Satellite communications, earth observation, navigation and positioning and control stations

Indra reserves the right to modify these specifications without prior notice.
**SATELLITE COMMUNICATIONS FOR AIR TRAFFIC MANAGEMENT**

**Introduction**

Radars, air traffic control centers, VHF radio communications stations, are some of the means needed for an accurate, efficient, reliable and safe management of air traffic operations.

Communications backbone infrastructure is probably one of the most critical elements to support all above mentioned means.

Satellites and its associated ground communications stations are today the most reliable, secure and efficient way of transmitting data and voice between the different components of an air traffic management infrastructure at national or continental level.

**Indra** provides a variety of satellite-based networks through IP or FRAME RELAY technologies to satisfy the most demanding requirements of air traffic authorities worldwide.

A central network management system allows the user to have a full control of its network and a comprehensive monitoring tool to supervise all events taking place during full-time operations.

**Technical characteristics**

- **Topology:** Meshed, star or hybrid network
- **Antenna aperture:** 1.8 m, 2.4 m and 3.7 m (other diameters are available for special cases)
- **Polarization:** Linear (H/V) or circular (LHCP or RHCP)
- **Frequency:** Ku band and C band
- **Access method:** FDMA, TDMA, MF-TDMA
- **Modulation:** QPSK, BPSK, QAM
- **FEC:** 1/2, 3/4 and 7/8
- **Digital voice/data:** E1/T1, ADSL, ISDN, QSIG (PSST)
- **Analog voice:** FXS, FXO, E&M
- **Legacy data:** HDLC, Frame relay, SDLC, TCP, IP, IPX, asynchronous protocols over V.35, TIA-232/V.24, TIA-530, TIA-449/V.36, X21...
- **IP-based networks:** TCP accelerations, VoIP (Voice over IP), VLAN (Virtual LAN)
- **Redundancy:** Optional redundancy for all interfaces and equipments
- **Power supply:** 110 or 220 VAC, 50 or 60 Hz
- **M&C system:** GENIUS NMS (Indra’s local and remote M&C)
**SATELLITE COMMUNICATIONS FOR AIR TRAFFIC MANAGEMENT**

Air Traffic Management Systems and activities require a high degree of safety.

**Introduction**

Satellites and its associated ground communications stations are today the most reliable, secure and efficient way of transmitting data and voice between the different components of an air traffic management infrastructure at national or continental level.

Indra provides a variety of satellite based networks through IP or FRAME RELAY technologies to satisfy the most demanding requirements of air traffic authorities worldwide.

A central network management system allows the user to have a total control of its network and a comprehensive monitoring tool to supervise all events taking place during full-time operations.

**Technical characteristics**

- **Topology**: Meshed, star or hybrid network
- **Antenna aperture**: 1.8 m, 2.4 m and 3.7 m (other diameters are available for special cases)
- **Polarization**: Linear (H/V) or circular (LHCP or RHCP)
- **Frequency**: Ku band and C band
- **Access method**: TDMA, CDMA, FDD, TDD
- **Modulation**: QPSK, BPSK, QAM
- **FEC**: 1/2, 3/4 and 7/8
- **Digital voice/data**: E1/T1, BRI, ISDN, IP, IPX, TCP, UDP
- **Analog voice**: FXS, FXP, E&M
- **Legacy data**: HDLC, Frame relay, X.25, X.21, X.25, T1 E1, DS1, D3
- **Video/data**: TCP accelerations, VoIP, VLAN
- **Redundancy**: Optional redundancy for all interfaces and equipments
- **Power supply**: 110 or 220 VAC, 50 or 60 Hz
- **M&C system**: GENIOS/MS (Indra’s local and remote M&C)

**Satellites and it associated ground communications stations are today the most reliable, secure and efficient way of transmitting data and voice between the different components of an air traffic management infrastructure at national or continental level.**

**Communications backbone infrastructure is probably one of the most critical elements to support all above mentioned means.**

**Radars, air traffic control centers, VHF radiocommunications stations, are some of the means needed for an accurate, efficient, reliable and safe management of air traffic operations.**

**Communication backbone infrastructure is probably one of the most critical elements to support all above mentioned means.**

**Air Traffic Control Centers (ATCCs)**

**VHF**

**ATS services (including APR)**

**Aircraft**

**Air Traffic Control Centers (ATCCs)**

**ROG services**

**Public network**

**AOC services**

**Aircraft network**

**Ground earth station**

**General earth station**