

Sat-Coord

RPC
TELECOMMUNICATIONS

For Visual Browsing of ITU Space Database
Files, Intersystem Interference Calculation,
IFIC Processing and Satellite Frequency
Coordination Support

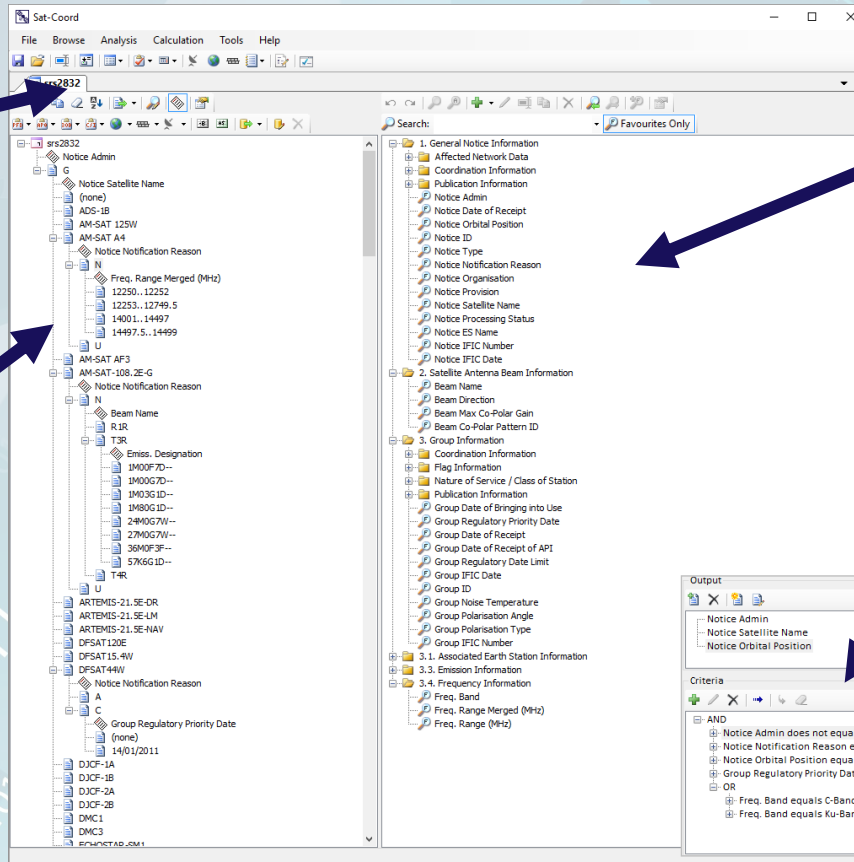


Browse and Interrogate ITU Database Files

Interrogate and retrieve information from ITU SNS Database Files (including the SRS, IFIC, SPS and AP30B database files) as well as the Space Network List (including Part-B and Part-C) and Article 5 quickly and accurately

A completely freeform approach to searching, allowing you to find the information you need quickly and efficiently

Output can be sorted and output in either text or CSV format for ease of processing



Over five hundred searches are available allowing you to extract the exact information you require

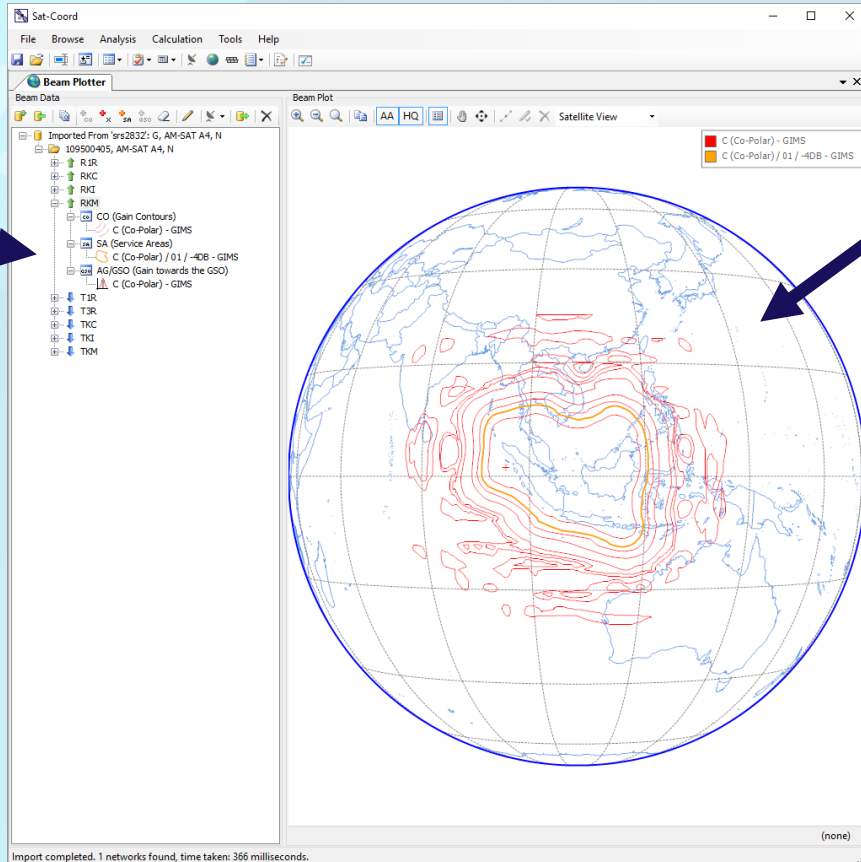
Create your own custom searches specifying complex criteria to perform a vast array of tasks e.g. identifying the coordination issues around a given slot, or examining an IFIC for the networks that have the potential to cause harmful interference

View and Edit Beam Data

Import and edit gain contour, service area and gain toward the GSO diagram data from ITU GIMS database files

Create and edit your own custom gain contour, service area and gain toward the GSO diagrams and save them into GIMS database format

Graphically compare gain contour diagrams by overlaying multiple diagrams



View Beam data using various projections, with zoom, pan and rotation functionality

Generate contours automatically using the ITU Antenna Pattern Library from a baseline contour allowing you to quickly and easily create custom gain contour diagrams

Real World Satellite Data

Download and then browse information from Union of Concerned Scientists Satellite Database as well as Space-Track data (account required)

Import two-line-element (TLE) data from Space-Track or other sources

Analyse TLE data including retrieving location data at the associated epoch date, or a prediction at any other custom date and time

The screenshot displays the 'Sat-Coord' software interface. The main window is titled 'Sat-Coord' and contains a menu bar (File, Browse, Analysis, Calculation, Tools, Help) and a toolbar. Below the toolbar is a 'TLE Analysis' section with a table of satellite data. The table has columns for Satellite Name, Orb. Pos., NORAD Number, COSPAR Number, and Epoch Date. The data rows are for Iridium satellites Iridium 03 through Iridium 15. Below the table is an 'Input / Result Data for IRIDIUM 10' section, which is split into 'Input Data' and 'Results (Epoch)'. The 'Results (Epoch)' section shows various orbital parameters for Iridium 10. To the right of the table is a 'Beam Plot' section with a 'Satellite View' window. This window shows a 3D globe with several blue lines representing satellite ground tracks. Below the globe is a 'Satellite Name: IRIDIUM 10' section with 'Display Options' and 'Animation' controls. The 'Display Options' section includes a date and time selector (16 November 2016, 17:24:49) and checkboxes for 'Plot position over past: 1 orbit(s) and future: 1 orbit(s)' and 'Re-Centre View on Selected Satellite'. The 'Animation' section includes a play button, a refresh rate of 100 ms, and a step size of 1 minute(s). At the bottom of the window, a status bar reads 'Import completed. 1 item added, time taken: 15 milliseconds.'

| Satellite Name | Orb. Pos. | NORAD Number | COSPAR Number | Epoch Date |
|----------------|-----------|--------------|---------------|-------------|
| IRIDIUM 03 | NGSO | 25431 | 1998-048A | 15 November |
| IRIDIUM 10 | NGSO | 24839 | 1997-0300 | 15 November |
| IRIDIUM 11 | NGSO | 25578 | 1998-074B | 15 November |
| IRIDIUM 12 | NGSO | 24837 | 1997-030B | 15 November |
| IRIDIUM 13 | NGSO | 24840 | 1997-030E | 15 November |
| IRIDIUM 14 | NGSO | 25777 | 1999-032A | 15 November |
| IRIDIUM 15 | NGSO | 24869 | 1997-034A | 15 November |

| Input Data | Results (Epoch) |
|---|---------------------------|
| Satellite Name | IRIDIUM 10 |
| NORAD Number | 24839 |
| COSPAR Number | 1997-0300 |
| Elet Classification | U |
| Epoch Date (UTC) | 15 November 2016 14:30:43 |
| B* Drag Term | 5.3833E-05 |
| Orbit Inclination | 86.3966 |
| Right Ascension of Ascending Node | 79.3684 |
| Eccentricity | 0.0002147 |
| Argument of Perigee | 97.464 |
| Mean Anomaly | 338.9451 |
| Mean Motion | 14.3421925 |
| 1st Derivative of the Mean Motion with resp | 1.71E-06 |
| 2nd Derivative of the Mean Motion with resp | 0 |
| Period | 100.403059016256 |
| Revolution Number at Epoch | 1634 |

Visually display satellite ground track data and simulate satellite movement over time on the basis of TLE data

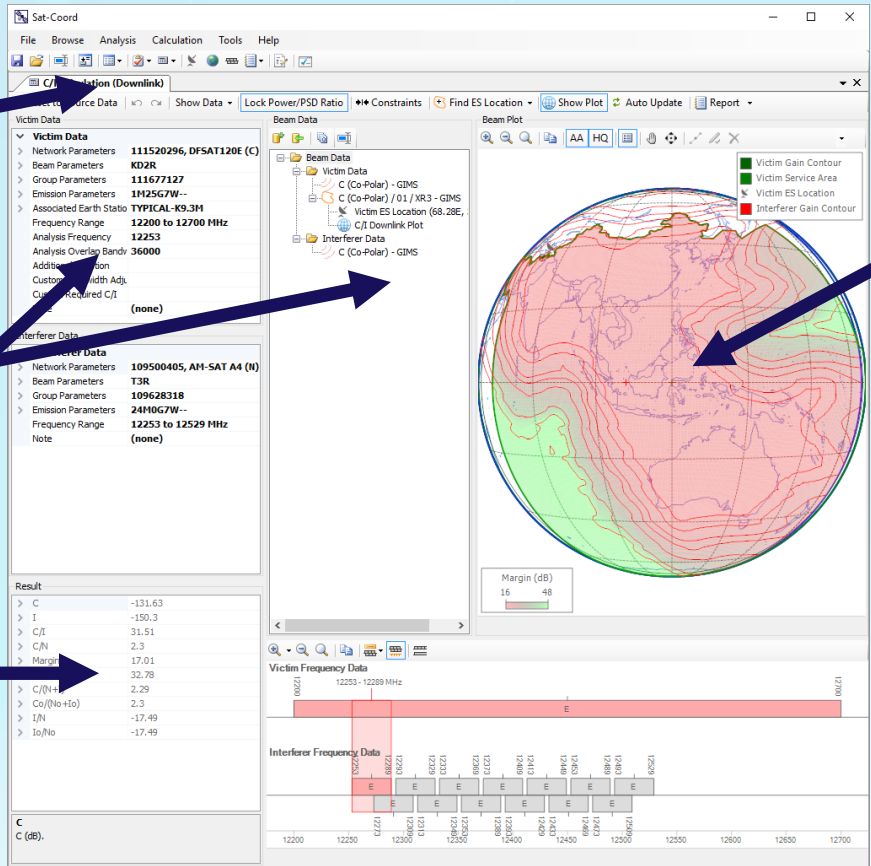
Plot position data over time, such as the longitude or altitude to understand when and how satellites are moving

Coordination Analysis

Perform downlink PFD, C/I, $\Delta T/T$ (Appendix 8) and Appendix 30B Annex 4 analysis

Import data from ITU SNS database files or create your own data including full control over beam gain contour, service area and test point data

C/I analysis including calculation of Margin, C/I, C_0/I_0 , $C/(N+I)$, $C_0/(N_0+I_0)$, I/N and I_0/N_0



View graphical plots showing interference over the Earth's surface (or inside the relevant service area)

Modify input victim and interferer data as well as beam contours and earth station locations with real time re-calculation to understand and overcome interference issues

Add coordination constraints into a C/I Analysis to see their impact in real time

IFIC Processing

Automate the processing of the bi-weekly IFIC databases to identify new filings which have the potential to cause interference to your filings

The screenshot displays the Sat-Coord software interface. The main window shows a table of satellite filings with columns for Notice ID, Admin, Satellite Name, Orb. Pos., Date Received, Reference, Number, IFIC, IFIC Date, ITU (Processed), SC (Processed), Comment, Check, and SpaceCom Appeals. A blue arrow points to the 'IFIC Contents' tab. Below the table, a 'Coordination Summary for: 116520136, QATARSAT-G4-19.7E, C' is visible. A second window, 'Causing Interference: Receiving Interference: Optional', is open, showing a table of affected networks and a detailed analysis of the 'Downlink Appendix8 Result' for a specific network. A blue arrow points to the 'Downlink Appendix8 Result' section.

| Notice ID | Admin | Satellite Name | Orb. Pos. | Date Received | Reference | Number | IFIC | IFIC Date | ITU (Processed) | SC (Processed) | Comment | Check | SpaceCom Appeals |
|-----------|-------|-------------------|-----------|---------------|------------|--------|------|------------|-----------------|----------------|---------|-------|------------------|
| 116505231 | RUS | KLPON-1M | 55 E | 15/08/2016 | PART I-S | 2832 | 2832 | 08/11/2016 | x | - | | | |
| 116505232 | RUS | KLPON-1M | 55 E | 15/08/2016 | PART I-S | 2832 | 2832 | 08/11/2016 | x | - | | | |
| 116505233 | RUS | KLPON-1M | 55 E | 15/08/2016 | PART I-S | 2832 | 2832 | 08/11/2016 | x | - | | | |
| 116503224 | RUS | EUTELSAT 3-10E | 10 E | 15/08/2016 | PART I-S | 2832 | 2832 | 08/11/2016 | x | - | | | |
| 116505266 | RUS | EXPRESS-10P | 140 E | 18/09/2016 | PART I-S | 2832 | 2832 | 08/11/2016 | x | - | | | |
| 11652002 | J | HIMAWARI-8-140E | 140.7 E | 15/01/2016 | PART III-G | 2832 | 2832 | 08/11/2016 | x | - | | x | |
| 116520002 | IRN | IRANDIBS-KARF | 34 E | 16/05/2016 | CRIC | 4092 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520065 | CHN | ITS-AR-64.5E | 64.5 E | 17/05/2016 | CRIC | 4093 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520066 | CHN | ITS-AR-83.5E | 83.5 E | 17/05/2016 | CRIC | 4094 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520115 | G | GBSAT-G14-2 | 129 W | 03/05/2016 | CRIC | 4088 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520119 | IND | GSAT-NS(74E) | 74 E | 12/05/2016 | CRIC | 4089 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520120 | IND | GSAT-NS(83E) | 83 E | 12/05/2016 | CRIC | 4090 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520121 | IND | GSAT-NS(93.5E) | 93.5 E | 12/05/2016 | CRIC | 4091 | 2832 | 08/11/2016 | x | x | x | x | x |
| 116520136 | QAT | QATARSAT-G4-19.7E | 19.7 E | 20/05/2016 | CRIC | 4097 | 2832 | 08/11/2016 | x | x | x | x | x |

| Admin | Sat Network | Orb. Long. | Orb. Sep. | Ntf. Ran. | A/T | Id. No. | C | R | Ar |
|-------|-----------------|------------|-----------|-----------|-----|-----------|---|---|----|
| G | GBSAT A1 | 105 W | 124.7 | N | A | 109500200 | | | |
| G | AM-SAT A4 | 108.2 E | 88.5 | N | A | 109500405 | | | |
| G | GBSAT-77W | 77 W | 96.7 | C | A | 110520007 | C | R | |
| G | GBSAT-125W | 125 W | 144.7 | C | A | 110520010 | C | R | |
| G | GBSAT-129W | 129 W | 148.7 | C | A | 110520011 | C | R | |
| G | GBSAT-139W | 139 W | 158.7 | C | A | 110520015 | C | R | |
| G | GBSAT-137W | 137 W | 156.7 | C | A | 110520226 | C | R | |
| G | AM-SAT 125W | 125 W | 144.7 | N | A | 111500388 | | | |
| G | GBSAT-137W | 137 W | 156.7 | C | A | 111520376 | C | R | |
| G | GBSAT-72.5W | 72.5 W | 92.2 | C | A | 111520383 | C | R | |
| G | GBSAT-129W-B | 129 W | 148.7 | C | A | 111520453 | C | R | |
| G | GBSAT-47.5W | 47.5 W | 67.2 | C | A | 111520456 | C | R | |
| G | GBSAT-8E | 47 W | 66.7 | N | A | 112500009 | | | |
| G | GBSAT-108.2E | 108.2 E | 88.5 | C | A | 112520404 | C | R | |
| G | GBSAT-G12-1 | 113 W | 132.7 | C | A | 112520442 | C | R | |
| G | GBSAT-G12-2 | 116.8 W | 136.5 | C | A | 112520443 | C | R | |
| G | GBSAT-G14-1 | 72 W | 91.7 | C | A | 114520193 | C | R | |
| G | AM-SAT-108.2E-G | 108.2 E | 88.5 | N | A | 115500096 | | | |
| G | GBSAT-108.4E | 108.4 E | 88.7 | C | A | 115520005 | C | R | |
| G | GBSAT-G14-2 | 129 W | 148.7 | C | A | 116520115 | C | R | |

| Victim vs Interferer Service | Downlink Appendix8 Result |
|---|---------------------------|
| ALL | ΔT 1187.24 |
| - Mobile Satellite Service vs. Space Tracking | Noise Temperature 145 |
| - Mobile Satellite Service vs. Space Telemetry | $\Delta T/T$ 818.78 |
| - Mobile Satellite Service vs. Fixed Satellite Service | |
| - Mobile Satellite Service vs. Space Telecommand | |
| - Fixed Satellite Service vs. Mobile Satellite Service | |
| - Mobile Satellite Service vs. Mobile Satellite Service | |

Quickly retrieve and view the ITU findings as well as perform independent analysis of many of the ITU coordination triggers to validate the ITU's findings

Supports ITU Appendix 5, Appendix 8, Appendix 30/30A Annex 1 and Annex 4, PFD downlink and Appendix 30B Annex 4 coordination triggers

Examine in depth the reason for identification on an individual network-by-network or group-by-group basis and, where applicable, launch a detailed analysis of the worst case identified

About Sat-Coord

Sat-Coord is a modular software suite which supports the processing of satellite network information filed with the ITU, intersystem interference calculation (including $\Delta T/T$ and C/I), IFIC processing and frequency coordination support.

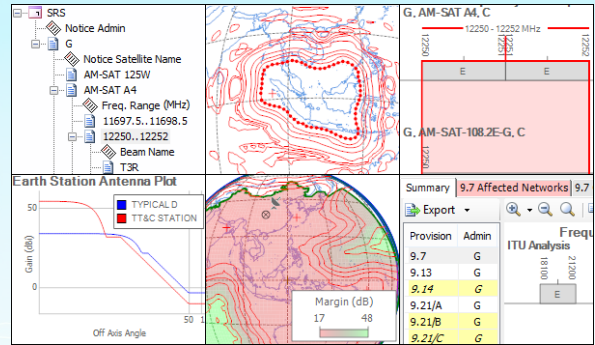
The software has undergone significant testing and development over a period of more than twelve years and has been used extensively to support the satellite coordination activities of RPC Telecom's clients including Intelsat, YahSat, VINASAT, THURAYA, TONGASAT, SingTel, HELLAS-SAT, SUPARCO, ETISALAT, SES Americom, ICO, Hughes Network Systems, O3B, JRANSA, DirecTV, the Cyprus Ministry of Communications, the Nigerian Communications Commission, INDOSAT, Es'hailSat, ANGKASA, Paradigm, BRIsat, KACST and the Government of Australia.

Sat-Coord can be downloaded and registered for a free, fully featured, 30 day trial.

RPC Telecommunications Ltd.

RPC Telecom specialises in satellite and radio communications engineering, software and training, with a particular emphasis on ITU satellite filing, coordination and radio-regulatory matters.

Since 1993 we have supported our clients to secure the orbit and spectrum resources needed to implement their satellite projects, attending more than 120 frequency coordination meetings and making in excess of 90 ITU satellite filings.



RPC

TELECOMMUNICATIONS

T: +44 (0)1473 487040

F: +44 (0)1473 357888

↗ www.sat-coord.com

@ info@sat-coord.com



T: +44 (0)1473 487040

F: +44 (0)1473 357888

 www.sat-coord.com

@ info@sat-coord.com