



Security and Information Systems Division

Embedded system approach overview

IWES 2017 Rome 7 September 2017



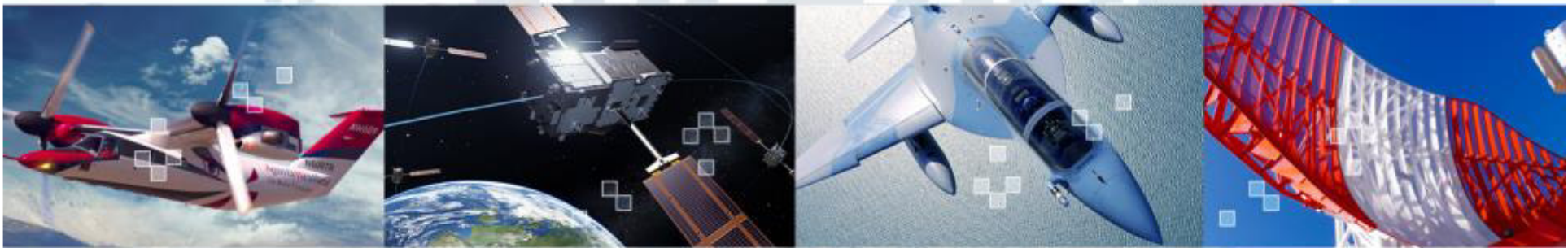
Leonardo

One Company, Stronger Together

1 January 2016: we absorbed the activities of **AgustaWestland, Alenia Aermacchi, Selex ES, OTO Melara** and **WASS** into One Company, while maintaining Parent Company and Corporate Centre functions for **DRS Technologies, MBDA, Telespazio, Thales Alenia Space, and ATR.**

Finmeccanica is now Leonardo

28 April 2016: our new name changed in Leonardo, inspired by Leonardo da Vinci, a universally recognised symbol of **creativity and innovation**. **Leonardo** represents the **ideal bridge** between historical legacy and our future in the high-tech industrial sectors.



Our Business

Leonardo is a global company in the high technology sector, and is one of the key actors in Aerospace, Defence and Security worldwide. We operate through:

DIVISIONS

-  ▪ Helicopters
-  ▪ Aircraft
-  ▪ Aerostructures
-  ▪ Airborne & Space Systems
-  ▪ Land & Naval Defence Electronics
-  ▪ Defence Systems
-  ▪ Security & Information Systems

SUBSIDIARIES AND JOINT VENTURES

- **DRS Technologies** (100% Leonardo)
- **Telespazio** (67% Leonardo and 33% Thales)
- **Thales Alenia Space** (67% Thales and 33% Leonardo)
- **MBDA** (37.5% BAE Systems, 37.5% Airbus Group, 25% Leonardo)
- **ATR** (50% Leonardo and 50% Airbus Group)

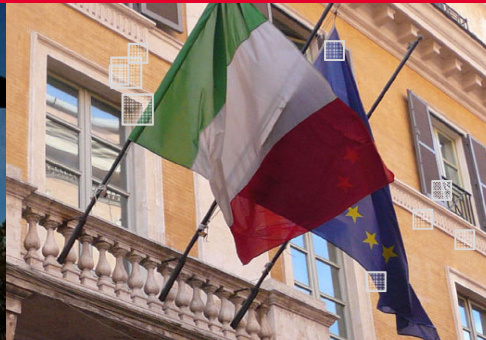
Security & Information Systems

Improving safety & security of economic and social environments, strengthening resilience of organizations and critical infrastructures by leveraging the synergies among information technology, secure communications networks, physical and logical security

DEFENCE



CENTRAL & LOCAL GOV



INDUSTRIAL SECTOR



AIR TRAFFIC MANAGEMENT



SECURITY & PUBLIC SAFETY



- CRITICAL INFRASTRUCTURE PROTECTION (Utilities, Oil & Gas, Mass Transit, Railways, Major Events)
- AVIATION SECURITY
- MARITIME & BORDER SECURITY
- COUNTER-TERROR & CRIME
- SAFE CITY

POSTAL & COURIER OPERATIONS



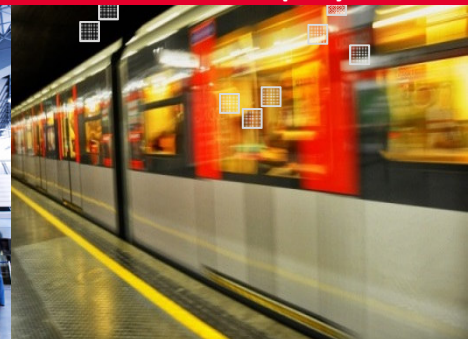
- MATERIAL HANDLING
- PARCEL & POSTAL

AIRPORT OPERATIONS



- BAGGAGE HANDLING

INTELLIGENT TRANSPORT SYSTEMS (ITS)



Security & Information Systems: **we secure your business**



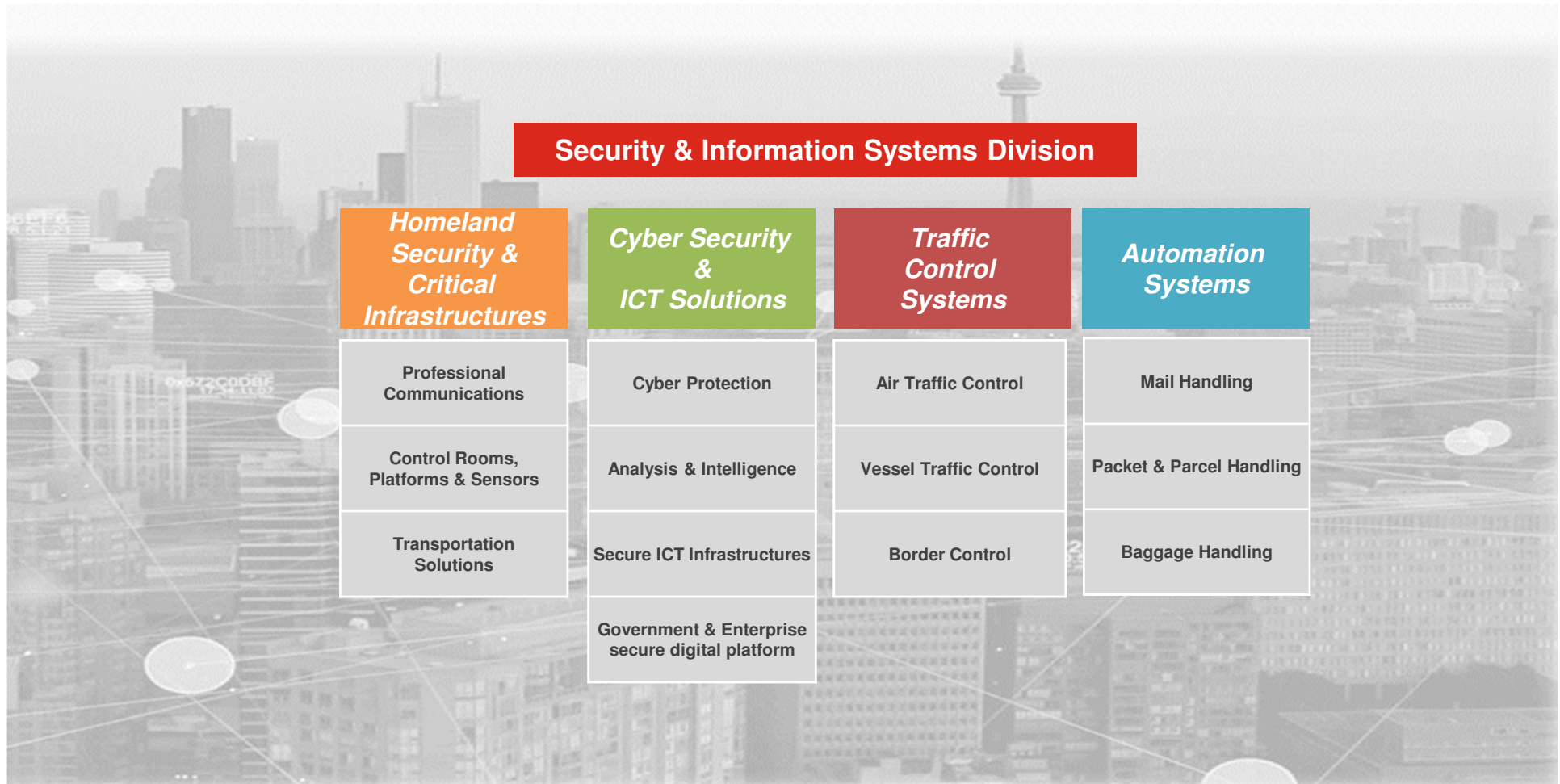
Security & Information Systems - Sites

ITA – 2.850^(*)

UK – 400^(*)

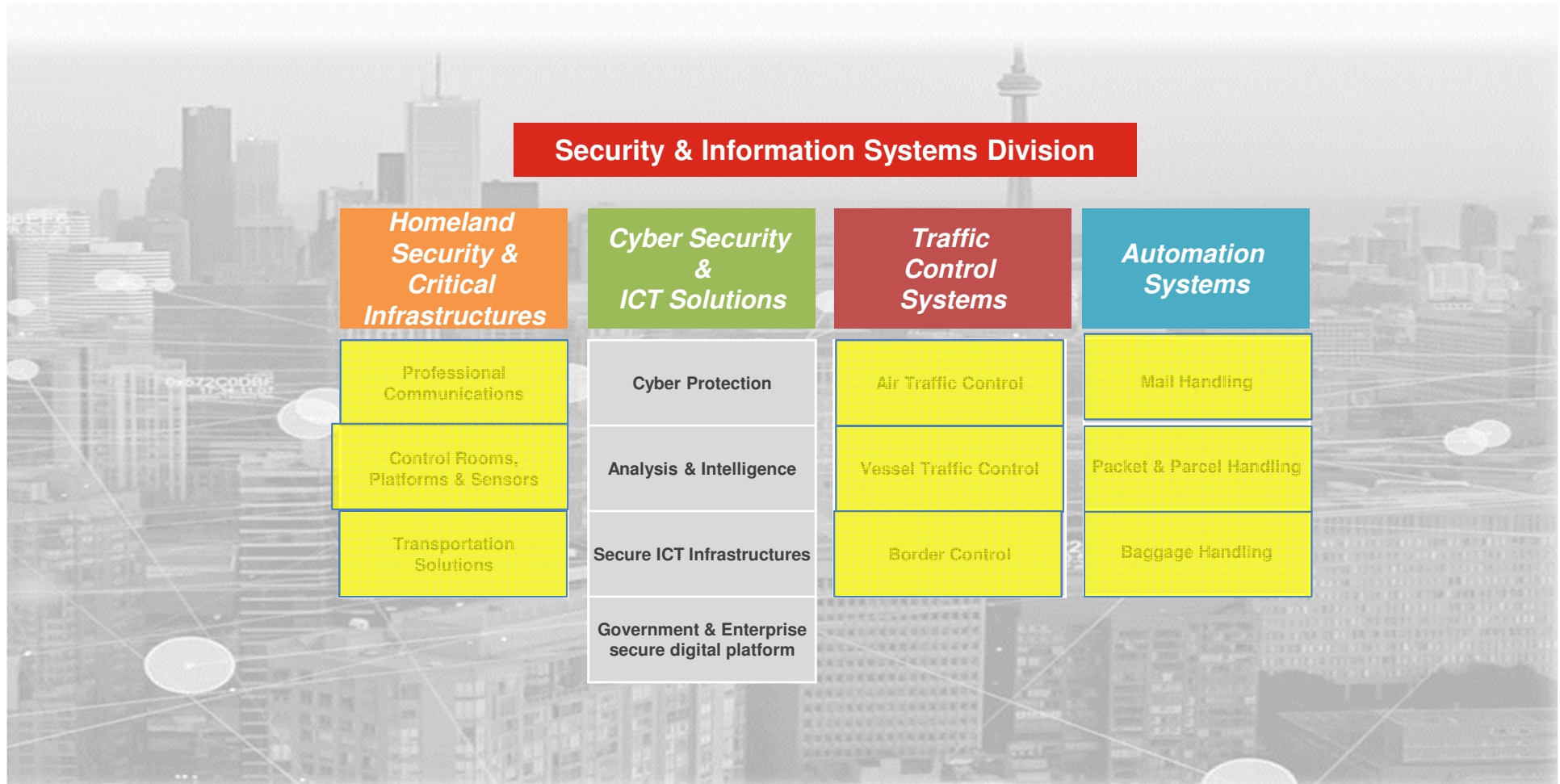


Security & Information Systems - Lines of Business



Security & Information Systems

Embedded design covered business areas



Relevant experiences

Cyber Security & Digital Platform



Sports & Major Events



Automation

Critical Infrastructures Protection

Relevant experiences

Border Security

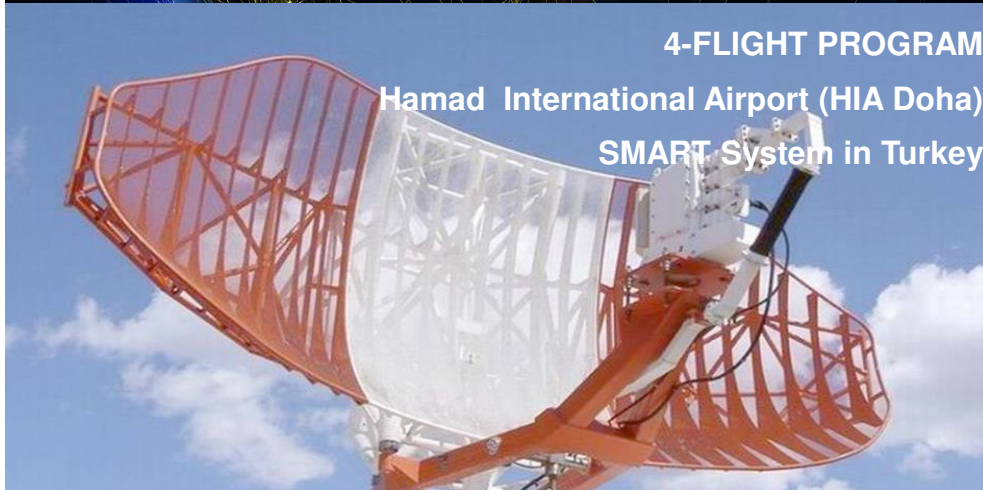


National VTMS system
GTYS of Turkey
Polish ZSRN system
Port of Genoa

Professional Mobile Radio



PIT Program (Programma Interpolizie TETRA)
Rome – TETRA Network
Buenos Aires TETRA network



4-FLIGHT PROGRAM
Hamad International Airport (HIA Doha)
SMART System in Turkey



UK National ANPR Data Centre (NADC)
Lower Manhattan Steel Belt
ANPR Plate reader - North America

Airports&ATC

Law Enforcement

SIS Embedded design development

Embedded design is selected as methodology typically if final product require:

- Deeply optimized power consumption
- Not standard features/interfaces
- Design optimization for low cost - high volumes
- High security and/or confidentiality standard implementation

Embedded products development for high security markets requires huge investments for design, validation and certification, so we focalize on:

- Maximum Design reuse (HW/SW)
- Maximum “designer skill” reuse
- Standard languages and methodology
- Long term available technology

Leonardo SIS products are then subject to a continuous product review and upgrade methodology, planned according to product lifecycle (varying from 5 year for Handheld terminals up to 15-20 years for Radar).

Standard transversal elements for embedded design

Currently there are some well stable Key elements and “de facto” standard technology driving embedded design for design reuse and development cost reduction.

Main common element transversal to all embedded design today are:

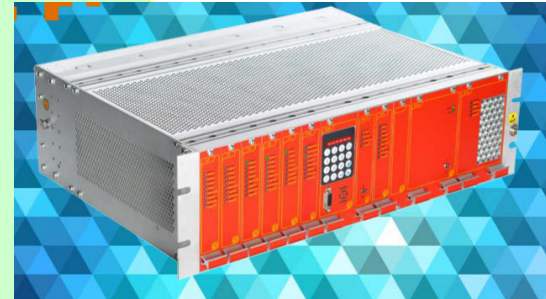
- ARM multicore processor SOC
- Linux platform
- Yocto approach
- Abstraction layer BSPs
- SDR (Software defined radio) technology
- FPGA for special tasks



Tetra BS Node



PMR terminals



DMR BS

Leonardo SIS embedded products

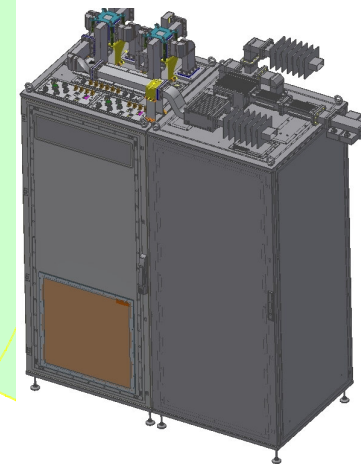


NOBU



Ares Demetra

ATCR33S



Aeromacs



Leonardo SIS embedded design - Professional communication (1)

Tetra BS Node: is a fully embedded Leonardo SIS design Developed as main network element of the ElettraSuite Adaptanet IP TETRA solution, working to supply a capillary radio coverage in the networks with a high performance up to 4-carriers Base Station. The BS-Node is a Dual Mode BS able to operate Connected to a TDM Switch or an IP Call Manager (CSP)

KEY FEATURES:

- Direct connection to IP backbone through Ethernet links
- E1 connectivity – 2 Mbit/s (ITU-T G.703/G.704 compliant) as option with drop insert capability
- Future proof with TEDS (TETRA Enhanced Data Service) capability for wideband data transmission
- Powerful Fallback Mode supporting group/individual calls, data transmission and encryption
- Mountable in standard 19" racks



Leonardo SIS embedded design - Professional communication (2)

PUMA T4

The PUMA T4 family introduces a new concept of modular handheld radio, combining reliable and secure communications with new value added services for enhanced efficiency. Computing, ancillaries and MMI functions are integrated within a device that can be delivered in different versions.



KEY FEATURES

- Android 5.1 OS
- Large colour display
- PTT button, emergency key and rotary selector for volume/group
- Support for browsing, images and video
- Voice and data support over TETRA, 2G/3G and LTE
- Touchscreen or keypad variants
- Camera, WiFi, Bluetooth and Near Field Comms (NFC)
- Enhanced location services, GPS, integrated accelerometer

Leonardo SIS embedded design - Professional communication (3)

VS 4000 TETRA/TEDS MOBILE RADIO UNIT

The VS 4000 combines the power and performance of the VS 4000 TETRA radio unit with the new, flexible and user-friendly FPG3 series front panels. It is ready to support dual-mode functionality to allow soft migration from conventional FM to TETRA, saving costs and operational effectiveness.

KEY FEATURES

- Dual Mode FM-TETRA capability
- TEDS wideband data transmission
- DMO Repeater/Gateway to facilitate communications even outside the network coverage
- Air Interface and End-to-End encryption
- Embedded GPS positioning and TETRA standard LIP protocol support
- Richness of interfaces (LAN, USB, CAN bus)
- SD and SIM card support
- Bluetooth and Wi-Fi hot spot connectivity (in FPG3 Plus)



Leonardo SIS embedded design - Professional communication (4)

ECOS-D RBS4000 110W: is a modular voice and data Radio Base Stations (RBS) designed to meet and exceed the requirements of professional and land mobile radio systems. The ECOS-D RBS4000 110W can be used from stand-alone repeater to conventional simulcast to digital multi-site trunking and can be connected to build a system natively with IP, E1, 4W+E/M links.

KEY FEATURES

- Available in VHF, UHF Frequency bands at 12.5kHz/20kHz/25kHz channel spacing
- Multiple-link Support: IP (SoIP – Simulcast over IP), E1, 4W+E&M link interfaces
 - RBS and Stand alone repeater operation
 - Support of Simulcast technology
 - Synchronization: GPS and/or Precise Time Protocol IEEE 1588v2 with fall-back
 - analog FM and digital DMR best in class voting
 - Embedded AMBE+2 vocoder for DMR Tier II voice communications
 - designed to be hosted in 19-inch rack (3 RU)



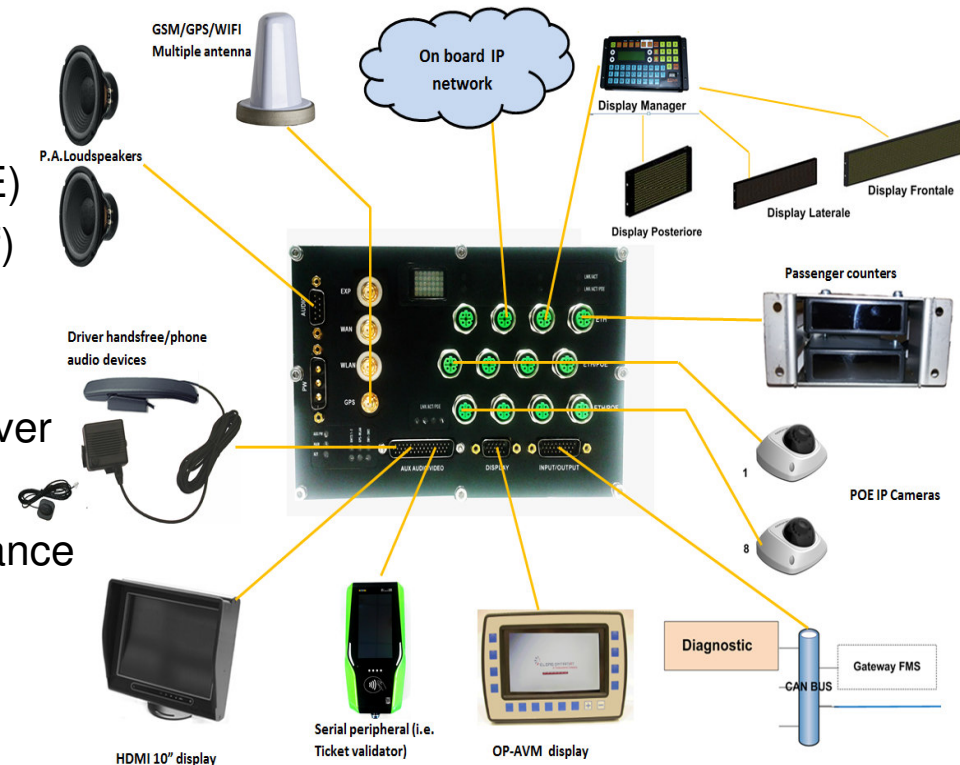
Leonardo SIS embedded design– Transportation (1)

NG-OBU on board Fleet management and Videosurveillance

The New Generation On-Board Unit (NG-OBU) is a versatile integration platform for Automatic Vehicle Monitoring and Fleet Management, Communication, Ticketing and Secure Videosurveillance for in-vehicle applications. The Unit provides an interface between the communication node, the operation centre, and any on-board devices.

KEY FEATURES

- quad core Arm @ 1 GHz
- Up to 2 WAN integrated modem (up to LTE)
- Up to 12 Ethernet Interfaces (POE 802.3af)
- Wi-Fi 802.11a/b/g/n
- 4 multi-standard serial ports, 2 USB & SD
- integrated gps, Galileo, egnos, glonas receiver
- Native text-to-speech engine
- SSD Hard Disk for Security Video Surveillance (up to 12 POE IP Cameras)
- 2 video output (HDMI and driver display)



Leonardo SIS embedded design – Traffic control system (1)

OTE ARES & OTE DEMETRA

OTE ARES (Air-ground Radio Equipment for Single-sky) and OTE DEMETRA (Defense Multirole Transponder) are the 5th generation of the OTE VHF and UHF radio equipment family for ground-to air civil and air defense communications. Thanks to their software-defined radio architecture, these new radio equipment series can be used for both Air Traffic Control and Air Defense markets.

KEY FEATURES

- State-of-the-art processing capability
- Maintenance operation network based
- Flexible configuration: up to 2 transceivers, 2 transmitters or 4 receivers in a single radio
- Low power consumption with patented PWM
- Double physical Ethernet interface for VoIP
- EUROCAE ED137B compliant (up to 8 VoIP connections and VoIP Recorder Interface)
- Voice (AM-DSB 25 & 8.33 kHz) and data link (VDL2/ D-ACARS) operating modes
- Fully redundant 8 channels capability with 1+1 “Embedded Changeover” in a single rack



Leonardo SIS embedded design – Traffic control system (2)

BS-ODU Aeromacs

BS-ODU is the main element of Leonardo Aeronautical Mobile Airport Communication System (AEROMACS), a Data Link solution for Airport Surface, in order to support mobile and fixed applications.

Aeromacs is studied in order to support the Integrated Airport CNS (Control, Navigation, Surveillance) domain with a reliable and secure wideband communications network to interconnect with adequate bandwidth fixed and mobile users.

KEY FEATURES

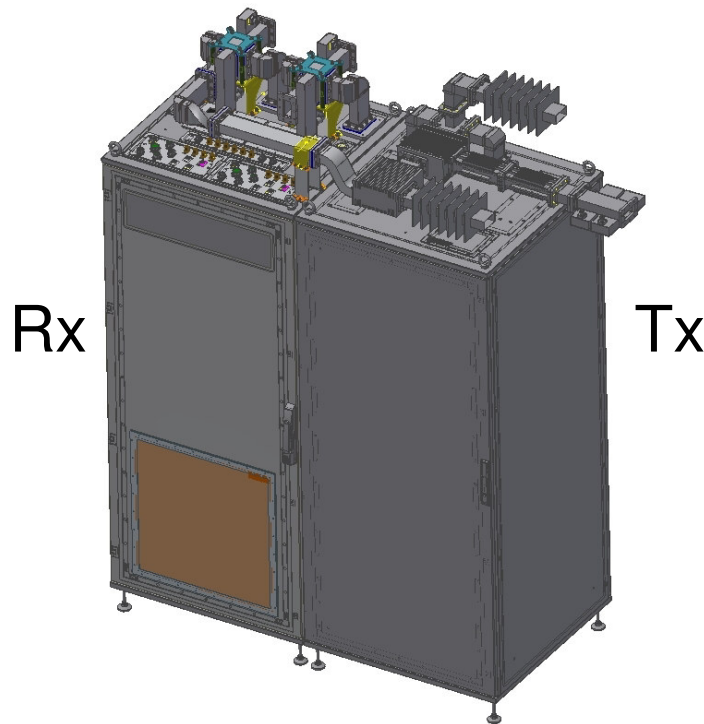
- Operation in protected AM(R)S spectrum (5091- 5150 MHz)
- Compliant to RTCA/EUROCAE AEROMACS profile and MOPS leading to ICAO ACP Working Group S
- IP network connectivity between base stations and mobile/stationary users (subscriber stations) on the airport surface
- Scalable and modular architecture with splitted RF outdoor units and BB indoor unit to minimize the RF cabling




Leonardo SIS embedded design – Traffic control system (3)

ATCR33S NG NEW GENERATION S-BAND SOLID STATE PRIMARY SURVEILLANCE RADAR

ATCR-33S NG provides superior air traffic surveillance in departure/arrival phases, up to extended Terminal Management Area. ATCR-33S NG is an S-band system part of the company family of primary radars.



In the latest redesign volumes and costs of this product were strongly reduced; starting from 2004 two channel receiver and CPU module design, based on 3 racks with 100 pcb and 20 «strip», the current design is now implemented with an embedded design with a single board approach for the full RX chain from 2.7 GHz signal to base band. Using a Xilinx ZYNQ 7000 SOC (ARM Cortex A9 based) the receiver implements all analogical receiver functions, ADC and ethernet communication. Massive computational are then implemented in a standard core I7, avoiding custom DSPs.



Thank for your attention

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