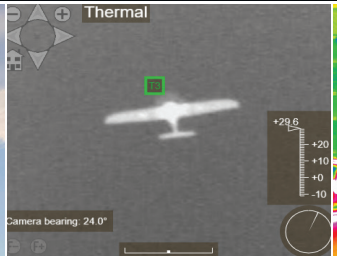
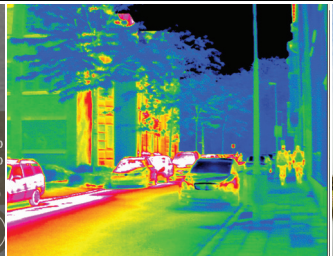
VSD-C2 & VSD-Camera

Customisable Operator Display Software for
Security, C2 & C-UAS Applications











CAMBRIDGE PIXEL

Customisable Operator Display Software for Security, C2 & C-UAS Applications

VSD is Cambridge Pixel's highly cost-effective, customisable operator display software. It can be purposed for both military/defence command & control (C2) and security-based critical infrastructure protection applications. VSD has built-in support for a wide range of cameras, video tracking systems, AI classifier modules, ground-based radars and other C2 sensors and effectors.

VSD runs on standard Windows-based PC workstations, laptops or servers and can be deployed in both hierarchical C2 or edge network structures for both ground fixed and ground mobile applications. Deployed systems are easy-to-learn and have a low overall training burden. The inherent flexibility of VSD allows additional capabilities to be quickly integrated into a new bespoke solution.

VSD can be tailored to visualise both 2D and 3D sensor feeds and supports live camera video windows, 2D map windows with radar track overlays and both panoramic and 3D display windows. The position and size of all controls and windows can be customised and support is included for real-time overlaid symbology and background maps or charts. Support for multi-screen operator displays is also included.

In addition to locally networked sensor/effector control stations, wide area C2 is supported through the concept of tiered regional and/or central command centres. When deployed at these higher levels of hierarchy, VSD supports automatic discovery of subordinate control stations on the C2 network. Where required, VSD can also support both local and remote control of the sensors and effectors.



VSD-C2 Advanced with Panorama, 3D Map, Track Table, 2D Map, Thermal & Visible Videos

VSD Versions

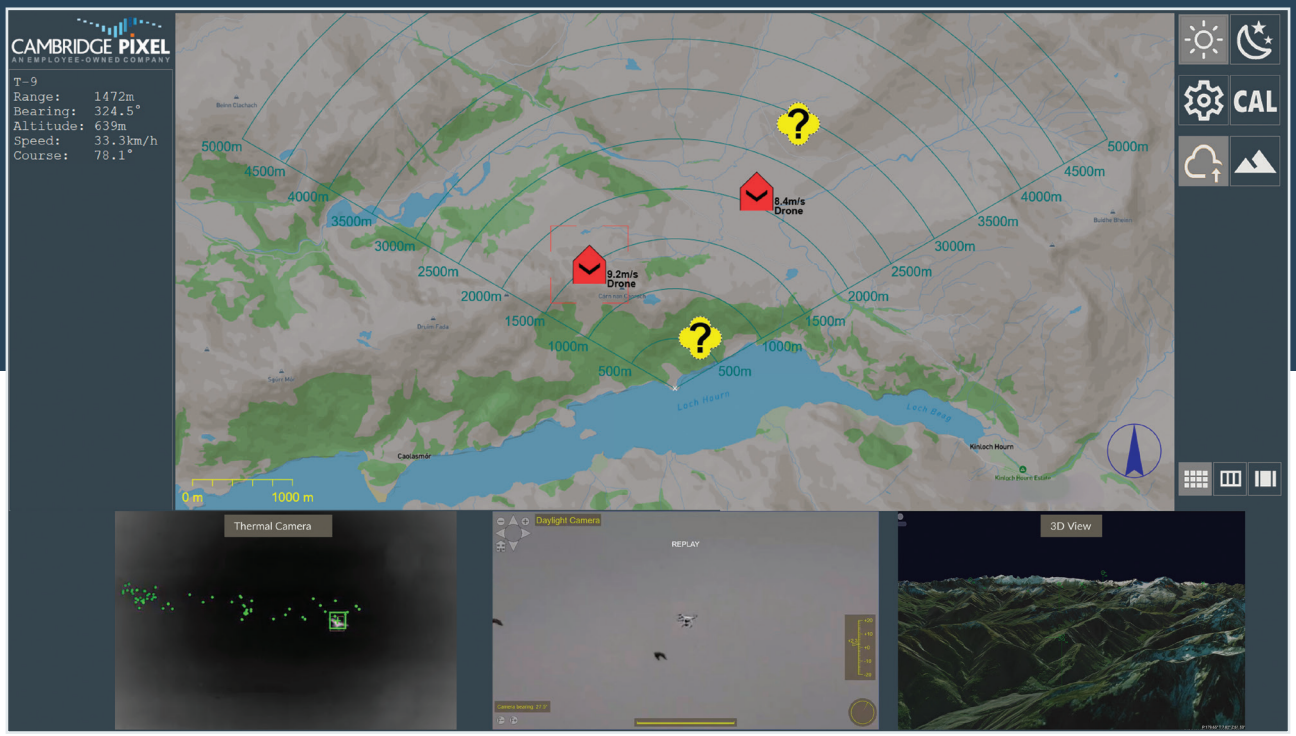
As standard, the VSD application software is available in four off-the-shelf, ready-to-run versions, which are progressively more feature-rich:

- VSD-Camera Standard
- VSD-Camera Advanced
- VSD-C2 Standard
- VSD-C2 Advanced

For specialised operator display requirements, Cambridge Pixel offers a customisation and rapid prototyping service for VSD, covering such activities as:

- Customisation of screen layout, controls and workflow
- Integration of new cameras, video tracking systems, AI-based classifier modules, C2 sensors and C2 effectors
- Rebranding of the user interface colours, icons and logos



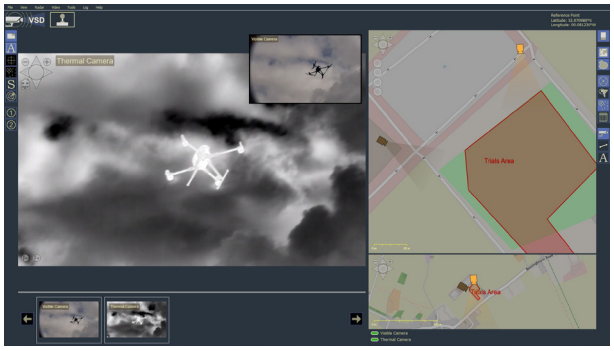


Example of a Customised VSD Display

VSD-Camera Standard

VSD-Camera Standard is the entry-level version of VSD and features multi-camera PTZ control, live camera video windows and a 2D tiled map window.

The map window can be used to command slew-to-cue of the camera(s) and includes real-time overlay graphics for the current camera field-of-view (FoV) and azimuth orientation.



VSD-Camera Standard

Additional features include:

- Camera tour support
- Configuration setup wizard
- Customisable video preset buttons

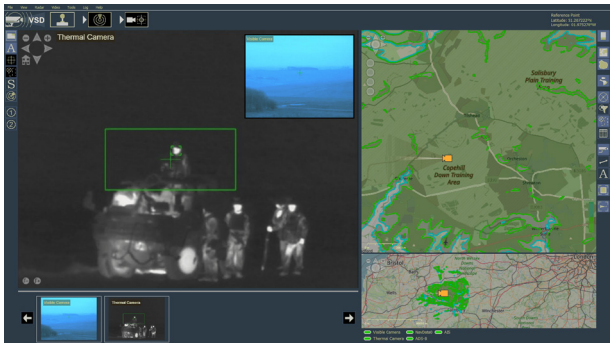
All versions of VSD support multiple screens and offer flexibility in the range of user input methods that are supported, including:

- Joystick
- Gaming controller
- Keyboard
- Mouse
- Touchscreen
- Trackball

VSD-Camera Advanced

VSD-Camera Advanced adds support for both third-party video tracking systems and the latest AI-based classifier modules.

VSD-Camera Advanced also supports receipt and display of AIS and ADS-B streams and can make use of GNSS/INS navigation data sources for automatic orientation and positioning of the platform on to the map window.



Coverage Tool in VSD-Camera Advanced

A useful line-of-sight coverage tool is also included to help identify optimum sensor locations that have minimal blind spots. SRTM (Shuttle Radar Topography Mission) terrain data is used to calculate an area's visibility to the sensor location being assessed. Once calculated, coverage areas are highlighted as a coloured overlay in the 2D map window.

Optional support for record/replay functionality is available through the purchase of a licence for Cambridge Pixel's RDR Data Recorder software. RDR Data Recorder provides multi-channel data recording of radar video, tracks, AIS, ADS-B, GNSS/INS navigation data, camera video, screen video and audio.

VSD-C2 Standard

VSD-C2 Standard adds support for interfacing a single type of C2 sensor (or C2 effector). Compatible C2 sensor types include 2D and 3D ground-based radars, acoustic direction finders, laser range finders and radio direction finders. Supported C2 effector types include acoustic hailing devices (e.g. LRAD), laser dazzlers and RF inhibitors/jammers.

VSD-C2 Standard provides alarm processing across regions/zones and gates, as well as the capability to display both scan-converted primary radar video and secondary track data. Support for MIL-STD-2525D common warfighting symbology is also included. Track data can be displayed in a sortable, multi-column radar track table. Tracks can also be output in ASTERIX, SPx or TAK CoT formats (either selected, designated or all tracks).

Where required, VSD-C2 Standard includes licences for both SPx Fusion Server (for primary and secondary track correlation) and SPx Track Manager (for radar format conversion). Support for 2D and 3D radar tracking can be purchased in the form of licences for SPx Server (2D tracking) or SPx Tracker-3D. Optional support for record and replay functionality is available through the purchase of RDR Data Recorder software.

VSD-C2 Advanced

VSD-C2 Advanced adds support for interfacing up to four different types of C2 sensors or effectors. By supporting multiple sensors and effectors, more advanced, multi-step workflows can be implemented. Also, for enhanced situational awareness, VSD-C2 Advanced adds support for 3D map windows, a web viewer, multi-level user access control and a novel panorama feature.

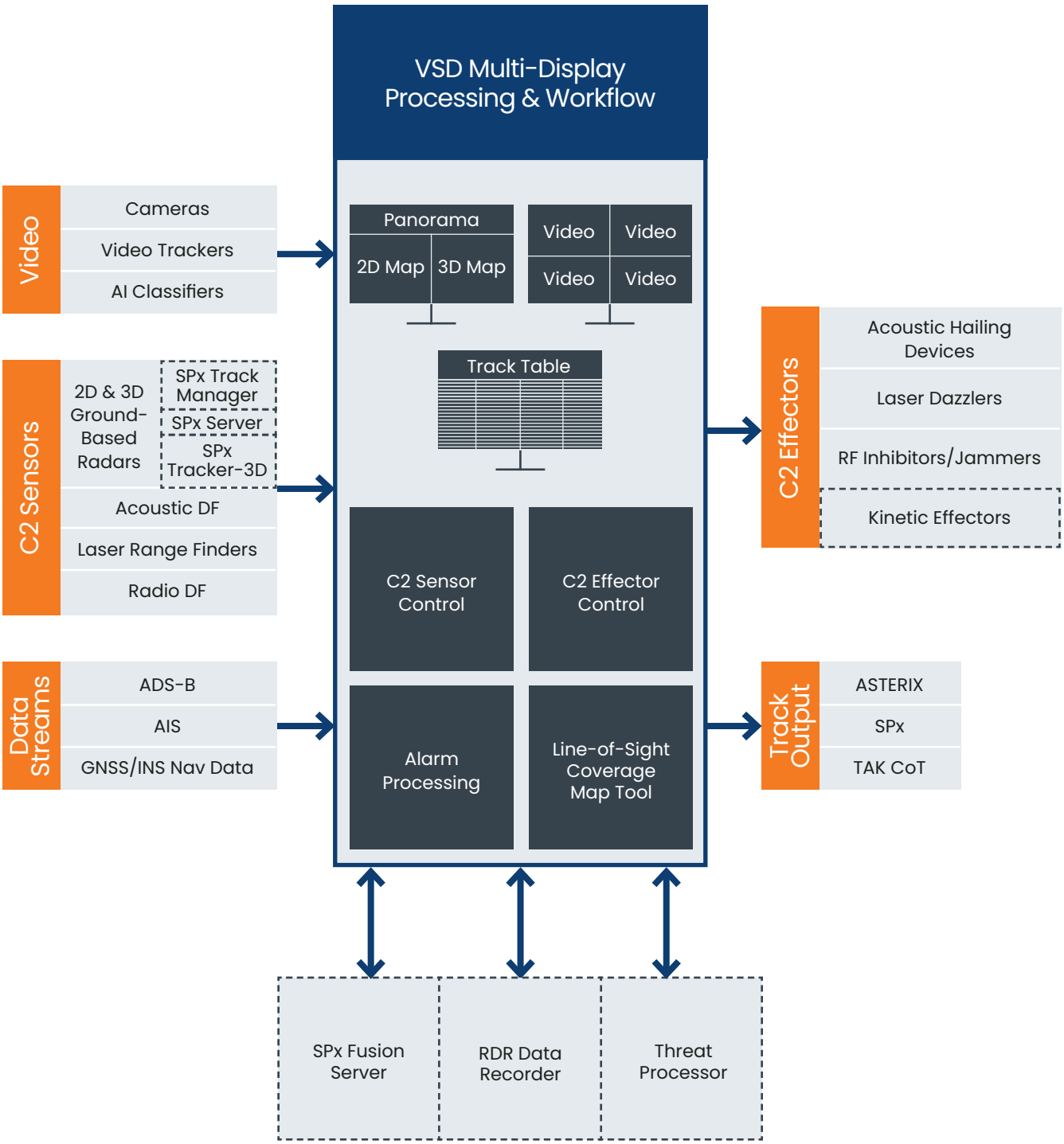
The panorama window is a picture which is captured at system set-up (or on-demand) by automatically panning and sequentially snapshotting camera sensor video to build up an ultra-wide static picture (covering up to 360° in azimuth). Operators can use the panorama window to quickly cue cameras (and/or effectors) to reference locations or features in the captured image, as well as to overlaid target tracks.

VSD-C2 Advanced has built-in support for networked wide-area C2, with automatic discovery of nodes. As cost options, VSD-C2 Advanced can also be configured to support kinetic effectors (subject to a safety case assessment) and can include an automatic threat processing feature. On The Move (OTM) operation will be supported in a planned future release.



Multiscreen VSD-C2 Advanced

VSD Processing Modules



Key: ⬚ = Optional software modules (some as cost options)

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.



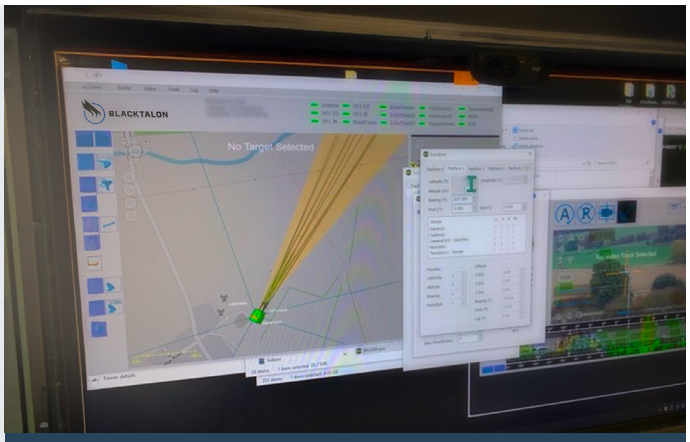
VSD Case Study

BlackTalon C-UAS Ecosystem from Enterprise Control Systems (ECS)

VSD-C2 is central to the BlackTalon Ecosystem, which is a scalable, fielded C-UAS solution that detects, tracks and defeats UAS. It combines a carefully selected mix of active radars, EO/IR sensors, passive RF direction-finding systems, RF jammers and mast configurations.

Its open architecture allows individual system elements to be customised or replaced to meet specific operational requirements.

Deep sensor integration ensures that all sensors are used to their full potential, whether they supply bearing/elevation measurements or complete 3D positions. User-definable alarms can utilise relevant sensor metadata, enabling efficient and effective mitigation of complex UAS threats, either automatically or through operator intervention.



> “VSD-C2 Advanced was an ideal choice for the BlackTalon Ecosystem. It supports existing systems and provides a solution that can be scaled to the increasing complexity of aerial threats.”

Graeme Forsyth, Product Manager Enterprise Control Systems

ICDs, Standards & Protocols

VSD can support the following ICDs, standards and protocols:

- ADS-B (Automatic Dependent Surveillance–Broadcast)
- AIS (Automatic Identification System)
- ASTERIX (All-Purpose Structured Eurocontrol Surveillance Information Exchange)
- MIL-STD-2525D Common Warfighting Symbology
- NMEA-0183 GNSS/INS Navigation Data
- SAPIENT (BSI Flex 335 V2.0, NATO STANREC/AEDP-4869)
- SEIWG ICD-0101 XML Interface Specification
- TAK (Team Awareness Kit) CoT (Cursor-on-Target)

Note: Please contact Cambridge Pixel for details of the supported categories, types and levels.

Cameras, Video Tracking Systems & AI-based Classifier Modules

EO/IR Cameras:

- Distribution protocols: ONVIF, MPEG-TS, RTP & RTSP
- Encoding formats: AVC/H.264 & HEVC/H.265
- Hensoldt: NightOwl M
- ONVIF protocol PTZ cameras: Profile S devices
- OpenWorks Engineering: Vision Flex & Vision Guard
- Pelco-compatible PTZ cameras: Pelco-D devices
- SAPIENT protocol cameras: BSI Flex 335 V2.0
- Teledyne FLIR: Ranger HRC, HDC series & PT-Series



Video Tracking Systems & AI-based Classifier Modules:

- Chess Dynamics Vision4ce: CHARM & DART
- OpenWorks Engineering: SkyAI
- SAPIENT protocol video tracking systems & AI-base classifier modules: BSI Flex 335 V2.0
- Vizgard: FortifAI
- Walaris: AirScout



Supported C2 Sensors

2D & 3D Ground-based Radars:

- APS: FIELDctrl radar family
- ASTERIX protocol radars: Category 048 & 062 (e.g. Saab Giraffe 1X)
- Blighter: A800 Mk 2, A400/C400/B400 series, B303 & B202 Mk 2
- Echodyne: EchoShield & EchoGuard
- Hensoldt: Spexer 600, Spexer 360 Enhanced & Spexer 360
- Leonardo DRS RADA Technologies: ieMHR (RPS-80, RPS-81, RPS-82 & RPS-84)
- Robin Radar Systems: IRIS & ELVIRA
- SAPIENT protocol radars: BSI Flex 335 V2.0
- Teledyne FLIR: Ranger R20SS series, R8SS series, R6SS, R5D, R5, R3D, R3, R2 & R1
- Weibel Scientific: XENTA-M & XENTA-C

Acoustic Direction Finders (ADF):

- SAPIENT protocol ADF: BSI Flex 335 V2.0
- Squarehead Technology: Discovair G2 (native API or SAPIENT)



Laser Range Finders (LRF):

- Safran Vectronix: LRF series
- SAPIENT protocol LRF: BSI Flex 335 V2.0

Radio Direction Finders (RDF) & ESM Systems:

- CRFS: RFeye Array
- MyDefence: Watchdog sensors via Argos
- SAPIENT protocol RDF & ESM: BSI Flex 335 V2.0
- SPX TCI: Blackbird series

Supported C2 Effectors

Acoustic Hailing Devices:

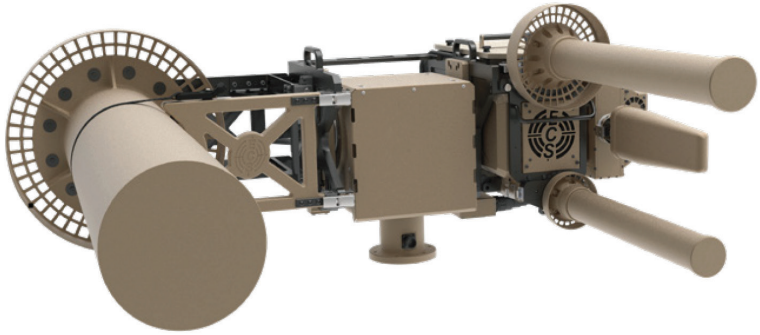
- Genasys: LRAD 950NXT
- SAPIENT protocol acoustic hailing devices: BSI Flex 335 V2.0

Laser Dazzlers:

- SAPIENT protocol laser dazzlers: BSI Flex 335 V2.0
- Wavelength Solutions / Passive Force: Medusa series

RF Inhibitors/Jammers:

- MyDefence: Dobermann jammers via Argos
- SAPIENT protocol RF inhibitors/jammers: BSI Flex 335 V2.0
- SPX ECS: Claw RF Inhibitor



Product Ordering Guide & Summary Feature Matrix

VSD-Camera Versions

Part No.	Product Description
283-601	VSD Application Software – VSD-Camera Standard runtime licence
283-602	VSD Application Software – VSD-Camera Advanced runtime licence

VSD-C2 Versions

Part No.	Product Description
283-603	VSD Application Software – VSD-C2 Standard runtime licence
283-604	VSD Application Software – VSD-C2 Advanced runtime licence

Additional C2 Sensor Channels

Part No.	Product Description
110-781	SPx Fusion Server runtime licence (Up to 4 sensors) *
110-782	SPx Fusion Server runtime licence (Up to 6 sensors) *
470-502	SPx Track Manager (2 Ch) runtime licence**
470-503	SPx Track Manager (3 Ch) runtime licence**
470-504	SPx Track Manager (4 Ch) runtime licence**

Optional Software Modules

Part No.	Product Description
110-703	SPx Tracking Server runtime licence
266-500	RDR Data Recorder (2 channel) runtime licence***
444-500	SPx Threat Processor runtime licence
502-500	SPx Tracker-3D Server Software runtime licence

User Interface Customisation

Part No.	Product Description
283-650	NRE to create customised version of VSD

* A dual channel SPx Fusion Manager is included with VSD-C2. Additional channels are charged on a pro rata basis.
** A single channel SPx Track Manager is included with VSD-C2. Additional channels are charged on a pro rata basis
*** Included as standard with VSD-C2 Advanced.

Software Feature	Camera Standard	Camera Advanced	C2 Standard	C2 Advanced
2D tiled map window with camera FoV & bearing overlay	✓	✓	✓	✓
Camera tour support	✓	✓	✓	✓
Configuration setup wizard	✓	✓	✓	✓
Customisable video preset buttons	✓	✓	✓	✓
Multi-camera PTZ control & live video windows	✓	✓	✓	✓
Multiple display support	✓	✓	✓	✓
Slew-to-cue support	✓	✓	✓	✓
Touchscreen, joystick, gaming controller, mouse & keyboard	✓	✓	✓	✓
AIS / ADS-B data receipt & display		✓	✓	✓
GNSS/INS navigation data support[1]		✓	✓	✓
Line-of-sight coverage map tool		✓	✓	✓
Video tracking systems & AI-based classifier modules support		✓	✓	✓
Record and replay (via RDR Data Recorder)		O	O	✓
C2 sensor/effector support - **single type** from either list			✓	✓
Supported C2 sensor type list:				
- 2D & 3D ground-based radars			✓	✓
- Acoustic direction finders			✓	✓
- Laser range finders			✓	✓
- Radio direction finders			✓	✓
Supported C2 effector type list:				
- Acoustic hailing devices (e.g. LRAD)			✓	✓
- Laser dazzlers			✓	✓
- RF inhibitors/jammers			✓	✓
Alarm processing (regions/zones & gates)			✓	✓
Live primary radar video & secondary tracks on 2D map			✓	✓
Multi-column radar track table window			✓	✓
Primary & secondary track correlation (via SPx Fusion Server)			✓	✓
Radar format conversion (via SPx Track Manager)			✓	✓
Track output in ASTERIX, SPx & TAK CoT (selected/designated/all)			✓	✓
Radar tracking (2D via SPx Server or 3D via SPx Tracker-3D)			O	O
C2 sensor/effector support - **up to four types** from either list				✓
3D visualisation window with map				✓
Multi-level user access control[2]				✓
Networked wide-area C2 with auto discovery				✓
Panorama window (static picture)				✓
Web viewer (via standard web browser)				✓
Kinetic effector support[3]				O
On The Move (OTM) operation[2]				O
Threat processing				O

Key: ✓ Software feature included as standard O Software feature available as a cost option

[1] GNSS/INS navigation data is currently only used for automatic orientation and positioning of a stationary vehicle platform
[2] Supported in planned future release [3] Subject to a safety case assessment - please contact Cambridge Pixel for details

Supporting Developers & Integrators in Security, Maritime & Defence

We are 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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