The DORIS network

- Antenna stability improvement: status and prospective
- The 3.0 beacons:
  - New features
  - Improvement of the reliability
- Beacons disposability: 2.0 and 3.0 models
- Other possible improvements:
  - Reducing the time between failure and replacement
  - Uniform model of antenna over the network
- Information and formalization of the relations with the host institutes

Antenna stability

Currently 3 different options:

- **Pillar on ground floor:**

  Represent 15 sites among the renovated or newly installed sites since 1999.

- **Rigid metal tower 2 meters high on ground or stable building structure: 6 sites since 1999.**

- **Rigid metal tower 1 meter high or less on building structure: 3 sites since 1999.**

Types of supports

Concrete pillar

2m tower on concrete structure

Short tower on building

Status and prospective

- **Configuration adopted for the moment**
  - Metal corrosion problems seem to be solved
  - Long term resistance should be achieved
- **Further improvements**
  - Concrete structure stability in case of soil ground
  - Initial study including ground structure when installing a new site
  - Cross comparison with other techniques?
- **Positive results at half way of this process**
- **Some difficult sites to prospect from now on**
- **The whole network equipped with STAREC antennas:**

better phase center determination relatively to a materialized point.

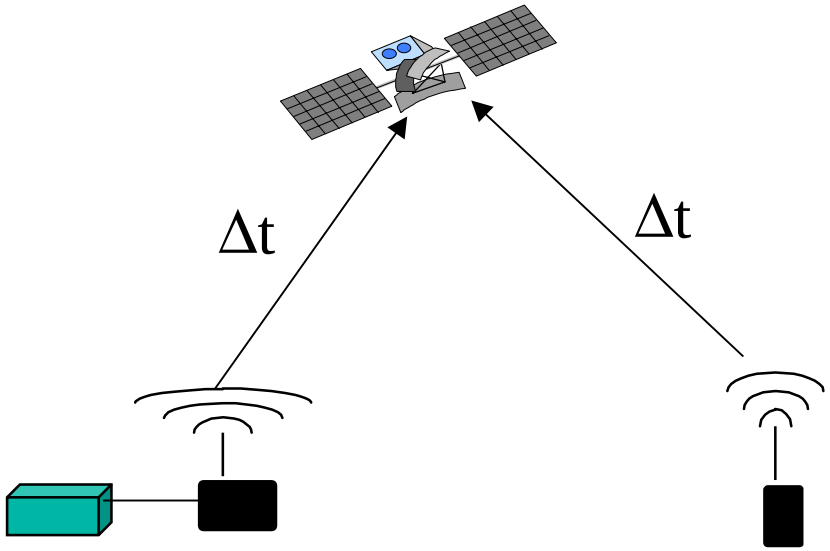
3.0 beacons: installation process

- **Installation process beginning**
  - 2 beacons installed (Toulouse, Tristan da Cunha)
  - 4 beacons more installed within 2 months
  - 5 beacons delivered in June 2002 to SIMB
  - 15 beacons/year delivery planned for the coming years
- **Master beacon function operational in Toulouse**
  - Automatic uploads for satellites programming soon achieved
  - Network image uploaded now to the 2nd generation receivers

3.0 beacons: new features

- **Modulation of the signal on the 2 GHz frequency**
  - Same message as 400 MHz
  - Allows eventual mono-frequency receivers conception
  - Measurements available even if 400 MHz interference
- **More control values transmitted**
  - Internal temperature
  - Transmitted power out of the amplifiers
  - Date and time (modulo 10 seconds)
  - Time elapsed since oscillator was on
  - Indicator of restart mode

Beacons clock lag determination

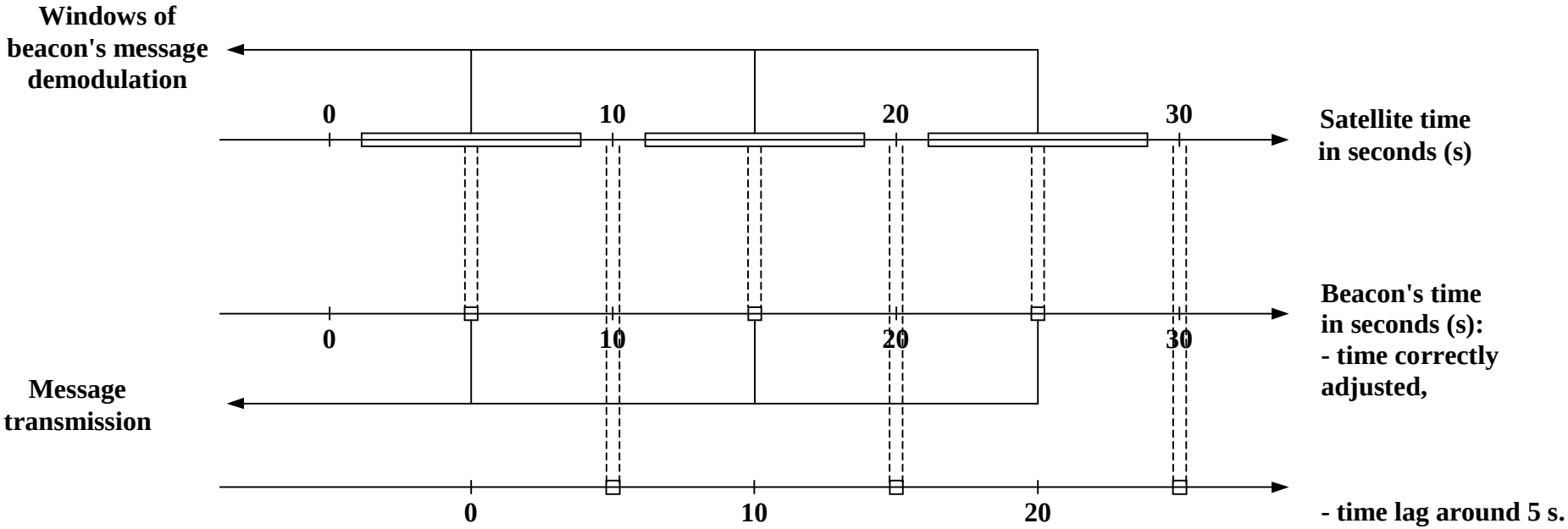


- Beacons time controlled trough the system to TAI, but modulo 10 seconds.
- Time lag between beacon time and TAI known after beacon reception and data treatment

Master beacon connected with cesium controlled by CNES time /frequency laboratory

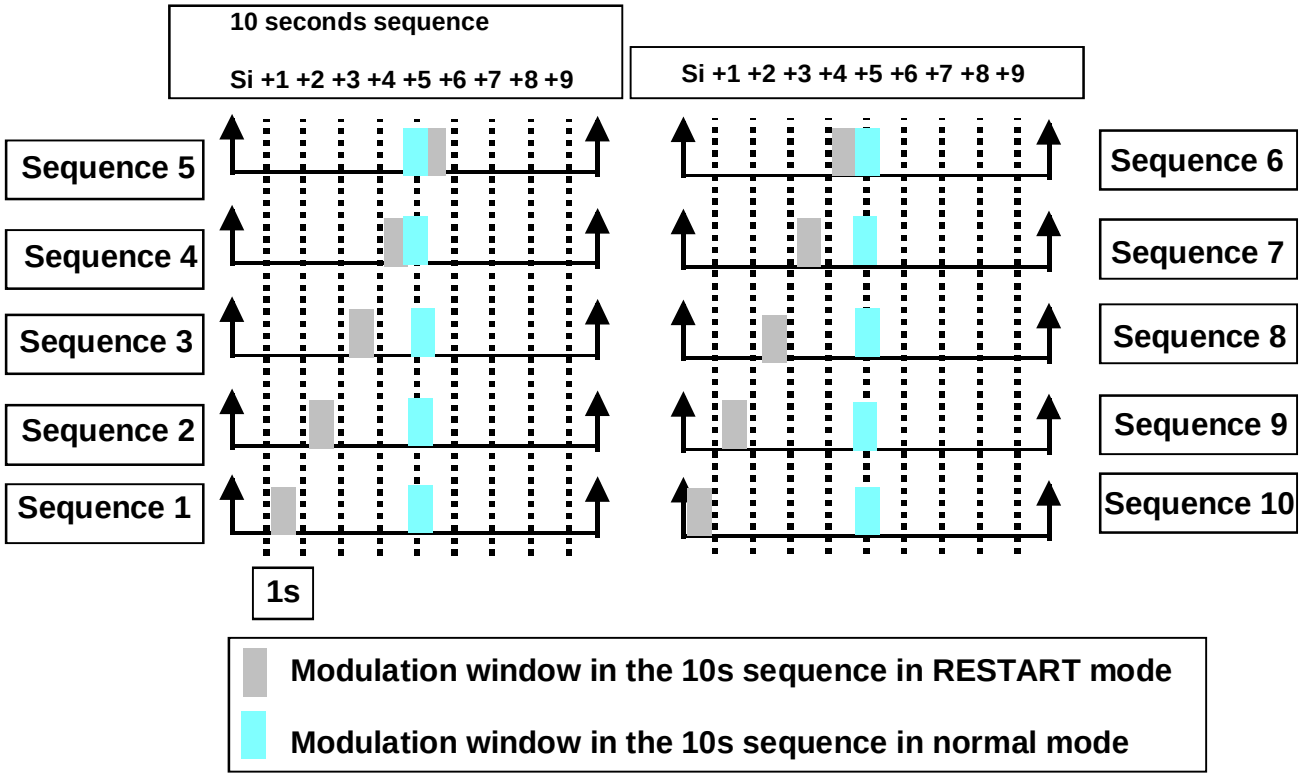
Transmitting beacon

Constraint for beacon's time setting (1.0 and 2.0 beacons)



A time lag of around 5 seconds when setting beacon's time doesn't allow reception of the modulation on the satellites. The measurements are lost in this case.

Restart mode with 3.0 beacons



Restart mode allows 2 new features:

- **automatic restart of the beacon in transmission mode after a cut off**
- **possibility to receive measurements with any time lag**

Restart mode is the default mode when switching on the beacon.

Beacons 3.0: other new features

- **Frequency lag programming available**
  - Avoid Doppler conflicts for beacons close together
  - Useful for the new 2 channels receivers
- **External power supply system**
  - 3 different sets of battery: adaptability to diverse configurations
  - Large voltage and frequency variability accepted
- **Possibility of remote control in the near future: useful for remote sites and non permanently maintained**
- **New generation of oscillators: stability increased by a factor 3 relatively to 1.0 beacons**

Beacon's availability

- **1.0 beacons replaced by the 3.0 and no more used**
  - Many components not constructed anymore
  - Difficult to maintain these beacons
- **2.0 beacons**
  - 26 existing —› allow 20 operational
  - Reliability increased since a protection module against signal return to the amplifiers implemented on 2 GHz output
  - Study initiated for 3.0 synthesizer implementation in 2.0 beacons (—› 2.1 model?)
- **3.0 beacons**
  - Regular delivery quite sure as all initial problems seem to be solved
  - Only USO delivery could limit delivery

Other possible improvements

- **Improve the sites measurement continuity**
  - Time sometimes important between failure and installation of a new beacon

  —› mostly due to customs procedures
  - Failure determination only through communications

  —› partial information or misunderstanding can lead to long time before diagnosis (even more important problem for temporary experiments)
- **Possible actions:**
  - Try to ameliorate communications
  - Improve the equipment reliability: objective during the 3.0 conception
- **Improve meteorological measurements reliability:** regular calibrations or comparisons to perform

Host Institutes and SIMB relations

- **Agreements signed between IGN and host institutes**
  - Facilitates administrative problems resolution
  - Gives an official status to the relations
  - Gives a base of discussion when problems arise
- **Information about the DORIS system and results**
  - Available through IDS web site
  - Altimetry data and information available on AVISO web site