Features

COMBITECH

SANDRA

Radio Communications
Intelligence Solution

Combitech SANDRA is a modular, scalable and distributed narrowband radio communications monitoring system

Monitor radio communications in large geographical areas

Monitor thousands of channels simultaneously

Control multiple sensor sites remotely with SANDRA
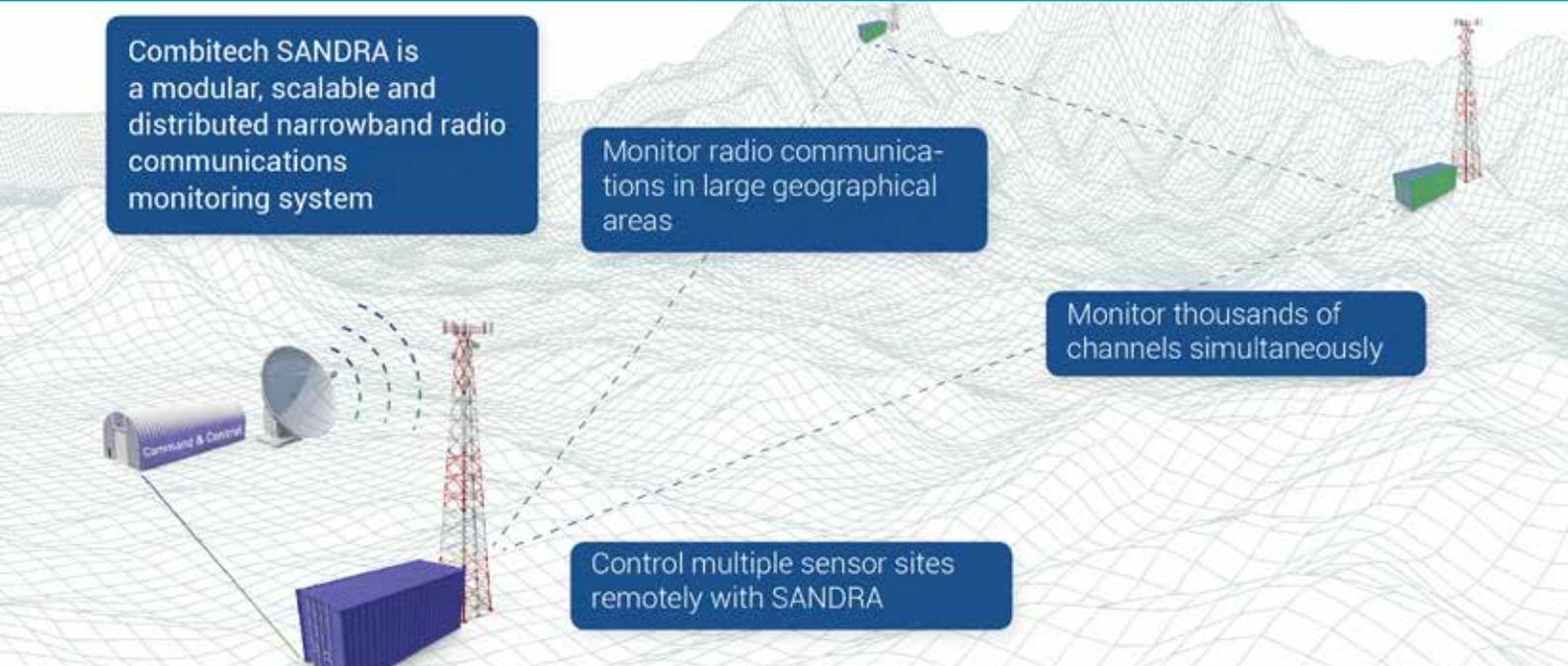
INTRODUCTION

Combitech SANDRA software enables your operations to capture the important communications.

We believe capturing important radio communications requires a combination of world-class hardware and software. That is why we created the **Combitech SANDRA** software suite.

Combitech SANDRA is a modular, distributed and scalable narrowband radio communications monitoring system. It provides operators full manual control, supports tens of concurrent operators with various roles and provides a tasking function for autonomous operation.

With **Combitech SANDRA**, operators are able to monitor thousands of channels simultaneously and remotely across large geographical areas. An intuitive user experience makes SANDRA quick to learn and easy to use. The multiple systems, extensive integrations capabilities guarantee that SANDRA is quick and easy to assemble into existing environments.

Our unique combination of knowledge and experience in the development of radio communications monitoring software enables our customers to start monitoring radio frequencies and capturing communications in the most cost-efficient way.

Scope

Combitech SANDRA is a narrowband radio monitoring and COMINT system. Narrowband here refers to narrowband signals, and SANDRA can utilize both narrowband receivers and wideband multi-channel receivers to capture them. One SANDRA sensor can control up to hundreds of receivers and handle up to thousands of simultaneous channels.

Combitech SANDRA provides tools for signal acquisition, recording, processing and reporting. It acts as a control software providing operators with full manual controls to integrated equipment such as receivers. On top of that it offers extensive tasking functions to automate routine tasks, allowing operators to focus on their most crucial missions.

Combitech SANDRA includes COMINT library tools to support operators' manual work, particularly through the automated tasking functions. Libraries collect information of known geographical locations, units, frequencies, networks, callsigns and waveforms. This information is presented to operators as background information layers and utilised to generate various tasks. For example, these tasks may follow a known frequency plan of the monitored radio networks.

Combitech SANDRA is scalable and adaptable to various operating environments. It can be set up as a control software on a laptop for a single receiver. On the other end of the spectrum, it can control hundreds of receivers and other equipment in a networked and distributed nationwide setup.

Deployment and operation

Combitech SANDRA supports either a standalone or networked deployment. In both, SANDRA supports multiple integrated receivers and multiple simultaneous operators sharing resources. In a networked deployment, SANDRA becomes multi-user, -receiver, and -site system that typically consists of remote sensor sites operated from one or several operating centres. In this setup, the system administrator can define how the different sensor sites are interconnected. This feature can be used to divide the sensor network into sections like responsibility areas.

Combitech SANDRA provides different user roles and matching tools for them. The roles can be connected to centralised user identity management system such as Windows AD. Typical user roles are system administrators and operators. The administrators configure the network and services while operators focus on using the different features that the system offers. It is possible to grant several roles for the same user, so that some operators also have full access to system administration settings.

Combitech SANDRA integrates **Combitech SAGA's** signal processing and recording services and automatically relays channelled audio from the receivers' channels to SAGA for further processing and recording. The system supports two different recording schemes: Constant recording to circular buffers and triggered recording. A trigger can originate from the operator or automatic processing that is applied to received data (such as speech detection). The applied recording method can be selected per receiver if need be.

Automated tasks and resource sharing

Combitech SANDRA provides a resource allocation feature to enable resource sharing between different operators and automated tasks.

Resource allocation means that available resources such as receivers and receiver channels are allocated for a specific use. Allocation is done by the operators or system tasks. Allocation information is always presented to all users, and this enables organisation-wide task tracking.

Automated tasks are provided for two main reasons: To handle routine tasks to free up the operators' time for more urgent duties and to ensure data collection when the sensor is offline.

Tasks can be manually created, for example directly from the receiver spectrum. When the system is equipped with libraries and good quality library data, the tasks can also be automatically generated from the libraries. The library information tells the radio networks, frequencies, frequency plans and utilised waveforms. This information is used to setup tasks and associated signal processing.

Tasks share the system resources with the operators and other tasks. This can lead to competition over available resources. Therefore, the system has a built-in function to overcome this. There are several key rules followed:

- Operator is priority 1 and task will never take allocation from an operator.
- Higher priority tasks may take allocation from the lower priority ones.
- Operators may take allocation from all tasks.
- Operators may force allocation from other operators (must be confirmed and original allocator is notified).
- In case the resource allocation is taken from active task, automatic handover to another resource may take place.

Direction finding, geolocation

Combitech SANDRA can integrate direction finders of different types including both narrowband and wideband ones with built-in memory for LOBs. SANDRA provides tools for the operators to manually retrieve LOBs for any selected frequencies as well as automated triggers when the system automatically commands the integrated DF systems. For example, this can be done when automatic processing detects speech from the monitored frequency.

Combitech SANDRA sensors can also be connected with another sensor to allow multi-sensor co-operation and triangulation of the signal source during DF operations. The sensor that receives the initial DF command (from user or automatic task) takes the coordination responsibility and the other sensors will co-operate. Once the distributed DF transaction is completed, the lead sensor will perform automatic geolocation given that enough bearing vectors are available.

Combitech SANDRA includes a map display that can present a variety of data from the system including sensor locations, antenna directions, library information, LOBs and calculated positions including their probability ellipses. The map can be used to display history data controlled by the operators and/or real-time data.
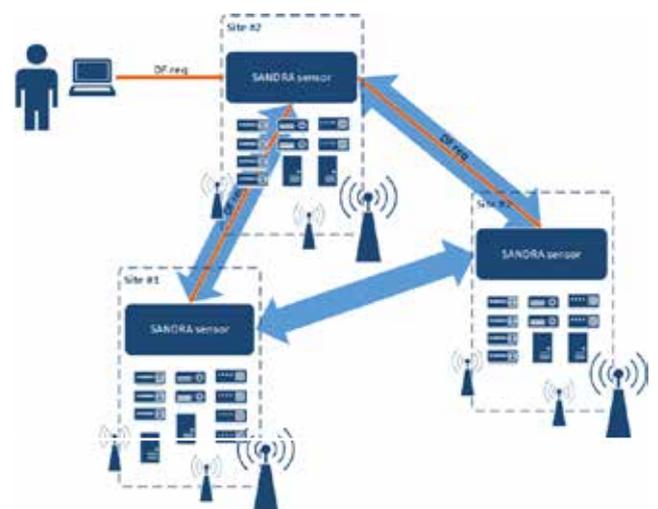
Main features

Sensor management

| Setup a new sensor wizard |
| Establish sensor network(s) |
| Establish and maintain receiver groups |
| Add / remove / configure resources |
| Define resource connections, for example: |
| Antennas to receivers or antenna matrices |
| Amplifiers to antennas |
| Hide / show resources |
| Restart services |
| View and analyse system status |
| Reset services (soft / hard) |
| BITE |
| Define masked frequencies for the sensor |

Signal processing

| Framework for real (audio) and complex (IQ) data processing |
| API to develop custom processing modules |
| Produced content can be signal (real or complex) or data (text or binary) |
| Standard audio processing modules that come with the system |
| Line level module |
| VAD – Voice Activity Detection |
| Manually set processing chains |
| Processing chains from tasks |

Library data

| Technical / waveform libraries |
| Technical signal types & parameters |
| Operative libraries |
| Units, Networks, Call signs, Frequencies, Behaviour |

Antenna direction control

| For antennas that have turning motor attached (steerable antenna) |
| Graphical UI for controlling the antenna |
| Show current direction |
| Turn to requested direction |
| Free turning with mouse wheel |
| Sector scan |

Audio streaming / playback

| Real-time streaming of audio produced by receiver channels |
| Playback from recorded audio |
| Support for large number of audio outputs and output channels (speakers, headphones) |
| Extensive routing options to play any audio stream from any available output |

Interceptions

| Real-time view |
| History view with extensive tools for searching |
| Manual or automatic drawing to the map |
| Sensor deletes old interception automatically |
| Can be turned on/off |
| History length is configured |
| Interceptions can be marked permanent, no automatic deletion. |

Logging

| System status log for observing status of individual services |
| Audit log for following the exposure of the classified information |

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Receiver control

Tuner settings

Frequency, (IF)BW, Generic support for receiver specific parameters such as various gains, filters etc.

Support for multiple channels

Channel view

All current parameters, Signal level, Allocation, Squelch

Channel tuning tool

Frequency, Bandwidth, Modulation, Gain (AGC / MGC)

Spectrum & waterfall displays

Channel management with graphical tools: frequency, bandwidth, squelch

Sliding window min & max

Max hold

Measurement cursors (frequency & time)

Custom frequency markers

Spectrum background items: Tasks, ibrary information, masked frequencies

Layer control to define what is shown

3D spectrum

Scan tools

Frequency scan, Memory position scan, Panorama scan

Antenna controls

Active antenna shown for each antenna input type (HF, VUHF, SHF, …)

Active antenna selection for each antenna input type

Amplification/attenuation control (if available)

Recording

Recording of audio and/or IQ signals.

Recording schemes:

Triggered recording

Well suited for scenarios with reliable detection

Configured pre-buffer to ensure the complete signal of interest is recorded.

Operators may trigger manually.

Signal processing may trigger (e.g. VAD).

Continuous recording

Well suited for challenging scenarios where automatic detection is not reliable enough.

Gives operators' valuable time for manual analysis & intercept.

Ring buffer, length can be configured flexibly.

Extensive playback & analysis tools

Waveform visualization, fluid zooming in/out

Seeking to pointed time.

Looping

Ring buffers

Operators can create permanent recordings from the buffer.

Operators can create manual interceptions from the buffer (e.g. transcoding).

Tasking

Task types

Production – single frequency,

Search – Search a given frequency range (utilizes frequency scan).

Monitor – Monitor a set of given frequencies (utilizes memory scan).

Receiver allocation

User may explicitly allocate a specific receiver group, receiver or receiver channel.

System can automatically select the best available resource based on user selection.

Automatic handover to a new resource if needed.

Implicit allocation fuzzy logic

Based on calculated performance scores

Parameters depend on task type, for example scan speed for frequency scan tasks.

Weight factors for parameters can be defined in task manager configuration.

Custom logic via scripting

Receiver parameters based on task type

Signal processing chain & parameters

Audio and/or IQ data processing

Direction finding & geolocation

Frequency cool-off period can be determined, Geolocation on/off, DF priority

Map view

Map data

From standard WMS & WMTS map servers

Sensor sites

From standard WMS & WMTS map servers

Antennas and antenna main beam direction for directional antennas

Direction finders

Interceptions

Automatically based on filtered interception view or manually by operator

Bearing vectors from direction finders

Geographic locations from geolocation

50% error ellipse

90% error ellipse

Library data

Units with tactical symbols (default is APP6B)

MIL2525B, MIL2525C, MIL2525D, APP6A, APP6B, APP6D

Networks

Options

Background situation picture from external source

Recognized air/ground/sea situation picture

Frequency situation view

View to sensor's frequency utilization.

From real-time to N-minutes in history.

Containes the following information:

Task frequency bands

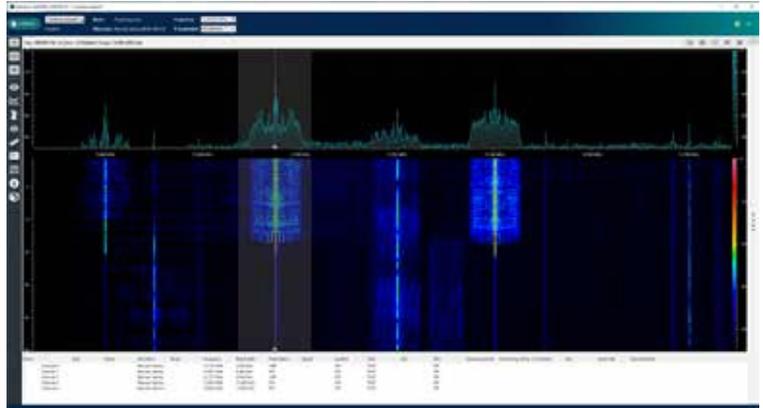Masked frequency bands

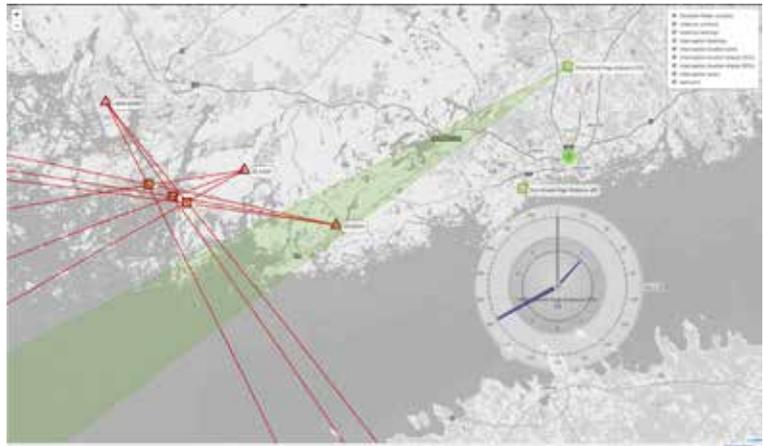Receiver processing bands

Produced interceptions
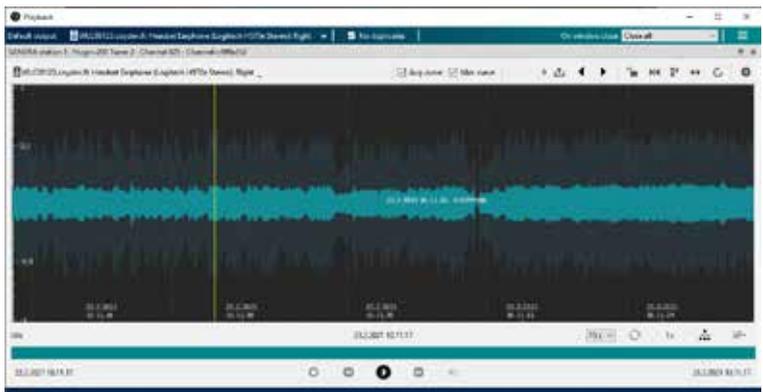
User interfaces
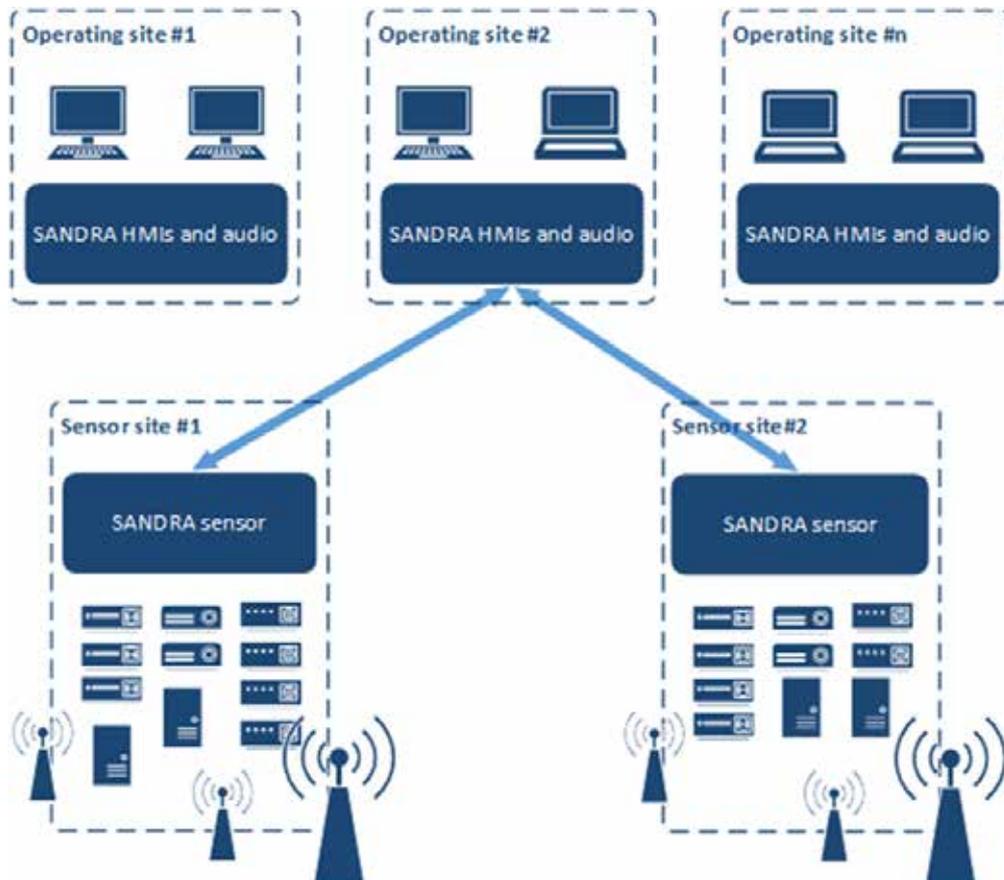
Spectrum view

Map view

RF situation view

Buffer view

TECHNICAL FEATURES

Architecture

Typical **Combitech SANDRA** deployment consists of sensor and operating sites. Sensor sites contain SAN-DRA sensors and operating sites contain SANDRA HMIs (UIs) and audio playback services. Any SANDRA sensor can be remotely operated from any operating site – given that the network infrastructure enables that. The system use is encrypted network communication.

NOTE: The represented distributed deployment with remote control is not the only supported deployment. There are other deployment options available:
• SANDRA sensor, HMIs and audio playback can all be deployed to a single workstation or laptop for mobile setups.
• SANDRA sensor can be locally controlled within the sensor site.

Device integration and supported device types

Devices are integrated to **Combitech SANDRA** by implementing device drivers (aka. adapters) that map the messages between the controlled equipment and SANDRA. Supported device types for integration are:

- Receivers
- Antenna amplifiers
- Antenna switch matrices
- Antenna turn motors
- Direction finders

Third party components

Combitech SANDRA does not include any third party components that have export restrictions or license fees to the end customer.

System requirements

Combitech SANDRA system requirements are heavily dependent on system setup and the number of produced channels. It is impossible to state exact configuration without knowing how many receivers and channels are handled by the sensor.
The minimum system requirements for SANDRA workstations and laptops are:

- 64bit CPU with minimum of 2 cores, and 3 GHz clock speed.
- 8 GB of RAM (16 GB is recommended)
- 256 GB hard drive

Want to know more?
Contact us!

Let's start a conversation that won't leave you cold.
Show us your puzzle and we'll solve it the Combitech way!

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