



Delivering Complex Interoperability





L-3 ASA

L-3 ASA is a pioneering systems solutions company with core capabilities in the development and through life management of Complex Information Systems, Data Fusion Solutions and Mission Configurable Communication Systems.

Integrated Air and Missile Defence

The threats facing commanders in the defence and security domains remain challenging and uncertain, while the capabilities and forces at their disposal have never been more complex.

At L-3 ASA we understand this complexity and recognise the absolute need for capability integration, interoperability and system agility at every C2 level.

Space Situational Awareness

Understanding our risks and vulnerabilities in this domain requires an awareness of operational activity in Space and the ability to detect and respond to threats and unforeseen events.

At L-3 ASA we have a strong reputation for developing products to enhance Space Situational Awareness, through the optimisation of sensors and through the fusing of multi-source data, to provide greater discrimination and characterisation of Space activity.

Communications

With the richness and variety of modern communications methods, being able to connect securely and reliably is essential.

L-3 ASA's enabling technologies have been satisfying the needs for Government, Military and Commercial customers for over 15 years, supplying robust high availability systems for deployment in challenging environments.

Intelligence Systems

For over a decade UK law enforcement has utilised a range of L-3 ASA's intelligence, workflow and case management solutions.

Providing multi-level security access these solutions allow for the analysis and dissemination of highly sensitive information in a secure and reliable way and users can structure, manipulate and tag data to meet their own requirements.

Transportation

L-3 ASA Information Systems Business Stream covers a number of technologies and applications. These include our Passenger Information and Entertainment Systems, Content Management, Intelligent Maintenance and Operation Management systems. Be it by Air or Rail, Passengers now expect to be connected from when they leave home to when they arrive at their destination. L-3 ASA's proven technologies provide key solutions to keep customers informed, entertained and in touch.

UK OFFICE

L-3 Communications ASA Ltd
Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS
+44 (0)1252 775700
+44 (0)1252 775701

US OFFICE

division of L-3 STRATIS, 11955 Freedom Drive, Reston VA 20190

www.L-3asa.com info.asa@L-3com.com



AN/PRD-13(V)2

Man Portable Signal Intelligence System

Linkabit's AN/PRD-13(V)2 Man Portable Signals Intelligence (SIGINT)

System incorporates sophisticated RF intercept and Direction

Finding (DF) processing capabilities into a low power, light-weight, ruggedized, and reliable system that satisfies the most demanding applications and mission requirements.

The AN/PRD-13(V)2 has been developed to support tactical SIGINT missions by providing:

- Signal Environment Characterization
- Signal Exploitation
- Signal Location
- Threat Warning

The AN/PRD-13(V)2 contains a powerful signal search capability that allows quick and accurate characterization of the signal environment. The system can support directed search, general search, or a combination of searches, providing the user greater flexibility.

For directed searches, the system allows the user to program a channel list of up to 400 normal plus 20 priority channels.

The system's general search capability allows for the monitoring of up to 9 bands. Three band search strategies are supported: automatic, semi-automatic, and new energy. In addition, a frequency pass list of up to 400 signals can be maintained.

When signals are detected, the system can maintain an active signals list measuring center frequency, bandwidth, time-first-seen, percent time active, DF bearing, and signal strength. An optional recorder is available to record and playback intercepted audio and signal parameters.



Linkabit

AN/PRD-13(V)2 Man Portable Signal Intelligence System

The system has been optimized for the man portable tactical mission. The entire system can be transported and operated by a single person, set-up in less than 5 minutes, and weighs just 19.5 kg (43 lbs) including the MB-5700 NiCd Battery and all field accessories. The system, cables, and components fit in a single pack and can be parachute jumped in support of airborne operations.

Key system components include the:

- MD-405A Receiver/Processor
- MA-445C HF/VHF/UHF DF Antenna (2-2000 MHz)
- MA-715A HF/VHF/UHF Monitor Antenna (2-2000 MHz)
- MA-308 Handheld DF Antenna (2-500 MHz)

The heart of the AN/PRD-13(V)2 is the MD-405A Receiver/Processor. This unit includes all system interfaces, three receivers, and dual microcontrollers, plus associated

display and man-machine interface (MMI) functions. The task-managed MMI provides easy, convenient operator access to all receiver resources and system features. The processor uses a patented single channel interferometer DF technique providing accurate DF and excellent sensitivity in a system that is low power and lightweight. It provides superior performance with most modulation signal types including SSB and OOK-Morse. The DF histogram display is particularly effective during weak signal conditions, simplex nets, or adverse propagation conditions that typify lower frequency bands.

The lightweight, low profile MA-445C HF/VHF/UHF antenna provides accurate DF coverage from 2 to 2000 MHz. The MA-715A

broadband dual whip antennas provide monitoring capability from 2 to 2000 MHz. The MA-308 is a handheld DF antenna used to support localization of nearby transmitters during on the move missions, such as locating a downed pilot's beacon. Other antennas may be used with the system to optimize it for ground vehicle, maritime, or fixed site applications.

The use of a low power design and effective power management allows the system to be operated using the internally mounted MB-5700 NiCd or other approved battery. An optional solar panel can be provided to power the system for extended operations or to recharge the MB-5700 NiCd battery. Additionally other power sources can be utilized with use of the provided accessory kit including local power at 110 or 220 VAC at 50 or 60 Hz, and direct DC power from 10 - 28 VDC.



THE MD-405A RECEIVER/PROCESSOR IS THE HEART OF THE AN/PRD-13(V)2 SYSTEM.

“Linkabit is the world leader in small, lightweight, low power signal intercept, direction finding, and signal processing systems for tactical Signals Intelligence (SIGINT) applications.”

Features

Frequency Coverage	2 - 2000 MHz DF and Intercept (MA-445C) 2 - 2000 MHz Monitor (MA-715A) 2 - 500 MHz DF (MA-308)
Demodulators	DF/Intercept Receiver Monitor Receivers
DF Accuracy	FM (200 kHz, 50 kHz, 15 kHz), AM (15 kHz, 6 kHz), SSB (6 kHz, 3 kHz), CW (3 kHz, 0.5 kHz) FM (15 kHz), AM (15 kHz, 6 kHz), SSB (6 kHz, 3 kHz), CW (3 kHz, 0.5 kHz)
DF Coverage	360° Azimuth, 0° to +60° Elevation
Graphical Displays	PAN (50kHz, 200kHz, 900kHz, 5MHz spans) DF (Histogram and Vector)
Number of Receivers	1 DF/Intercept and 2 Monitor Receivers; manual independent receiver control by user
Remote Interface	RS-232C
Receiver Operating Modes	Directed Search (Channel Scan): 400 Normal channels, 20 priority channels General Search (Band Sweep): Automatic, semi-automatic, new energy modes Bands: Selectable, 9 bands Signal List: Log up to 400: Center frequency, BW, time statistics Pass List: Avoid up to 400 channels Built-In-Test: End-to-end system test, includes: Start-up, Operator Initiated, and background
Physical Characteristics	System Weight: 19.5kg (43 lbs) including MB-5700 NiCd Battery and all field accessories Power: 9.5 watts max Power Input: 10 to 28 VDC Temperature: -20°C to +50°C Operating -40°C to +70°C Storage Humidity: 0 to 100% Condensing Altitude: 15,240 meters (50,000 feet) Submersion: 1 meter (3 feet) for 1 minute (MD-405A) Rain, Salt Fog, Vibration: Tested to MIL-STD-810E modified

AN/PRD-13(V)2 Man Portable Signal Intelligence System

21st Century Leadership in Small, Lightweight, Low Power SIGINT

Systems — Linkabit is the world leader in small, lightweight, low power signals intercept, direction finding, and signal processing systems for tactical signals intelligence (SIGINT) applications. U.S. and international military forces and law enforcement agencies use our systems to provide critical SIGINT capability for a multitude of missions. These include systems for man portable and small platforms, such as ground vehicles and patrol boats.

Located in San Diego, we are committed to providing the best high technology-based SIGINT products and services to our customers. This commitment ensures that our systems provide maximum self-protection and situational awareness to users on the electronic battlefield, regardless of the climatic condition or location.

Today's information-intensive operations are a forerunner to tomorrow's exciting challenges. We are uniquely positioned to help Government and commercial customers succeed by delivering optimum solutions at the best value. Since the early 1980's, we have continuously delivered leading edge solutions to our customers, while steadily expanding our capabilities, products, and performance reputation.



Note: All specifications subject to change without notice

Cleared by DoD/OFOISR for public release under
OFOISR Case Number 06-S-1185 on May 2, 2006.



Linkabit

LINKABIT DIVISION
3033 SCIENCE PARK ROAD, SAN DIEGO, CA 92121
(858) 552-9555 FAX (858) 552-9668 www.L-3com.com
Product Service Help Desk: 1-800-331-9401
e-mail: LinkabitProducts@L-3com.com



SIGpac Man Portable Signals Intelligence (SIGINT) System

Linkabit's SIGpac is the next-generation tactical Signals Intelligence (SIGINT) System for global, full-spectrum operations. Its low-power, lightweight, ruggedized and modular design incorporates sophisticated state-of-the-art RF, signal processing and Direction Finding (DF) techniques. Using a software-driven design approach, SIGpac gives today's intelligence professional a versatile and modular capability that is easily scaled to support a wide variety of missions to include man-packable, mobile, riverine, and unmanned applications.

The SIGpac simultaneously conducts DF, monitor, search and scan operations. There are three search modes for both General and Directed Search:

Automatic Search – Performs the search on a continuous basis without user notification and signal collection, unless a signal is observed on the High Value List.

Semi-Automatic Search – Performs the search and immediately stops and waits for user interaction at each signal detect that is not on the Pass List.

New Signal Occurrence Search – Performs the search and immediately stops and waits for user interaction only when a new signal detect is observed that does not reside on the Pass List, Signal List and Channel List.

The general search capability allows the flexibility to monitor up to 10 (TBR) frequency bands by indicating frequency start and stop, F1 to F2, for each specified band. These frequency bands can be contiguous, non-contiguous or overlapping.

When critical signals are detected, SIGpac maintains an active signals list measuring center frequency, bandwidth, time first seen, percent time active, DF bearing, modulation type, and signal strength.

SIGpac is optimized for the remote tactical mission. The SIGINT Capability can be transported and operated by a single person and set-up in less than 5 minutes. The total weight is less than 27 pounds, which includes cabling, DF antenna, and internally-mounted battery. All accessories fit in a standard military issued ALICE/Rucksack for ease of transport and airborne early entry operations.

Key system components include the:

- SIGpac Receiver/Processor (100 KHz – 3000 MHz)
- MA-445C HF/VHF/UHF DF Antenna (2-2000 MHz)
- RF/Control Cable

The heart of SIGpac is the Receiver/Processor. The processor uses a patent-pending interferometer DF technique typically providing 3 degrees RMS of DF accuracy, as well as excellent sensitivity to distinguish a variety of signals. SIGpac provides superior performance with most modulation types including CW, USB, LSB, AM, ISB and FM.

The lightweight, low profile, combat-proven MA-445C HF/VHF/UHF antenna provides accurate DF coverage from 2 to 2000 MHz. Built in flexibility allows for the use of antennas optimized for specific RF environments, as well as quick integration to ground mobile, maritime, or fixed-site missions.

The use of a low-power design and effective power management allows the system to be operated using the internally-mounted standard military batteries. Multiple power sources can be utilized with use of an external adapter including vehicle, shore and generator power at 110 or 220VAC at 50 or 60 Hz.

SIGPAC IS OPTIMIZED FOR THE TACTICAL SIGINT MISSION BY PROVIDING:

- SIGNAL ENVIRONMENT CHARACTERIZATION
- SIGNAL EXPLOITATION
- SIGNAL LOCATION
- THREAT WARNING



SIGpac Man Portable Signals Intelligence (SIGINT) System

Product Specs

Frequency Coverage	0.5 – 3000 MHz DF and Intercept (Receiver) 2 – 2000 MHz (with MA-445C)
DF Accuracy	3° RMS Typical
DF Resolution	1°
DF Threshold	10 µV/m (nominally)
Demodulators	FM, AM, SSB, CW, 2ISB
Tuner Frequency Resolution	10 Hz
Tuner Tuning Speed	≤ 5 ms
Tuner Dynamic Range	75 dB or greater
Processor	Integrate multiple LOB estimates, up to at least 30, for enhanced accuracy Provide operator-selectable DF integration time Provide internal storage for at least 100 LOBs (including timestamps) Provide built-in-test (BIT) to the card level
Antenna Weight	≤ 15 pounds
Antenna Height	≤ 6.0 inches (without whip)
Antenna Area	≤ 2.0 square feet
Remote Interface	Ethernet 10/100 or USB
Position Accuracy	≤ 9 meter SEP
Position Resolution	≤ 1 meter
Electronic Compass*	Bearing accuracy: ≤ 1° Bearing resolution: ≤ 0.1°
Physical Characteristics System	
Size:	3.50" H x 9.23" W x 11.05" D
Weight:	≤ 27 pounds (excluding antenna mount, and power source)
Power Input	
Power:	20 to 30 VDC (stand-alone), 9V to 36V (with external adapter)
Battery Type:	≤ 15 Watts when fully operational BB390, BB390B, BB590, BB590MB BB2590, BA5390, BA5590
Environment	
Operating Temperature:	-20° to +60°C
Storage Temperature:	-40° to +55°C
Humidity:	5% to 95% Condensing
Altitude:	15,000 feet
Submersion:	1 meter (3 feet) for 1 minute
Rain, Salt Fog, Vibration:	Tested to MIL-STD-810F modified

Resistant to externally generated radio frequency interference (RFI)

In accordance with MIL-STD-461E, tests CE102, CE106, CS101,
CS103, CS114, CS115, CS116, RE102 and RS1

Note: All specifications subject to change without notice



Cleared by DoD/OSR for Public Release
Under 10-S-3026 on August 24, 2010.



Linkabit

LINKABIT DIVISION

3033 SCIENCE PARK ROAD, SAN DIEGO, CA 92121

(858) 552-9555 FAX (858) 552-9668 www.L-3Com.com

Product Service Help Desk: 1-800-331-9401

e-mail: LinkabitProducts@L-3com.com



MA-445C HF/VHF/UHF DF Antenna

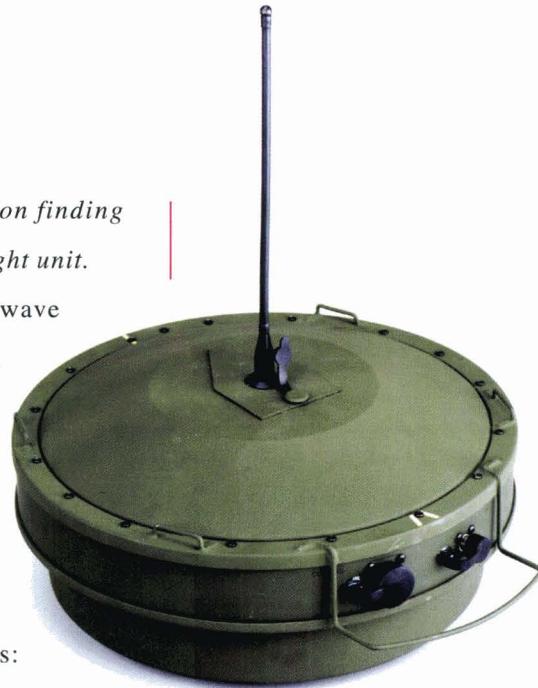
The MA-445C HF/VHF/UHF DF Antenna provides accurate direction finding (DF) over the 2 to 2,000-MHz frequency range in a small and lightweight unit.

The antenna was designed for use on vertically-polarized ground wave and sky wave signals. The MA-445C may be ground or tripod mounted, and can also be operated from the top of a ground vehicle with a metal roof using Linkabit's optional vehicle mounting strap. In the AN/PRD-13(V)1 and AN/PRD-13(V)2 system configurations, a common RF/control cable is used to connect the MA-445C to Linkabit's SIGINT receiver-processors (MD-403A and MD-405A).

The MA-445C is physically divided into two frequency sections: 2–100 MHz (called the HF portion) and 100–2,000 MHz (called the VHF/UHF portion). The unit design incorporates several antenna technologies:

- Ferrite-loaded crossed loops plus a short active monopole whip covering 2–100 MHz
- An annular slot with eight feed points covering 100–460 MHz
- A four-element monopole array covering 460–2,000 MHz

Each antenna section has an independent calibration (frequency versus angle) correction table read by the receiver/processor on power-up, as well as an independent built-in test (BIT) oscillator to help isolate failures between antenna sections. The VHF/UHF section contains a switchable low noise, high performance preamplifier. The preamplifier can be enabled to improve antenna sensitivity and offset coaxial cable loss.



**MA-445C
HF/VHF/UHF DF
ANTENNA - ELEMENT
ATTACHED**



MA-445C HF/VHF/UHF DF Antenna

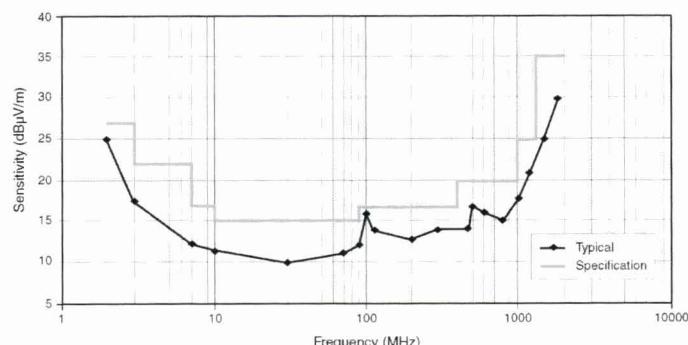
MA-445C HF/VHF/UHF DF Antenna Features

Performance Characteristics	
Frequency Coverage	2–2,000 MHz
Azimuth Coverage	360°
Elevation Coverage, 2–100 MHz	0° to 10°
Elevation Coverage, 100–2000 MHz	0° to 60°
Bearing Accuracy ¹	3° RMS typical
Bearing Sensitivity ²	See chart
Polarization	Vertical
Output Impedance	50 Ohms unbalanced
Preamplifier (100–2,000 MHz)	Selectable (In/Out) Gain: 18 dB nominal NF: 4.0 dB nominal IP ₃ : +18 dBm minimum RF: Waterproof BNC; Control: Sealed JT quick disconnect
Connector	
Physical and Environmental Characteristics	
Size (diameter)	330 mm, 13 in.
Height (less whip)	140 mm, 5.5 in.
Weight	4.08 kg (9 lbs.)
Power	1 Watt maximum at 12 VDC
Temperature	Operating: -20° to +50° C; Storage: -40° to +70° C
Humidity	0 to 100% Condensing
Altitude	4,572 m (15,000 ft)

¹ Test range, AM demodulator, un-modulated signal, 1 sec. integration, 20 dB S/N

² Test range, AM demodulator, un-modulated signal, 6° RMS degrees jitter, 1 sec. integration. Bearing accuracy and sensitivity in operational situations are subject to the effects of installation, proximity of large conductive objects, terrain, and elevation

Note: All specifications subject to change without notice



Part Number	Description	Includes
02-105608-01	MA-445C Antenna	Antenna, Manuals
05-103228-01	Tripod	Antenna Tripod
05-105872-01	RF/Control Cable	Cable
03-102475-01	Tie Down Kit	Antenna Mount Strap

Cleared by DoD/OFOISR for public release under
OFOISR Case Number 06-S-1601 on June 22, 2006.



communications

Linkabit

LINKABIT DIVISION
3033 SCIENCE PARK ROAD, SAN DIEGO, CA 92121
(858) 552-9555 FAX (858) 552-9668 www.L-3Com.com
Product Service Help Desk Number: 1-800-331-9401
e-mail: LinkabitProducts@L-3com.com

Multi-Role Tactical Common Data Link

The MR-TCDL (Multi-Role Tactical Common Data Link) is the most interoperable and **scalable** “System of Systems” in the military’s broadband-networking inventory. Coupling the power of **modularity** and scalability with the rewards of parts-commonality and packaging flexibility, MR-TCDL drives the **highest levels of performance** and value in military communication networks.





Multi-Role Tactical Common Data Link (MR-TCDL)

Key Features

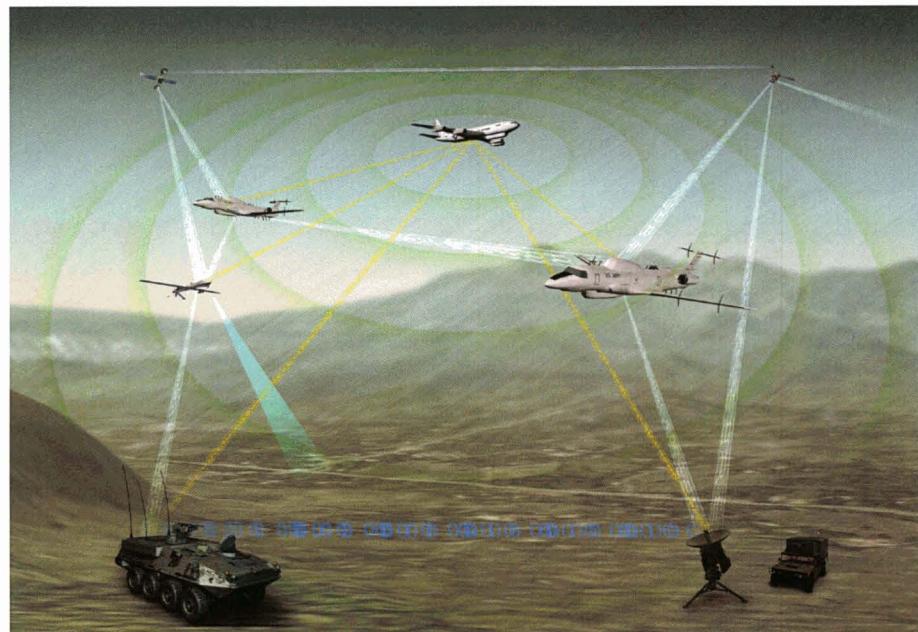
- Wideband RF wide-area-network backbone for GIG and diverse IP subnets including Communications OTM
- Multi-band including LOS (X and Ku-bands) and SATCOM (Ka, X and Ku-bands)
 - LOS ranges up to 500 km (depending on selected RF options)
- Symmetric and asymmetric TCDL data rates from 200 kbps up to 274 Mbps
- JTEL approved SCA compliant architecture and TUAV Level IV
- Software programmable architecture provides greater interoperability and flexibility
- User Ports: 3 to 7 for 10/100 Base-T Ethernet and 1 to 2 for Gig Ethernet
- Layer 2 and Layer 3 processing
- Self-forming, self-healing, mobile ad hoc networking
- Networking topology management including: point-to-point, point-multi-point, hub and spoke, relay, semi-mesh
- LOS communications: STD-CDL, N-CDL and bandwidth efficient modes
- Scalable from 1 to 4 link systems
- MMPP (Mix and Match, Plug and Play) family of modules to suit virtually any application.
- FPGA-based, open-standard interface—CPCI, IP System.
- Networking protocols: IPv4, IPv6, BGP, IGMP, DHCP, SNMP, ICMP, PIM/SIM and others

Product Description

The MR-TCDL “System of Systems” provides warfighters with broadband data, voice and video services, connecting on-the-move surface, fixed surface, airborne and space-based platforms using:

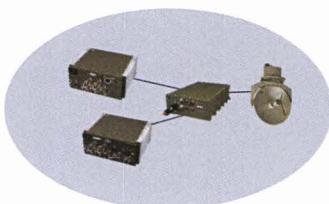
- Line-of-sight communications including:
 - STD-CDL to 274 Mbps
 - Bandwidth efficient modes to 274 Mbps
 - N-CDL to 137 Mbps OL 67 Mbps IL (both hub and spoke)
 - Ad hoc network formulation
- Broadband SATCOM communications including:
 - Comms-On-the-Move (COTM) capability

MR-TCDL leverages Common Modules (cPCI), Common Module Carriers and an extensive family of RF and antenna solutions. It's scalable and modular methodology allows military network configurations to effectively connect warfighters on disparate legacy and emerging subnets, by allowing a two-level maintenance concept, a JTEL approved SCA architecture using a gigabit Ethernet IP switch fabric and full contractor logistics support (CLS). MR-TCDL accomplishes this while pleasing both taxpayer and end users.

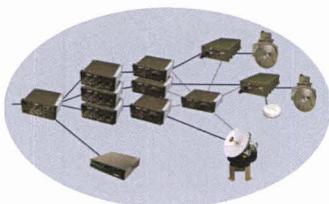




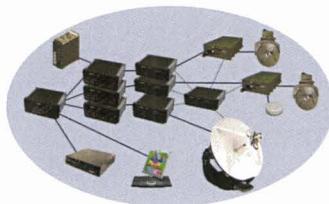
Typical Air Configurations



Typical Single Link

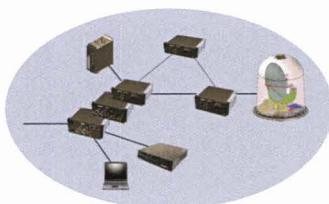


Typical UAV 3-Link

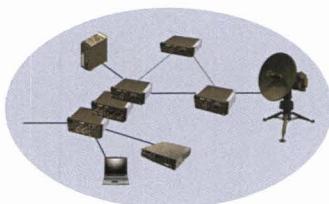


Typical 3-Link ATE

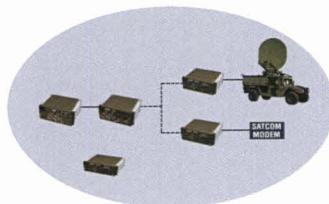
Typical Surface Configurations



Typical On-the-Move STE



Typical Fixed STE



Typical SATCOM STE Kit

There are as many possible configurations as user requirements.
The configurations shown above are just a few of the possibilities.

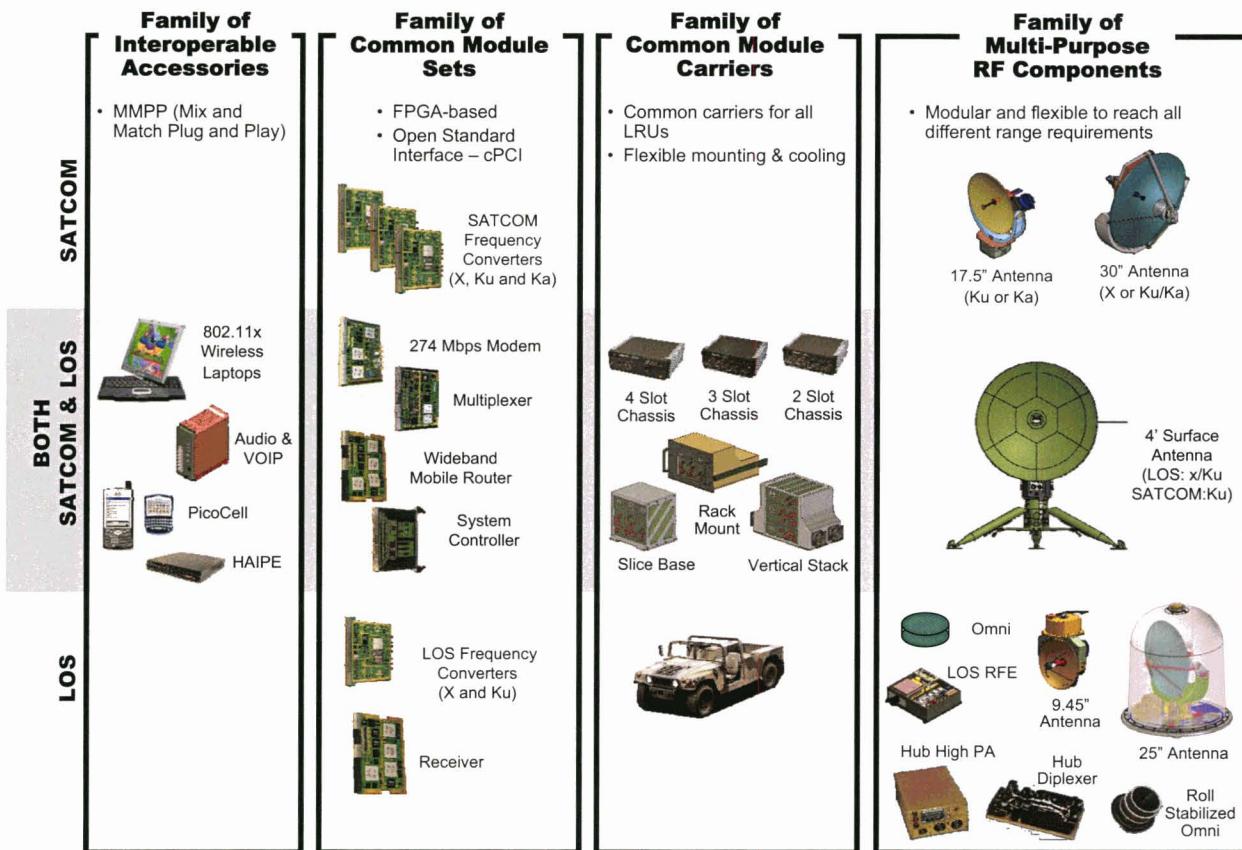
Detailed data sheets are available on the individual configurations.
PDF versions can be downloaded from the L-3 Communications,
Communication Systems-West website: www.L-3com.com/csw





Specifications

Configuring MR-TCDL



Scalable, modular MMPP architecture enables customization within families of common system components and installation methodologies.

Dissemination of intelligence

Intelligence is disseminated to other parties such as partner agencies. This process allows partial, composite or full dissemination of raw intelligence as permitted. Dissemination capabilities include:

- ➔ Partial dissemination - redacted documents or fragments from a document
- ➔ Composite dissemination - custom dissemination from multiple sources
- ➔ Full document – disseminate document in its native format

Document management

The underlying enterprise document management system provides conventional content management functionality, including:

- ➔ Check-in, check-out, versioning
- ➔ Advanced searching, including full-text, search term highlighting and scoring
- ➔ Scalable architecture for consistent system availability

Security and records management

A custom multi-level IL4 security model with extensive audit capability which includes:

- ➔ Detailed security model allowing varying degrees of access
- ➔ Full audit trail for all user actions
- ➔ Complete data histories filterable by event and user

Collaborative intelligence environment

Analysts have access to a system that enables collaboration, including the registration of flags or interest markers on entities to alert other users and agencies of ongoing investigations or potential operational conflicts. This includes:

- ➔ Covert and overt flags on data
- ➔ Grant specific markers to users upon request and approval
- ➔ Conduct status checks against marked entities
- ➔ Mediation between marker owners and other interested users

UK OFFICE

L-3 Communications ASA Ltd

Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS

T +44 (0)1252 775700 info.asa@l-3com.com

L-3 ASA delivers robust, scalable and extensible intelligence solutions which have been in use for a decade at the highest levels of UK law enforcement. It provides core intelligence management capability that underpins expert analyst's efforts in the fight against crime.



The L-3 ASA intelligence repository and analysis platforms allow the entry, search, retrieval, structuring and manipulation of information. Built using an extensible service-oriented architecture, enterprise document management system and a robust, multi-level security system, raw and unstructured data is transformed into a structured network of entities and relationships with full data provenance. These capabilities, combined with a customisable business process and workflow engine, provide a valuable tool used for the analysis and dissemination of critical and highly sensitive intelligence by UK law enforcement.

Input and structuring of raw intelligence

Analysts use a controlled process for creating structured intelligence from raw intelligence information. Intelligence input and structuring capabilities include:

- ➔ Upload intelligence reports as controlled, versioned documents
- ➔ Tag entities within intelligence reports
- ➔ Search for or create tagged entities
- ➔ Link tagged entities to intelligence reports
- ➔ Link entities with each other with full data provenance and relationship nature maintained
- ➔ Upload and link supporting documents

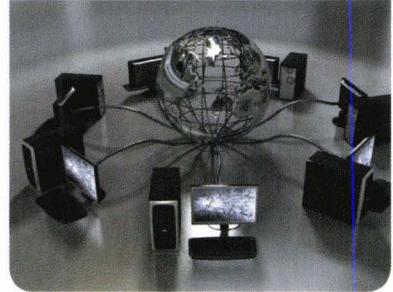
Search and display of intelligence

Users conduct structured (meta-data) and unstructured (content) searches against an intelligence repository. Once found, all information regarding the entity in question and those related to it can be displayed to the user. Search and display capabilities include:

- ➔ Search based on structured and unstructured information
- ➔ Guided search capability
- ➔ Editing and saving of queries
- ➔ Scoring and categorization of search results
- ➔ Search agents and persistent searches
- ➔ Preview of document contents (unstructured data)
- ➔ Display of core entity profile data (structured data)
- ➔ Interest markers and flags
- ➔ Display of links between entities
- ➔ Visualisation of networks, items and relationships

In a world where the confidentiality, integrity, and availability of information is paramount, L-3 ASA ensures the communication paths are open, reliable, accessible, and secure.

Systems provided by L-3 ASA offer the widest choice of interface, operating system, and communication technologies. Enabling multiple networks, devices, and data systems to interoperate securely in the field.



L-3 ASA is a proven provider of mission configurable intelligent switching and interoperability systems, enabling VoIP, circuit switched, radio, and Satcom networks and devices to inter-communicate. Secure interoperability is achieved through an adaptation to incorporate the majority of Crypto devices.

- ➔ Interoperability Gateways
- ➔ Legacy and current Crypto Gateways
- ➔ High Grade Secure Communications
- ➔ Command & Control Room Communications

Unified Communications is a key requirement and MultiSwitch is the cornerstone for the provision of Interoperability for the UK CORMORANT, GATE, SKYNET and FALCON programmes, uniquely providing a single node to handle the UK TacISDN and NATO STANAG 4578Ed2 protocols.

MultiSwitch

At the core of L-3 ASA's communications systems is MultiSwitch, a multi-source COTS component-based Interoperability product. With access to the protocol stack, full use can be made of standard extensions to enable versatility in the solution.

MultiSwitch solutions are available in a variety of configurations, suitable for deployment from data centre to battlefield.

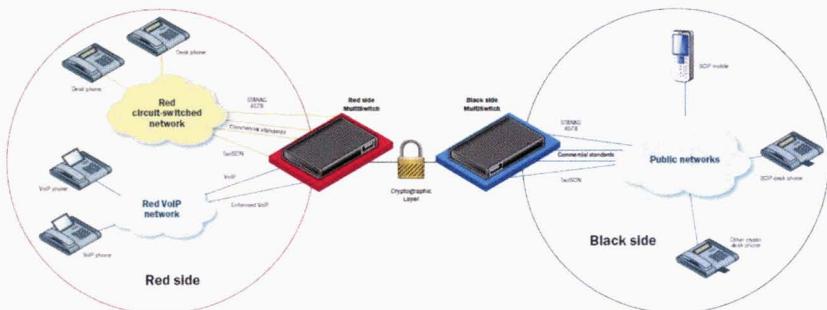


ASA

MultiSwitch - Unifying Communications Commercial and Military Applications ASSURED SOLUTIONS

MultiSwitch is suitable for leading edge applications, including:

- Crypto Inter-operability gateways
 - Legacy crypto life extension
- VoIP to PSTN gateways
- Tactical deployable military gateways
- Conference systems
- Least Cost routing IP telephony gateways
- High availability switching platforms
- CCTV/Video switching and compression gateways



Technologies

Speech recognition/speaker verification
Text-to-speech
IP Telephony / IP Fax Relay / MoIP
Circuit-Switched Telephony
Fax (Grp3, STANAG 5000, FoIP)
Precedence & Pre-emption (CPI/CPIP; MLPP; DSCP)
H.450 Supplementary Services
SNMP

Interfaces

Interfaces
STANAG 4578 Ed2
TaciSDN
ISDN30, ISDN2
TCP/IP
Packet/Circuit Switched Data
Voice CODECs (G.711, G.729, CVSD)
VoIP (H.323/SIP)
E1/T1: Q.931; DASS2; DPNSS; EuroISDN; CAS
Analogue 4 wire / 2 wire

Crypto Support

BRENT
STE
SCIP
HAIPE

Operating System Support

Windows (XP, 7, 2003Server)
Unix
Linux

UK OFFICE

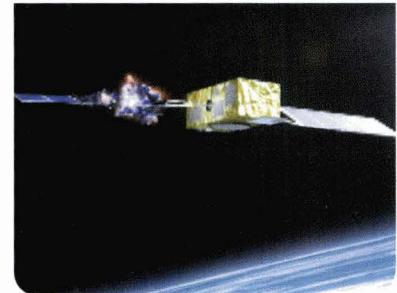
L-3 Communications ASA Ltd
Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS
T +44 (0)1252 775700 info.asa@l-3com.com



ASA

**Space Situational Awareness
ASSURED SOLUTIONS**

The Space domain presents unique challenges that continue to test our technological limits while providing unparalleled opportunities to exploit real-time information in our increasingly global enterprises.



At L-3 ASA we have a strong reputation for developing products to enhance Space Situational Awareness, through the optimisation of sensors and through the fusing of multi-source data, to provide greater discrimination and characterisation of Space activity.

We continue to work in partnership with the operational Space community and are proud of our contribution to the daunting task of improving awareness of a remote and increasingly critical environment.

Underpinned by over 20 years of development of high throughput real-time systems operating in the most challenging environments:-

L-3 ASA Capabilities

- ➔ Space and Missile Defence Systems
- ➔ Deployment of Real-Time High Throughput System
- ➔ Enhancement of Legacy Sensor Systems
- ➔ Radar Data Processing
- ➔ Kinematic Fusion and Tracking
- ➔ Simultaneous Precision Tracking of Multiple Target Types



TOTS

TOTS underpins our Space and Missile Defence business stream. It is a powerful real-time multi-target tracking and sensor data fusion technology developed by L-3 Communications ASA Ltd. in collaboration with US and UK Government operational community. A single TOTS-based system is capable of fusing information from multiple distributed sources to enable target tracking and identification covering simultaneously the domains of Air, Space and Missile Defense. In the Space Surveillance and Missile Defence domains, TOTS enables the resolution and tracking of complex and increasingly small objects.

Space and Missile Defence Sensor Enhancement

Using technology developed in response to the need for enhanced Space Situational Awareness, L-3 ASA has been able to optimize existing sensors to resolve and track smaller and more complex objects. The technology can be applied to a number of sensor types in any highly assured and safety-critical environment, with the potential to maximise sensor performance against Difficult Air and Space Targets.

Features Include:

- ⇒ State-of-the-art, real time, kinematic fusion & tracking software system
 - Number of tracks governed by computer capacity
- ⇒ Simultaneous, precision tracking of multiple target types
 - Ground targets, surface ships, aircraft, helicopters, cruise missiles, UAV's, ballistic missiles and orbiting objects – detection through to weapons engagement
- ⇒ Fuses returns from multiple heterogeneous sensors
 - Radar(s), IFF, TADILs, passive sensors (EO/IR)
 - Target characteristics (e.g. from ESM) can be associated with tracks
 - Number of sensors unlimited
- ⇒ Low-latency concurrent processing
 - Continuous automated selection of optimal filter model based on target kinematic behaviour
 - 4 ballistic models (filters) and 7 air breathing models (filters)
 - Autonomous-multiple-model (AMM) tracking
 - a priori knowledge of target behaviour not required
- ⇒ Comprehensive API for straightforward exploitation/integration

Technologies

Sensor Fusion
Information Fusion
Tracking
Discrimination

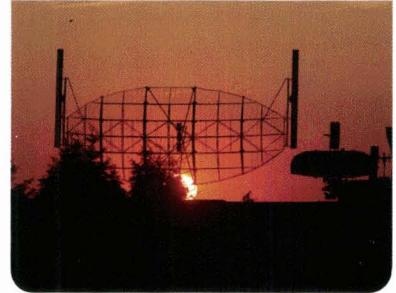
Operating System Support

Windows
Linux

UK OFFICE

L-3 Communications ASA Ltd
Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS
T +44 (0)1252 775700 info.asa@l-3com.com

L-3 ASA has over 20 years of expertise in the development and delivery of complex multi-sensor data fusion and battlespace management systems.



We have delivered decision support tools across the Air and Missile Defence environments, developing a reputation for overcoming the most demanding information and data fusion challenges.

Our core C2 products are modular, scalable and adaptable to suit any operational timeline, with a proven pedigree of safety and security assurance that can only come from fielding within operationally critical mission systems.

Above all, they provide the practical means to integrate force elements across the Battlespace.

L-3 Communications ASA Capabilities

- ➔ Sensor Data Fusion and Tracking
- ➔ Single Integrated Air Picture Production
- ➔ Information Dissemination via Link 16
- ➔ Expertise in integrating data from legacy sensors
- ➔ Systems Integration

L-3 ASA's experience in the Air Defence arena are:

- ➔ UK MoD's Land Environment Air Picture Provision (LEAPP)
- ➔ Automated Sense and Warn (AS&W) programmes.

L-3 ASA is responsible for the core 'Situational Awareness Component' (SAC) and for integration of the overall software for the LEAPP and AS&W programmes.

The SAC produces a Local Air Picture (LAP) by the fusion of sensor data and the reconciliation of this local picture with the Recognised Air Picture(RAP) provided through Tactical Data Link interface.



ASA

**Integrated Air and Missile Defence
BATTLESPACE SYSTEM INTEGRATION
ASSURED SOLUTIONS**

TOTS

TOTS multi-sensor fusion-tracker underpins the L-3 ASA SAC, fusing data from the organic radars and other external sensors which might be located within or near to the local area. The system also incorporates counter-rocket, artillery and mortar (C-RAM) warning capabilities and is configurable to meet multiple mission requirements.

It is a powerful real-time multi-target tracking and sensor data fusion technology developed by ASA with US and UK Government support. Able to simultaneously track multiple targets of different types, and with the ability to resolve tracks from marginal sensor inputs, TOTS provides a scalable 'black box' solution to the fusion/tracking requirements of surveillance, weapon control, battle management and security systems.

Features Include:

- ➔ State-of-the-art, real time, kinematic fusion & tracking software system
 - Number of tracks governed by computer capacity
- ➔ Simultaneous, precision tracking of multiple target types
 - Ground targets, surface ships, aircraft, helicopters, cruise missiles, UAV's, ballistic missiles and orbiting objects – detection through to weapons engagement
- ➔ Fuses returns from multiple heterogeneous sensors
 - Radar(s), IFF, TADILs, passive sensors (EO/IR)
 - Target characteristics (e.g. from ESM) can be associated with tracks
 - Number of sensors unlimited
- ➔ Low-latency concurrent processing
 - Continuous automated selection of optimal filter model based on target kinematic behaviour
 - 4 ballistic models (filters) and 7 air breathing models (filters)
 - Autonomous-multiple-model (AMM) tracking
 - a priori knowledge of target behaviour not required
- ➔ Comprehensive API for straightforward exploitation/integration

Technologies

Sensor Fusion
Information Fusion
Tracking
Discrimination

Operating System Support

Windows
Linux

UK OFFICE

L-3 Communications ASA Ltd
Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS
T +44 (0)1252 775700 info.asa@l-3com.com

L-3 ASA delivers robust, scalable and extensible intelligence solutions which have been in use for a decade at the highest levels of UK law enforcement. It provides core intelligence management capability that underpins expert analyst's efforts in the fight against crime.



The L-3 ASA intelligence repository and analysis platforms allow the entry, search, retrieval, structuring and manipulation of information. Built using an extensible service-oriented architecture, enterprise document management system and a robust, multi-level security system, raw and unstructured data is transformed into a structured network of entities and relationships with full data provenance. These capabilities, combined with a customisable business process and workflow engine, provide a valuable tool used for the analysis and dissemination of critical and highly sensitive intelligence by UK law enforcement.

Input and structuring of raw intelligence

Analysts use a controlled process for creating structured intelligence from raw intelligence information. Intelligence input and structuring capabilities include:

- Upload intelligence reports as controlled, versioned documents
- Tag entities within intelligence reports
- Search for or create tagged entities
- Link tagged entities to intelligence reports
- Link entities with each other with full data provenance and relationship nature maintained
- Upload and link supporting documents

Search and display of intelligence

Users conduct structured (meta-data) and unstructured (content) searches against an intelligence repository. Once found, all information regarding the entity in question and those related to it can be displayed to the user. Search and display capabilities include:

- Search based on structured and unstructured information
- Guided search capability
- Editing and saving of queries
- Scoring and categorization of search results
- Search agents and persistent searches
- Preview of document contents (unstructured data)
- Display of core entity profile data (structured data)
- Interest markers and flags
- Display of links between entities
- Visualisation of networks, items and relationships



Dissemination of intelligence

Intelligence is disseminated to other parties such as partner agencies. This process allows partial, composite or full dissemination of raw intelligence as permitted. Dissemination capabilities include:

- ➔ Partial dissemination - redacted documents or fragments from a document
- ➔ Composite dissemination - custom dissemination from multiple sources
- ➔ Full document – disseminate document in its native format

Document management

The underlying enterprise document management system provides conventional content management functionality, including:

- ➔ Check-in, check-out, versioning
- ➔ Advanced searching, including full-text, search term highlighting and scoring
- ➔ Scalable architecture for consistent system availability

Security and records management

A custom multi-level IL4 security model with extensive audit capability which includes:

- ➔ Detailed security model allowing varying degrees of access
- ➔ Full audit trail for all user actions
- ➔ Complete data histories filterable by event and user

Collaborative intelligence environment

Analysts have access to a system that enables collaboration, including the registration of flags or interest markers on entities to alert other users and agencies of ongoing investigations or potential operational conflicts. This includes:

- ➔ Covert and overt flags on data
- ➔ Grant specific markers to users upon request and approval
- ➔ Conduct status checks against marked entities
- ➔ Mediation between marker owners and other interested users

UK OFFICE

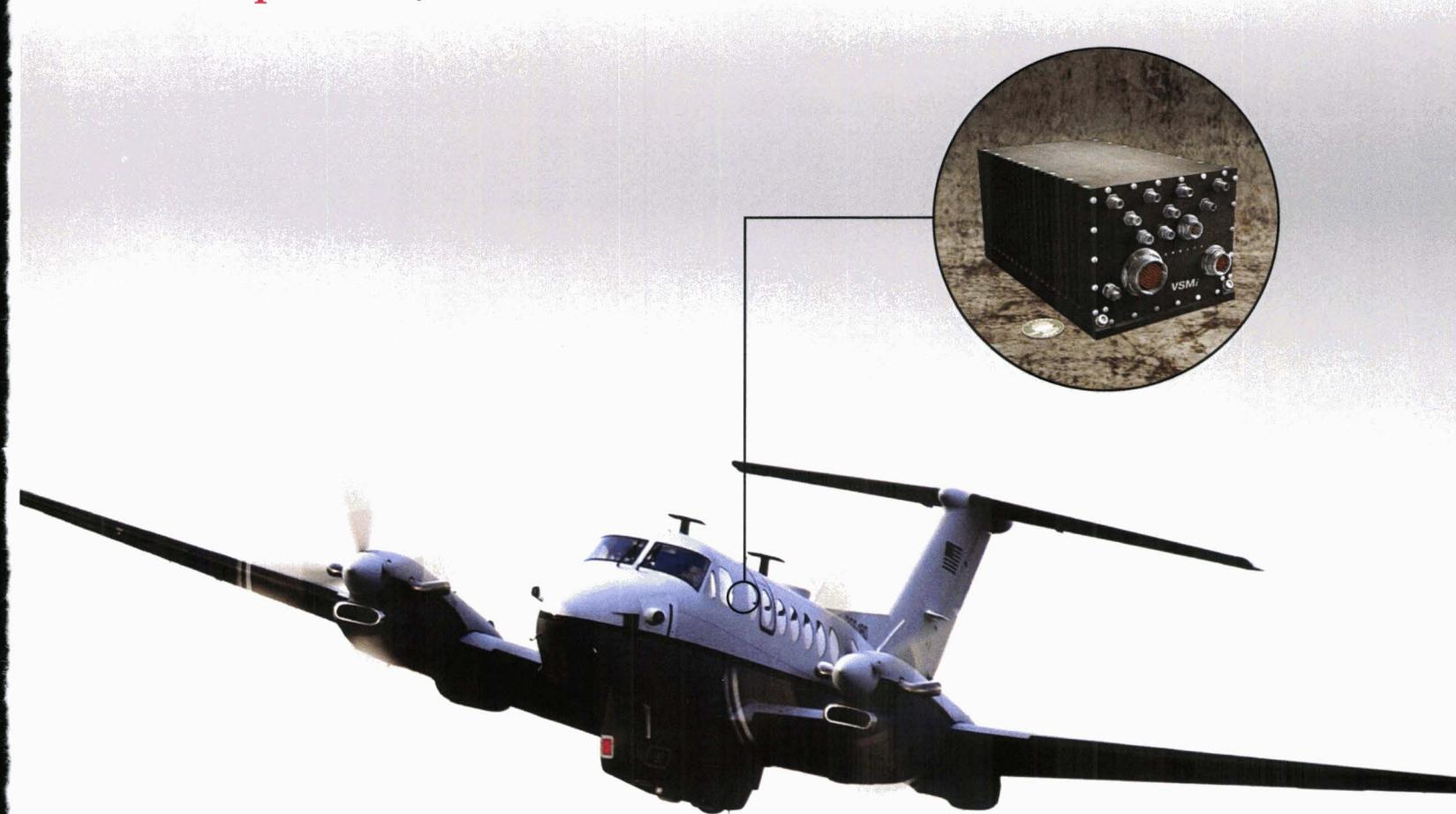
L-3 Communications ASA Ltd

Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS

T +44 (0)1252 775700 info.asa@l-3com.com

VORTEX SATCOM Modem International (VSM*i*)

The VSM*i* is the next generation of compact, multi-band, multi-use, IP software defined radio. The **combination** of **Line-of-Sight** and **SATCOM** functionality reduces cost and SWAP. Adherence to MIL-STD-188-165A, CDL/STANAG 7085(1), and other legacy standards guarantees a **flexible** and **interoperable** system.





VORTEX SATCOM Modem International (VSM*i*)

Key Features

- Broadband full duplex SATCOM capability; UHF through Ka
- Broadband full-duplex LOS capability; UHF through Ku
- Mission selectable RFE and antenna; flexibility to meet system requirements
- Net-T multi-access capability
- Compact, Low SWaP
- Layer 2 and 3 Networking for data relay
- Mitigates adjacent satellite interference
- Data Encryption
- Independent Transmit and Receive
- Simple, web-browser GUI control
- 1080p30 HD Video

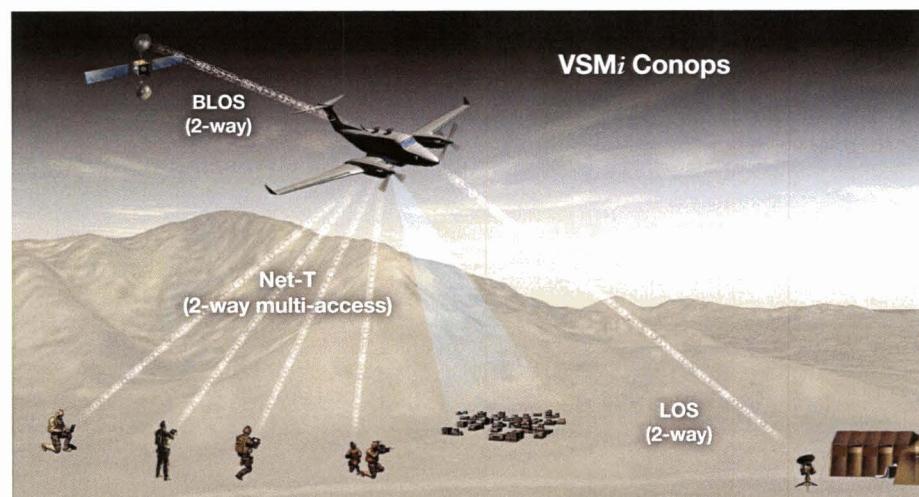
Product Description

The VSM*i* is a compact IP digital transceiver that provides wide-band communications capability adaptable to a wide variety of applications. When operating in the SATCOM mode, the full duplex, multi-band VSM*i* is interoperable with military and commercial geostationary satellites providing connectivity up to 52 Mbps according to MIL-STD-188-165A between host and satellite ground station(s). When operating in the Line of Site (LOS) mode, the VSM*i* supports digital data rates to 45 Mbps and is interoperable with all versions of ROVER and SIR systems. The combination of fully interoperable duplex LOS and SATCOM in one small compact package makes the VSM*i* the ideal communications system of choice for a wide array of airborne and ground applications.



Networking Conops

- Simultaneous video streaming
- Smartphone Pico Cell
- Wide area surveillance
- Biometrics
- Medevac
- Voice Over IP
- White board and chat
- Large file transfer
- Remote sensor control
- SoldierSight Suite
- Exploitation and mapping
- Nine-line messages
- Blue force tracking
- Applications available upon request





Applications

- Ground Based Tactical Operations Center
- Manned ISR Aircraft
- UAV Operations
- Mobile SATCOM Systems
- Manpack SATCOM



Multiple antenna assembly options available to meet the needs of end users, satellite providers, and platform integrators for LOS and BLOS implementations.

Specifications

SATCOM Performance Characteristics

Transmit Bands**

- Ka-band: 27.5–31.0 GHz
- Ku-band: 13.75–14.5 GHz
- X-band: 7.9–8.4 GHz
- C-band: 5.85–6.65 GHz
- L-band: 950–2050 MHz
- VHF/UHF: 243–270 MHz and 292–318 MHz

Receive Bands**

- Ka-band: 17.2–21.2 GHz
- Ku-band: 10.95–12.75 GHz
- X-band: 7.25–7.75 GHz
- C-band: 3.4–4.2 GHz
- L-band: 950–2050 MHz
- VHF/UHF: 243–270 MHz and 292–318 MHz

Data Rates

- MIL-STD-188-165A: 64 kbps–52 Mbps
- MIL-STD-188-165B*
- JIPM*
- DVB-S2, RCS*

LOS Performance Characteristics

Transmit and Receive Bands**

- Ku-band:
 - 15.15–15.35 GHz
 - 14.4–14.83 GHz
- C-band:
 - 5.25–5.85 GHz
 - 4.4–4.94 GHz
- S-band: 2200–2500 MHz
- L-band: 1625–1850 MHz
- VHF/UHF: 230–470 MHz

Data Rates

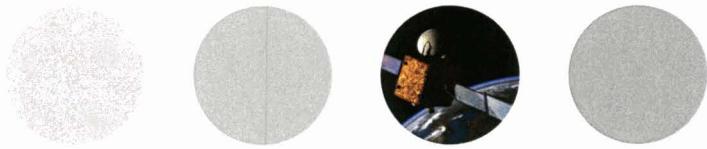
- CDL: 200 kbps–45 Mbps
- Tactical:
 - 455 kbps (receive only), 466 kbps
 - 1.6, 3.2, 6.4 Mbps
- VNW 50 kbps–5 Mbps
- DVB-T*

Net-T Multi-Access

- For details, see Net-T data sheet

* Future software upgrade

** Additional frequency options may be available.



Specifications

General Performance Characteristics

Encryption

- External
- AES

Networking

- Layer 2, 3 switching/routing
- IPv4
- IPv6*

External or User Interfaces

- User I/O:
 - Ethernet (Qty 2; 1 Gig, 10/100 Base-T Ethernet)
 - RS-232 (Qty 3; Console, GPS, Remote Operation)
 - RS-422
 - RS-530
 - Audio in/out
 - USB 2.0
 - Video (Qty 2; In/Out)
 - RS-170 SD and HD-SDI
 - Video compression standards:
 - SD: MPEG-2, MPEG-4 part 2, H.264, Motion JPEG, H.261 (decode only)
 - HD: H.264
- Antenna, RFE I/O:
 - RS-232
 - RS-485 (Qty 2; antenna control)
- Other:
 - RF In (Qty 2; Ka, UHF thru Ku)
 - RF Out (Qty 2; Ka, UHF thru Ku)
 - IF in/out test port
 - 10 MHz in/out reference

*Future software upgrade

Physical Characteristics

SWaP

- Size: 11.4 cm x 9.7 cm x 21.9 cm (4.5" x 3.8" x 8.6")
- Weight: < 4.6 kg (< 10.0 lbs)
- Power
 - Input Power: 10-32 VDC
 - Consumption: 60W

Environmental

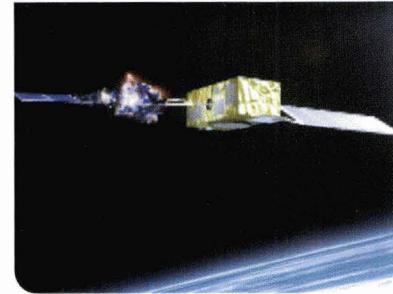
- Temperature:
 - Operating: -20 to +70 C
 - Non-Operating: -40 to +85 C
- Altitude: -152.4 to 21,336 m (-500 to 70,000 ft)
- Humidity: MIL-STD-810F, Method 507.4 (non-condensing), RTCA/CO-160E, Sec 10
- Shock: MIL-STD-810F, method 516.5
- Vibration: MIL-STD-810F, method 514.5
- EMI: MIL-STD-461E
- Salt Fog: MIL-STD-810F, method 509.4
- Fungus: MIL-STD-810F, method 508.5



**L-3
ASA**

**Space Situational Awareness
ASSURED SOLUTIONS**

The Space domain presents unique challenges that continue to test our technological limits while providing unparalleled opportunities to exploit real-time information in our increasingly global enterprises.



At L-3 ASA we have a strong reputation for developing products to enhance Space Situational Awareness, through the optimisation of sensors and through the fusing of multi-source data, to provide greater discrimination and characterisation of Space activity.

We continue to work in partnership with the operational Space community and are proud of our contribution to the daunting task of improving awareness of a remote and increasingly critical environment.

Underpinned by over 20 years of development of high throughput real-time systems operating in the most challenging environments:-

L-3 ASA Capabilities

- ➔ Space and Missile Defence Systems
- ➔ Deployment of Real-Time High Throughput System
- ➔ Enhancement of Legacy Sensor Systems
- ➔ Radar Data Processing
- ➔ Kinematic Fusion and Tracking
- ➔ Simultaneous Precision Tracking of Multiple Target Types



TOTS

TOTS underpins our Space and Missile Defence business stream. It is a powerful real-time multi-target tracking and sensor data fusion technology developed by L-3 Communications ASA Ltd. in collaboration with US and UK Government operational community. A single TOTS-based system is capable of fusing information from multiple distributed sources to enable target tracking and identification covering simultaneously the domains of Air, Space and Missile Defense. In the Space Surveillance and Missile Defence domains, TOTS enables the resolution and tracking of complex and increasingly small objects.

Space and Missile Defence Sensor Enhancement

Using technology developed in response to the need for enhanced Space Situational Awareness, L-3 ASA has been able to optimize existing sensors to resolve and track smaller and more complex objects. The technology can be applied to a number of sensor types in any highly assured and safety-critical environment, with the potential to maximise sensor performance against Difficult Air and Space Targets.

Features Include:

- ➊ State-of-the-art, real time, kinematic fusion & tracking software system
 - Number of tracks governed by computer capacity
- ➋ Simultaneous, precision tracking of multiple target types
 - Ground targets, surface ships, aircraft, helicopters, cruise missiles, UAV's, ballistic missiles and orbiting objects – detection through to weapons engagement
- ➌ Fuses returns from multiple heterogeneous sensors
 - Radar(s), IFF, TADILs, passive sensors (EO/IR)
 - Target characteristics (e.g. from ESM) can be associated with tracks
 - Number of sensors unlimited
- ➍ Low-latency concurrent processing
 - Continuous automated selection of optimal filter model based on target kinematic behaviour
 - 4 ballistic models (filters) and 7 air breathing models (filters)
 - Autonomous-multiple-model (AMM) tracking
 - a priori knowledge of target behaviour not required
- ➎ Comprehensive API for straightforward exploitation/integration

Technologies

Sensor Fusion
Information Fusion
Tracking
Discrimination

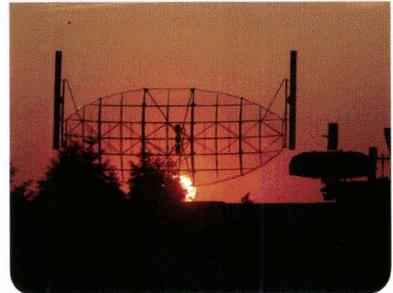
Operating System Support

Windows
Linux

UK OFFICE

L-3 Communications ASA Ltd
Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS
T +44 (0)1252 775700 info.asa@l-3com.com

L-3 ASA has over 20 years of expertise in the development and delivery of complex multi-sensor data fusion and battlespace management systems.



We have delivered decision support tools across the Air and Missile Defence environments, developing a reputation for overcoming the most demanding information and data fusion challenges.

Our core C2 products are modular, scalable and adaptable to suit any operational timeline, with a proven pedigree of safety and security assurance that can only come from fielding within operationally critical mission systems.

Above all, they provide the practical means to integrate force elements across the Battlespace.

L-3 Communications ASA Capabilities

- ➔ Sensor Data Fusion and Tracking
- ➔ Single Integrated Air Picture Production
- ➔ Information Dissemination via Link 16
- ➔ Expertise in integrating data from legacy sensors
- ➔ Systems Integration

L-3 ASA's experience in the Air Defence arena are:

- ➔ UK MoD's Land Environment Air Picture Provision (LEAPP)
- ➔ Automated Sense and Warn (AS&W) programmes.

L-3 ASA is responsible for the core 'Situational Awareness Component' (SAC) and for integration of the overall software for the LEAPP and AS&W programmes.

The SAC produces a Local Air Picture (LAP) by the fusion of sensor data and the reconciliation of this local picture with the Recognised Air Picture(RAP) provided through Tactical Data Link interface.

TOTS

TOTS multi-sensor fusion-tracker underpins the L-3 ASA SAC, fusing data from the organic radars and other external sensors which might be located within or near to the local area. The system also incorporates counter-rocket, artillery and mortar (C-RAM) warning capabilities and is configurable to meet multiple mission requirements.

It is a powerful real-time multi-target tracking and sensor data fusion technology developed by ASA with US and UK Government support. Able to simultaneously track multiple targets of different types, and with the ability to resolve tracks from marginal sensor inputs, TOTS provides a scalable 'black box' solution to the fusion/tracking requirements of surveillance, weapon control, battle management and security systems.

Features Include:

- ➔ State-of-the-art, real time, kinematic fusion & tracking software system
 - ➔ Number of tracks governed by computer capacity
- ➔ Simultaneous, precision tracking of multiple target types
 - ➔ Ground targets, surface ships, aircraft, helicopters, cruise missiles, UAV's, ballistic missiles and orbiting objects – detection through to weapons engagement
- ➔ Fuses returns from multiple heterogeneous sensors
 - ➔ Radar(s), IFF, TADILs, passive sensors (EO/IR)
 - ➔ Target characteristics (e.g. from ESM) can be associated with tracks
 - ➔ Number of sensors unlimited
- ➔ Low-latency concurrent processing
 - ➔ Continuous automated selection of optimal filter model based on target kinematic behaviour
 - ➔ 4 ballistic models (filters) and 7 air breathing models (filters)
 - ➔ Autonomous-multiple-model (AMM) tracking
 - ➔ a priori knowledge of target behaviour not required
- ➔ Comprehensive API for straightforward exploitation/integration

Technologies

- Sensor Fusion
- Information Fusion
- Tracking
- Discrimination

Operating System Support

- Windows
- Linux

UK OFFICE

L-3 Communications ASA Ltd
Rusint House, Harvest Crescent, Ancells Business Park, Fleet, Hampshire GU51 2QS
T +44 (0)1252 775700 info.asa@l-3com.com