



GNSS PRODUCTS FOR R&D AND ACADEMIA SINCE 2007



ABOUT IP-SOLUTIONS

IP Solutions was established in Japan as a new generation high-tech business.

IP Solutions has been supplying its users with GNSS instruments since 2007. Members of our staff have more than 35 years of experience in the GNSS field.

PRODUCTS

We have developed cutting-edge GNSS instruments, such as GNSS simulators and software-defined GNSS receivers.

Our clientele includes prominent space agencies like the Japan Aerospace Exploration Agency (JAXA), NASA, and the European Space Agency (ESA), along with numerous universities and global companies, such as Mitsubishi and NTT DoCoMo.

PUBLICATIONS

Our engineering staff has presented numerous conference papers, published articles in GPS World and Inside GNSS magazines, and authored three textbooks on GNSS published by Cambridge University Press.



CAMBRIDGE
UNIVERSITY PRESS



COOPERATION WITH JAXA

From 2007 for a span of 7 years, IP Solutions developed various GNSS instruments for the Japan Aerospace Exploration Agency (JAXA). These instruments included ionospheric scintillation monitors, GNSS simulators, and instant positioning technology. Both the receiver and simulator were developed to aid JAXA's research on ionospheric scintillation, leading to the publication of numerous papers and a joint book. The instruments were validated through flight tests and the ISM receiver network for monitoring scintillation effects in Asia.

PARTICIPATION IN EXHIBITIONS

We have showcased our instruments at various exhibitions in Japan, USA, Australia, China, among others. Our presentation at the ION GNSS meeting is featured on the GPS World magazine's YouTube channel.



UNIQUE TECHNICAL SUPPORT



We provide technical support directly from the engineering team that developed our instruments. Esteemed engineers, like Dr. Ivan G. Petrovski, offer our customers the highest level of technical support and professional services. He is the author of three books and numerous articles published in GPS World and Inside GNSS magazines, GNSS Solutions journal, and more.

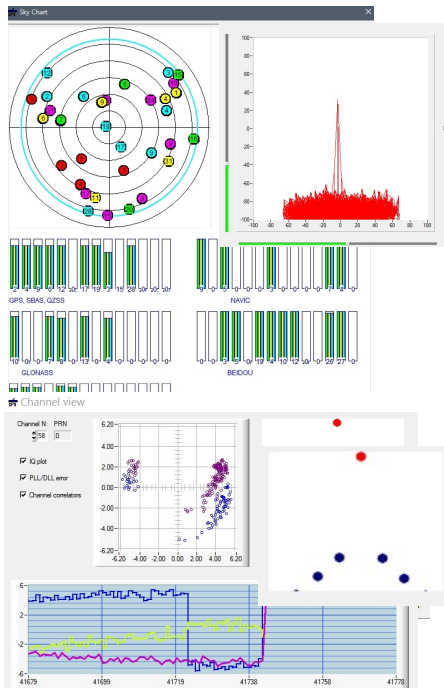
OUR CUSTOMERS

Our clientele includes organizations such as JAXA, NASA, ESA, BSA, NTT DoCoMo, Hitachi, Mitsubishi, Core, Thales, NVS, Kath, Nokia, TUMSAT, Hong Kong Polytechnic University, as well as numerous universities and companies in Japan, USA, UK, Germany, India, Italy, France, Spain, Sweden, Switzerland, China, RF, South Korea, Pakistan, Australia, Hong Kong, Singapore, Malaysia, Thailand, Vietnam, and more.



We are actively involved in organizing IPNTJ and TUMSAT International GNSS Summer Schools in Tokyo.

CATALOG



ARAMIS™ software GNSS receiver

ARAMIS™ software receiver allows multi-frequency, multi-system GNSS signal processing in real-time.

It supports dual frequency GPS, GLONASS, NavIC, Galileo, BeiDou, QZSS, SBAS

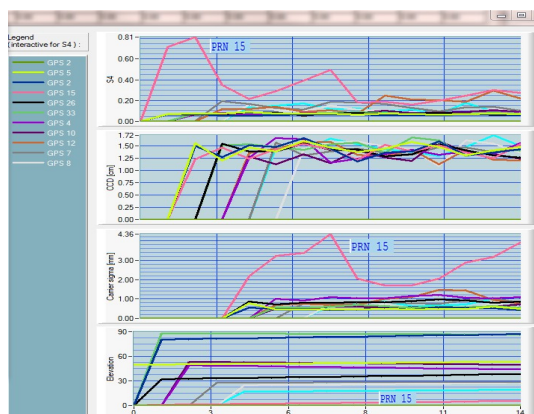
It allows unique level of visualization, including Baseband Processor operation.

The receiver supports RTK with RTKlib.

It allows a user to access source code through NAV API and BASE API (available as separate product) to implement custom positioning algorithms

First release: 2008

Ionospheric scintillation monitor (ISM) extension to the ARAMIS™



ARAMIS ISM ionospheric scintillation output screenshot

ISM extension to ARAMIS™ receiver (former JAXA COSMODE) allows to turn GNSS real-time software receiver into highly customized ionospheric scintillation monitor.

It allows high level of customization and implementation of user algorithms, including tight coupling with INS.

According to JAXA report, it overperformed other commercial scintillation monitors during flight tests due to tight coupling with JAXA's INS.



Eagle-2 JAXA COSMODE ISM



Digital Satellite Navigation and Geophysics book

Authors : Dr. Ivan G. Petrovski, Prof. T. Tsujii

"...The authors write in an accessible, conversational, style with many enjoyable descriptions of historical context. This is most welcome, and makes for pleasant reading..." Frank Van Diggelen, Broadcom Corporation



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Eagle-2 A2-L1-R2-U2 with two synchronized RF channels.

Eagle GNSS L1 front end and RF signal recorder

Eagle (A1-L1-R1-U2) serves as a front end for ARAMIS software receiver or standalone recorder to work in real time and in post-processing mode with recorded signal.

Eagle-2 (A2-L1-R2-U2) modification features up to **two perfectly synchronized antenna inputs** to support research in indoor positioning, reflectometry, etc.

The front ends can be used with 3rd party C/C++, MATLAB and SCILAB software receivers. It is used by such companies as JAXA and Japan Weather News.



ATOS GNSS front end and RF signal recorder

ATOS serves as a front end for ARAMIS software receiver.

It also can serve as standalone RF GNSS recorder to be used with 3rd party C/C++, MATLAB or SCILAB software receivers. It is equipped with OCXO, includes Streamer recording software.

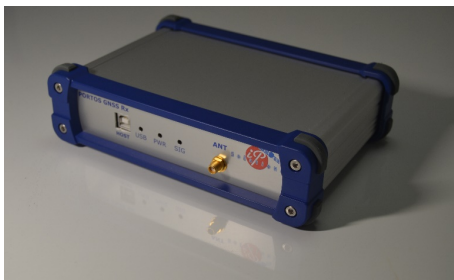
A1-LX-R2-U2 supports: GPS, Galileo L1 + NavIC L5 + SBAS



*Digital GPS, GLONASS, Galileo, and
BeiDou for Mobile Devices
From Instant to Precise Positioning.*

Author : Dr. Ivan G. Petrovski

*This book was recommended and used as a reference text
in university courses at least at three distinct universities.*



Model A1-LX-R4-U2

*PORTOS GNSS front end and RF signal
recorder*

*It serves as a front end for ARAMIS™ software receiver or
standalone GNSS signal recorder.*

*It is equipped with OCXO, includes Streamer recording
software.*

*Supports L1,L2,L5 frequencies.
Optionally available with 4 antenna inputs (CRPA mode).
Optionally available with S-band support (antenna is not*



*Ninja A8-R6-Q14-U3 CRPA simulator
And PORTOS A4-LS-R4-U3 front end*

CRPA Ninja GNSS simulator

Ninja A8-R6-Q14-U3 CRPA simulator.



*Four RF GNSS front end and signal
recorder*

*It serves as a front end for ARAMIS™ software receiver or
standalone GNSS signal recorder. Supports S-band.*

Digital Satellite Navigation and Geophysics book . Chinese edition.



Authors : Dr. Ivan G. Petrovski, Prof. T. Tsujii

"greatly exceeds what is found in other textbooks and by this reason it should be recommended. "

-Pawel Wielgosz, Institute of Geodesy, University of Warmia and Mazury in Olsztyn, Pure and Applied Geophysics



SDR GNSS Lab



It includes ARAMIS™ GNSS SDR software receiver and Simceiver™ RF GNSS simulator.

Equipped with OCXO. Excellent set of instruments for academia and R&D.

It allows a user to work with GNSS signals either from live satellites or simulated, in real time or recorded.

The user can work outside of office without hardware using recorded signals and software only. Making distant team work possible and easier.



Bird's collar with GPS sensor

BGPS Know-how.

Using BGPS allows to keep receiver on for 20 ms instead of 30 sec → more than 1,000 improvement in power consumption

First introduced in 2007 for a receiver developed for JAXA and then in our article in GPS World magazine, the technology allows Instant positioning and low power tracking. Our paper joint paper with Bangor University on one of the applications for bird tracking is available online.

Simceiver™ GNSS simulator and playback device.



Real-time simulation of GNSS signals on one or two central frequencies at a time, selectable from GUI.

The signals can be simulated in real-time with state-of-the-art signal simulation software ReGen™ or recorded and played back with Simceiver software.

Comprehensive simulation models include atmospheric error models, orbits, multipath, dynamic user simulation, 6-DOF.

*Separate simulator and recorder units.
Enclosure may differ for new models.*

Replicator™ high-end GNSS simulator.



The Replicator™ is a multi-frequency, multi-system high-end GNSS simulator for advanced R&D, equipment testing and education.

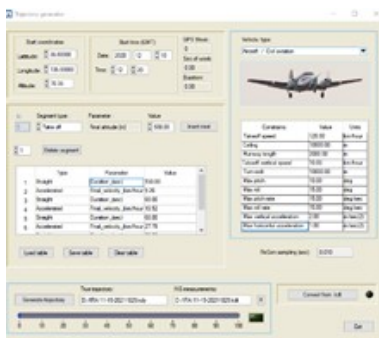
The Replicator supports all GNSS frequencies in L- and S-bands.

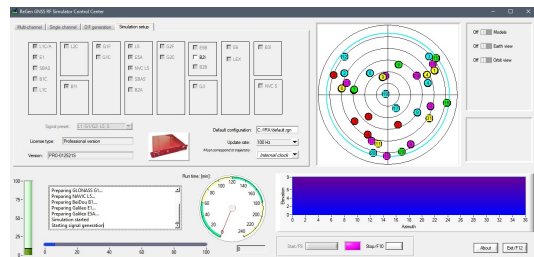
The Host PC operates control software ReGen™.

*Model A1-R4-Q8-U3
Enclosure may differ for new models*

6-DOF trajectory generator

Generates 6-DOF trajectory for the ReGen™ software,





ReGen™ Software Family

ReGen™-CC : GNSS RF simulator control center

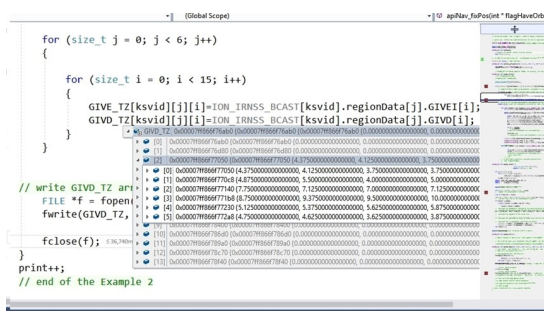
ReGen™ is a Control Software for IP-Solutions GNSS RF simulators.

ReGen™-DIF : GNSS digitized IF simulator.

ReGen™ version for simulating Digitized IF signal files similar to recorded from live satellite by IP Solutions signal recorder to work with IP-Solutions software receiver ARAMIS (2-bit format). Most of the MATLAB and C 3rd party software receivers can be supported.

ReGen™-SDR

ReGen™ version to work with some 3rd party general purpose SDR (8-bit ADC supported).



NAV API for ARAMIS™

It allows a user to get access to ARAMIS™ receiver navigation processor. The user can then modify existing algorithms or implement his or her own algorithms.

The user can also get access to broadcast NAVDATA. For example, to access grid data in SBAS or NavIC signal, and modify positioning algorithms to use these data.

The ARAMIS™ even allows the user to compare API positioning results with algorithms used by the receiver.

The API is provided as ready to run Microsoft Visual Studio project.


```

(Global Scope)
double Azimuth,
double Elevation,
double RealRange, // range without errors
int epoch // simulation epoch [ms of week]
{
    int status=0;

    static double dAdd = 0;

    if ((PrntNumber == 26) && (epoch>349246270))
    {
        *CodeMeasurements = *CodeMeasurements + dAdd;
        if(dAdd<99)dAdd = dAdd + 0.01;
    }

    return status;
}

```

MODEL API for ReGen™

It allows a user to apply his or her own error models, implemented in C by inserting them into ReGen™ core through an API.

One of the provided examples shows how to use it in order to test RAIM algorithms in a 3rd party off-the-shelf receiver.

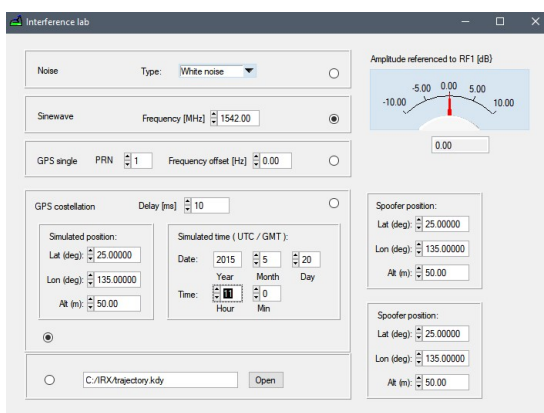
The API is provided as ready to run Microsoft Visual Studio project.



INS simulator

INS simulator is generating INS aiding data for a receiver. This data can be used along with simulated by ReGen™ signal for given position or trajectory.

Interference / spoofing Lab



ReGen™ add-on Interference and spoofing Lab software allows a user to simulate spoofing and interference.

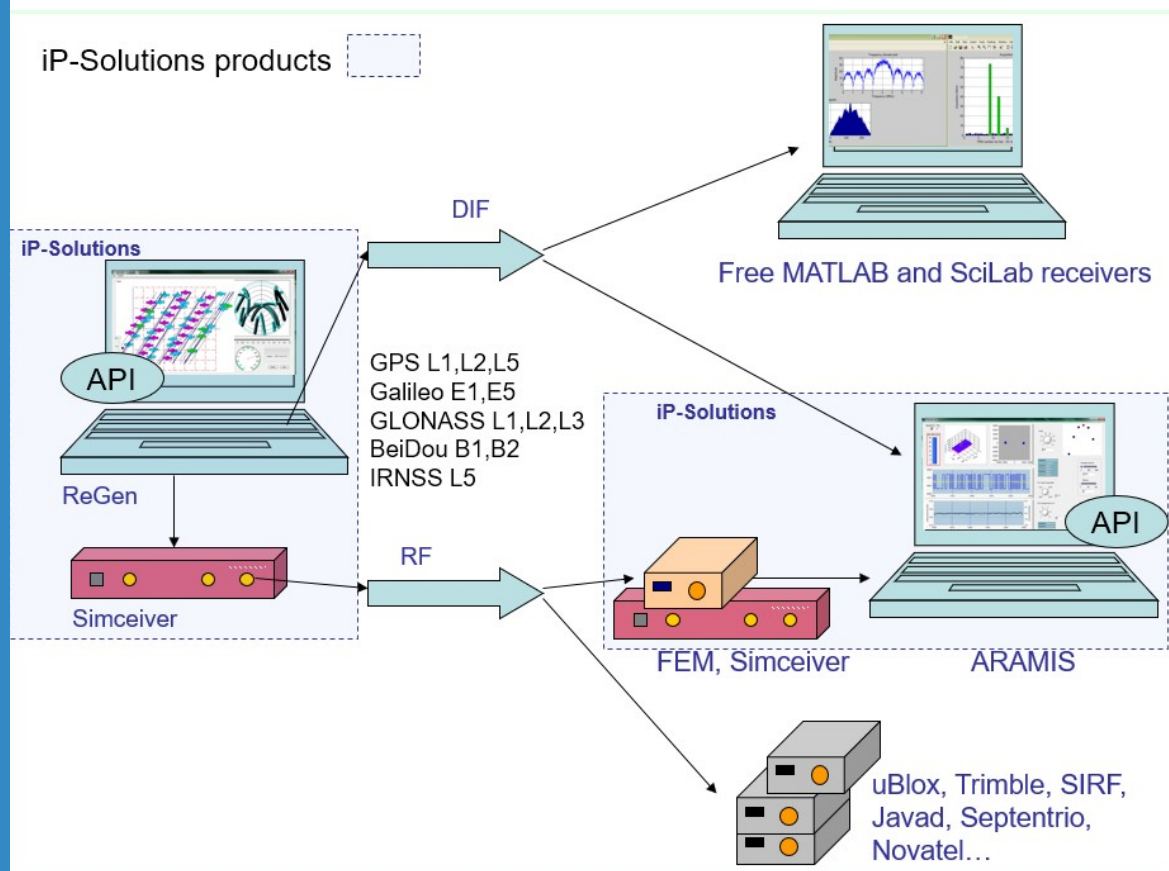
Interference signals can be simulated as a noise, single harmonic, spoofing GNSS signals and meaconing signals.

User can work with:

- hardware
- software only
- live satellite signals
- simulated signals
- user software
- off-the-shelf 3rd party receivers



DIF GNSS AT HOME, RF GNSS
IN OFFICE.





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