

Communication detection in prison facilities

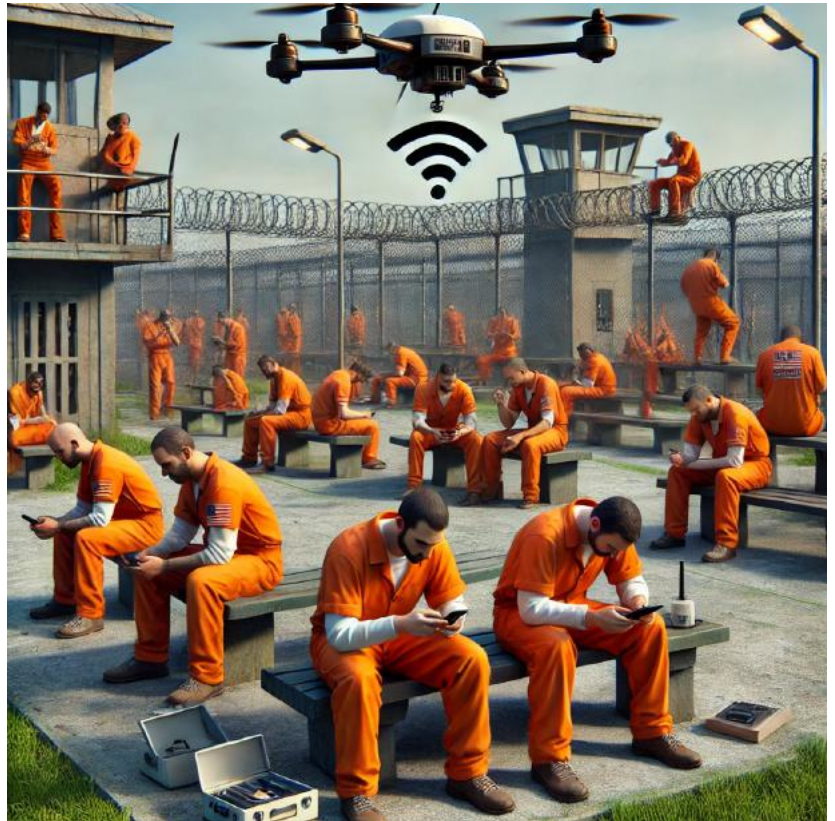
Introduction and concept

In many prisons and detention centers around the world, inmates are increasingly gaining access to illegal communication devices, such as mobile phones or wireless LAN devices.

These devices allow prisoners to bypass official monitoring systems, enabling them to coordinate criminal activity both inside and outside prison walls. Smuggled phones are often used to intimidate witnesses, run drug operations, or maintain control over gangs.

Despite frequent searches and advanced detection technologies, the trade in illegal devices persists, often facilitated by corrupt staff or drone deliveries. This ongoing issue poses a serious challenge to prison security and public safety, prompting authorities to implement stricter measures, including signal jammers and advanced surveillance.

The cognitelligent systems from YOTASYS allow the detection of illegal communication devices with the use of Artificial Intelligence (AI) algorithms.



The monitored radio signal spectrum covers from 10kHz to 9GHz (or higher frequencies) and includes the classical communication bands for mobile networks 4G and 5G and wireless networks, plus special frequency allocations such as for satellites network (LEOS) and Internet-of-Things (IoT).

One special functionality is the detection of drones, which are typically equipped with wireless modems in order to reach the prison inmates. The typical signal of the drone is detected as well as the provided communication channel

Highlights

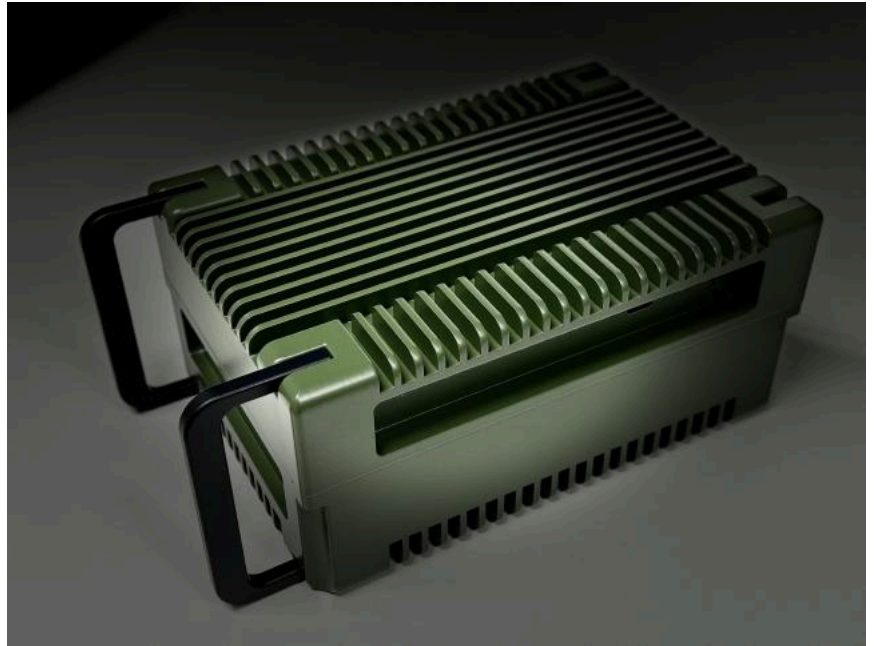
- Broadband RF signal analysis and signal capturing
- Technologies detected such as 4G, 5G, WLAN, PMR, Bluetooth and IoT
- Application of AI algorithms like modulation and interference analysis, drone detection and more
- Remote installation and control over Ethernet or LTE modem
- Wide RF signal coverage from 9 kHz to 54 GHz (using ANRITSU MS2090A)
- Remote operation of ANRITSU MS2090A or MS27201A Spectrum Analyzer
- Permanent capturing and storage, plus export in open data format

Applications and use cases

- Monitoring and classification of 'live' RF signals using AI algorithms
- Detection of signal anomalies or unwanted emissions
- Deployment as fix installation or tactical portable unit
- System for spectrum occupancy measurement techniques (ITU-R SM.2154)

Product Y9860A AI enabled Realtime Spectrum Analyzer (RTSA)

The Y9860A is a high-performance state-of-the-art AI algorithm processing and deep learning inference hardware, perfectly developed for the combination with a modern Spectrum Analyzer board Anritsu MS27200A and using performant communication. The combination of an embedded graphics processing unit (CPU/GPU) enables real-time neural network signal (CNN) processing algorithms to be executed in software, with additional specialized signal analysis development. The GPU is one of the most utilized processor type for machine learning, therefore the Y9860A significantly reduces the efforts for developers to create autonomous signal identification, modulation recognition, interference mitigation and many other machine learning applications for RF technologies.



Using a most performant CPU/GPU, the Y9860A is capable of analyzing an RF signal source and also generate IQ data files and reports. Thanks to the powerful AI capabilities of the integrated software, RF signals can be inspected in a very sophisticated modern way.

In one single box, the Y9860A includes numerous functions - such as modulation recognition - and open source APIs. The system includes complete software packages and is based on a Linux UBUNTU operating system with drivers, FPGA firmware, and everything required for a professional operation. This system is the base for customer specific software developments.

The YOTASYS Y9860A is an innovative and modern solution for a performant portable setup for the capturing, analysis and reporting of RF signals. Based on the sophisticated IQ streaming streaming of MS27200A, this system expands the need of measuring and investigating RF signals up to 9 GHz (or higher) with unique features for the detection and analysis of unknown (or unwanted) signals in the RF space.

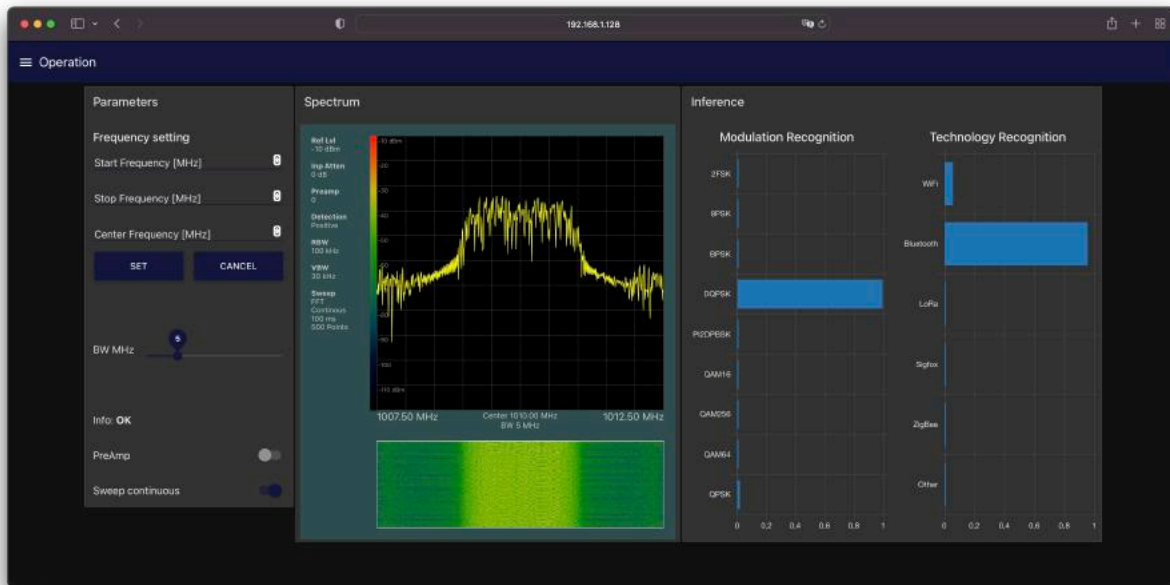


One single sensor Y9860A can cover a complete prison area and the system will monitor a suspicious wireless signal activities.

Application Note

Easy graphical user interface

The software of the Y9860A is flexible and modular, and can be tailored to customer specific needs. YOTASYS is offering the development of customer specific software and/or tools for fast prototyping and installation.



A web interface allows the enduser to operate and configure the Y9860A, using comprehensive and application-specific dashboard with charts, buttons, status LED and map information.

The system Y9860A can be easily integrated into existing prison monitoring solutions. The alarms can be tailored to specific interfaces such as HTTP, MQTT or SNMP.



Technical specifications

RF specifications (based on Y9860A)

Parameter	Value	Unit	Comment
Frequency range / bandwidth	9	kHz	RX lower frequency limit
	up to 54	GHz	RX upper frequency limit (see datasheet)
	2 .. 150	MHz	Realtime / IQ Bandwidth
Antennas	1		RX Antenna on front connector N(f) for <20GHz or K(f) for <43.5GHz and V(f) for <54GHz
Sampling rate	200	MSpS	ADC/DAC sample rate at 32bit resolution
Signal Bandwidth	0.036..150	MHz	
Bit resolution	8, 10, 16 or 32	bit	
Trigger source	Free run External 1/2 Video		
Capture Memory	2	GB	Internal at MS27200A
GNSS Antenna	1		RX Antenna on front connector SMA(f)

The RF specifications are depending on setup and configuration of Anritsu MS27200A.

Disclaimer

The specifications and instructions for our customers in this document reflect the product engineering level at the time of manufacturing. Please consider the valid data sheet release at a time. For questions please contact the YOTASYS customer service. YOTASYS AG accepts no liability for damages resulting from unprofessional installation or application or misuse for a purpose. This disclaimer also includes damages to third parties. It is the customer's responsibility to check the delivered products and immediately notify YOTASYS AG of detected faults. It is also the customer's responsibility to test the delivered product on its applicability for the intended purpose. YOTASYS AG will accept no liability or responsibility for their products if a product or a YOTASYS system is combined or used together with third-party products, i.e. products from other companies than YOTASYS AG. Jurisdiction in all legal disputes concerning product liability has the courts of the canton of Bern/Switzerland. Swiss law applies.

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