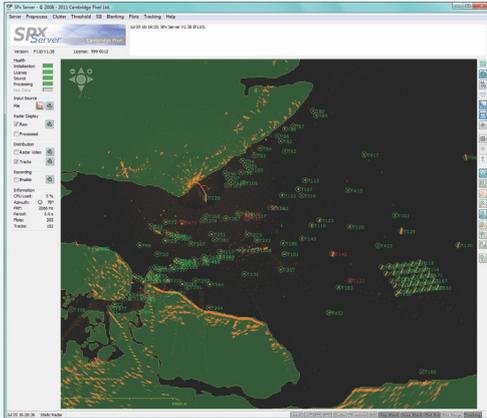# SPx-Server

Features:

- Multi-function radar processor
- Radar from HPx cards or network
- Radar processing
  - Filtering
  - CFAR Thresholding
  - Area-based video filtering
  - Clutter map generation
- Plot Extraction and merging
- AIS track display and recording
- Multi-hypothesis target tracking
- Fully configurable tracking
- Area-dependent tracking parameters
- Full auto track initiation
- Built-in world coastline database
- Static or moving platform
- NMEA navigation input for ship systems
- Radar network distribution
- Radar record and replay to local disk
- Comprehensive configuration GUI
- Windows or Linux versions
- Network configuration
- Video, plot and track output to network
- Fully configurable for:
  - Vessel traffic systems (VTS)
  - Surface movement radars
  - Air defence
  - Security (personnel, vehicles etc)
  - Military naval

SPx Server is a multi-function radar processor that, with different license options, can provide the capabilities of a radar distribution server, plot extractor and target tracker.

Receiving radar video from a sensor either through the HPx family of radar input cards or direct from a network, SPx Server provides a set of configurable processing modules that permit the incoming video to be processed prior to distribution and analysis.

Video Distribution with SPx Server

When used as a distribution server, SPx Server compresses the video and delivers the data to client consoles across standard Ethernet networks. Distribution is based on UDP multicast, ensuring that the network bandwidth is a function only of the radar signal and is independent of the number of client consoles. Each client display receives the same polar-format radar video and can create its own independently-controlled scan converted radar image (for example using the SPx scan converter software).

Target Extraction and Tracking

The Plot Extraction module examines the processed video to identify target-like radar returns. A set of configurable parameters define the target size of interest, allowing small noise returns or larger clutter or land masses to be eliminated early in the processing. An adaptive CFAR threshold is used to separate likely target returns from background noise.

Plots may be eliminated from further consideration by using an area mask. This can be defined as a configuration-dependent high-resolution map. Alternatively, the area mask can be constructed automatically from a built-in world-vector shoreline database. In moving platform and coastal surveillance applications, this built-in database allows SPx Server to automatically eliminate plots over land, which would otherwise be a potential source of nuisance alarms.

For plots that pass the acceptance test, the tracker supports manual or fully automatic track initiation with a configurable integration period. The area of initiation may be defined in a configuration file, and the criteria for initiation may be adjusted in different geographical areas. Track association is handled with multiple hypotheses, which means that decisions to associate tracks with measurements can be deferred until additional information becomes available. If the tracker isn't sure whether a track should be associated with plot p1 or plot p2, for example, it can create two hypotheses. This allows both possibilities to be propagated to the next stage of processing, an approach which provides enhanced robustness in the face of high clutter.

Track and Plot Reporting

SPx Server outputs plot and track data onto a standard Ethernet network for delivery to remote clients for data fusion or display. The time-stamped reports are delivered with low latency, and may include both the filtered and measured components of the track's state vector. The destination address and port for these reports may be configured.

Client-side software libraries are provided to receive the network reports and make them available as data structures for client processing or display.

Configuration and Control

A Graphical User Interface is provided for server configuration and maintenance. This provides a full set of tools to visualise the video, plots and tracks. Once configured, the server may be started as a background process and controlled through a network interface. ■
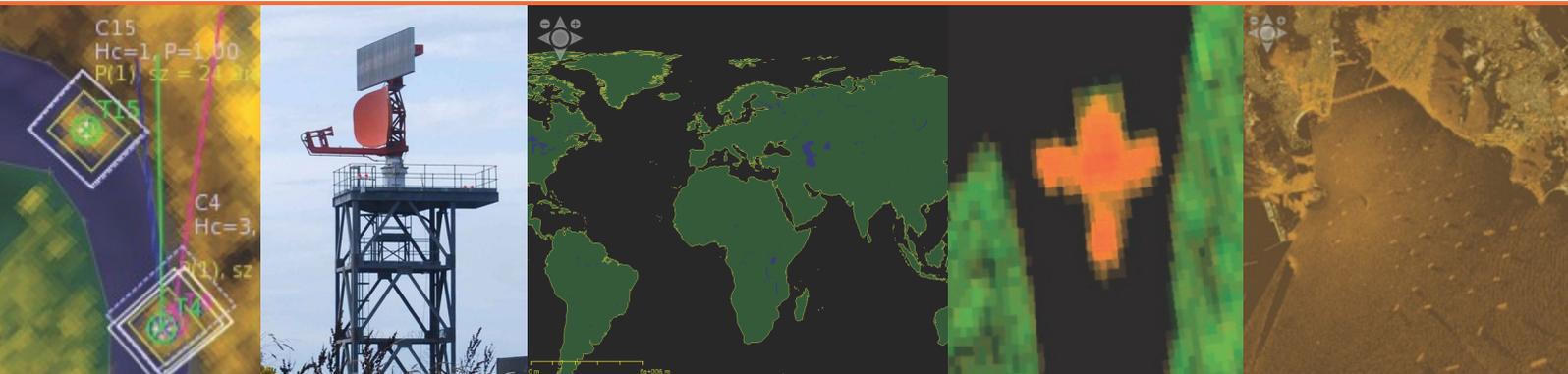
Architecture

Architecture:	Ready-to-run server application
Control:	Local GUI for configuration Network interface for runtime monitor/control
Platform:	x86 with Windows 10 or Linux
Hardware:	Intel i5 or higher 4GB System memory Graphics card (PCIe or XMC card preferred)

Inputs and Outputs

Inputs:	HPx family radar interface Network-based radar video Test/scenario tools for simulation and testing Radar replay from file
Outputs:	Compressed video Plot reports Track reports Status messages (Licence options affect outputs supported)

Radar Video Distribution

Compression:	ZLIB or ORC (both lossless)
Network:	UDP distribution
Control:	Remote monitoring and control of distribution process

Plot Extraction and Tracking

Video Processing:	Peak-picking, smoothing, sub-sampling, CFAR thresholding, gain control. Scan-to-scan integration, FTC, STC, Offset/gain adjustment. Also supports user-defined modules

Number of tracks:	Up to 4,000 (500 typical, but not limited by software)
Target Speed:	Up to 600 Kts (for higher speeds consult factory)
Target Types:	Personnel, vehicles, surface movement aircraft airborne aircraft, surface targets.
Tracking range:	Programmable from 5 metres to 500 km
Tracking area:	Programmable polygon area for tracking World vector shoreline for auto land masking
Target extraction:	Programmable extraction criteria Plot merging
Max radar rotation:	240 rpm
Track Filter:	Adaptive alpha-beta, multi-hypothesis
Track output:	New (on initial detection), provisional or mature, Programmable maturity level for output
Track output latency:	Typically 10% scan time.

Maintenance Display

Video Presentation:	Scan converted video + processed video PPI + A-Scan display for configuration Fully configurable view for radar analysis
Plots and Tracks:	Display of plot positions and parameters Display of tracks, hypotheses, clusters, gates. Click on track for information AIS track receipt and display
Control:	Dynamic control of all processing parameters Record/replay of video Status information for system Configuration of network addresses Save configuration to file

For more information, please contact:

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