go2SIGNALS
PROCITEC® SOFTWARE

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CASE STUDY 401

go2MONITOR-ALERT in Maritime Security Operations

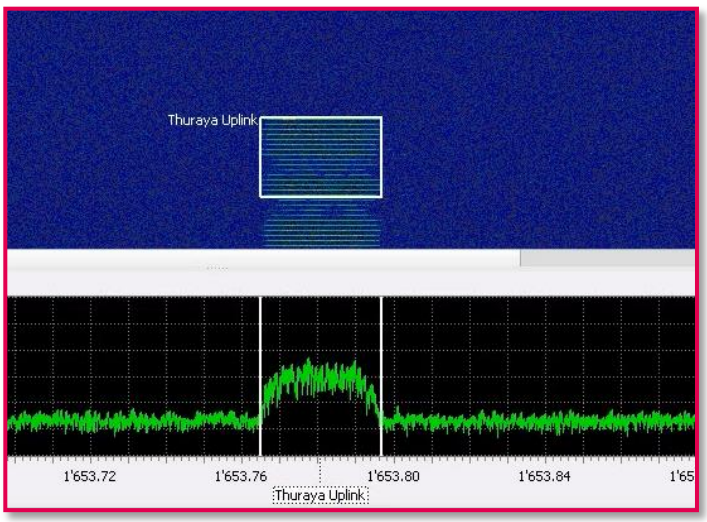
INTRODUCTION

Maritime Security Operations (MSO) are defined as the actions of naval forces to combat sea-based terrorism and other illegal activities such as hijacking, piracy, human & drug trafficking.

At customer-request, this Case Study explores the use of the go2MONITOR-ALERT Electronic Surveillance (ES) software-application to automatically detect, classify, recognize & report satellite telephone ('satphone') activations, digital-speech 'walkie-talkies', maritime distress beacons and other 'Signals-Of-Interest' (SOIs) encountered during MSOs.

The capability is designed for use in Offshore Patrol Vessels (OPVs) & Fast-Patrol Boats (FPBs) to enable ES-derived Indications & Warnings (I&W) for real-time Situational Awareness (SA) in the maritime & littoral space. The capability can be considered a force-multiplier for proximity-detection & threat-warning of detected SOIs being transmitted from persons aboard Vessels-Of-Interest (VOI) or ashore at close-proximity to the OPV or FPB.

OPV mainmast showing V/UHF communications & intercept antennas
(OPV displacement 54 Tonnes / Length 20 Meters [range 300nm] in this example)



go2MONITOR-ALERT "… satphone noted active, type Thuraya XT-PRO"

"NO WARRANT REQUIRED"

Using PROCITEC-proprietary techniques, the go2MONITOR-ALERT capability processes *only* the detected signals' 'external parameters' and does not process the signals' digital ('internal') content.

Subject to an individual Maritime Security Unit's policy, go2MONITOR-ALERT can therefore be deployed as a "*no warrant required*" capability for lawful use by general-service personnel.

THE NEED

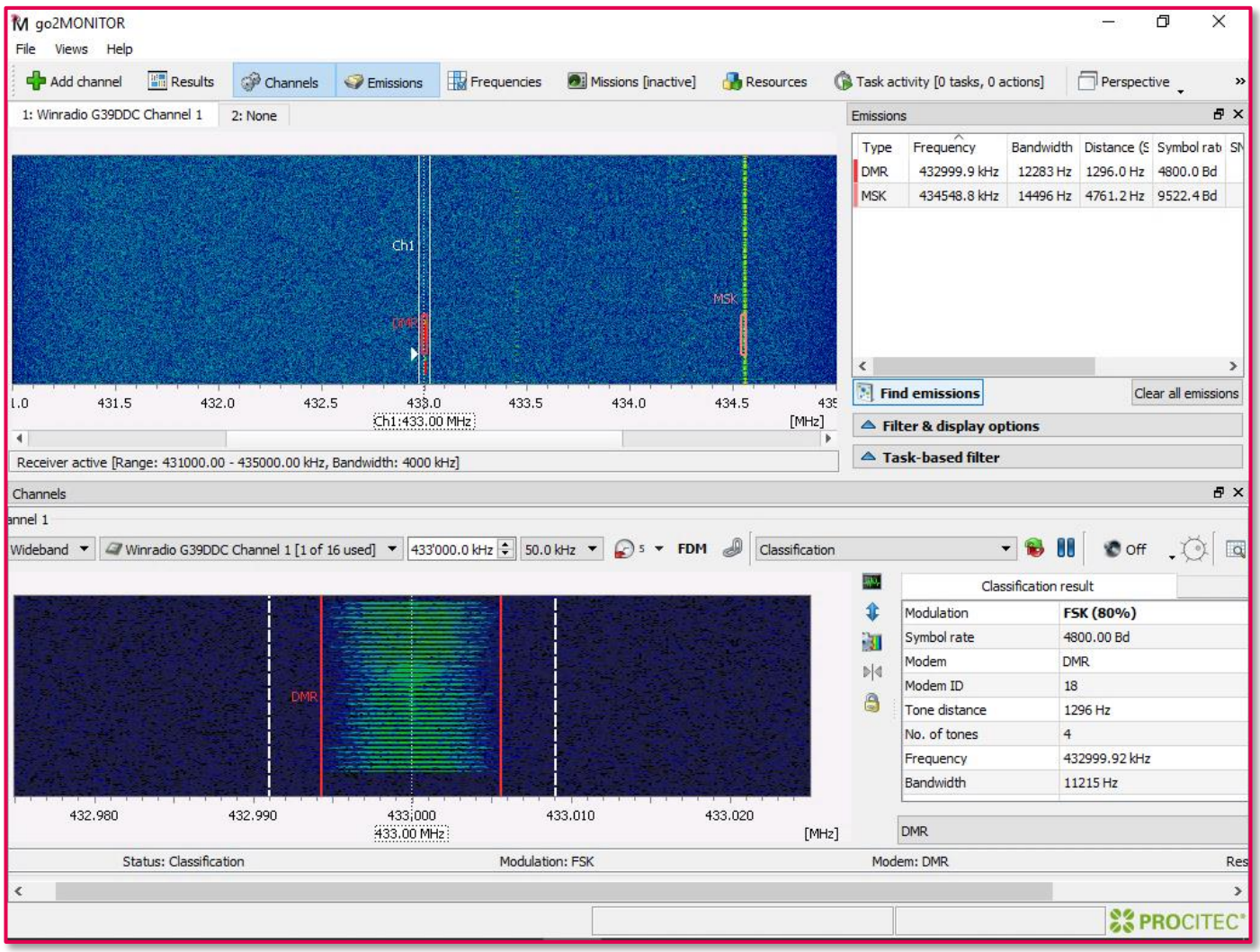
Adversarial & criminal use of satellite telephones & Push-To-Talk (PTT) digital-speech handheld 'walkie-talkies' is increasing in the maritime & littoral space around the globe.

Patrol Vessels can enhance their Situational Awareness by using go2MONITOR-ALERT to deliver Electronic-Surveillance derived Indications & Warnings of these digital-speech activations.

Vessel-Of-Interest at-speed – littoral location (East Africa)

THE CAPABILITY

Integrated into appropriate wideband-sensors/receivers & operating automatically from the OPV's bridge or ops-room, the new go2MONITOR-ALERT software package automatically processes the radio-spectrum and reports digital & analogue signal protocols encountered therein, including (but not limited to) satphone activations, digital-speech 'walkie-talkies', marine radios, emergency locator-beacons (i.e. COSPAS-SARSAT), & aircraft voice/data downlinks.



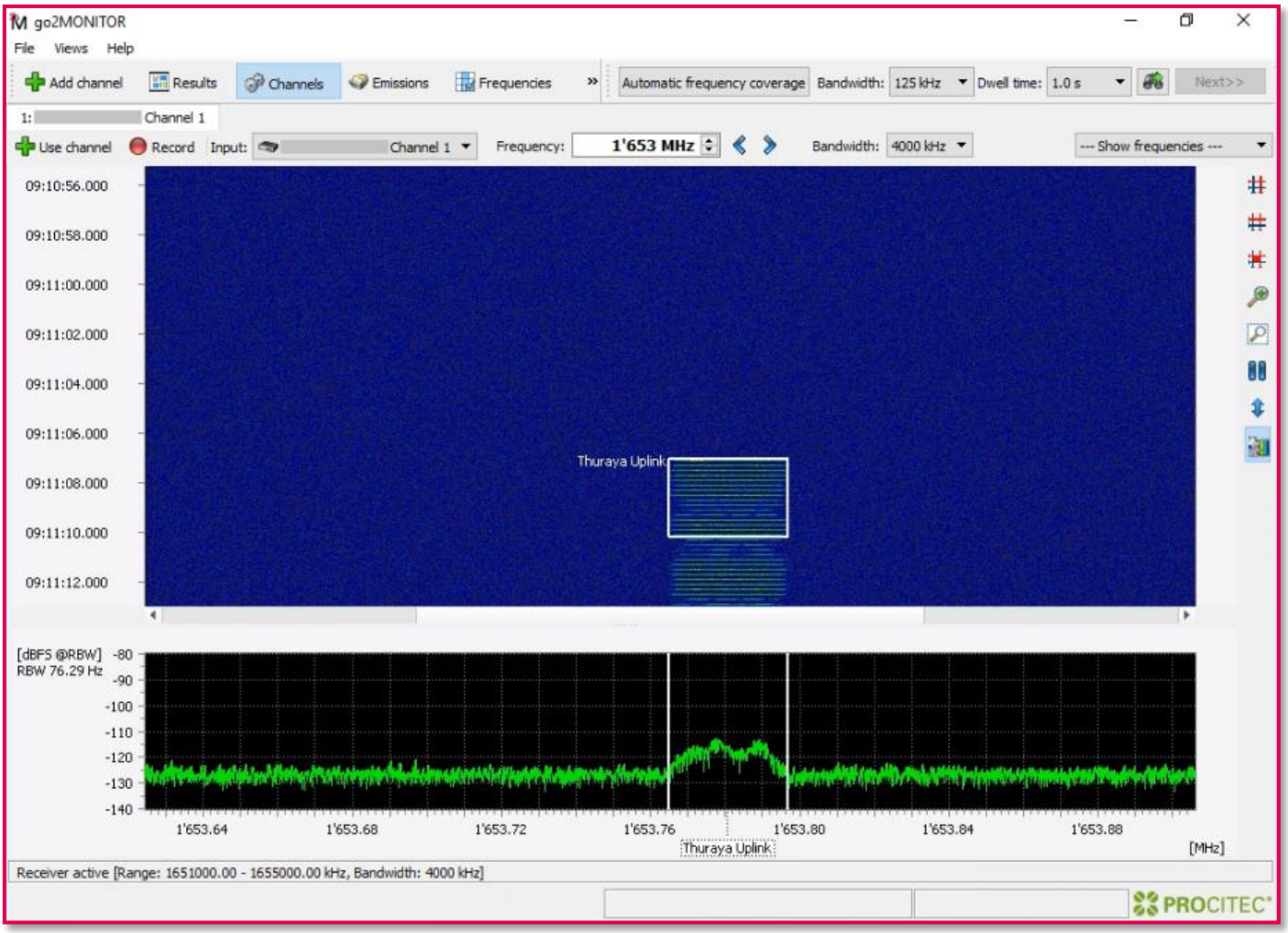
go2MONITOR-ALERT automatic detection, classification & reporting of DMR-protocol digital-speech activation

OPERATIONAL SCENARIO (1)

An OPV is closing on a Vessel-Of-Interest (VOI). Subject to the VOI's positive response to the OPV's request for information via VHF marine-band radio, the OPV may not action a 'Visit, Board, Search & Seizure' (VBSS) operation to examine the ship's cargo for drugs, weapons & passengers which are not recorded on the ship's manifest.

However, despite repeated calls from the OPV, the VOI does not respond either by radio or visual means.

Immediately after the OPV's unanswered calls to the VOI, the OPV's bridge-located go2MONITOR-ALERT system detects a 'Thuraya XT-PRO' satphone handset activation by a Person-Of-Interest (POI) aboard the VOI, suggesting to the OPV's Ops-Team that the POI is probably attempting to inform or seek direction from a remote associate.



go2MONITOR-ALERT auto-detecting, classifying & reporting a Thuraya- XT-PRO Uplink activation

…'DETECT - ALERT - INFORM'

The OPV Boarding Team's evidence that a satphone call has been made (or attempted) prior to boarding the VOI delivers valuable 'atmospherics intelligence' that the VOI is probably adversarial & potentially hostile, enabling the Team to review & revise their imminent boarding tactics.

Mainmast with antennas on Offshore Patrol Vessel
(OPV displacement 2000 Tonnes / Length 90 Meters [range 5500 nm] in this example)

INTERCEPT RANGES

OPV-borne go2MONITOR-ALERT intercept ranges will vary, depending on a number of factors including (but not limited to) ambient weather conditions, sea-state, signal-type & frequency, host-sensor/receiver sensitivity & intercept-antenna height.

For example, a satphone handset's uplink activation can be automatically detected, classified & reported ('prosecuted') at ranges >0.5 nautical miles, whilst Digital Mobile Radio (DMR) emissions can be prosecuted at ranges >10 nautical miles (i.e. 'Over-The-Horizon' (OTH) & 'Beyond Line-Of-Sight' (BLOS) from the OPV.

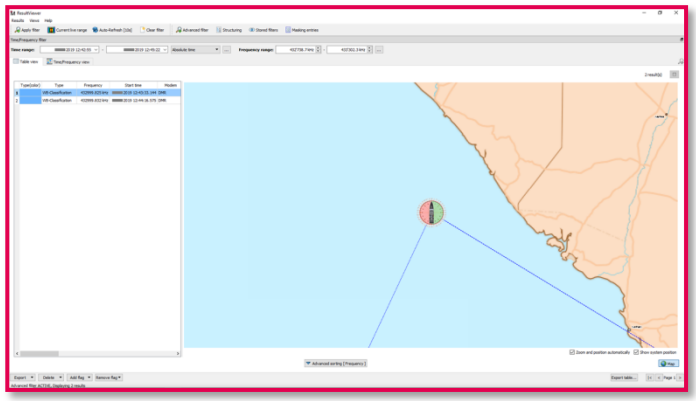
In the absence of surface-search RADAR results, any OTH/BLOS detection of the go2MONITOR-ALERT Mission-Plan's tasked SOIs will act as a 'first warner' of activity to the OPV's on-watch team.

OPERATIONAL SCENARIO (2)

Example operational scenario: potential adversaries in a specific Area-Of-Interest (AOI) are known to use encrypted VHF Digital Mobile Radio (DMR) 'walkie-talkies' for short-to-medium-range Line-Of-Sight calling between their deployed Fast-Patrol Boats (FPBs).

Whilst patrolling in international waters, an OPV-borne go2MONITOR-ALERT system automatically detects & reports new activations of DMR emissions at relatively high signal-strength, giving the first indication that potentially adversarial FPBs may be approaching from 'Over-The-Horizon'.

Patrolling International Shipping Lanes



go2MONITOR-ALERT Direction-Finding GUI concept

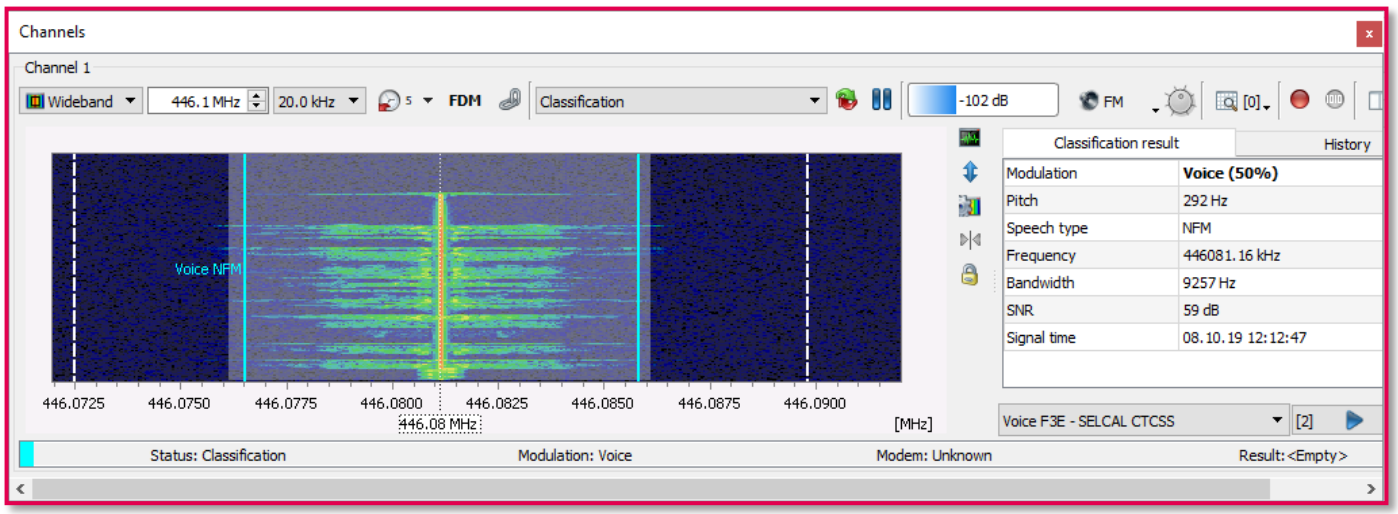
DIRECTION-FINDING

The go2MONITOR-ALERT capability enables real-time automatic 'tip-off' of all detected & recognized signals to co-located Radio Direction-Finding (DF) systems (optionally using STANAG 4658 'CESMO' reporting format).

The conceptual screenshot shows automatically-derived DF results plotted to the go2MONITOR-ALERT mapping engine as Lines-Of-Bearing relative to the ship's heading (i.e. 'relative bearings').

CAN CLEAR-SPEECH SIGNALS BE MONITORED?

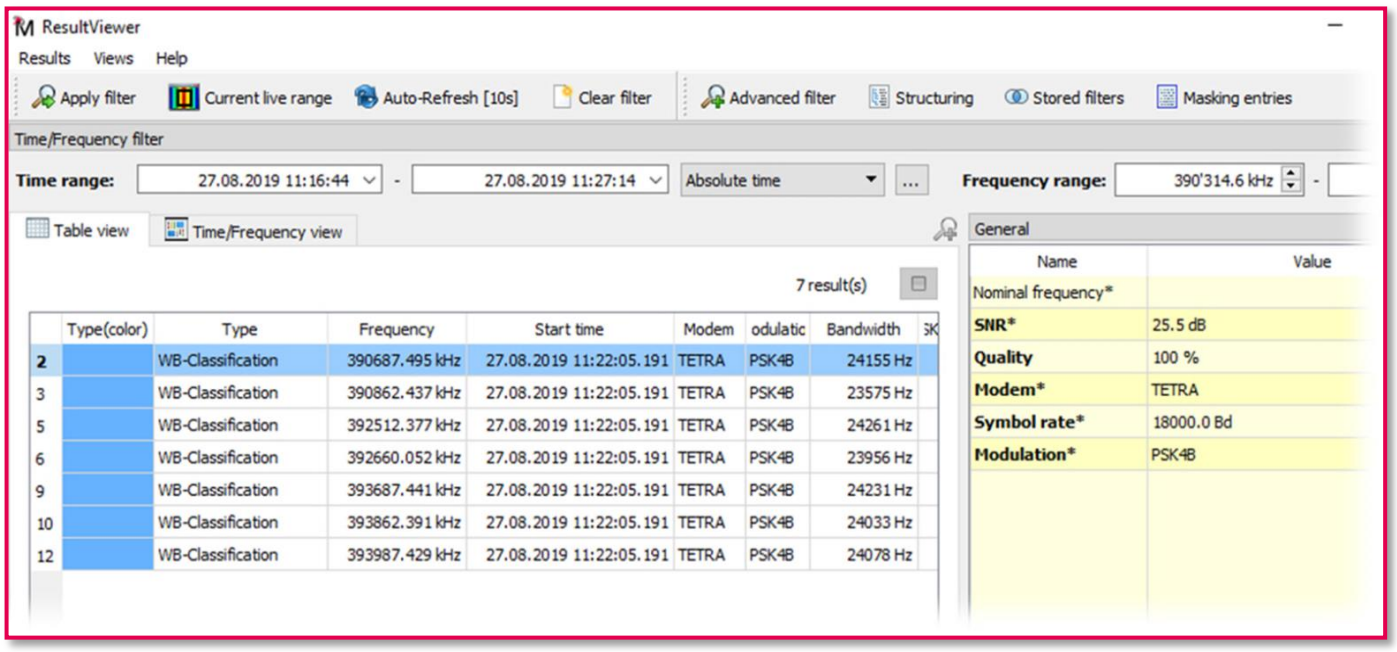
Yes. Analogue Clear-Speech emissions (e.g. VHF marine-band channels [156 MHz]) can be automatically detected, classified, recognized, demodulated, monitored, recorded & reported. The go2MONITOR-ALERT multichannel audio-demodulators include FM audio demodulation for the VHF marine-band & other V/UHF analogue portable radio transceivers, & AM audio demodulation for the VHF airband.



Audio-demodulation of an FM PTT Clear-Speech emission (PMR446 Ch.07 with CTCSS tone) in a go2MONITOR-ALERT Narrowband Channel

RESULTS DATABASE & REPORTING

The go2MONITOR-ALERT 'ResultViewer' smart-database reports & archives all detected signals' classification results and signal recordings. These results & recordings can be managed locally & exported via physical media or wireless means to rear-echelon units for further analysis & processing.



ResultViewer database showing classification results of a recently encountered UHF TETRA Digital-Speech network

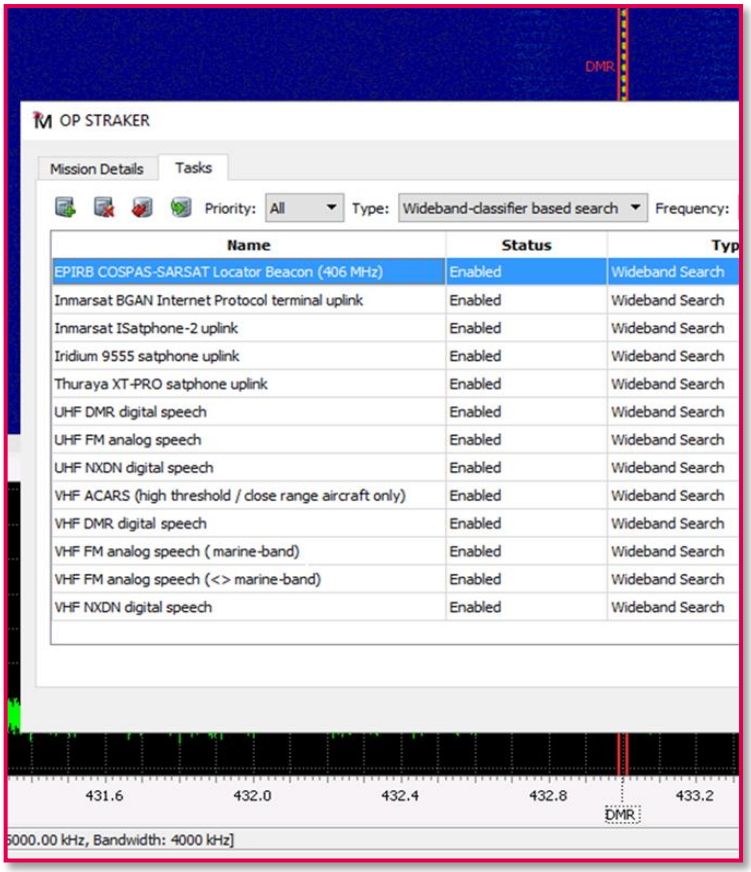
MISSION PLANNING

The go2MONITOR-ALERT Mission Plan contains the list of Signals-Of-Interest for a given operation.

The Mission Plan can be created offline & distributed during the pre-mission planning phase, and modified or updated by the embarked team when patrolling offshore to suit revised operational objectives.

In this example (right), the 'OPERATION STRAKER' Mission Plan includes mission-specific, prioritized Tasks for the automatic detection, classification & alerting of Emergency Position-Indicating Radio-Beacons (EPIRB), analogue & digital-speech emissions (including satphones), & close-proximity aircraft data downlinks.

(maritime Automatic Identification System [AIS] emissions have been intentionally excluded in this operational example).



Example Mission Plan showing mission-specific Signals-Of-Interest

Project DORNHAI Field-Trials – target emitters deployed offshore

PROJECT DORNHAI

Project DORNHAI is PROCITEC's capability development initiative to enable go2MONITOR-derived Indications & Warnings in the maritime & littoral space for FPBs, OPVs & other Minor War Vessels (MWVs).

The Phase-1 Field Trial was completed successfully in the Baltic Sea in October 2019. Range-testing was achieved by the automatic intercept of target satphone uplinks & Point-To-Point V/UHF digital-speech emissions (& other lawful Signals-Of-Opportunity).

With an intercept antenna elevation of just 4.5 Meters, satphone uplink activations were automatically detected & classified at ranges beyond 0.5 nautical miles, delivering credible results for development of real-time Situational Awareness during Maritime Security Operations.

FURTHER INFORMATION

For further information relating to go2MONITOR-ALERT in Maritime Security Operations, please contact ***sales@procitec.de***

PROCITEC GmbH
Rastatter Straße 41
75179 Pforzheim
Phone +49 7231 155 61 0
Fax +49 7231 155 61 11