Gapless, High Speed Recording

DATA SHEET | MUNIN 1005-IF WIDEBAND SIGNAL RECORDER

Recording Wideband Signals

INTRODUCTION

MUNIN 1005-IF is the wideband IF recorder platform from Novator Solutions. Built upon modular, commercial-off-the-shelf hardware, MUNIN 1005-IF is the ideal solution for gapless recording of narrowband and wideband IF (intermediate frequency) signals with 2 MHz to 1000 MHz real-time bandwidth.

MUNIN 1005-IF is optimised for mission-critical ELINT and wideband COMINT applications, supporting precise time difference of arrival (TDOA) measurements and enabling offline spectrum analysis.

Highlights

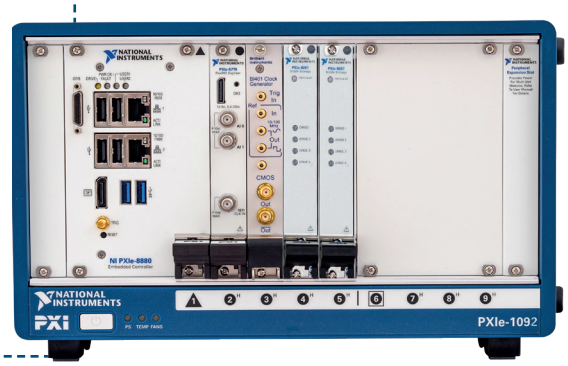
- Gapless and lossless recording of narrowband and wideband IF inputs
- 2 MHz to 1000 MHz instantaneous bandwidth
- Flexible storage disk options up to 96 TB
- Superior timing precision that supports NTP (Network Time Protocol)
- Large pre-trigger buffer that ensures signals are never missed
- Real-time spectrum monitoring to detect known and unknown signals
- Server-client architecture enables scalability and flexibility for remote operations

MUNIN 1005-IF in brief

MUNIN 1005-IF is a configurable platform designed for real-time capture of one or more Intermediate Frequency (IF) channels, making it ideal for Electronic Intelligence (ELINT) and wideband Communications Intelligence (COMINT) data collection.

Its versatile design supports two primary modes of operation:
1. IF Sampling Recorder: By incorporating an RF stage before the IF input, the MUNIN 1005-IF functions as an IF sampling recorder.

2. Direct RF Sampling Recorder: With appropriate attenuation and filtering at the input, it operates as a direct RF sampling recorder.



MUNIN 1005-IF

KEY CAPABILITIES

Gapless Recording with Pre-Trigger Buffer

Ensures no RF event is missed. An advanced buffer and streaming architecture compensates for potential latencies, ensuring continuous, lossless IQ data capture, while a buffer stores pre-trigger events.

High-Precision Timing (<10 µs)

Accurate time is critical for geolocation using time difference of arrival (TDOA) measurements. Synchronisation via Network Time Protocol (NTP) across modules on client and server side. GPS and IRIG-B support is available on request.

Scalable, Modular Architecture

Mix and match IF inputs, bandwidths and RAID storage from 4 TB to 96 TB+. Adapt to any mission profile without overinvestment.

Extended Recording Durations

Continuous capture from minutes to days supports long missions without interruption, preserving full situational awareness.

Remote Operation and Monitoring

Operate locally or from remote command centres with the built-in client and real-time spectrum monitoring display, or integrate custom applications via TCP/IP API.

Open File Format for Analysis

TDMS files (MATLAB® compatible) with custom metadata support simplify post-mission workflows and ensure interoperability.

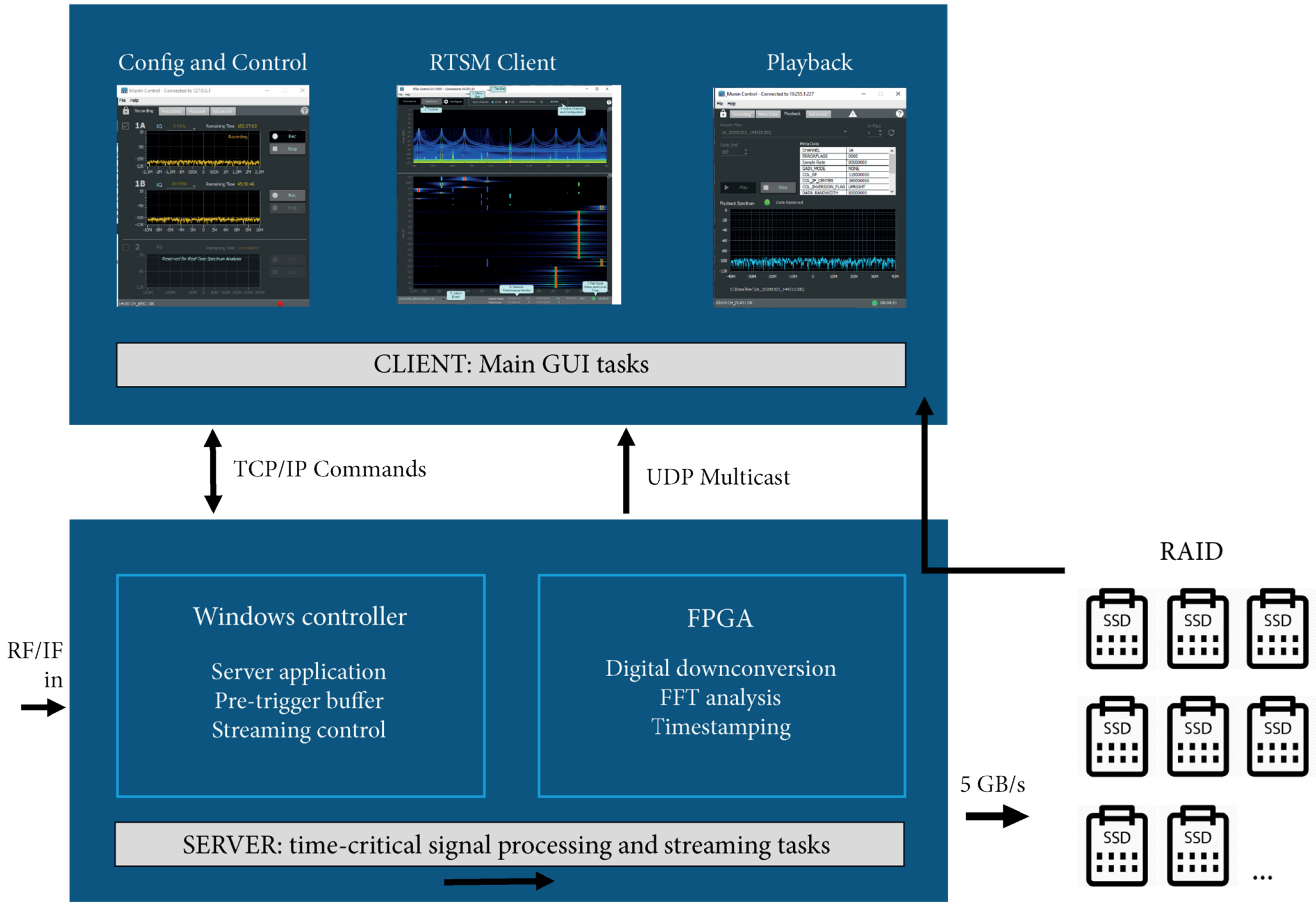
Playback Capability

Replay captured signals in software for analysis, or integrate signal generator hardware to recreate the RF signals for testing, training or evaluation.

Key Technology

Streaming

At the heart of all Novator Solutions record and playback systems is our high-performance streaming engine, designed for gapless, high-speed data streaming over extended durations. Built on a server-client architecture, the system efficiently separates time-critical tasks, such as real-time data processing and transfer, from non-time-critical operations, including configuration and display. All communication between the server and client is managed via TCP/IP and UDP protocols, ensuring seamless and reliable data transmission.



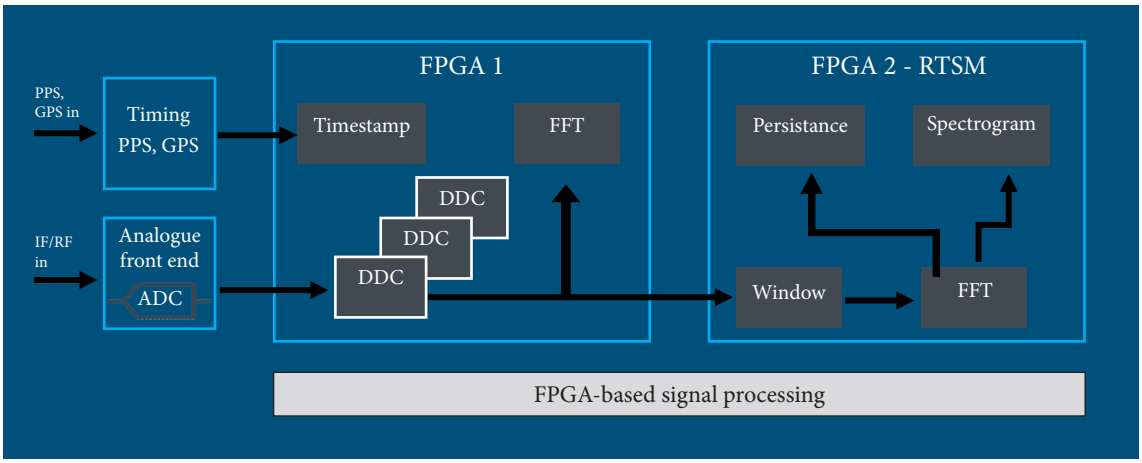
Signal processing

MUNIN 1005 leverages high-performance Field-Programmable Gate Arrays (FPGAs) to execute the most time-critical processing tasks, including:

- Digital Downconversion (DDC)
- 1024-point Fast Fourier Transform (FFT)
- Optional Real-Time Spectrum Monitoring (RTSM)

The flexible DDC architecture enables precise downsampling of real data from virtually any IF centre frequency supported by the analogue front end. With the 1024-point FFT, users can monitor the spectrum of all analogue channels in real time.

To ensure optimal performance, the RTSM algorithm is processed directly on an FPGA. After the windowing stage, the system computes up to 120,000 overlapping FFTs per second. The RTSM provides both a spectrogram and a persistence plot, enabling operators to detect and analyse new or unknown radar emitters and COMINT signals with precision.



Hardware platform

MUNIN 1005-IF uses the industry-proven modular PXI platform, latest FPGAs, and industry-grade disk storage from leading vendors. Thanks to the modular architecture, it is possible to repurpose MUNIN 1005-IF recorders for varying mission requirements

Products

MUNIN 1005-IF is built on the industry-standard PXIe platform, incorporating cutting-edge Kintex™ UltraScale™ FPGAs and high-performance disk storage from leading manufacturers. Its modular architecture allows users to customize analogue channel configurations, providing flexibility to meet evolving requirements. The system supports multiple configurations, including 1-2 wideband and 1-2 narrowband IF inputs, ensuring adaptability for various applications.

Each standard MUNIN 1005-IF configuration includes:

- A 10-slot PXIe chassis
- A high-performance controller running the latest Windows OS
- 24 GB DRAM for efficient data processing
- 1 Gigabit Ethernet connectivity for seamless remote control and data offloading

MUNIN 1005-IF is designed for scalability. Its modular architecture enables seamless integration of new functionality over time.

For extended recording capabilities, the system includes high-capacity SSDs --available as internal or removable storage options. These high-speed, industrial-grade SSDs support long-duration recording, minimizing the need for frequent disk replacements. Additionally, they ensure fast data access, reliability, and security, safeguarding your critical data.

For extended recording capabilities, the system includes high-capacity SSDs --available as internal or removable storage options. These high-speed, industrial-grade SSDs support long-duration recording, minimizing the need for frequent disk replacements. Additionally, they ensure fast data access, reliability, and security, safeguarding your critical data.

Options

Custom Chassis Option
Smaller depth and width: for specific environmental requirements, a custom chassis may be produced to fit the space available.

Low noise: Fans with a low noise profile for deployment in quiet environments.

Custom Airflow: Depending on the deployment environment, the airflow direction can be modified (front-to-back or back-to-front)

Enhanced Timing
IRIG-B and GPS synchronisation options may be added on request.

Customisations

Custom Narrowband IF Frequencies
Narrowband IF frequencies from DC to 225 MHz (0.07 MHz to 225 MHz if AC-coupled) may be supported as a customisation.

Data Movement
VITA 49.0 may be implemented on request, to streamline interoperability with software tools that may receive VITA 49 packets.

Automatic Event Detection
Detection of events including:

- Power exceeding a set level in a determined band
- Events or signals from a database
- Clicks on the waterfall in the real-time spectrum monitoring view.

Contact Novator Solutions to discuss any of these customisations to MUNIN 1005-IF.

Typical Specifications

IF Receiver		
	Narrowband input	Wideband input
IF receiver channels (Rx)	1 - 2, SMA connectors	1 - 2, SMA connectors
ADC resolution	16 bits	12 bits
ADC clock	500 MHz	2.8 GHz - 3.2 GHz
SFDR	88 dBc (@ 70 MHz bandwidth)	71 dBc (@ 500 MHz bandwidth)
IF centre frenquency (default)	160 MHz	1000 MHz
Frequency range (-3 dB)	0.1 MHz - 225 MHz	0.1 MHz - 6 GHz
Instantaneous bandwidth	2 MHz - 100 MHz	500 / 1000 MHz
IF output		
IF channel (Tx)	1, SMA connector	
DAC resolution	12 bits	
Update rate	6.4 GS/s	
SFDR	-62.4 dBc @ 1.01 GHz	
General		
Recording modes	Manual, software trigger and hardware trigger	
Data format	Real or IQ, 16-bit	
File format	TDMS or Midas Blue 2.0	
Time source	GPS antenna, IEEE 1588 PTP, or external NTP server	
Time reference	GPS, PPS	
Disk storage		
	M.2 storage	U.2 storage
Form factor	Single-slot module	Single-slot module
Removable disk(s)	No	Yes
Total storage capacity	8 - 32 TB	7.68 / 15.2 TB
Mechanical / Environmental		
Form factor	4U - 19” rack mountable chassis	
Operating altitude	3000 m	

Novator Solutions AB, part of Novator Consulting Group, is at the forefront of SIGINT and EW technology. Our highly skilled R&D team combines expertise in high-speed data processing and software defined radio (SDR) technology to develop cutting-edge monitoring receivers and RF signal recorders. Our software proficiency, combined with modular hardware designs, allows us to create customised solutions that meet specific project and mission needs.

Gapless, High Speed Recording

GET IN TOUCH

Mail: info@novatorsolutions.se
Call: +46 8-622 63 50
Visit: novatorsolutions.com

NOVATOR SOLUTIONS