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 through 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.
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