The Sentinel Multiservice Switch Router MSR165 is a versatile and reliable dual stack IPv4/IPv6 networking solution for military tactical applications on land platforms used in operational missions, such as Main Battle Tanks, armoured Fighting Vehicles, Personnel Carriers, Protected Tactical and Logistics platforms.

MSR165 hardware and mechanics are specifically designed to withstand the challenging mechanical, environmental and electromagnetic stresses affecting the equipment inside mobile combat units. It meets the most stringent military Standards, including MIL-STD-810F, AECTP300, AECTP400, MIL-STD-461E, MIL-STD-1275.

The MSR165 is an Integrated Service Router with layer 3 switching capabilities able to support intra-vehicle communications, interfacing the on board Intercom system (Digital or VoIP) and providing Gigabit Ethernet connectivity to vehicle sensors and computing systems (e.g. BMS). In addition, MSR165 carries out external communications providing voice/data access to HF/VHF/UHF legacy radios such as to new generation radios making a wide set of interworking features available across a range of heterogeneous radio technologies.

The MSR165 operates in dynamic networks, where topology continuously changes and no hierarchical connectivity can be assumed, nodes are mobile and not always reachable, bandwidth availability is poor and links are unstable. The variations of network topology are automatically recognized and managed by MSR165. The routing algorithms are self-adaptive, both to the topology changes and to the traffic variance.

The MSR165’s ability to immediately work after a simple configuration, without needing a network infrastructure, allows soldiers and tanks to automatically form a network on the battlefield.

The MSR165 exploits all the benefits deriving from IP technology in terms of service convergence, system openness and upgrading capabilities. It provides enhanced networking features with respect to optimized QoS for any different application or service, network mobility and resilience.
STATE-OF-THE-ART PERFORMANCE
The MSR165 combines outstanding throughput performances with innovative services and protocols support in an extremely scalable architecture.

A wide range of electrical and optical interfaces is available to establish network connections over Ethernet. 6-wires E&M analog interfaces allow audio communications with different radio devices and towards the INTCOM system, thus enabling automatic relay of voice and data between different radio technologies. Serial interfaces assure a packet data service according to MIL-STD-188-220 data link protocol.

Its integrated service functionalities and the capability to embed the Sentinel IPCS115 IP Calling Suite functionalities make MSR165 a complete IP solution to provide all voice, video and data services on vehicles, included digital conference services.

In addition to standard IP protocols, specific networking solutions are introduced for faster system topology convergence and graceful network performance degradation upon link failures or nodes disruption or rapid nodes mobility.

Along with standard DiffServ QoS policies, advanced traffic management strategies, including traffic control and resources optimization mechanisms, are implemented in support of mission critical applications (real time data).

The capability of providing advanced military features can be fully exploited when MSR165 is deployed in conjunction with the Selex ES Sentinel equipment family (Sentinel IPCS115, Sentinel MSR115, Sentinel MSIP115, Sentinel VoIP phone).

ROUTING PROTOCOLS
The MSR165 supports all relevant standardized routing protocols, such as OSPF and BGP, in line with typical user requirements.

MANET routing algorithms tailored to battlefield use are provided in order to select the best radio transmission vector to reach the destination.

These algorithms are completely suitable for wireless applications, even in the absence of full any-to-any connectivity. The capability to achieve fast network topology convergence with a significantly reduction of bandwidth consumption and the efficient handling of narrowband radio bearers make these routing algorithms completely suitable for CNR networks.

Policy Based Routing (PBR) and GRE tunneling complete the advanced routing features available.

INTEGRATED SERVICES
The MSR165 series completes the Selex ES family of Multiservice Switch Routers with layer 3 switching capabilities, supplying Integrated Service Router functions.

The MSR165, via embedded Sentinel IP Calling Suite IPCS115 application software, provides civilian and military VoIP services in accordance with H.323 and SIP standards. The embedded IPCS115 application software integrates high quality Voice over IP and guarantees that MSR165 fulfills tactical operational requirements, such as independence from the physical network topology, management of PTT signaling, support of multilevel priority and integration of legacy non-IP assets directly connected to the MSR165 itself.

The support of a wide set of interworking and transcoding functions makes MSR165 capable of end-to-end communications across different technology domains like legacy voice CNR and VoIP systems.

TECHNICAL SPECIFICATIONS
The MSR165 is available in two different size versions: 1U and 2U. The product is designed to meet very stringent mechanical, environmental and electromagnetic stresses in accordance with the applicable MIL-STD and AECTP specifications.

IP INTERWORKING
- OSPFv2
- BGPv4
- GRE Tunneling
- PIMv2-SM
- IGMPv2

ADVANCED ROUTING
- Policy Based Routing
- MANET Routing algorithms

SECURITY
- Firewalling through Access Control Lists

QOS
- DiffServ
- Enhanced traffic management strategies for mission-critical applications

RADIO DATALINK PROTOCOLS
- MIL-STD-188-220C

MAIN RADIO DEVICES INTERWORKING
- VHF radio devices like SINCGARS, Raytheon PSC-5, Harris PRC-117
- HF radio devices like Selex ES CNR2000/TURMA, Harris RF-5800H
- UHF radio devices like ITT HCDR, Selex ES VISSR and SDR VM3
- Satcom DVB/RCS terminals

INTEGRATED SERVICE FEATURES
- Standard and military basic and supplementary VoIP services, supporting:
  - H.323
  - SIPv2
- Telephonic addressing formats according to standard and military numbering plans:
  - ITU-T E.164
  - STANAG 4214 Ed. 1 and Ed. 2
  - STANAG 5046
- Support of a wide set of voice codings:
  - G.711 A and u-law
  - G.726 ADPCM16 and ADPCM32

**NETWORK SERVICES**
- DHCP
- IPv6 Stateless Address Autoconfiguration
- Proxy ARP

**LAYER 2 FEATURES**
- Transparent bridging
- MAC learning, aging and switching by hardware
- VLAN according to IEEE 802.1q
- Rapid Spanning Tree Protocol according to IEEE 802.1d
- InterVLAN routing

**INTERFACES**

**MSR165-1U**
- 1 x RS232 serial interface for management
- 1 x 10/100 Base T Ethernet interface for management
- 4 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces with capability to feed DC 12 V
- 4 x 6 wires analog interfaces
- 1 x USB interface towards Combat Net Radio for data applications
- 4 x unbalanced serial interfaces for radio data applications according to RS232 and MIL-STD-188-114 and supporting MIL-STD-188-220C datalink protocol or alternatively
- 2 x unbalanced serial interfaces for radio data applications compliant to RS232 and MIL-STD-188-114 and supporting MIL-STD-188-220C datalink protocol
- 1 x balanced serial interfaces for radio data applications compliant to RS422

**MSR165-2U**
- 1 x RS232 serial interface for management
- 1 x 10/100 Base T Ethernet interface for management
- 2 x 1000 Base Lx Ethernet LAN/WAN interfaces
- 8 x 10/100/1000 Base T autosensing Ethernet LAN/WAN interfaces with capability to feed DC 12 V
- 8 x 6 wires analog interfaces
- 1 x USB interface towards Combat Net Radio for data applications
- 8 x unbalanced serial interfaces for radio data applications compliant to RS232 and MIL-STD-188-114 and supporting MIL-STD-188-220C datalink protocol or alternatively
- 4 x unbalanced serial interfaces for radio data applications compliant to RS232 and MIL-STD-188-114 and supporting MIL-STD-188-220C datalink protocol
- 2 x balanced serial interfaces for radio data applications compliant to RS422

**MANAGEMENT**
- Auto-diagnostic:
  - Power-on self-test
  - General Alarm
- Local Terminal:
  - RS232 asynchronous serial line with ASCII protocol
- NMS Control through an Ethernet 10/100 Base T:
  - SNMPv3 protocol
  - Telnet protocol
  - Configuration files via XML
  - TFTP saving and restoring configuration

**MAIN SUPPORTED STANDARDS**
- IPv4 (RFC 791)
- ICMP (RFC 792)
- GRE tunneling protocol for IPv4 (RFC 2784)
- IGMPv1,v2 for IPv4 (RFC 2236)
- UDP (RFC 768)
- IP over Ethernet (RFC 894)
- TCP (RFC 793)
- ARP (RFC 826)
- Proxy ARP for IPv4 (RFC 1027)
- DHCPv4 (RFC 2131)
- IPv6 (RFC 2460)
- IPv4-IPv6 dual stack (RFC 4213)
- ICMPv6 (RFC 2463)
- Neighbor Discovery for IPv6 (RFC 4861)
- IPv6 Stateless Address Autoconfiguration (RFC 2462)
- OSPFv2 (RFC 2328)
- BGPv4 (RFC 4271)
- PIMv2 Sparse Mode for IPv4 (RFC 2362)
- Interoperability standard for digital message transfer device subsystems (MIL-STD-188-220C)
- Session Description Protocol (SDP) (RFC 2327, RFC 3264)
- Session Initiation Protocol (SIP) (RFC 3261)
- The SIP INFO Method (RFC 2976)
- Real-Time Transport Protocol (RTP) (RFC 1889, RFC 2833, RFC 3550)
- H.323
- E.164
- Stanag 4214
- Stanag 5046
- VLAN Tagging (IEEE 802.1q)
- Rapid Spanning Tree Protocol (IEEE 802.1d)
- A Simple Network Management Protocol (SNMP) (RFC 1157)
- Structure of Management Information for SNMPv2 (RFC 1442)
- SNMPv3 Applications (RFC 2263)
- SNMP Applications (RFC 2573)
- Telnet (RFC 854)
- TFTP (RFC 783)
POWER SUPPLY
DC source:
- Voltage
  - DC19V-DC34V according to MIL-STD-1275
- Consumption
  - Max. 70W

PHYSICAL
MSR165-1U
Size:
- 65 x 266 x 328mm (H x W x D)
Weight:
- 5kg

MSR165-2U
Size:
- 120 x 266 x 328mm (H x W x D)
Weight:
- 8kg

ENVIRONMENTAL
- According to MIL-STD-810F
- According to AECTP300
Temperature:
- -40°C +55°C
Humidity:
- 95% non condensing

MECHANICAL
- According to MIL-STD-810F
- According to AECTP400

EMI/EMC
- According to MIL-STD-461E

ELECTRICAL SAFETY
- According to CEI EN 60950-1

INSTALLATION
- Wheeled or tracked combat and combat support vehicles,
tactical logistics platforms and ships
- Fixed