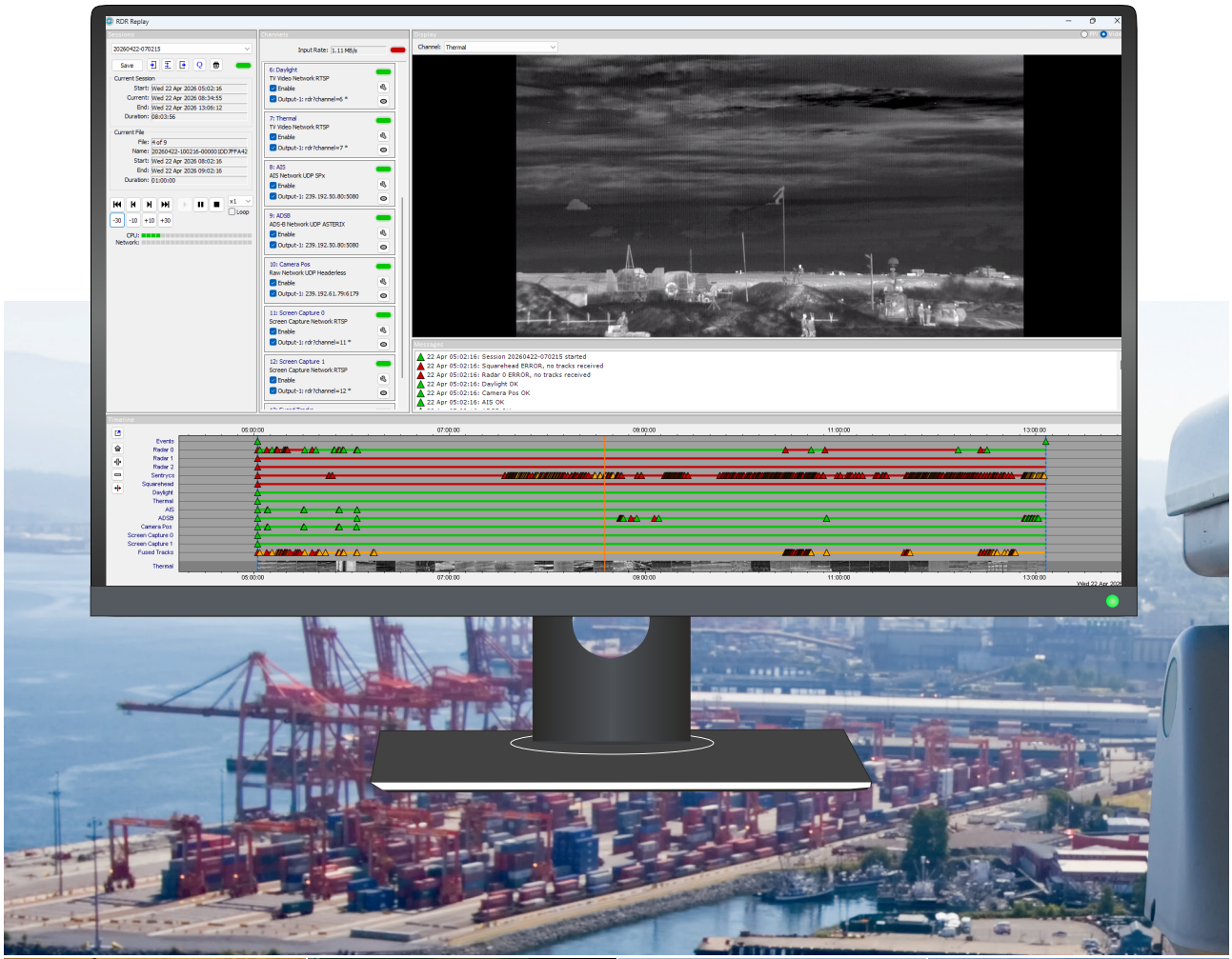
RDR Data Recorder

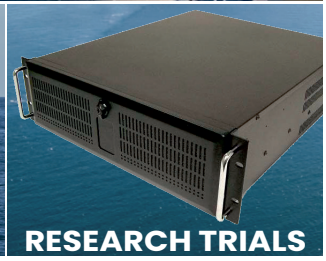
Multi-Sensor Record and Replay Software











CAMBRIDGE PIXEL

RDR Data Recorder

RDR is Cambridge Pixel's ready-to-run, Windows-based data recording application. It provides a fully-featured, multi-channel record and replay solution for a multitude of input data types and formats.

The RDR application can record and replay:

- Radar video & track reports
- Camera video (ONVIF, DirectShow or RTSP)
- PTZ Control
- AIS & ADS-B
- GNSS/INS Navigation Data
- Raw data (from a network feed)
- Audio
- Computer screens
- Events

Screen recording is supported, through a special lightweight "RDR Screen Capture Agent" client application. Audio recording is supported from a DirectShow device or from an RTP/RTSP networked audio source.

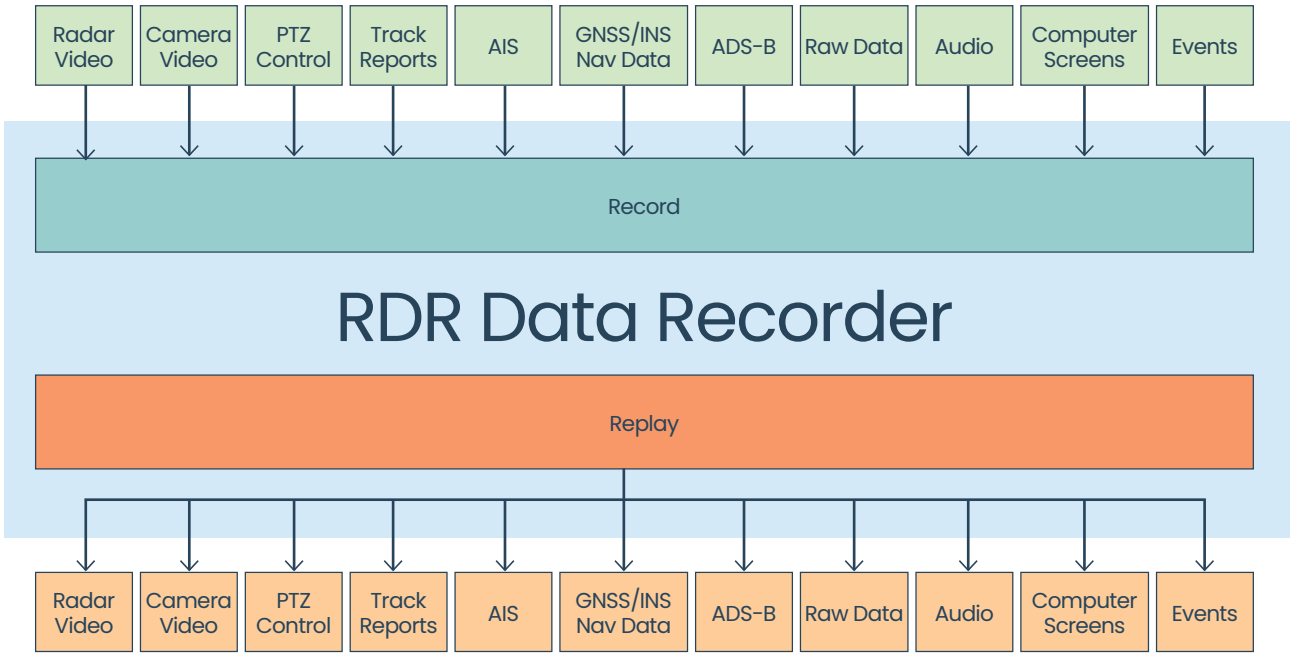
RDR is typically supplied as a software-only product. However, it is also available as a turnkey PC-based system, with appropriate input/output hardware pre-installed.

RDR allows the user to create multiple input channels for different data/sensor types. For example, RDR can accept primary radar video via Cambridge Pixel's HPx series of radar input cards or as network data, in SPx format or ASTERIX CAT-240 format, over Ethernet. A number of proprietary radar formats are also supported. Similarly, NMEA-0183 navigation data sentences may be received via serial port or Ethernet.

Defining channels is simple and intuitive, and a "Quick View" feature and status indicators allow the user to confirm that data is successfully being received and recorded.

Typical applications of RDR Data Recorder include:

- Surveillance - air, land or sea
- Security - air, land or sea
- Maritime activity monitoring and recording
- ATC systems
- Naval sea trials
- Research trials



Application Overview

RDR's graphical user interface (GUI) includes an overview display, which shows either camera video or radar video and/or radar tracks in the appropriate world-referenced location, on top of a tiled map underlay.

A visual timeline display shows the status of each input channel as the recording proceeds. The timeline also shows periodic snapshots of the radar video or camera video, as well as event markers.

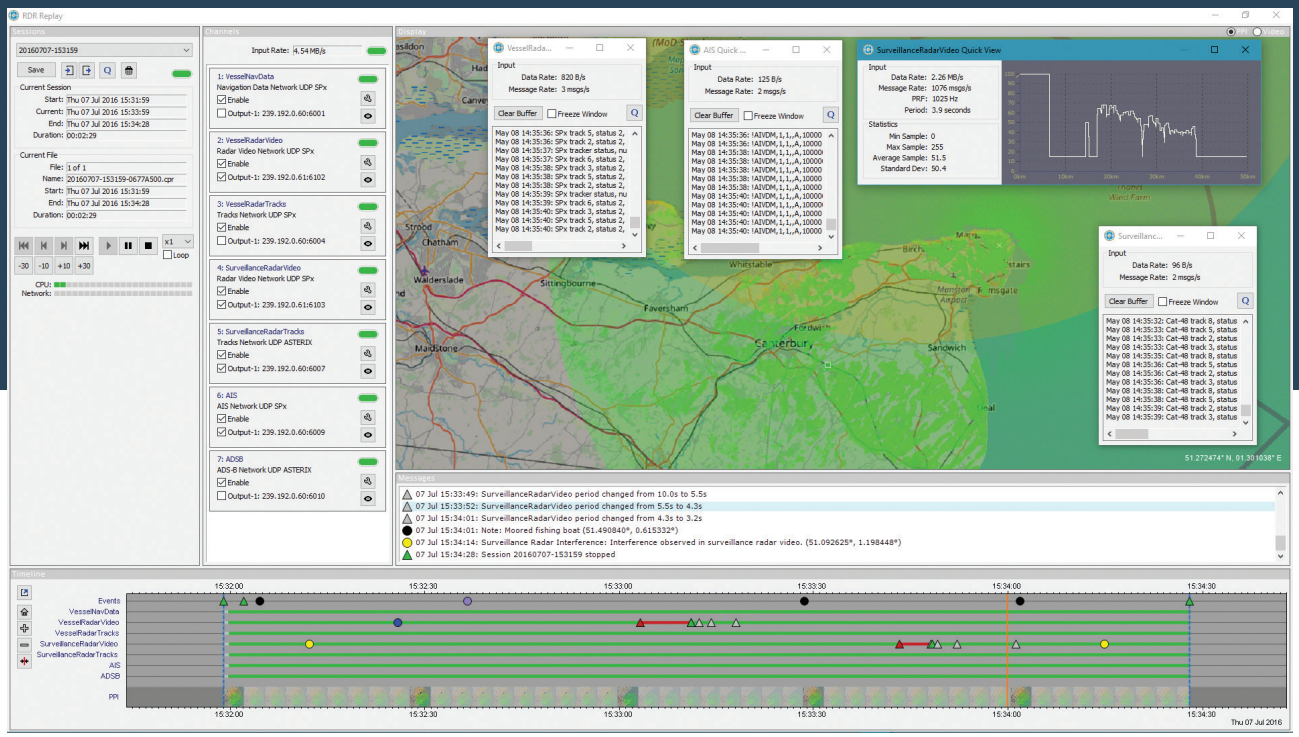
A/B start/stop reference markers may be set within the timeline, allowing replay to be looped within the defined interval or sections of recordings to be exported.

Discrete user-defined events may be logged at the click of a button or received as network input messages. System events (such as loss of channel data) are logged automatically. RDR also supports location-based events, allowing the user to mark where and when a particular type of event occurred.

On replay, data may be output via user-defined channels, routing the data to an appropriate physical output. For radar video replay, RDR is fully compatible with Cambridge Pixel's HPx series of radar signal output cards. RDR can therefore form a complete analogue radar record/replay system.

RDR includes a recording scheduler, allowing for recording sessions to be started at specified dates and times. Sessions may also be set to repeat with a selected frequency and the scheduler can delete sessions that are older than a specified age. This allows RDR to be configured for continuous capture of the last 'n' days of data.

The native Windows GUI provides full control over the application for configuration and operation. A browser-based Web GUI provides access to top-level control functions, and RDR may also be controlled via a socket-based control interface, allowing clients to manage record and replay remotely. RDR can also be controlled by Cambridge Pixel's VSD and RadarWatch products.



Radar Recording

RDR accepts primary radar video via Cambridge Pixel's HPx series of radar input cards or as network data (in SPx format or ASTERIX CAT-240 format) over Ethernet.

A number of proprietary radar formats are also supported, from manufacturers such as Simrad, Terma and Navtech Radar.

Radar tracks in ASTERIX CAT-10, CAT-34, CAT-48 & CAT-62 format are supported, with full control over the network source for recording and destination for replay.

During the recording process, RDR records the full radar video at maximum resolution, in addition to small scan-converted images to assist with navigating the timeline during replay.



Video Recording



RDR is designed to be compatible with a wide variety of cameras and video capture devices, using a wide range of video standards and compression formats such as:

- MJPEG
- H.264
- H.265

Cameras that employ either the ONVIF or DirectShow connection standards are also fully supported.

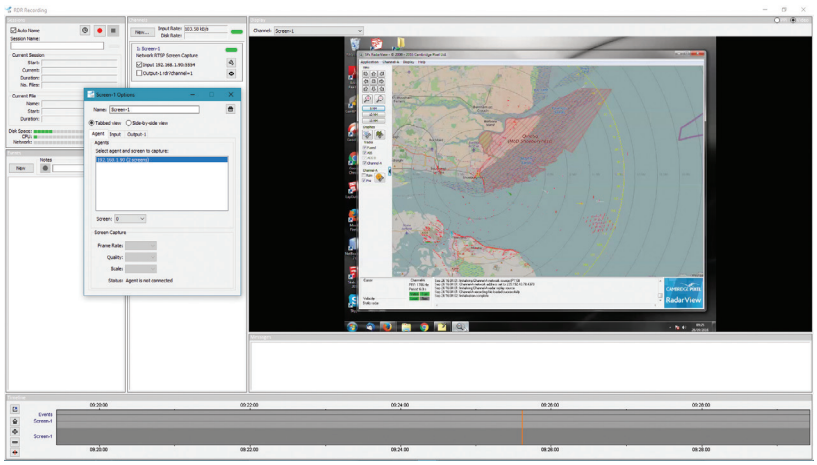
Video is streamed directly to disk, onwards to a network destination, or it can be viewed within a "Quick View" dialog box.

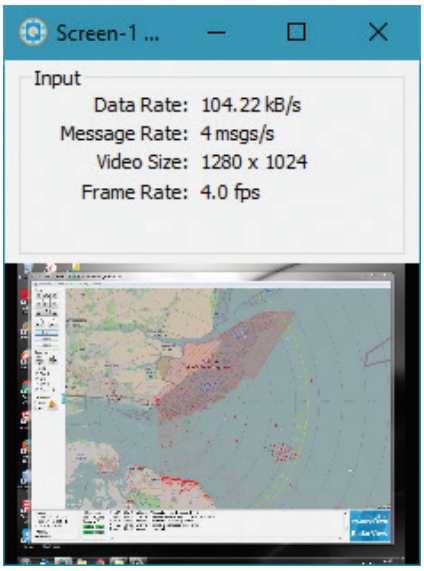
Recording of the PTZ camera control messages is also supported (when used with Cambridge Pixel applications such as VSD or RadarWatch).

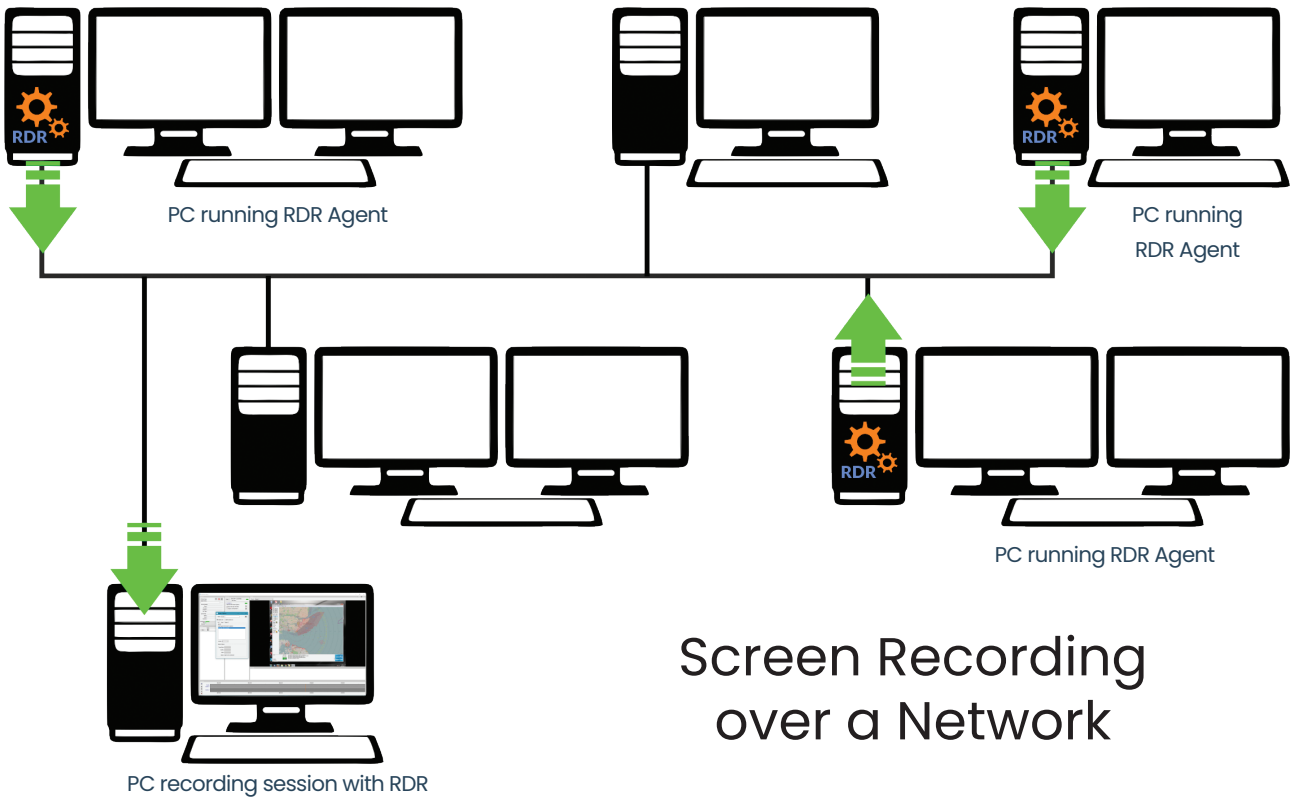
Computer Screen Recording

RDR is able to capture the displays of one or more client computers and record the screen imagery, along with other selected sensor data.

A lightweight RDR Screen Capture Agent is run on each display client to capture the screen, compress it and send the data to RDR. Typical capture rates of the screens are 1 to 5 fps.

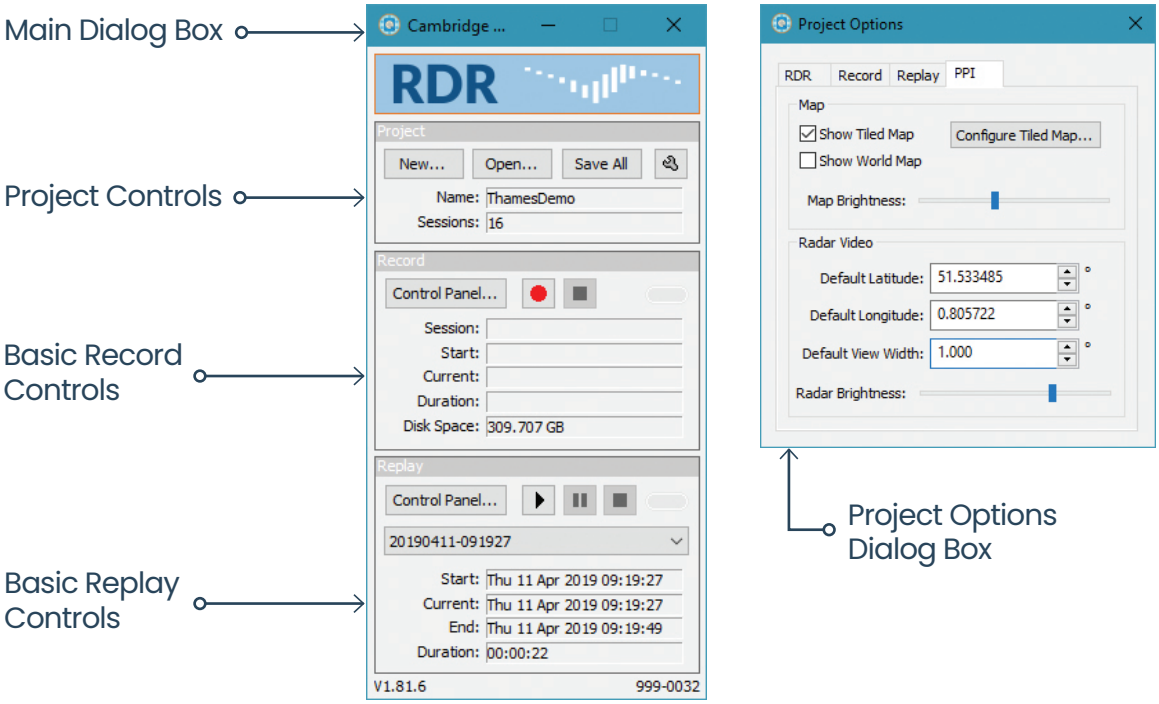


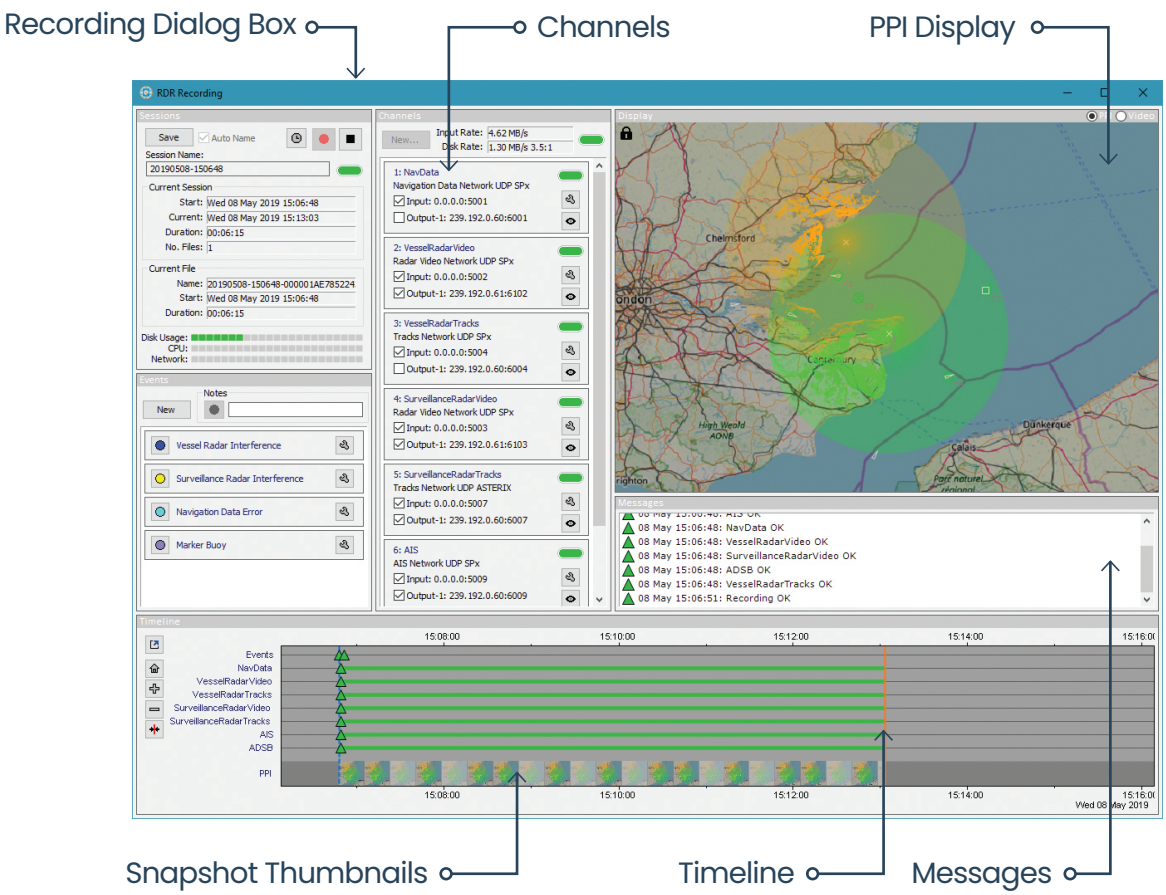


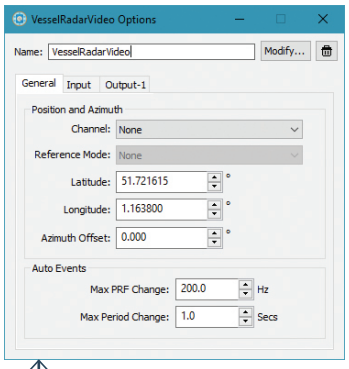


Screen Recording over a Network

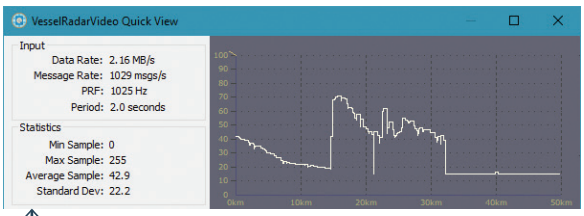
Key GUI Features



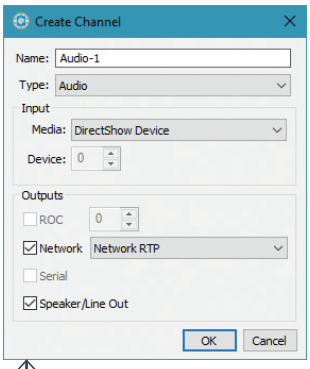




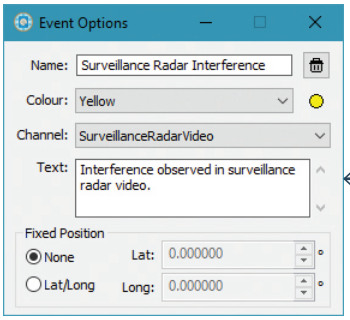
Example of a Channel Dialog Box



Example of a Quick View Dialog Box



Example of a Create Channel Dialog Box

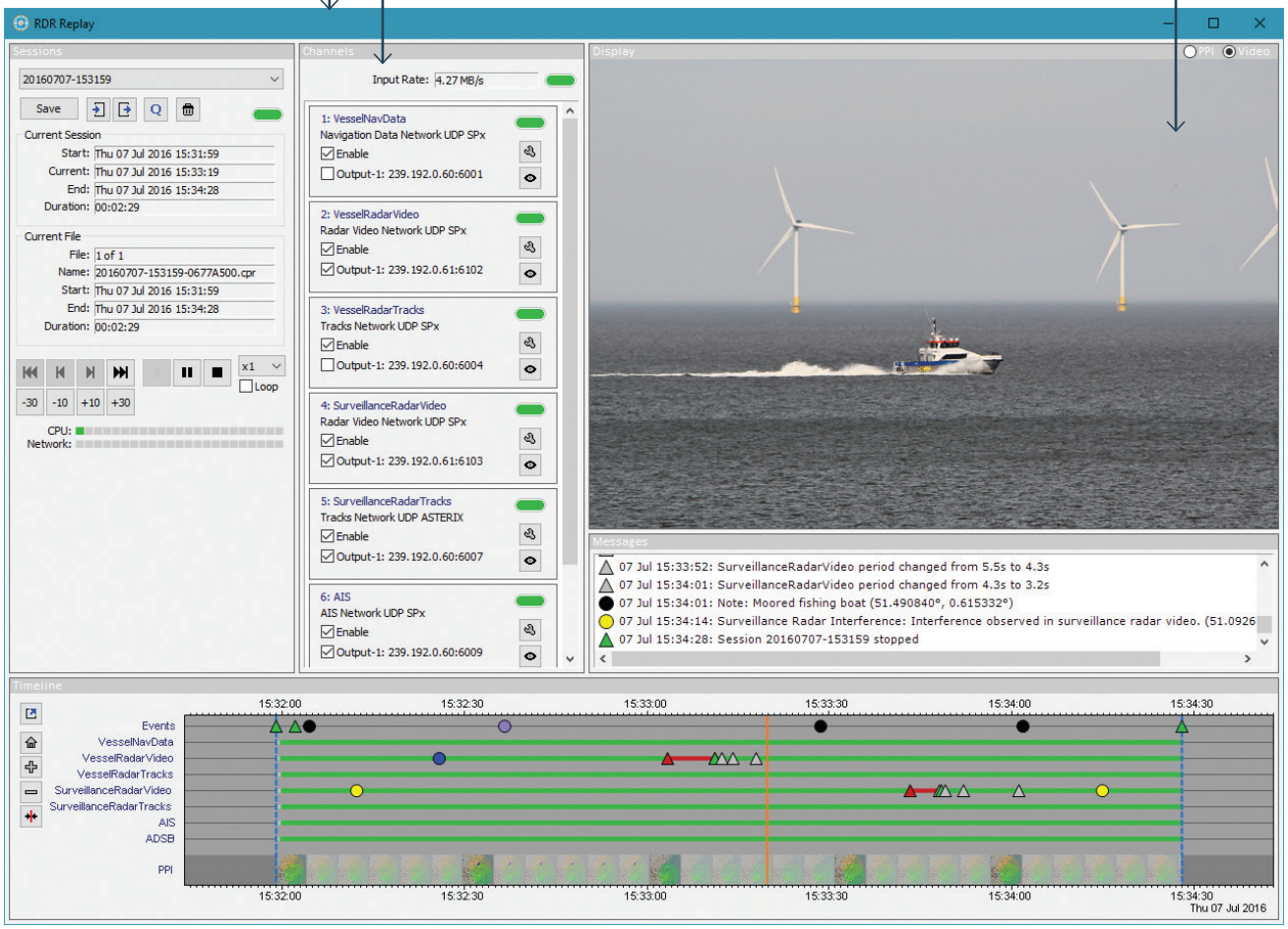


Example of an Event Options Dialog Box

Replay Dialog Box

Channels

Video Display



Audio Recording

Audio recording can be used for various purposes, including recording of voice memos and commentary during trials and recording of radio communications.

Audio recording is supported from DirectShow devices or from network RTP/RTSP sources.

Audio replay is supported by using a speaker/line out on the local PC or over the network to a network-enabled audio device using the RTP or RTSP format.

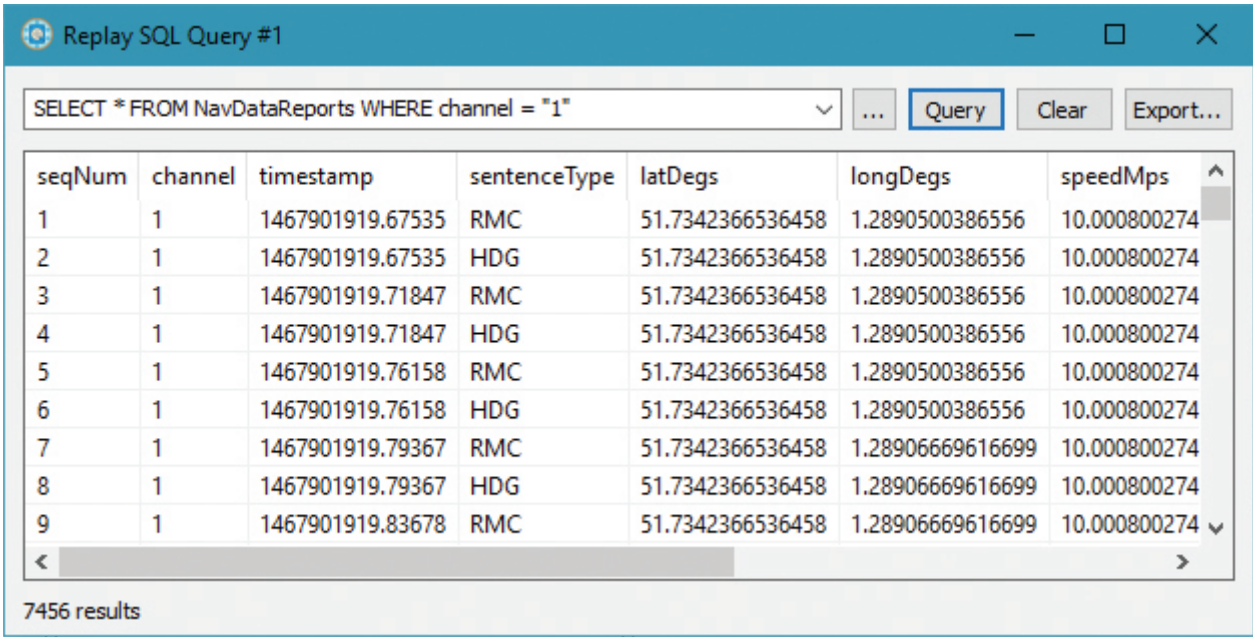


SQL Queries

The SQL database feature allows a user to run SQL (Structured Query Language) based queries on a session's recorded data and events.

To support this, in addition to recording data to the RDR session file, RDR can be configured to record data from the following channel types into an SQLite database file:

- AIS
- ADS-B
- GNSS/INS Navigation Data
- Tracks



seqNum	channel	timestamp	sentenceType	latDegs	longDegs	speedMps
1	1	1467901919.67535	RMC	51.7342366536458	1.2890500386556	10.000800274
2	1	1467901919.67535	HDG	51.7342366536458	1.2890500386556	10.000800274
3	1	1467901919.71847	RMC	51.7342366536458	1.2890500386556	10.000800274
4	1	1467901919.71847	HDG	51.7342366536458	1.2890500386556	10.000800274
5	1	1467901919.76158	RMC	51.7342366536458	1.2890500386556	10.000800274
6	1	1467901919.76158	HDG	51.7342366536458	1.2890500386556	10.000800274
7	1	1467901919.79367	RMC	51.7342366536458	1.28906669616699	10.000800274
8	1	1467901919.79367	HDG	51.7342366536458	1.28906669616699	10.000800274
9	1	1467901919.83678	RMC	51.7342366536458	1.28906669616699	10.000800274

Why Choose Cambridge Pixel?

Cambridge Pixel is an employee-owned British company, based near Cambridge in the East of England. We are independent, stable and an expert supplier of sensor processing and display solutions for the air defence, ATC, C-UAS, critical infrastructure protection, maritime, naval and USV markets.

We are hardware-agnostic and can provide off-the-shelf software processing modules and hardware cards or devices to interface to a wide selection of third-party sensors and effectors. We are experts in user interface (UI) design for radar and camera display systems. Cambridge Pixel has an extensive library and existing codebase for efficient development of new systems.

Cambridge Pixel is trusted by many leading primes and system integrators, with a strong track record in the military/defence and security markets.



RDR Case Study

Supporting NPL's Maritime Autonomy Assurance Testbed (MAAT) deployment.

The UK's National Physical Laboratory (NPL) is utilising Cambridge Pixel's RDR Data Recorder to capture and analyse multiple radar and sensor datasets from sea trials at Plymouth and an inland testing capability at Wraysbury Reservoir.

This work helps build an accurate picture of situational awareness from the perspective of an autonomous system, supporting efforts to verify and improve navigational safety. The testbed includes accurate weather data collected from multiple sites, including water state and atmospheric conditions that degrade sensor performances. With autonomous vessels expected to play a growing role in commercial shipping, defence, and scientific exploration, the ability to rigorously test and validate navigation systems is more critical than ever.



> "RDR has been an invaluable tool to simplify data collection for our sensor assurance testbed. It allows us to replay and dissect radar and sensor scenarios in detail, providing ground truth insights into how autonomous platforms interpret their surroundings in multiple weather scenarios."

Richard Dudley, NPL

Feature Summary

Platform:

- Operating system: Windows 11

Channels:

- Radar video: 2, 4, 8 or 16 channels (depends upon which runtime licence is purchased)[1]

Inputs:

- Radar video: SPx format, ASTERIX CAT-240, Simrad, HPx series radar input hardware and other proprietary formats
- Camera video (H.264, H.265 and MJPEG): DirectShow Capture or network (ONVIF or RTSP) input
- Camera PTZ control messages[2]
- Track reports: SPx format, ASTERIX CAT-10, CAT-34, CAT-48 and CAT-62
- AIS: NMEA-0183 from serial port or network
- Navigation data: NMEA-0183 from serial port or network
- ADS-B: ASTERIX CAT-21 or 112-bit extended squitter from serial port or network
- Audio: Input from DirectShow device or via network (RTP or RTSP)
- Computer screen capture: Input from network, using RDR Screen Capture Agent[3]
- Raw data: Record any network data without interpretation
- Event messages

Outputs:

- Radar video: SPx format, ASTERIX CAT-240 or HPx series radar signal output hardware
- Camera video (H.264, H.265 and MJPEG): Network output (ONVIF or RTSP)
- Camera PTZ control messages
- Track reports: SPx format, ASTERIX CAT-10, CAT-34, CAT-48 and CAT-62
- AIS: NMEA-0183 to serial port or network
- Navigation data: NMEA-0183 to serial port or network
- ADS-B: ASTERIX CAT-21 or 112-bit extended squitter to serial port or network
- Audio: Output to local speaker/line out or via network (RTP or RTSP)
- Computer screen capture: Network output (ONVIF or RTSP)
- Raw data: Replay any network data without interpretation
- Event messages

Local Display:

- "Quick View":
  - Provides overview of incoming data
- Situational display:
  - Radar video and track PPI display
  - Camera video display
  - Tiled map and/or world map underlay
  - Location-based event markers
- Status indicators:
  - Overall system health
  - Individual channel status
- Timeline:
  - Chronological display of channel status and event markers
  - Adjustable timescale
  - PPI or camera video snapshots

Control:

- Windows native GUI: User interface for local control and configuration
- Web GUI: Browser-based web interface for remote management
- Network API: C++ / .NET programming interface for remote control
- SQL database: Run SQL-based queries on a Session's recorded data and events
- Computer screen capture: Using RDR Screen Capture Agent across the network
- Control by VSD and RadarWatch: RDR can be controlled remotely by Cambridge Pixel's VSD and RadarWatch products for recording and replaying of sessions

Product Ordering Guide

RDR Data Recorder - Record & Replay

Part No.	Product Description
266-500	RDR Data Recorder (2 channel) runtime licence
266-501	RDR Data Recorder (4 channel) runtime licence
266-502	RDR Data Recorder (8 channel) runtime licence
266-503	RDR Data Recorder (16 channel) runtime licence

RDR Data Recorder - Replay Only

Part No.	Product Description
266-505	RDR Data Recorder (2 channel, replay only) runtime licence

RDR Data Recorder - Record Only

Part No.	Product Description
266-506	RDR Data Recorder (2 channel, record only) runtime licence

[1] May also be limited by host PC's performance and/or availability of slots to host PCIe cards
[2] When used with applications such as VSD or RadarWatch [3] RDR Screen Capture Agent is currently available for Windows only - please consult Cambridge Pixel for availability of a Linux version

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Trusted by Lockheed Martin, BAE Systems & the US Navy for reliable radar and sensor processing solutions and system engineering support.

Leading innovators of safety, security and defence solutions use our radar, camera and sensor processing technology to enhance their capabilities, speed up project delivery and reduce risks.

Cambridge Pixel is driving innovation for a safer, more secure world.

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