Monitoring and Network Testing Division

Excellence in spectrum monitoring, mobile network testing and SIGINT/EW solutions

ENSURE HOMELAND SECURITY

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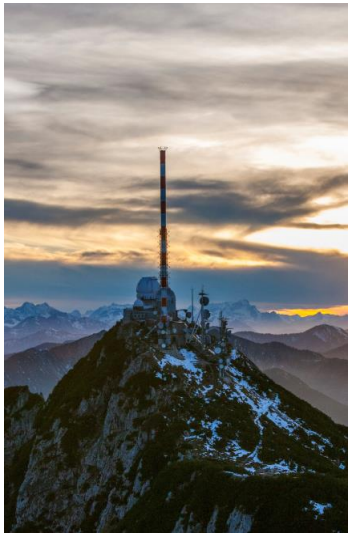
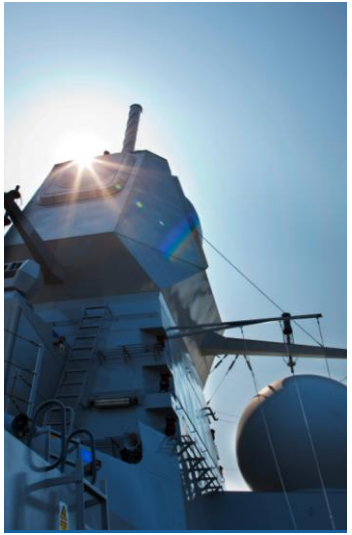
The company group at a glance

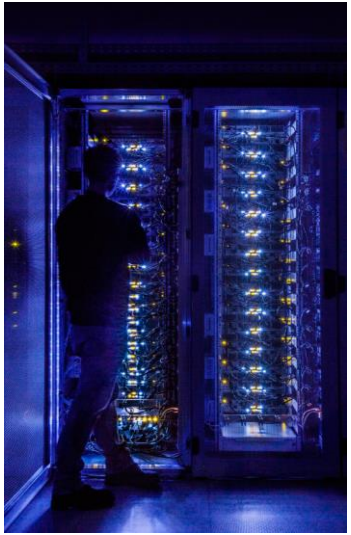
History	Type of enterprise	Global presence	Net revenue	Employees	Success
Established 1933 in Munich, Germany	Independent family-owned company	In over 70 countries, more than 60 subsidiaries	EUR 1.91 billion (FY 16/17)	10,500 worldwide	A leading international supplier in all of its fields of business

Business fields

Test and Measurement	Broadcast and Media	Secure Communications	Cybersecurity	Monitoring and Network Testing







Service

Monitoring and Network Testing Division

Our Focus

The Monitoring and Network Testing Division provides world-leading technology for government authorities, network operators and system integrators

We are a leading manufacturer of equipment and systems for the **detection, location and analysis of radio communications, radar signals and IP data traffic**. Rohde & Schwarz specializes in designing and manufacturing customized turnkey solutions for **Spectrum Monitoring**, **IP-Monitoring**, **mobile network testing, SIGINT/EW applications**.

Single Source

Products	Systems	Solutions
▪ Antennas ▪ Receivers and Direction finders ▪ Signal processing and analysis ▪ System Software	▪ System Engineering and Design ▪ Project Management ▪ System Integration and test ▪ Training	▪ Complete turnkey solutions ▪ From single operator to hierarchical multi-user architecture ▪ Customer-tailored

Design → Development → Production → Training

Services / Product and system lifetime support

Government Agencies and Security Companies

Law enforcement	 VHF/UHF reconnaissance	 Mobile phone monitoring	 Border surveillance
Intelligence	 HF intelligence	 Satellite intelligence	 Network intelligence
Safety	 ATC and VTS	 Search and rescue (SAR)	 Countering commercial drones

Product Portfolio

Complete range of devices from a single supplier

Antennas

From 10 Hz to 40 GHz

Receivers

From 8 kHz to 40 GHz

Direction Finders

From 300 kHz to 8.2 GHz

R&S® BORDER CONTROL / SPECTRUM MONITORING NETWORKS

Spectrum Monitoring Solutions

Spectrum monitoring solutions are used to monitor emergency frequencies and protect large-area, high-value assets such as airports and seaports, as well as industrial or public areas.

Realizzazione allestimenti in collaborazione con GB Barberi S.r.L.

Security Gap by Drones

- Can easily enter physically protected areas

- Threat
  - Cheap
  - Carry payload
  - Flown by anybody

- Payload
  - Cameras
  - Hacking devices
  - Explosives
  - …

Various Threat Scenarios

Micro-UAVs overview

Specifications

Radio control via FHSS/DSSS	Radio control via Wi-Fi	Radio control via Bluetooth®	Autonomous flight
• **Widespread (> 80 %)** • Range: <1 km (w/o booster); 3 km (with booster) • Some standards include telemetry data (downlink), e.g. Jeti, Graupner	• Range: 80 m to 100 m (up to 2 km with booster) • Some are equipped with a FPV and additional GPS navigation	• Low-cost models • Limited range with approx. 60 m	• Via GNSS (predefined waypoints)

DJI Phantom

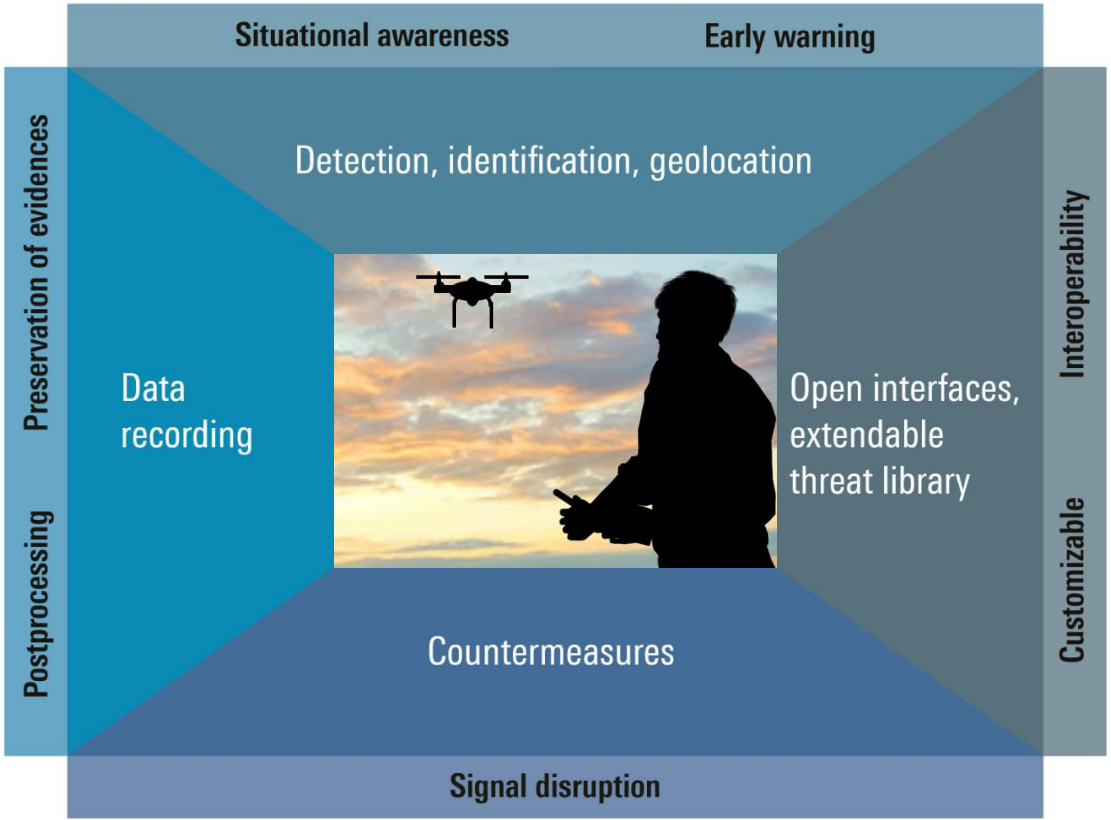
Parrot Bebop

Hexo +

Yuneec Typhoon

Walkera QR W100S

R&S®ARDRONIS - automatic radio-controlled drone identification solution



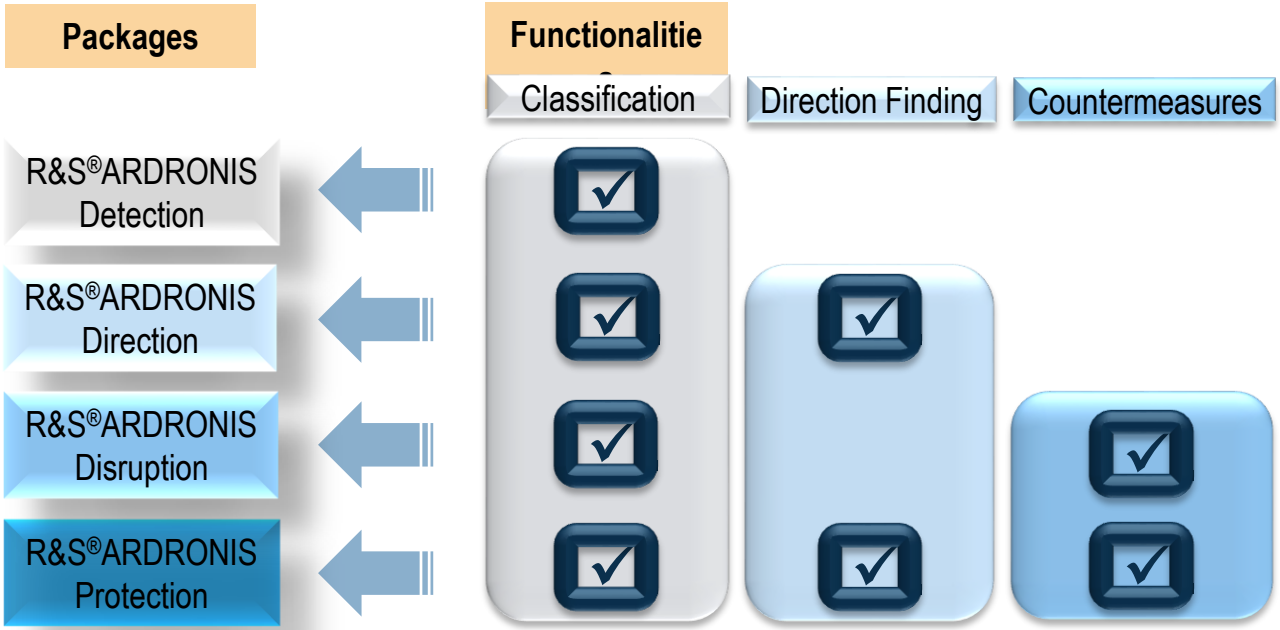
R&S®ARDRONIS Mission!

- A comprehensive, reliable solution to counter threats arising from FHSS/DSSS and Wi/Fi controlled drones
- Detection, identification, direction finding, locating, recording and jamming
- A highly automatic integrated operational workflow

R&S®ARDRONIS

Applications

- The key functionalities of R&S®ARDRONIS include: classification, direction finding and countermeasures
- These functionalities are categorized in four packages to meet users' specific technical requirements



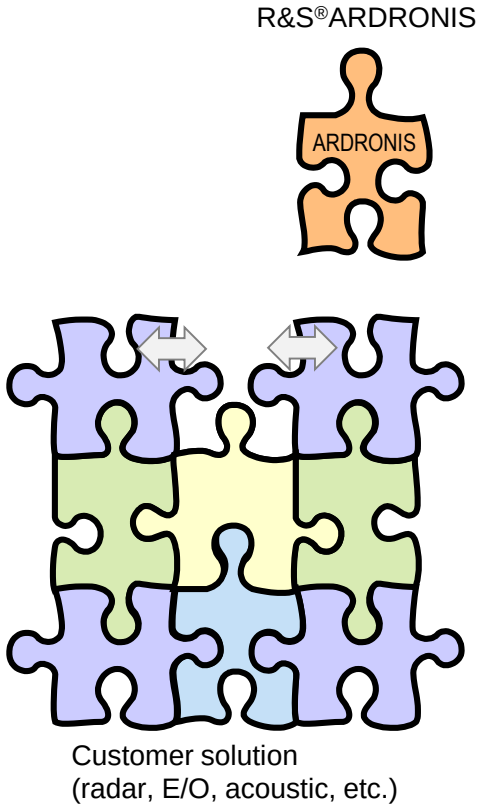
- Classification
- Classification + direction finding
- Classification + countermeasures
- Classification + direction finding + countermeasures

Open interface, extendable threat library

Key Features

- Open Interface, customizable and interoperable
  - XML interface allows integration into third-party solution
  - Users can integrate R&S®ARDRONIS into their custom approach, e.g. radar, E/O (electro-optical), infrared, acoustic

- Extendable database/ threat library
  - The profile library of remote control is constantly extended
  - The library can also easily be extended by the operator by training the new profile



Fully Integrated Turnkey Solution

detection

RF ANAL SIS IR CTION FIN R

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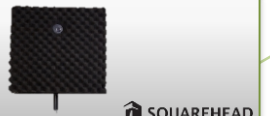
ACOUSTIC



OPTIC

MOBIL , PORTABL OR STATIONAR

System Installation mobile

ESG

TARANIS MOBILE

Command and Control

ESG

TARANIS SMART

TARANIS MOBILE

Common Operational Picture

ESG

Wi-Fi ISCONN CT

AMMING ISM-BAN

AMMING GNSS

HP M

countermeasures

GNSS Jamming

When commercial drones intrude in waypoint mode, they use a GNSS (global navigation satellite system)

Solution: GNSS jamming with

- R&S®SMBV100A vector signal generator
- GNSS option for GPS, Glonass, Galileo

Result: Immediate stop of commercial drone.

R&S®SMBV100A vector signal generator and directional right hand circular antenna

Mobile Network Survey (MNS) – R&S NESTOR

- **Cell Measurements within Mobile Radio Networks**

- In all 3GPP bands up to 350 – 6000 MHz
- GSM, UMTS, LTE (TDD/FDD), CDMA200/EVDO and Spectrum Analysis in parallel

- **Applications**

  - Automatically find all active networks, bands and technologies (ACD)
  - Autonomously retrieve cell system information and cell power (SCN)
  - Measure and analyze cell coverage (COV)
  - Determine cell borders and handover areas (CME)
  - Create and maintain cell lists with geo positions, ground & airborne (CPE, APE)
  - Verify alibies through cell coverage and quality analysis (ALI)
  - Analyze cell coverage at crime scene locations (CSI)
  - Detect misconfigured cells (stationary, mobile) (BSA)
  - Monitoring of misconfigured cells (stationary) (BSM)
  - Spectrum analysis in uplink and downlink bands (SCA)

R&S®NESTOR Monitoring at R&S