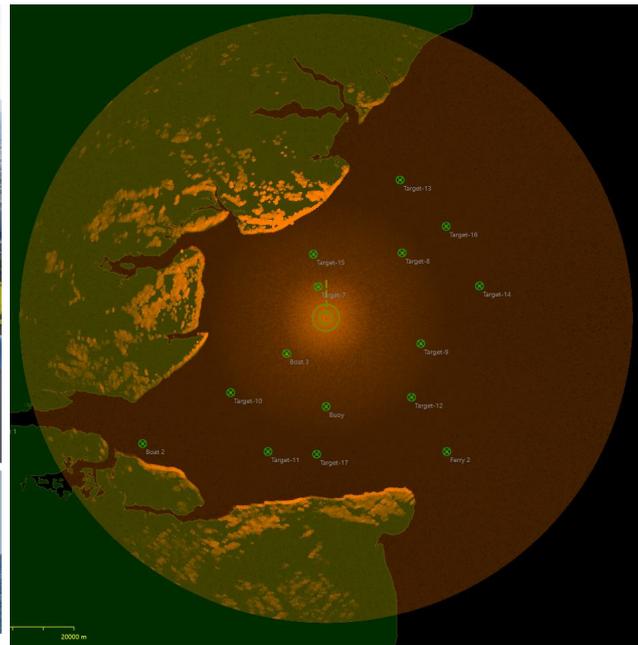


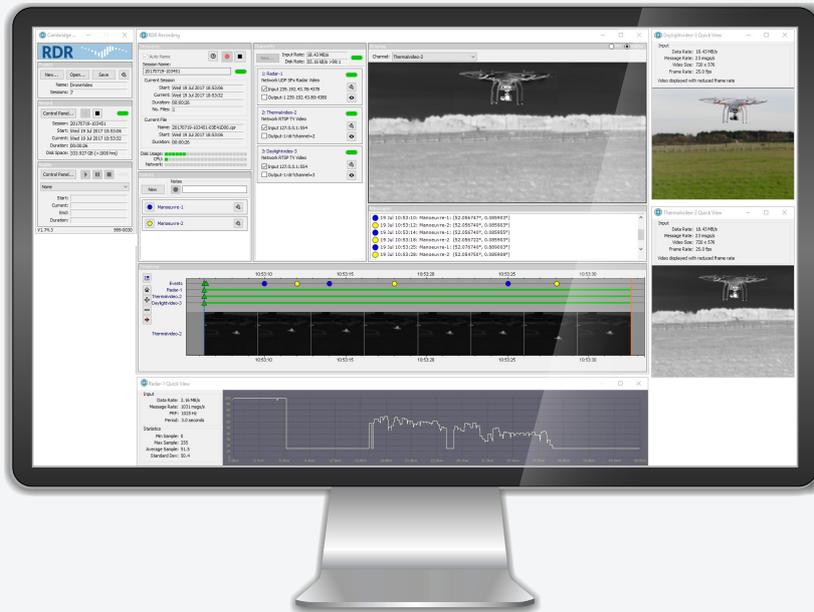
RDR Data Recorder

Multi-Sensor Record and Replay



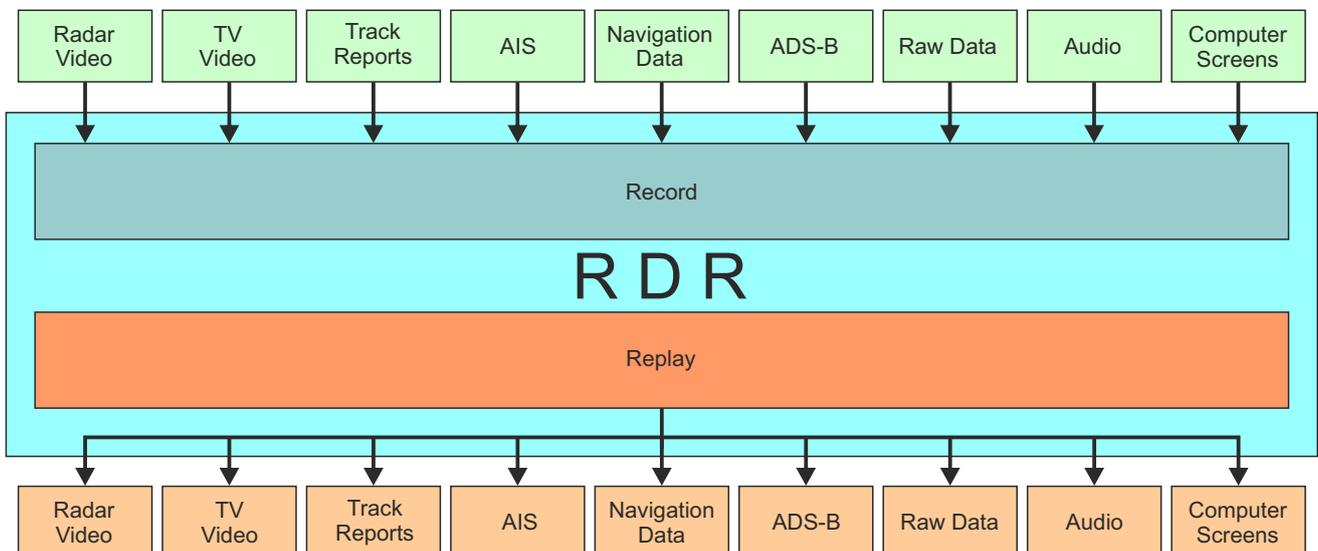
RDR Data Recorder

RDR is a multi-sensor, multi-channel data recorder capable of synchronised recording of a wide range of data sets, including radar video, radar tracks, navigation data, ADS-B, AIS, audio, camera video, computer screens and general network data.



Cambridge Pixel's ready-to-run RDR application provides a full-featured, multi-channel record and replay solution for a multitude of input data types and formats. The RDR application can record radar video data, radar tracks, AIS, ADS-B, IFF and navigation data, simultaneously within a synchronised data file structure. RDR is also capable of receiving and recording TV video from ONVIF or DirectShow devices and RTSP networked video streams, making it a truly versatile recording package. Screen recording is also supported, through a special lightweight "Agent" client application. Audio recording is supported from a DirectShow device or from an RTP networked audio source.

RDR may be supplied purely as a software product or as a turnkey PC system, with appropriate input/output hardware installed.

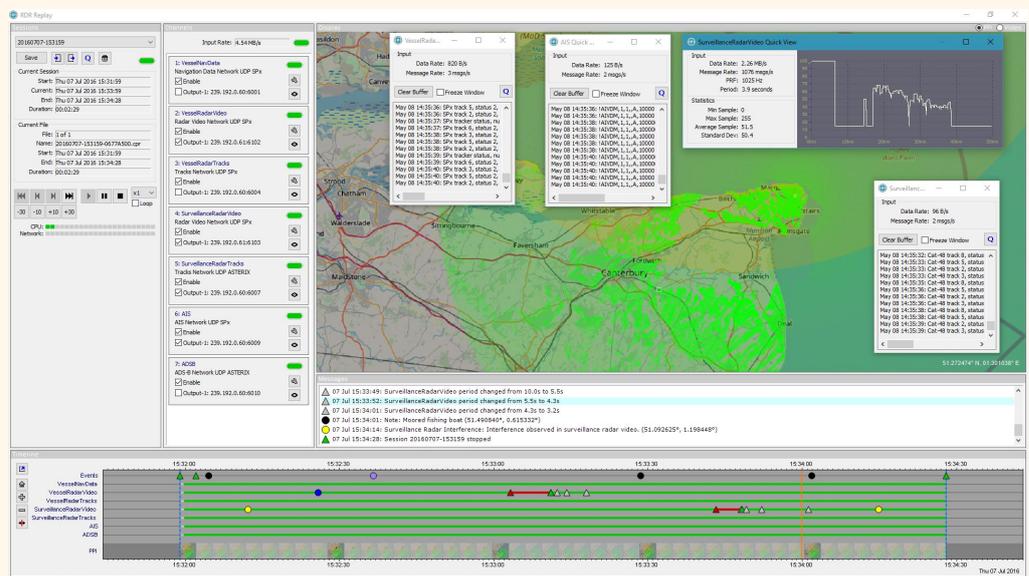


RDR allows the user to create multiple input channels for different data/sensor types. For example, RDR can accept primary video via Cambridge Pixel's HPx series of radar input cards or as network data, in SPx format or ASTERIX CAT-240 format, over Ethernet. A number of proprietary radar formats are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



RDR may be supplied purely as a software product or as a turnkey PC system, with appropriate radar input/output cards installed (example pictured).

RDR's graphical user interface includes an overview display, showing either camera video or radar video and tracks in the appropriate world-referenced location, on top of a tiled map underlay. A visual timeline display shows the status of each channel as the recording proceeds. The timeline also shows periodic snapshots of the radar video or camera video, as well as event markers. Start/stop 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 output channels, routing the data to an appropriate physical output. For radar video replay, the application is fully compatible with Cambridge Pixel's HPx series of radar signal output cards. RDR can therefore be used as part of an analogue radar record and replay system.

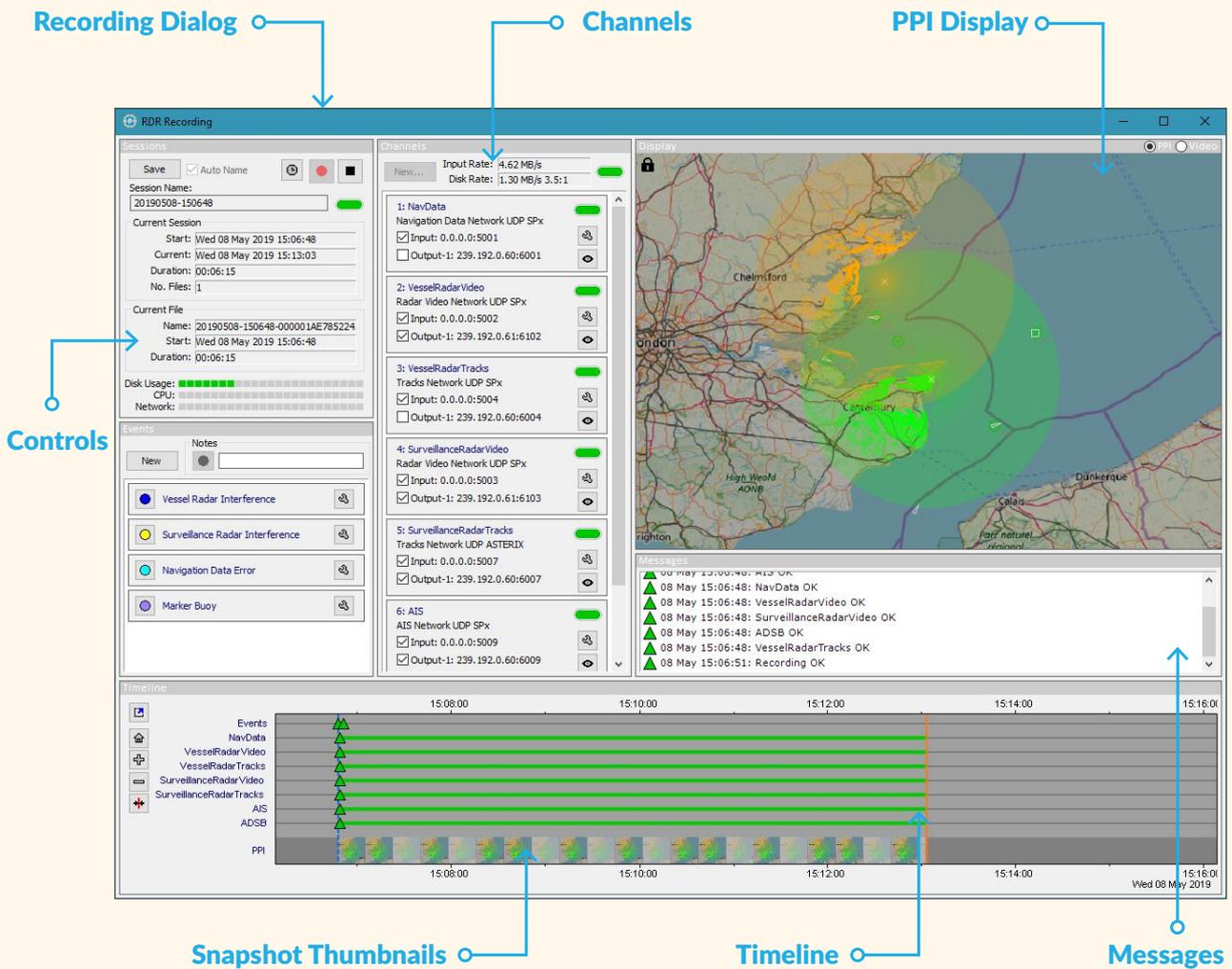
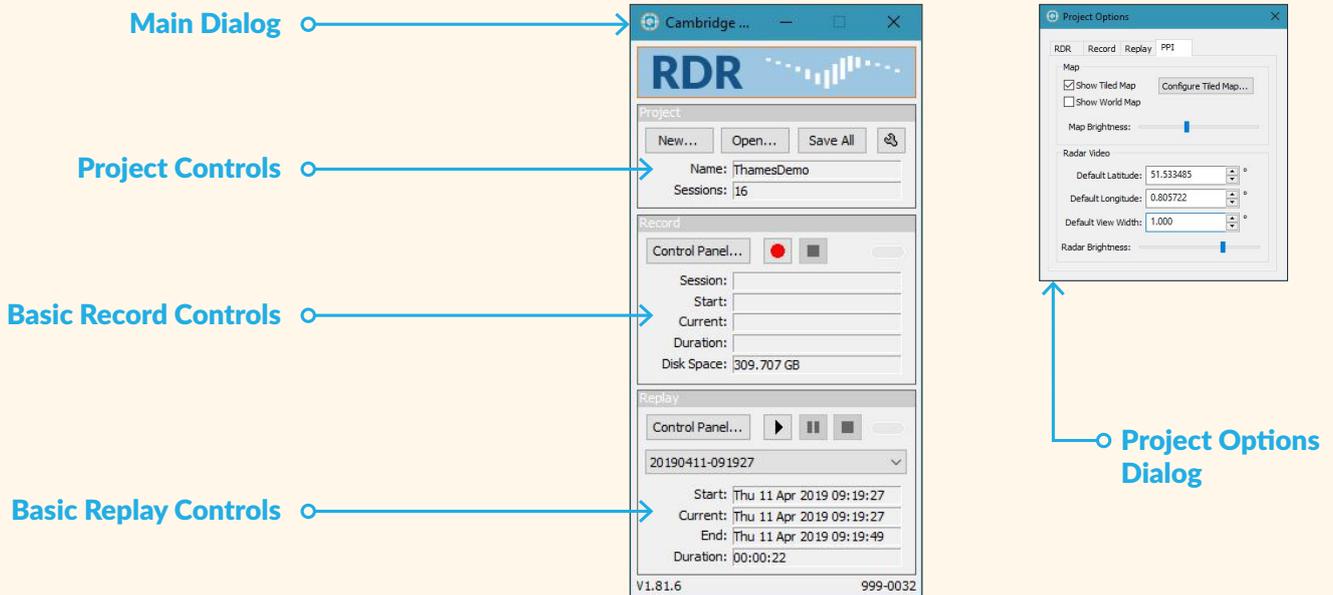
RDR includes a recording scheduler, allowing for recording sessions to be started at specified dates and times. Sessions may also be set to repeat with a selected frequency and the scheduler can delete sessions that are older than a specified age. This allows RDR to be configured for continuous capture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

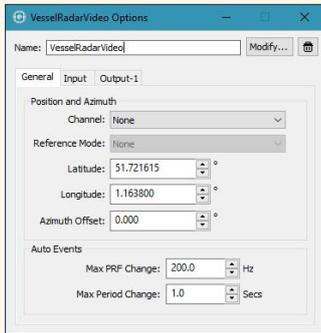
The RDR graphical user interface provides full control over the application for configuration and operation. Operation of the application may also be controlled via a socket-based control interface, allowing clients to manage recording and replay remotely (RDR can be controlled remotely by Cambridge Pixel's RadarWatch product for recording and replaying of sessions).



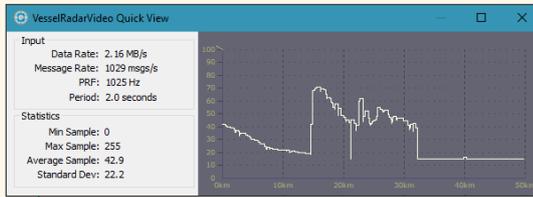
Graphical Controls

Key features of the RDR Data Recorder GUI:

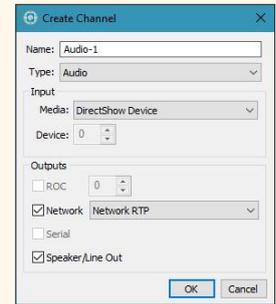




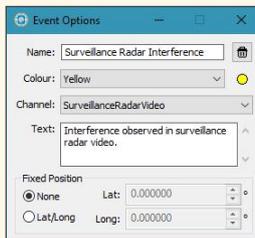
Example of a Channel Dialog



Example of a Quick View Dialog



Example of a Create Channel Dialog



Example of Event Options Dialog

Replay Dialog

Channels

Video Display

Controls

Snapshot Thumbnails

Timeline

Messages

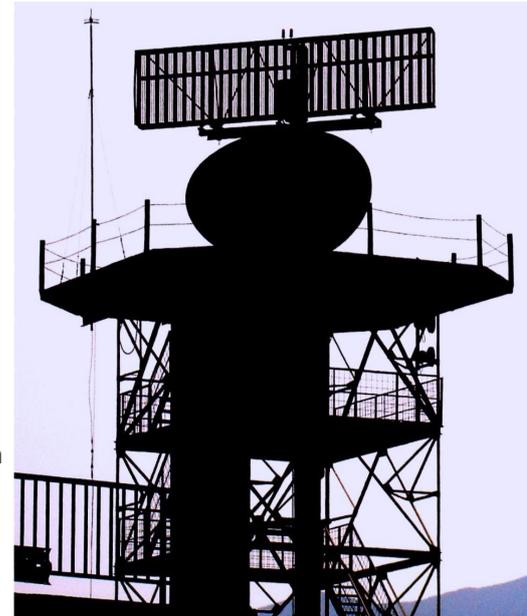
Radar Recording

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

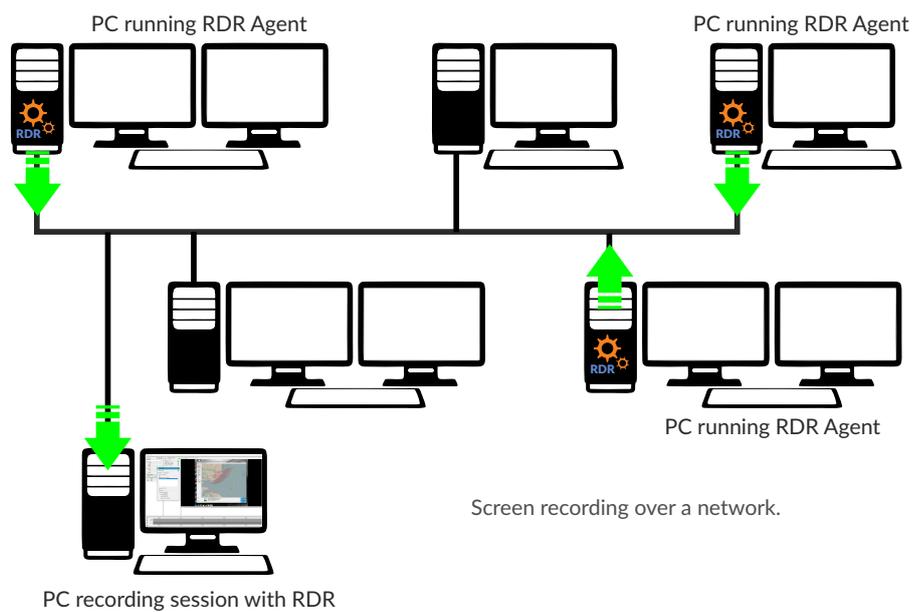
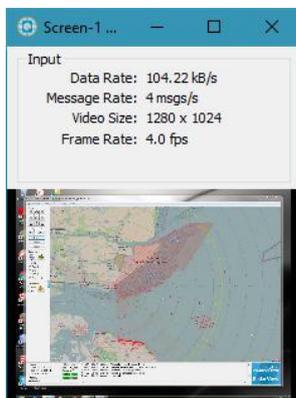
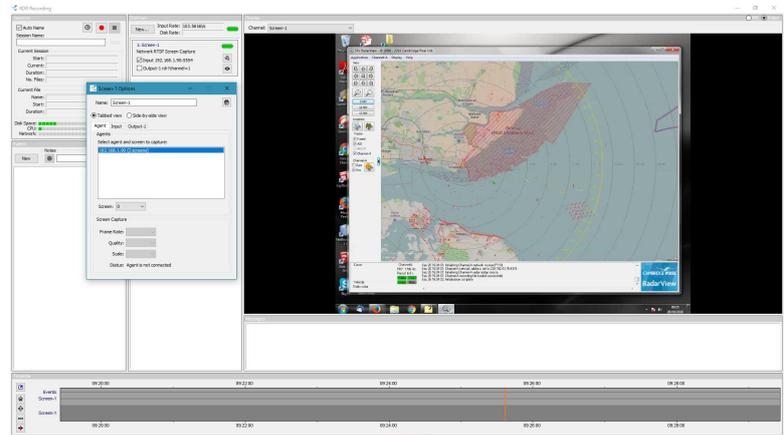
During the recording process, RDR records the full radar video at maximum resolution, in addition to small scan-converted images to assist with navigation during replay.



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.

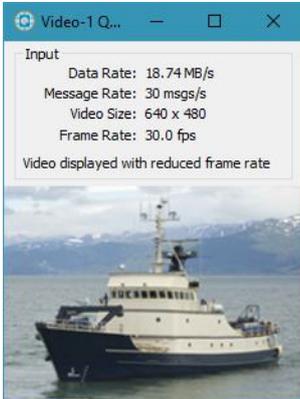
A lightweight RDR Screen Capture Agent is run on each display client to capture the screen, compress it and send the data to the RDR recorder. Typical capture rates of the screens are 1 to 5 Hz.



Video Recording

RDR can receive and record TV video from ONVIF or DirectShow devices and RTSP network streams.

It is designed to be compatible with a wide variety of cameras and video capture devices, using a wide range of video standards.



Cameras employing the ONVIF and 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.



Audio Recording



Audio recording can be used for various purposes, such as recording of voice memos and commentary during trails recording and recording of radio communications.

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

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

SQL Queries

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

- AIS
- ADS-B
- Navigation Data
- Tracks

A screenshot of the RDR software interface. The top part shows a "Replay SQL Query #1" window with a table of results. The table has columns for seqNum, channel, timestamp, sentenceType, latDegs, longDegs, and speedMps. Below the table, it says "7456 results". The bottom part of the screenshot shows a timeline view with various data tracks. The tracks include Events, VesselNavData, VesselRadarVideo, VesselRadarTracks, SurveillanceRadarVideo, SurveillanceRadarTracks, AIS, ADSB, and PPI. The timeline is marked with time from 15:32:40 to 15:33:30.

Feature Summary

Platform:

- Windows 10/11.

Channels:

- The maximum number of channels is limited only by the host PC's performance and by the number of available slots to host HPx series PCIe cards.

Inputs:

- **Radar Video:** SPx format, ASTERIX CAT-240, Simrad, HPx series radar input hardware and other proprietary formats.
- **TV Video (H.264):** DirectShow Capture or network (ONVIF or RTSP) input.
- **Track reports:** SPx format, ASTERIX CAT-48, ASTERIX CAT-10.
- **AIS:** NMEA-0183 from serial or network.
- **Navigation data:** NMEA-0183 from serial or network.
- **ADS-B:** ASTERIX CAT-21 or 112-bit extended squitter from serial or network.
- **Audio:** Input from DirectShow device or network (RTP).
- **Computer screen capture:** Input from network, using RDR Screen Capture Agents.
- **Raw data:** Record any network data without interpretation.

Outputs:

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

Local Display:

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

Control:

- **Local GUI:** User interface for local control and configuration.
- **HTTP 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.
- **Computer screen capture:** Using RDR Screen Capture Agents across the network.
- **Control by RadarWatch:** RDR can be controlled remotely by Cambridge Pixel's RadarWatch product for recording and replaying of sessions.

Typical Applications

Applications of RDR include:

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



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