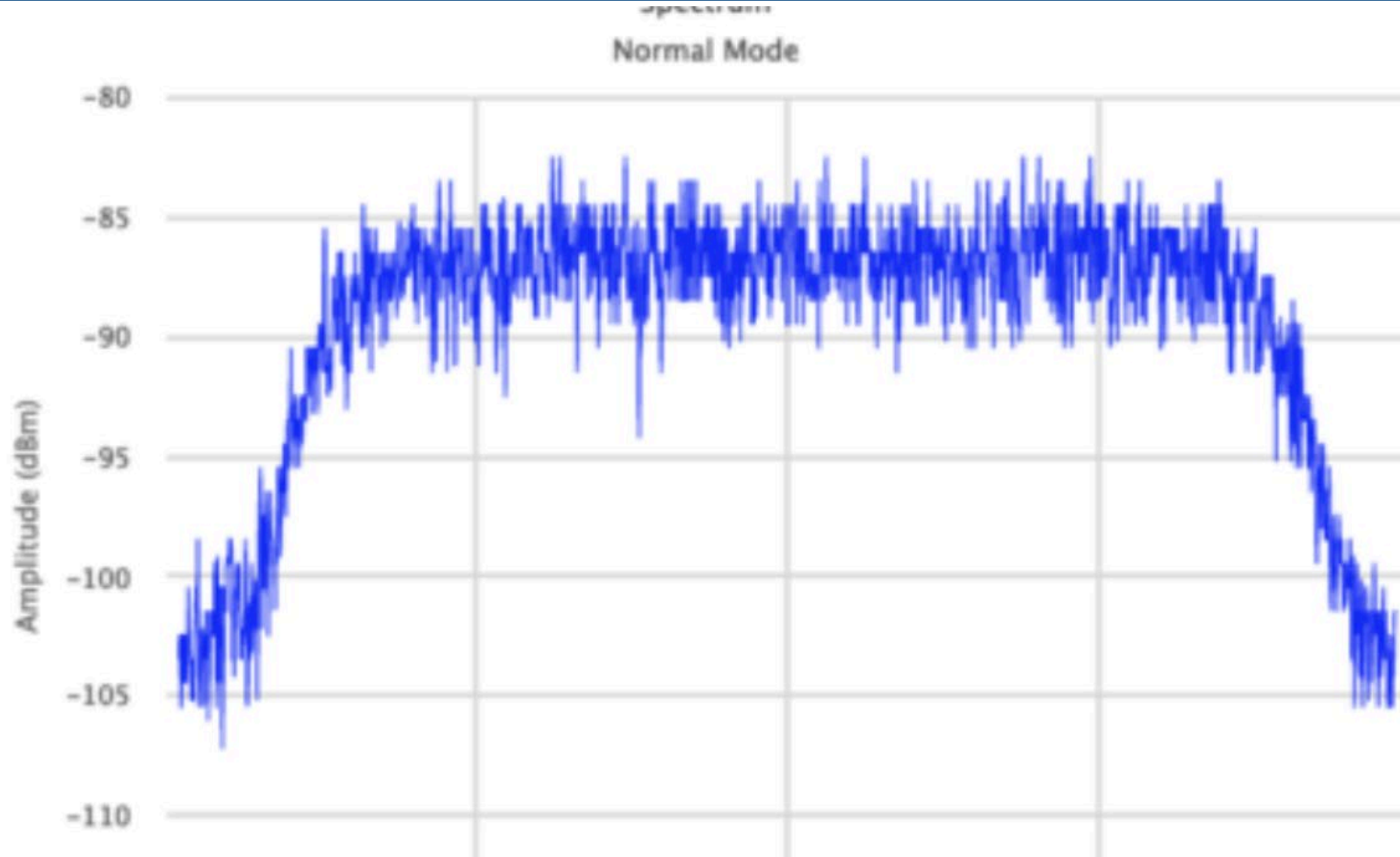
Modem Frequencies and ModCod

EbNo hot – have to lower



Carrier Frequency: 1104.5684MHz
Symbol rate: 149172sps
Code rate: 3/5
Modulation: 8PSK
Carrier level: -54.7dBm
Spectral Inversion: On
EbNo: 18.2dB
EsNo: >20dB
Resolution BW: <1kHz

EbNo lowered and spectrum



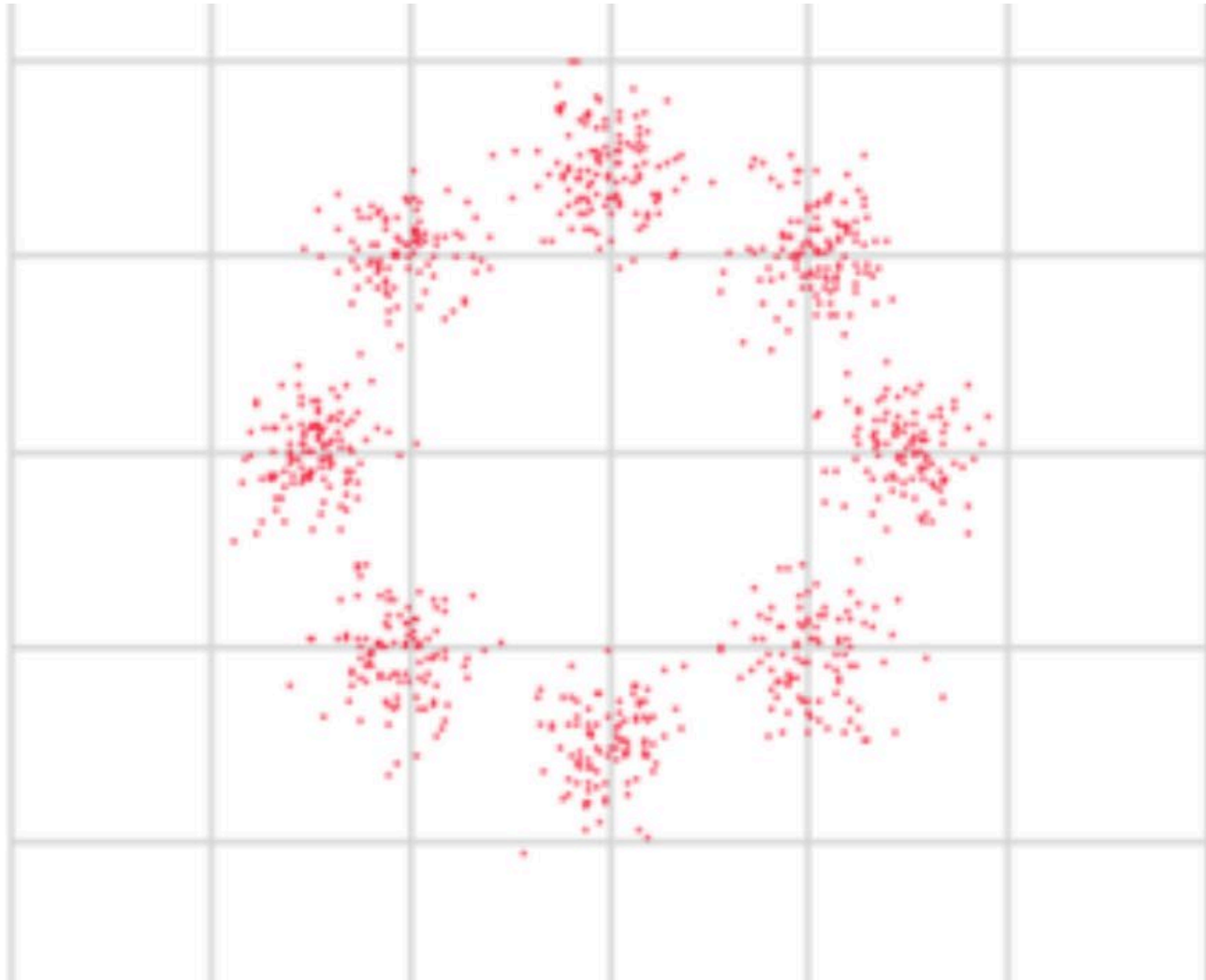
Carrier Frequency: 1104.5684MHz
Symbol rate: 149172sps
Code rate: 3/5
Modulation: 8PSK
Carrier level: -61.6dBm
Spectral Inversion: On
EbNo: 11.2dB
EsNo: 13.6dB
Resolution BW: <1kHz

Nominal signal quality constellation



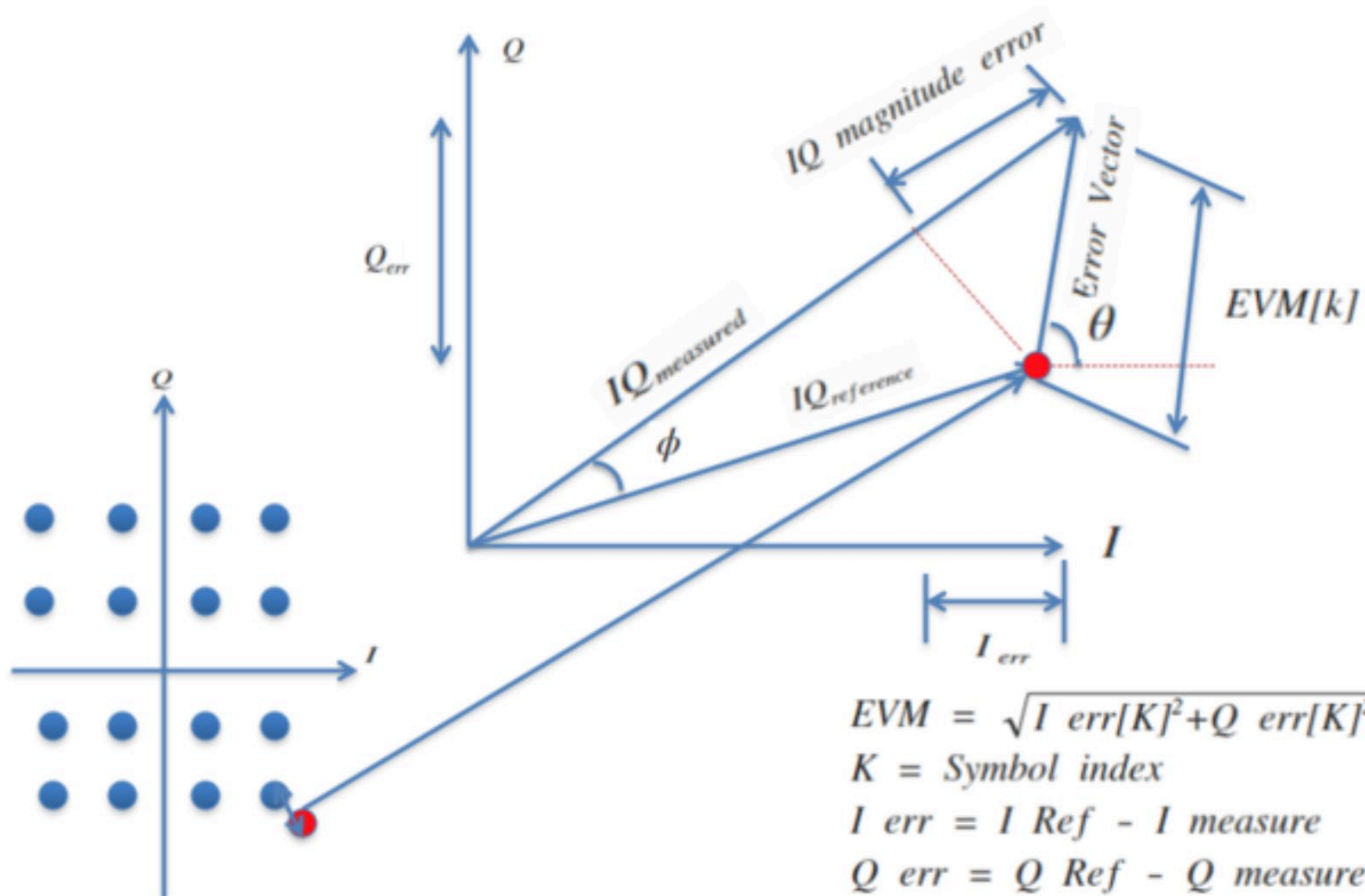
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Q Channel



Carrier Frequency: 1104.5684MHz
Symbol rate: 149172sps
Code rate: 3/5
Modulation: 8PSK
Carrier level: -61.3dBm
Spectral Inversion: On
EbNo: 12.2dB
EsNo: 14.6dB
MER: 14.5dB
EVM: 19.2%

Check the math



Thanks for your attention!



“Captain – The crew were given the choice of better food or better Internet.

The cook chose better food.

The rest of the crew chose better Internet.

-Chief Mate Quicksort, RV Petasail