



## **MXC** ADS-B 1090 ES GROUND STATION

### SYSTEM DESCRIPTION

**The MXC is a high performance ADS-B (Automatic Dependent Surveillance - Broadcast) Ground Station for en-route, terminal and airport surveillance applications, compliant with the 1090 MHz Mode-S Extended Squitter standard.**

Taking advantage of the thorough experience gathered in ADS-B technologies, systems and applications since mid 1990s, SELEX Sistemi Integrati has designed and developed the **MXC** as fail-safe, modular system that fulfils stringent operational requirements and maintains growth possibilities through hardware and software upgrades.

Exploiting ADS-B capable Mode S transponders, aircrafts and vehicles can periodically broadcast over the 1090 MHz RF channel extended squitter messages (DF17/18), which contain identification, position, altitude, velocity, and other airborne derived data. The **MXC** receives and processes those messages in order to distribute the collected surveillance information to ground ATM systems (e.g. Tracker, Surveillance Data Processing Systems, Flight Data Processing Systems), using the ASTERIX CAT

21 standard format over LAN or WAN communications infrastructures.

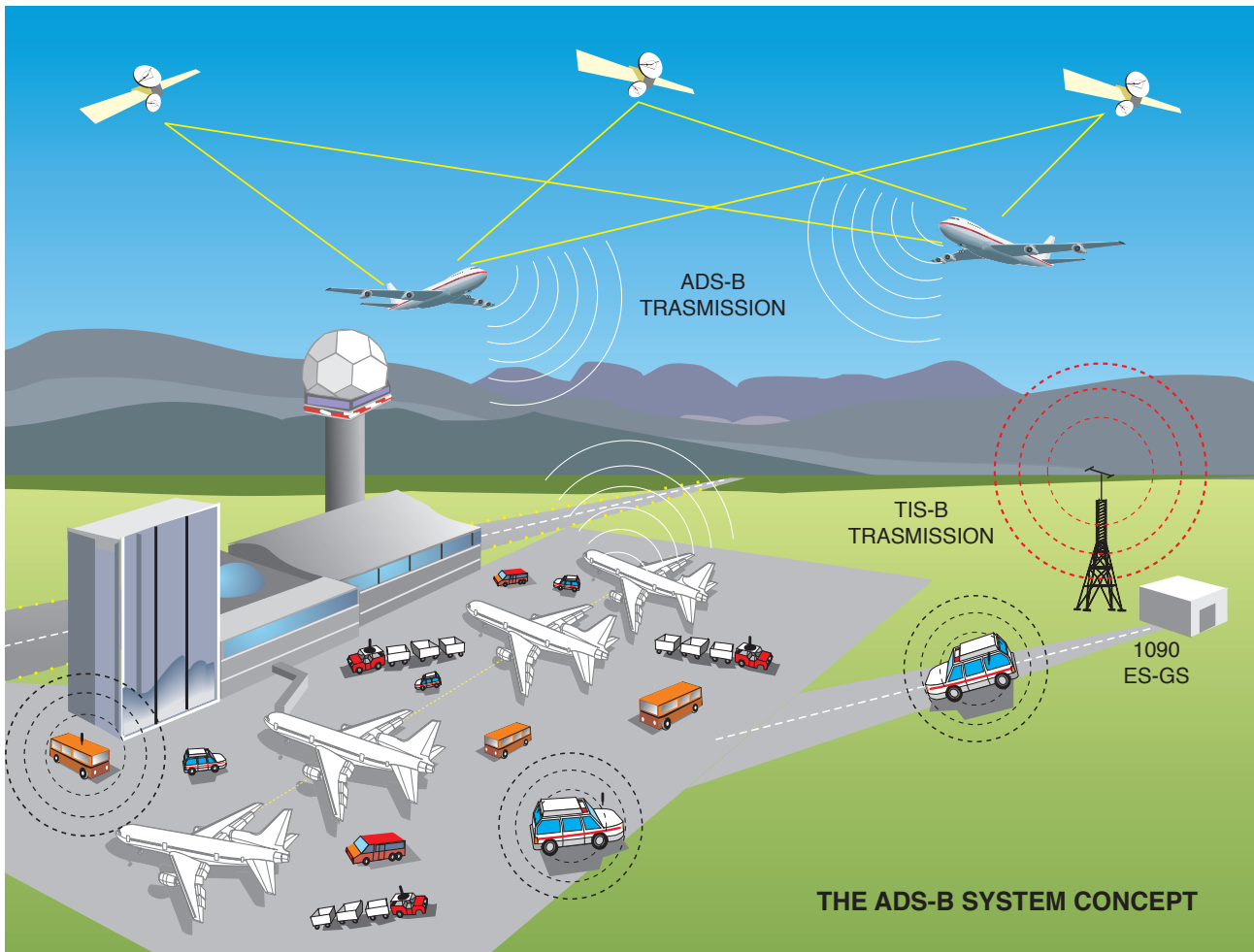
The **MXC** can be perfectly integrated with the other systems for cooperative ATC surveillance (Mode A/C/S secondary radars and multilateration system).

### TECHNICAL FEATURES

The **MXC** makes use of advanced sensors and innovative processing of signals transmitted by the targets. These characteristics guarantees high reliable detection of cooperative targets, also in the most demanding traffic scenarios.

The **MXC** is able to receive and decode in real time Mode S Extended Squitter DF17/18 ADS-B messages. The following subtypes are currently supported:

- Surface Position messages (BDS0,6)
- Airborne Position messages (BDS0,5)
- Velocity messages (BDS0,9)
- A/C Identification & Type messages (BDS0,8)
- A/C Operational Status messages (BDS6,5)



In addition, the **MXC** is also capable to receive and decode other Mode S defined messages transmitted by aircraft in reply to interrogations made by Mode S radars:

- DF 4, 5 (surveillance altitude/identity reply)
- DF 11 (All Call Reply/Acquisition Squitter)
- DF 20, 21 (Comm-B altitude/identity reply)

After decoding, information received for each target are assembled, formatted in standard ASTERIX CAT 21 messages and distributed to ground users which have subscribed to the **MXC** service.

ASTERIX messages can also directly feed a local tracker hosted on board the **MXC**.

The basic **MXC** configuration includes:

- 1090 MHz Receiver unit
- Low Noise Amplifier
- High gain antennas (sectorised or omnidirectional)
- Ground-station Data Processing (GDP)
- UTC time reference subsystem via GPS receiver
- Ground-station Maintenance Monitor (GMM)

A redundant configuration with dual receiver and or processing subsystem is also available.

#### OPTIONAL SUBSYSTEMS

The modular design allows for easy system expansion as well as specifically tailored **MXC** configurations, which extend the capability of the basic system with additional data link technologies and/or applications. Features that can be added to the basic **MXC** configurations are:

- a 1090 MHz transmitter, which enables the **MXC** to broadcast TIS-B (Traffic Information Surveillance - Broadcast) messages
- a VDL Mode 4 base transponder, which makes the **MXC** capable to support the dual link concept, while maintaining the same interface with the ATM systems

#### TIS-B

Broadcast of traffic information complements the operation of ADS-B by providing through ground-to-air transmission surveillance data related to aircraft not capable to transmit ADS-B over the 1090 MHz channel. TIS-B broadcasts contain at least identification, position and altitude of all targets flying within an airspace volume.

Traffic information can be derived from other surveillance sources (secondary radars, multilateration, other ADS-B data links, multiradar trackers, etc.). The **MXC** accepts the traffic data with the standard ASTERIX CAT 062

encoding and broadcast this information over the 1090 MHz data link using the same formats as ADS-B (112-bit Mode S DF=18 message) , which can be easily decoded by any 1090 MHz ADS-B receiver to complement information received air-to-air through ADS-B.

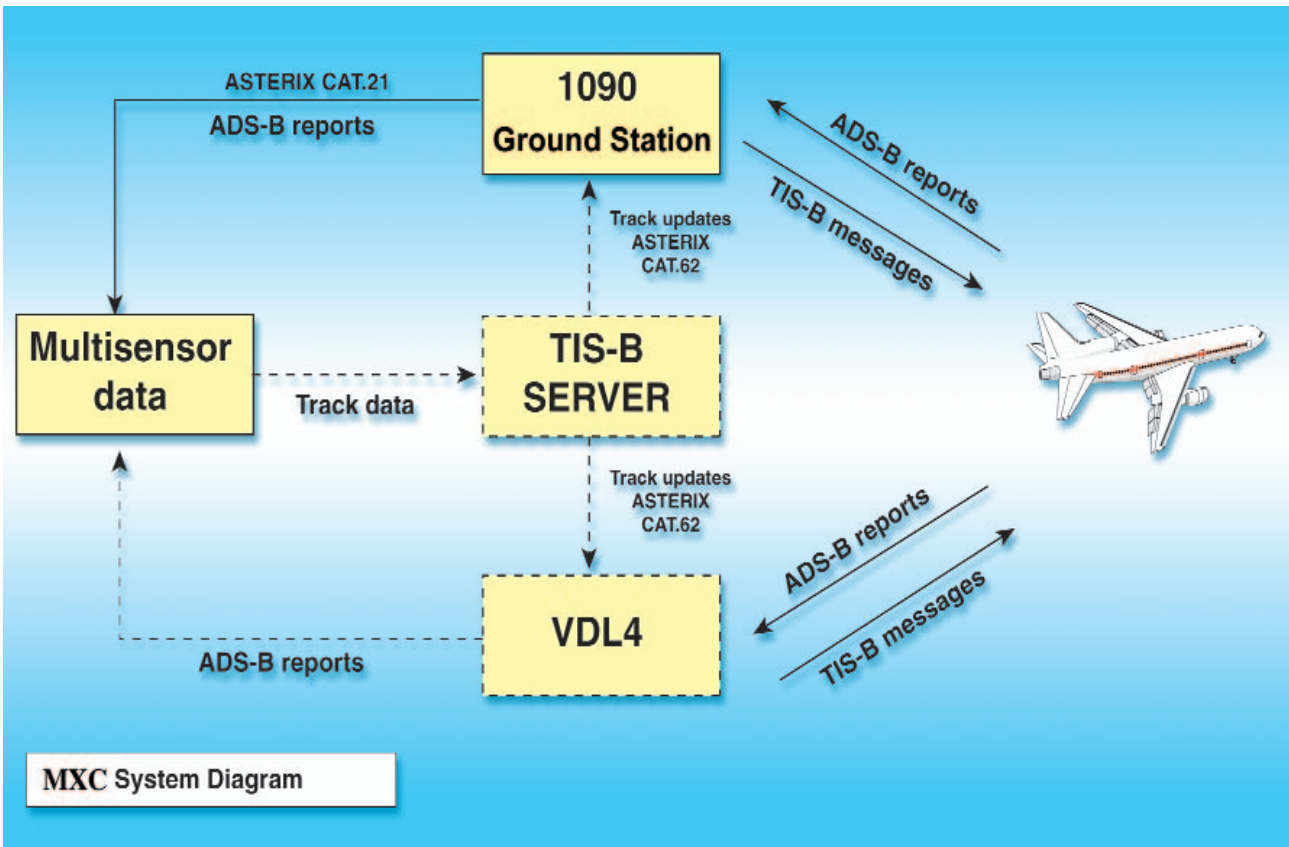
TIS-B is one of the enabler for pilot's enhanced situation awareness or more advanced airborne surveillance applications.

**VDL Mode 4**

VDL Mode 4 is an alternative ADS-B data link that uses multiple narrow-band channels in the VHF band. The use of this additional data-link together with the 1090 MHz ES guarantees, for aircrafts equipped with VDL Mode 4 transponder, higher surveillance performance and data integrity.

**MXC SPECIFICATION & PERFORMANCE**

Operating Frequency	1090 MHz
Bandwidth	± 15 MHz
Sensitivity	-86 dBm
Dynamic range	70 dB
Data Formats	ASTERIX CAT21/CAT23/CAT22/CAT62
Capacity	Up to 600 targets
Mode-S downlink formats	DF 17/ 18, DF 4/5, DF 11, DF 20/21
Coverage	up to 250 NM - 360°
Availability	99.9%
Continuity	> 99.98% per hour of flight
MTBF	>20000 hours
Applicable Standards	- ICAO Annex 10 - RTCA DO-260A - RTCA DO-260 - VDL 4 SARPs - ETSI EN 301 842-1 - ETSI EN 301 842-2



**MXC System Diagram**

## Timing

OCXO Clock

60 MHz highly stable Oven Clock

Absolute Timing (UTC)	GPS receiver (15 nsec 1_ accuracy exploiting quantisation error)
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## Environmental

Operating

Temperature	-10 : 55°
Relative humidity:	10% : 90%

Non Operating

Temperature	20 : 60°
Relative humidity:	5 : 95%

## Electrical

Input voltage	90 : 265 VAC
Input frequency	47 : 64 Hz
Consumption	70 W

## External Interfaces

10/100 Fast Ethernet (IEEE 802.3) port  
RS232/485 port for local and remote maintenance access  
N Female for RF input

