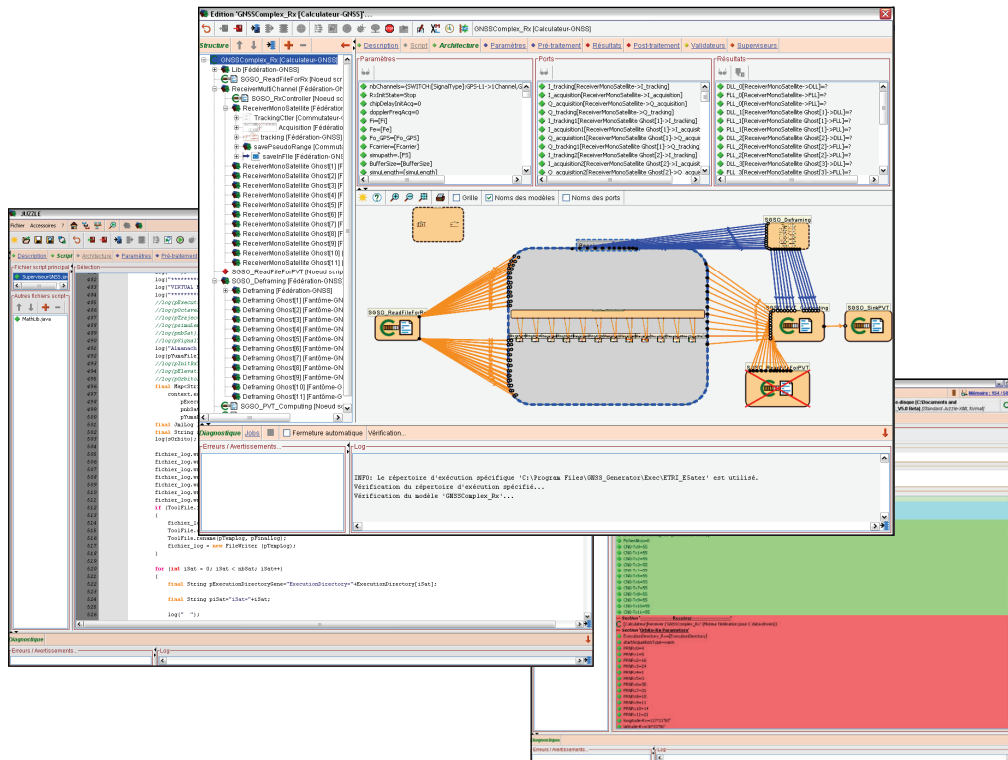


# J-GNSS

## Juzzle GNSS global simulator

J-GNSS is a GNSS signal simulator running on Juzzle platform, which offers several functions: signals generator, orbitography, signals propagation, GPS/Galileo signals control, receiver algorithms,...



### GNSS Environment simulation:

- Complete orbitography simulation
- Navigation message generation
- Electromagnetic GNSS signal simulation
- Calculation of resulting signal at any earth point, taking in account multiple satellites, propagation effect, Doppler, etc.

### GNSS Receiver algorithm

- Multi-channel Acquisition/tracking of satellites
- Point, Velocity and Time estimation

# J-GNSS

## Juzzle GNSS global simulator

### J-GNSS Overview

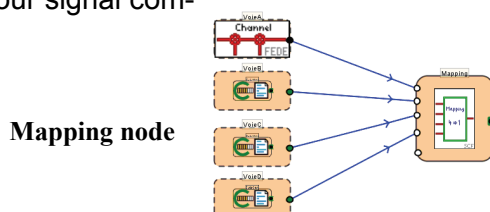
#### Signal generation

- J-GNSS provides a complete orbitography module designed for the computation of the satellites position (considering GPS and Galileo SV ephemeris parameters).
- For each generated signal, the navigation message data frames are built, including all the mandatory contents (preamble, TOW) and the ephemeris parameters.
- A complete GNSS signal structure simulation is built (signal carrier, spreading codes, secondary codes if present, modulations etc).
- The generator brings the resulting composite signal, taking into account the multiple satellites emissions, the electromagnetic signals propagation, Doppler etc.
- The toolbox currently provides a highly configurable model of satellite, covering various signal configurations for Galileo and GPS IIF block constellations.
- According to the GPS and Galileo Interface Control Documents (ICD), the GNSS simulator generates several signals components within dedicated channels (data and pilot channels...). GPS CNAV, Galileo I/NAV, F/NAV, C/NAV navigation messages are generated by the simulator on the data channels.

All the signals components are modulated thanks to:

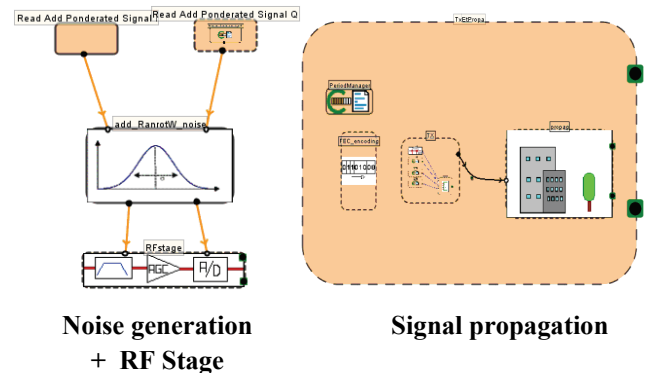
- Primary spreading codes (LFSR)
- Secondary codes if necessary
- Subcarriers if the signal is BOC-modulated (BOC, CBOC, ALTBOC, TMBOC...)

A Mapping node allows modulating and multiplexing up to four signal components.



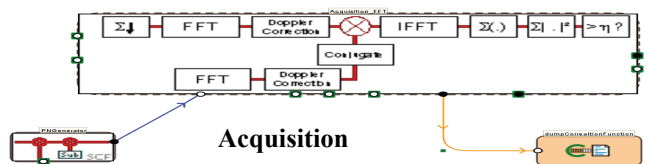
#### Signal propagation & RF stage

The satellite-to-ground propagation node applies attenuation, propagation delay (atmosphere crossing, multipath, etc.) and Doppler shift to the signal. Their evolution can either be calculated in the node or read from an external tool. The simulator also adds thermal noise.

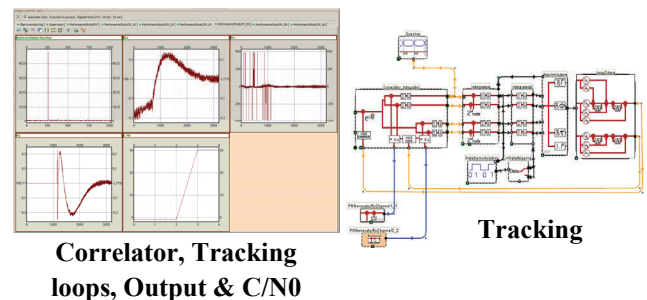


#### Receiver

- Multi-channel Acquisition: semi-automatic mode (almanac loaded) and warm start.



- Tracking of acquired satellites



- Bit, word and frame synchronization
- Message extraction (optional, query for availability)
- Point, Velocity and Time estimation

## Juzzle GNSS global simulator

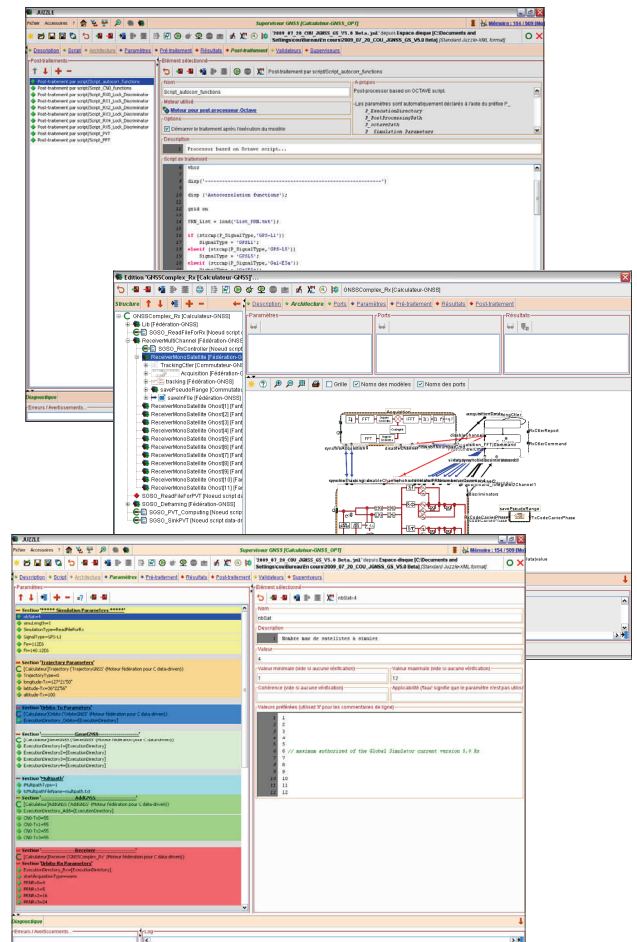
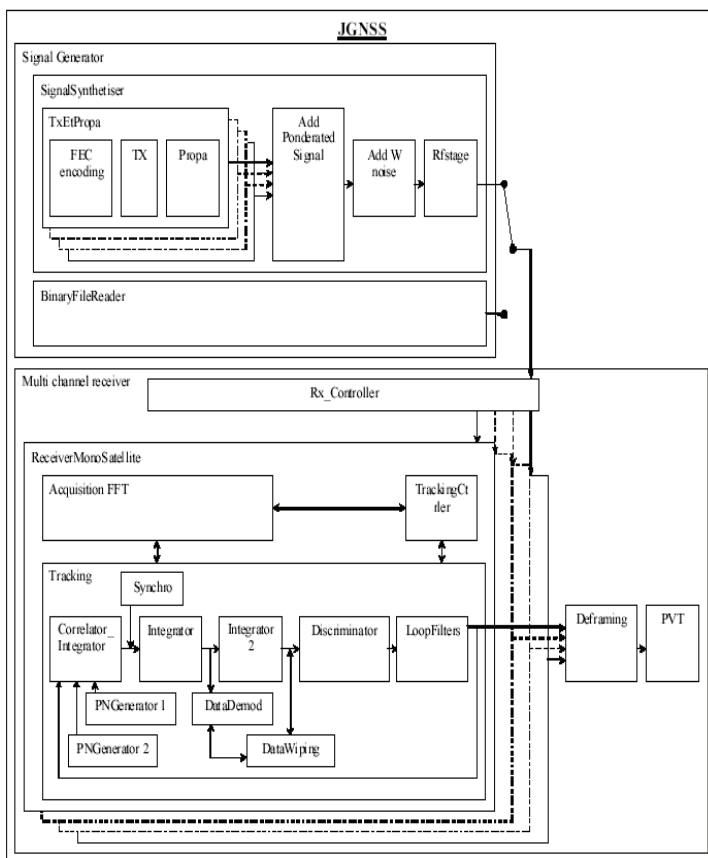
### Scope of application

- Hardware receivers testing
- Signals testing scenarios
- Research:
  - New signal processing algorithms testing
  - Validations
  - Post-processing

### Overall applications

- Navigation: terrestrial, air, maritime, railway
- Geographical or topographic information
- Mobile communications, telecommunications

### JGNSS Overall Architecture



### Juzzle platform overview

- Open-source freeware (<http://www.juzzle.org>)
- Development and exploitation simulation platform
- Model graphical design
- Grid computing capability over a hetero-genic network
- Statistical, parametrical studies
- Integrated code edition, code generation and code debugging

# J-GNSS

## Juzzle GNSS global simulator

### Key features

- User-friendly tool, thanks to its use with Juzzle platform.
- Able to replay a scenario
- Usable for simulation and for real time
- In constant evolution
- Available in different OS (Linux, Windows...)
- Possibility to configure the whole simulator

### Proprietary

J-GNSS is a co-proprietary of SILICOM and the CNES (French Space Agency).

### Services provided by SILICOM

- Specific GNSS signal implementation
- Customization of J-GNSS for particular application
- Optimized view development, adapted to particular cases
- Support (On-site, Hotline, Web)
- On-site training

### SILICOM GNSS Products:

