PLS®

Communications & Technology

SOLUTIONS & COMPANY PROFILE

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ABOUT

MISSION

PALS was established in 1995 as a satellite antenna, broadcast equipment manufacturer and a system integrator in Istanbul, Turkey. PALS designs, develops antennas also integrates large earth stations, and communication systems. PALS merged with Hitachi Kokusai Electric between 2015 and 2020 after the sale of Hitachi's share to KKR. PALS decided to continue its business under it's own name with the same team and capabilities.

VISION

With more than 3 decades experience, we achieved and we aim followings to keep pleasing our stakeholders. Being a leader satellite communication solutions manufacturer globally by leading a customer and technology oriented approach while bringing high quality indigenious technologies to the market innovatively. Our valeus are "Honesty, Reliability, Customer-Orientation, Innovation, Quality"

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PALS LOCATIONS

THE REPUBLIC OF TURKEY
MINISTRY OF FOREIGN AFFAIRS

95091151-520.55-2021/32847542

FACILITY SECURITY CLEARANCE CERTIFICATE (FSCC)

This is to certify that facility security clearance was granted to Pals Elektronik Sanayi ve Ticaret Ltd. Şti. (located at Dudullu OSB Mahallesi 1. Cadde Onaysan Apt. No:18/1 Ümraniye/İSTANBUL) by the National Security Authority of the Republic of Turkey on **1 June 2021** in accordance with the provisions of the Industrial Security Directive, supporting Enclosure "G" to the NATO Security Policy (C-M(2002)49-REV1), and that this clearance is valid until **30 April 2026.**

The National Security Authority of the Republic of Turkey confirms that the above-mentioned facility possesses storage capabilities approved for safeguarding of classified information up to the "NATO SECRET" level.

This certificate has been issued upon the request of the said company.

Signed : Bekir Sarp ERZI

Title : Head of Department
NATO and Euro-Atlantic Security
Infrastructure and Logistics

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PALS PRODUCT CAPABILITIES

SATCOM PRODUCTS

HYBRID NETWORK SOLUTIONS

PALS SYSTEM INTEGRATION CAPABILITIES

EARTH STATION

Installation / Retrofit & Relocation

MOBILE / SHELTER

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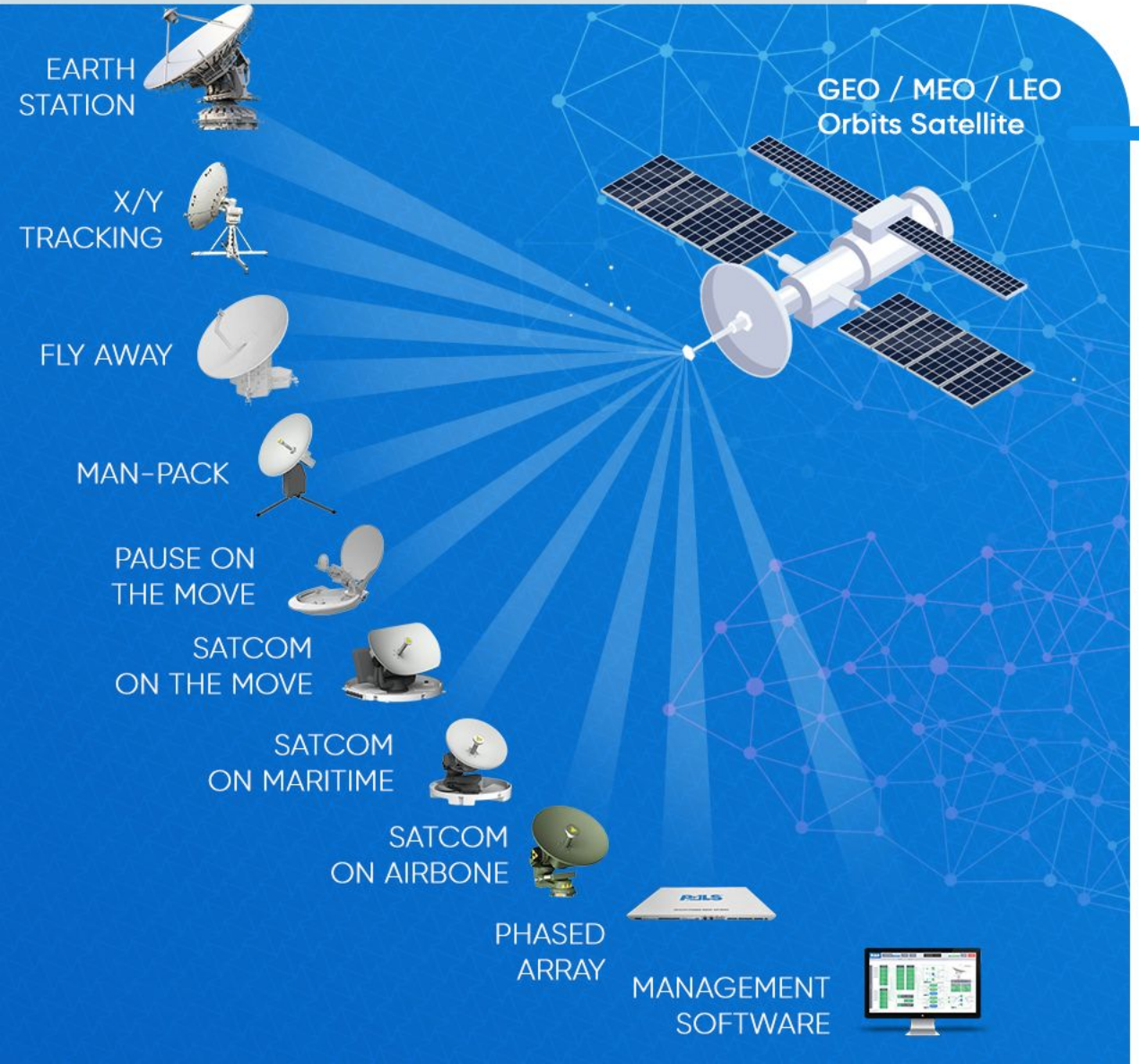

SATCOM PRODUCTS FAMILY

- PALS designs, develops, manufactures and tests a wide range of SATCOM antennas
- PALS' antennas are tested according to the commercial and military standards
- PALS manufactures COTS model as Pause on the Move, SATCOM On the Move, Fly-Away, Man-Pack, Fixed Motorized, Phase Array and Maritime antennas and develops softwares like NMS and EMS
- PALS designs system architecture and delivers turnkey system projects
- PALS also manufactures customized products

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PAIR - Airborne SATCOM

0.35m&0.45m

- Supports Ku, and Ka-Bands
- Ideal for aircrafts, ships, go-fast boats and military vehicles
- Fast initial pointing time to satellite
- High tracking accuracy
- Perfect tracking stability
- Fast blockage recovery time
- Fast satellite switching time < 8s
- Convenient maintenance
- Dynamic pointing and dynamic switching of satellite
- 4-Axes tracking system

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EARTH STATIONS

Starts with 1.8m Up to 13m

- S, C, X, KU, DBS, KA, Q and V Bands options are available
- Servo motors, azimuth and elevation drivers
- Full-motion option is available
- Entirely zero-backlash mechanical drive system
- Optional feed stabilization kit
- Optional beacon tracking
- Optional low consumption De-Ice System
- Military version is available

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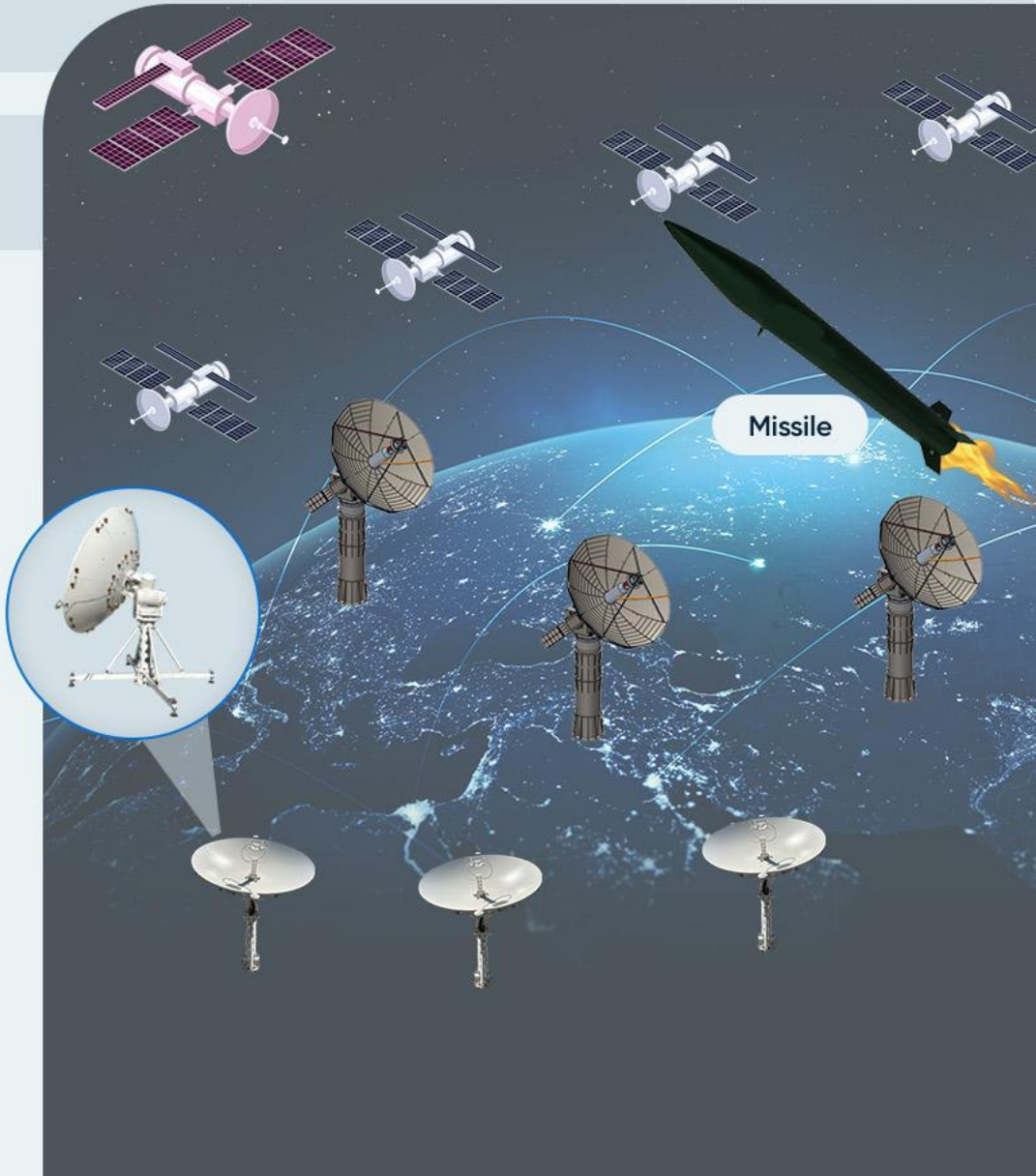
X/Y TRACKING SOLUTIONS

Starts with 1m Up to 7.5m

- Available in L, S, X, Ku, and Ka bands, as well as simultaneous bands
- Motorized and manual control modes for emergency operations in various environments, ensuring convenience and reliability
- High-Speed and Automatic Tracking ensures rapid and accurate tracking for GEO, LEO, MEO satellites, and UAVs
- Portable, compact, light-weight and rugged construction
- Satellite Position Storage and Modification supports storage and modification of satellite position parameters for at least 10 satellites
- High Reliability and Accuracy
- High Torque and Zero- Backlash
- Fast Slew Rates



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FLY-AWAY

Starts with 1.20m Up to 3.70m

- Available in X, C, Ku and Ka Band
- Splash plate antenna with segmented reflector
- Light-weight, high-strength carbon fiber reflector
- Installation can be completed by one person in just minutes
- Effortless acquisition without the need for training or tools
- Rapid, high-quality transmission anytime, anywhere
- Stable tripod with high resistance support legs, designed to withstand the toughest weather conditions (wind, rain, sun, etc.)

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TRI-FOLD

Starts with 4m Up to 4.5m

- C, X, KU, KA, DBS Band options are available
- Supports manual and auto tracking features
- 3-Axes Motorization
- Side wing electrical deploy and stow
- Carbon-Fiber reflector with light-weight, high strength and exceptional accuracy
- Convenient installation on the platform of trailer
- Supports DVB-S/DVB S2
- Optional Beacon Tracking
- Optional De-Ice System
- High accurate GPS and anti-interference electronic compass
- Manual drive tool kit for emergency situations
- High gain, low side-lobe, high accuracy and very good cross-pol rejection

PALS MILITARY STANDARD MIL-STD-461F

PALS MILITARY STANDARD MIL-STD-188-164A

PALS MILITARY STANDARD MIL-STD-810G

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Starts with 0.60m Up to 1.20m

MAN-PACK

- X, Ku, Ka, DBS Band options are avialable
- Light-weight and durable Carbon-Fiber reflector
- Stable tripod support legs
- High resistance for rugged environmental conditions
- Carbon-Fiber tripod support legs
- Motorized version is available
- IATA Standart Back-Pack
- Optional 4G/5G/LTE supported modem for load balancing and bonding solutions

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SAT-FINDER & P-SM

MAN-PACK ACCESORIES

- Integrated sensor of 3-Axes gyroscope&inclinometer&accelerometer
- Satellite Identification, using Beacon Signals & DVB -S Signatures
- Supports Wi-Fi 802.11b/g/n wireless connection control
- Supports TCP/IP wireline access control
- Optional 4G/5G/LTE supported modem for load balancing
- Built-in Rechargable polymer lithium battery
- High-speed broadband iP connectivity over satellite
- Supports DVB-S2/S2X & ACM for outbound, A-TDMA for inbound
- Provides advanced routing, VLAN, and other IP-based user services
- Optional 256-bit AES Link Encryption
- Seamless integration with OpenAMIP

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Manpack OTM Antenna Systems & Solutions

- Enables individual soldiers to communicate directly with the command center via satellite from anywhere within the satellite's coverage
- Provides real-time interworking between soldiers and the command center on the field
- High precision pointing, fast capture, and stable tracking
- 40 seconds from startup to fully operational status
- Over 3 hours of battery runtime
- Simple One-Button operation for ease of use
- Convenient, detachable and portable battery design

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ON THE PAUSE

Starts with 1.0m Up to 2.40m

- C, X, KU, KA, DBS Band options are avialable
- Military Grade version is available for all sizes and bands
- Carbon-Fiber composite reflector supported with light weight mount
- Entirely zero-backlash mechanical drive system
- Easy vehicle integration
- Optional beacon tracking
- Optional de-ice system
- Manual drive tool kit for emergency situations
- High gain and very good cross polar rejection (> 35 db)
- Optional hand-held control unit

PALS MILITARY STANDARD MIL-STD-461F

PALS MILITARY STANDARD MIL-STD-188-164A

PALS MILITARY STANDARD MIL-STD-810G

COMBAT PROVEN

THOR 7 · عرب سات ARABSAT · measat · THAICOM · eutelsat · TÜRKSAT

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PKA SERIES

Starts with 0.75m Up to 1.20m

- One-Touch Operation
- Strong yet light-weight carbon-fiber design (PKM-77Ka), rigorously tested to perform in the toughest environments (wind, rain, sun, etc.)
- 0.01° pointing accuracy with resolvers across 3 axes
- Fully motorized driving mechanism with a zero-backlash gear system
- Prime Focus antenna and feed system
- Low power consumption optional De-Ice system
- Manual drive tool kit for emergency situations
- Easy vehicle integration
- Supports OpenAMIP

HUGHES · iDirect Government · Newtec · tooway Fast internet for everyone · AVANTI

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SATCOM ON THE MOVE

Starts with 0.35m up to 0.60m

- X, Ku, Ka and Simultaneous Ku and Ka Band options are available
- Reliable high data rate
- Fast initial pointing time (<80s or <60s)
- Allow communication in all terrains and weather conditions
- Accurate satellite tracking
- Advanced tracking system
- Military version is available
- Light-weight and compact design

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P-MAR

Starts with 0.35m Up to 1.05m

- X, KU and KA Band options are available
- 3-Axes mechanical design enables tracking of satellites at high elevations
- Defines zones in azimuth for transmission lock to manage blockages
- Transmit Lock is achievable through both hardware and software settings
- Fully functional without NMEA data from the ship's compass
- Easy software and firmware update for the ACU and the Antenna via web interface
- Supports automatic satellite switching via OpenAMIP (Automatic Beam Switch)
- User-friendly configuration via easy satellite setup and manual satellite switching
- Scan function facilitates the detection of alternative tracking carriers

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PHASE ARRAY ANTENNA

- Electronic beam scanning delivers unparalleled beam tracking speed
- Fully digital phased array antenna with no drive motor, eliminating mechanical wear
- High reliability and extended service life
- Supports multi-waveform Open AMiP compatible modems
- GEO/MEO/LEO interoperability with <100µs auto beam switching
- 20W transmit chip with high throughput (up to 2 bits/Hz)
- Integrated ACU and phased IF converter

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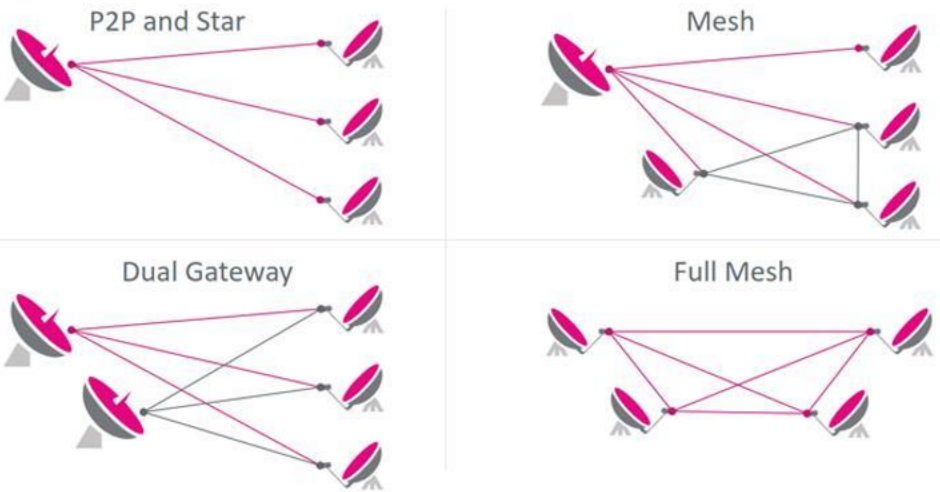
MODEM SOLUTIONS

- Universal Hardware Platform: Available in various enclosures
- Software-Activated Features (remotely activated and transferable) allowing for flexible and scalable functionality adjustments;
  - Scalable Virtual Smart HUBs
  - Dynamically assigned network roles
  - Smart redundancy and diversity
  - Designed for multi-spot HTS networks
- Topology Options supports various network topologies including Point-to-Point (P2P), Star, Dual-Gateway, Mesh, and Hubless configurations;
  - Advanced Waveforms features a range of modulation schemes and MODCODs including QPSK, 8PSK/8APSK, 16APSK, 32APSK, 64APSK, 128APSK, and 256APSK with Adaptive Coding and Modulation (ACM),
  - Access Schemes provides flexibility with access schemes such as SCPC, TDM, TDMA, MF-TDMA, and DAMA for versatile communication needs
- QOS (Classification of IP packets, Customized action rules, Traffic policy manager, Multichannel hierarchic traffic-shaper)



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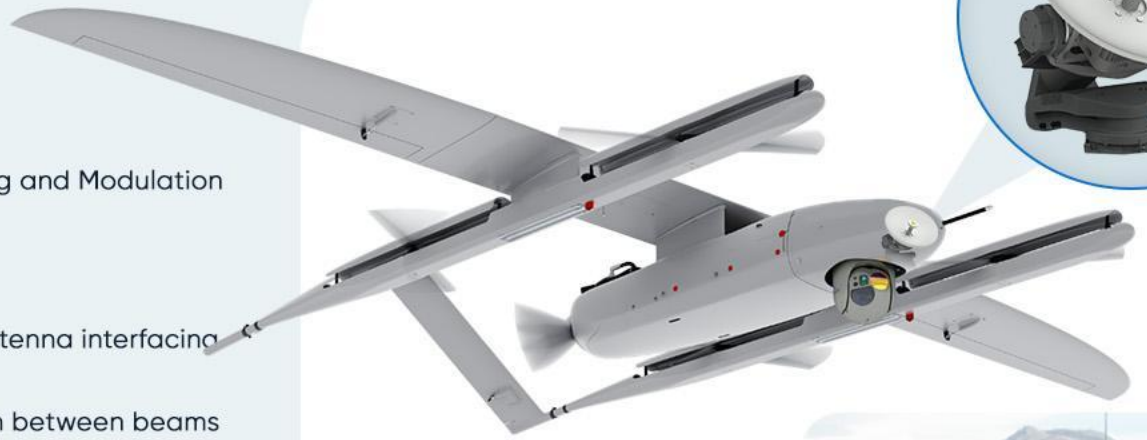
MODEM SOLUTIONS - MOBILITY

- Advanced modulation and coding schemes (MODCODs) with Adaptive Coding and Modulation
- Software-Defined Equipment with TDMA and SCPC return
- Compatible with OpenAMIP and various Proprietary Protocols for seamless antenna interfacing
- Automatic Beam Switching with Network Roaming facilities seamless transition between beams and networks for uninterrupted connectivity
- Support for GXT Coverage Maps includes prioritization of overlapping coverage areas for optimized network performance
- Doppler Effect Compensation adjust for Doppler shifts at high speeds, ensuring accurate tracking as aircraft travel rapidity
- Load balancing of channels and beams with predefined priorities
- Satellite Router Board is designed for seamless for integration into antennas



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MODEM SOLUTIONS - MISSION CRITICAL

- Dynamic topologies and M:N redundancy for enhanced reliability
- Designed for seamless integration with manpack antenna systems
- Ultra-Fast Startup for rapid initialization and operation across extended temperature ranges
- Superior network Reliability and Survivability in various conditions
- Ruggedized Outdoor Hub is built for field-deployable networks and provides durability in challenging environments
- Ultra-Low Latency VSAT with TDMA mesh topology for minimal latency and efficient data transmission
- Support of OpenAMIP and other protocols to interface with antennas

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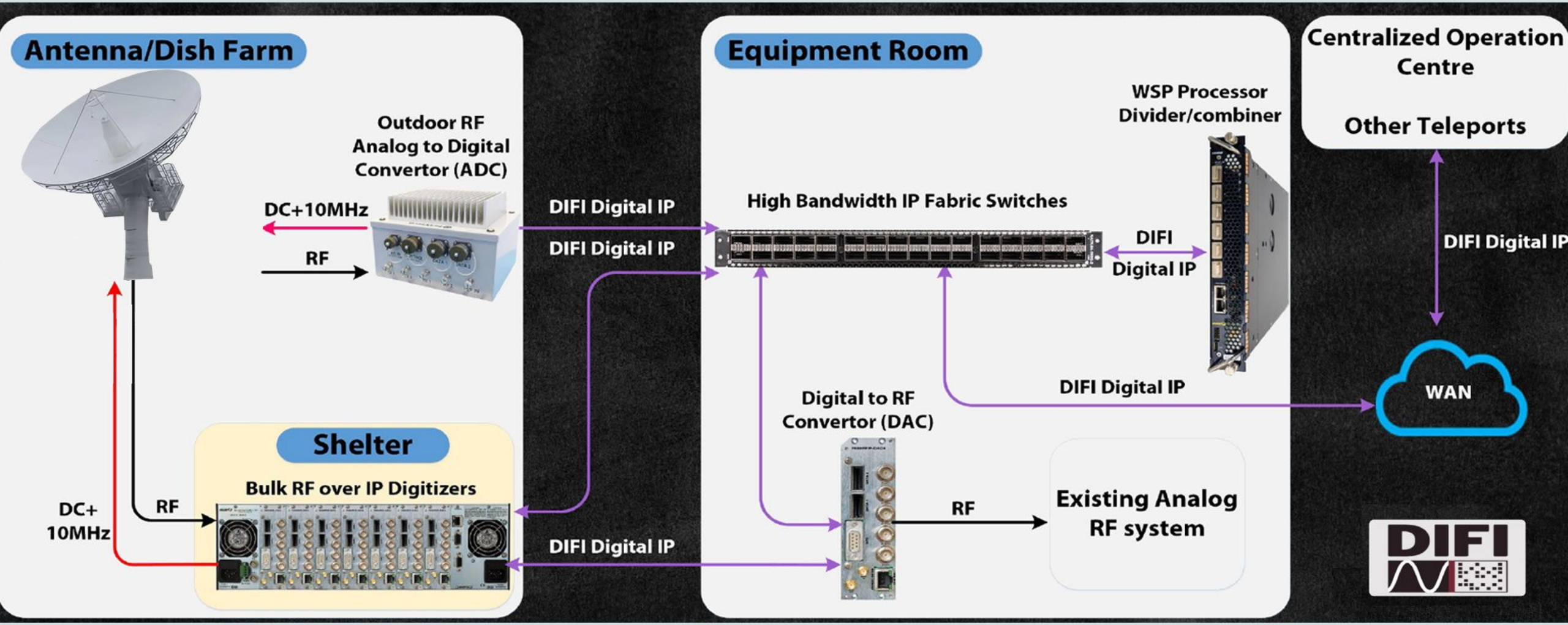
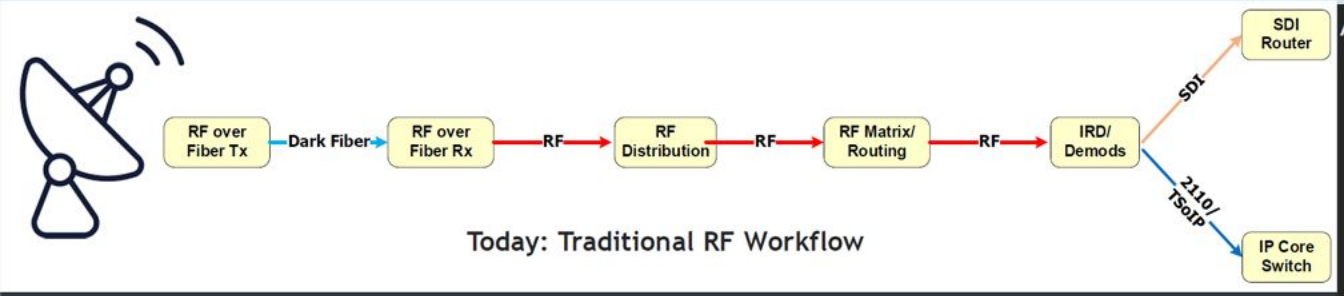
END TO END DIGITAL RF OVER IP SOLUTIONS



RF EVOLUTION: GAME CHANGE IN RF INDUSTRY AND ITS CHALLENGES



Today: Traditional RF Workflow

Vision: Future RF Workflow

Availability of high throughput IP Bandwidth

Digitized RF – IP Bandwidth Approximations					
RF Bandwidth	Sample Sizes (Gbps)				
	4	6	8	12	16
10 MHz	0.10	0.15	0.20	0.31	0.41
36 MHz	0.37	0.55	0.73	1.10	1.47
100 MHz	1.02	1.53	2.04	3.06	4.08
200 MHz	2.04	3.06	4.08	6.12	8.16
400 MHz	4.08	6.12	8.16	12.24	16.32
500 MHz	5.10	7.65	10.20	15.30	20.40
600 MHz	6.12	9.18	12.24	18.36	24.48

Broadcast Downlink Uplink or Military/Gov

Digitization of unwanted Transponders

- Waste of IP Bandwidth

WHO NEEDS RF OVER IP SOLUTIONS

Satellite Operators

Teleport Operators

Large Broadcasters/ Content Originators

Telco Providers

Government and Defense

Existing Customers with a DWDM RF over Fiber System

Customers with Disaster Recover (DR) sites Teleports and Broadcasters

Telecommunication Providers

Government and Defense

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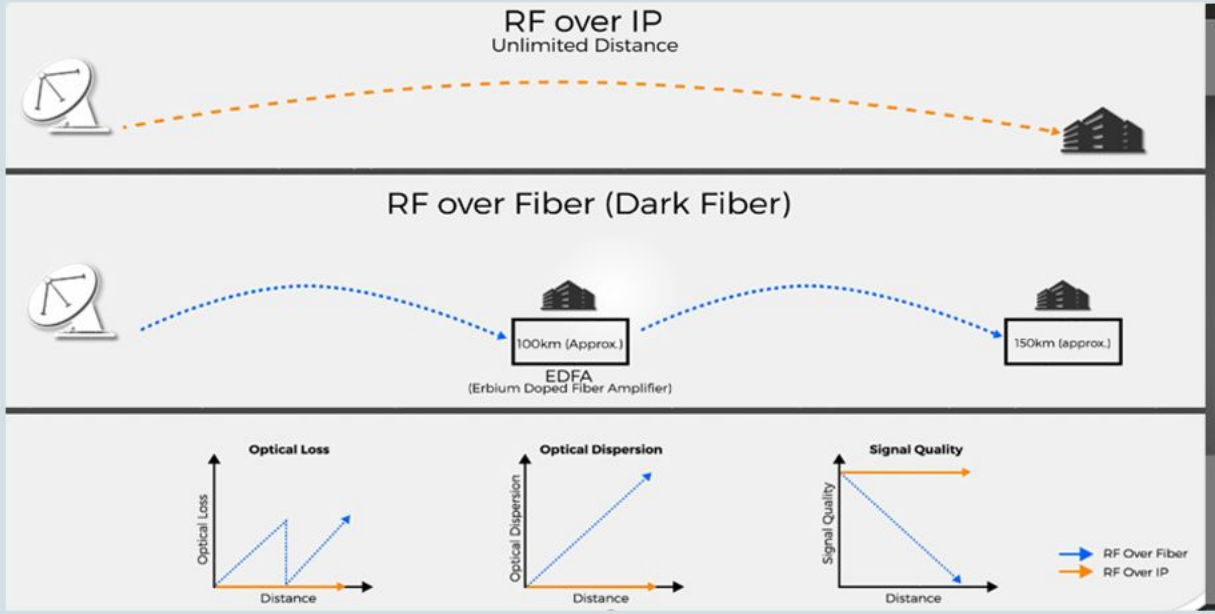
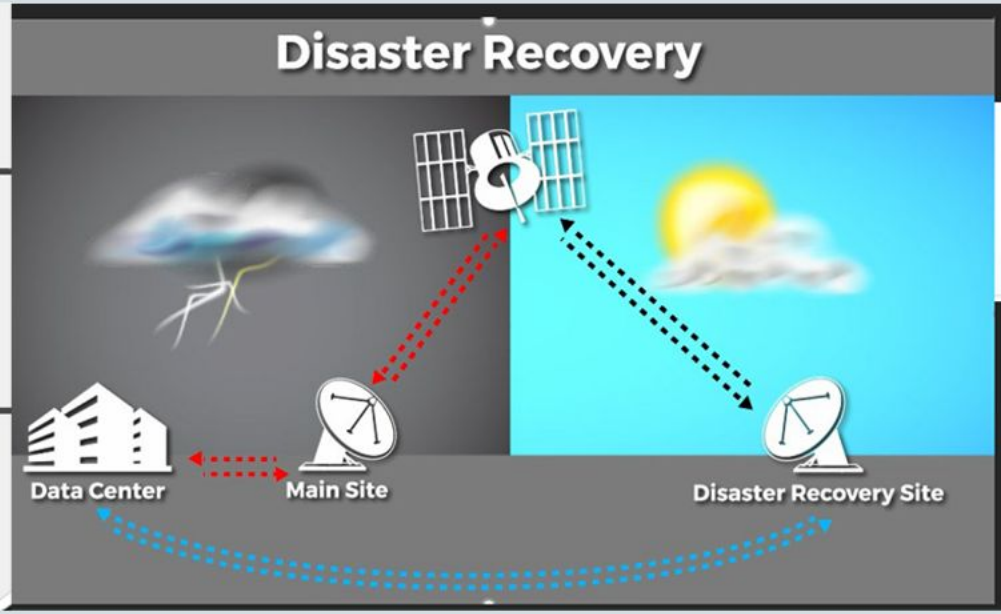
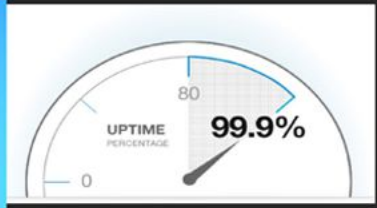
APPLICATIONS & BENEFITS: LONG HAUL TRANSPORT & DISASTER RECOVERY







- ✓ Guaranteed Service
- ✓ Meet strict SLA requirements

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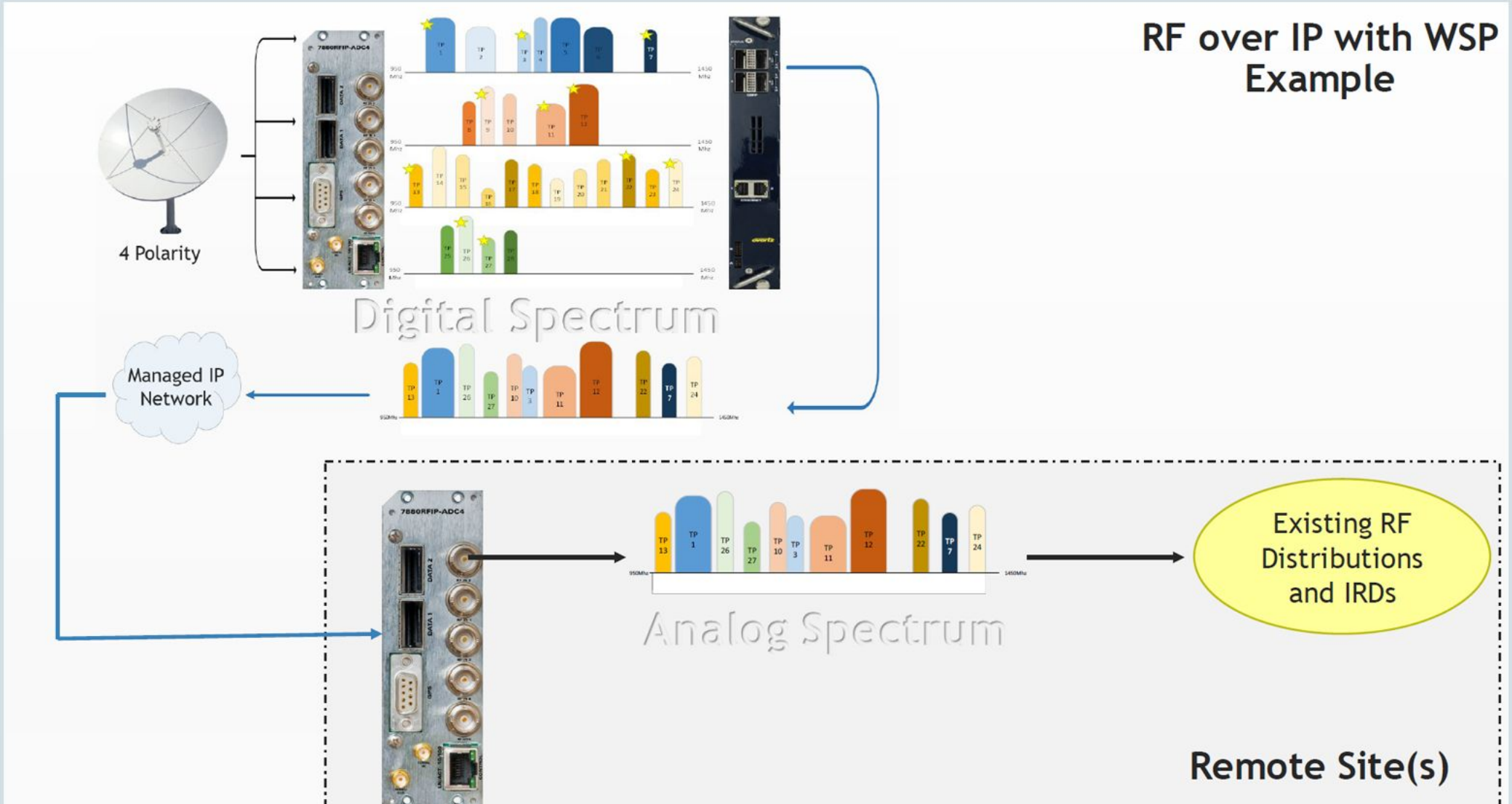
RF OVER IP WITH WSP EXAMPLE



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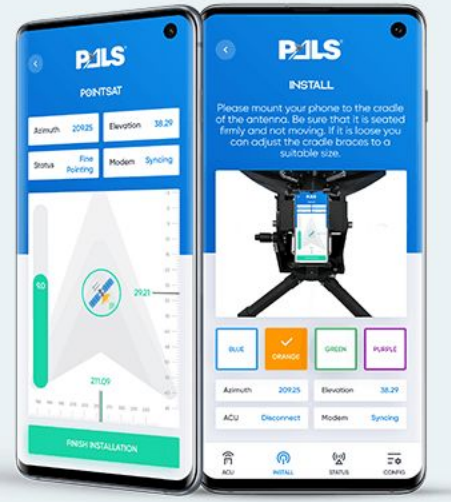
SYSTEM CONTROL & MONITORING SOFTWARE SOLUTIONS

SIGHT

VISION

POINTSAT



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VISION

- Scalable and modular system architecture
- Instant alarm/event monitoring and recording
- Extensive device driver library with virtualization of multiple M&C systems, all using the same intuitive interface
- GUI experience for all operators
- Increased customizability, simplicity and stability
- Antenna, Redundancy, Router, Redundancy Control Interface options
- Easy to troubleshoot system problems
- Live status monitoring for all equipment
- Password protected user level configuration (admin, operator, guest)
- Critical commands verification

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SIGHT

- Remote Monitoring
- Instant Reporting
- Web Interface
- Security Roles & Permisions
- Flexible to add more feature
- Real Time Notifications and Alarms
- Dashboard Customization
- Credential Management

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ACU ANTENNA CONTROL UNITS

AVAILABLE MODELS
PAC-500 / PAC-550MIL / PAC-700

- Integrated DVB-S/S2 Receiver
- Integrated 10 MHz Generator with Auto External Switching
- Military Grade GPS and GLONASS Receiver
- Integrated Beacon Receiver (Optional)
- Integrated De-Ice Controller with sensors (Optional)
- Emergency stop button
- More than 5000 Hours MTBF (MIL-HNDBK-217)
- Beacon receiver can be integrated and used simultaneously with DVB S/S2 receiver in same unit
- Fully responsive Web Interface (SNMP Support)
- User-configurable target pointing
- Satellite memory tracking
- 3 Level user access
- Event and alarm logging
- Build in self test

PALS MILITARY STANDARD MIL-STD-461F
PALS MILITARY STANDARD MIL-STD-188-164A
PALS MILITARY STANDARD MIL-STD-810G

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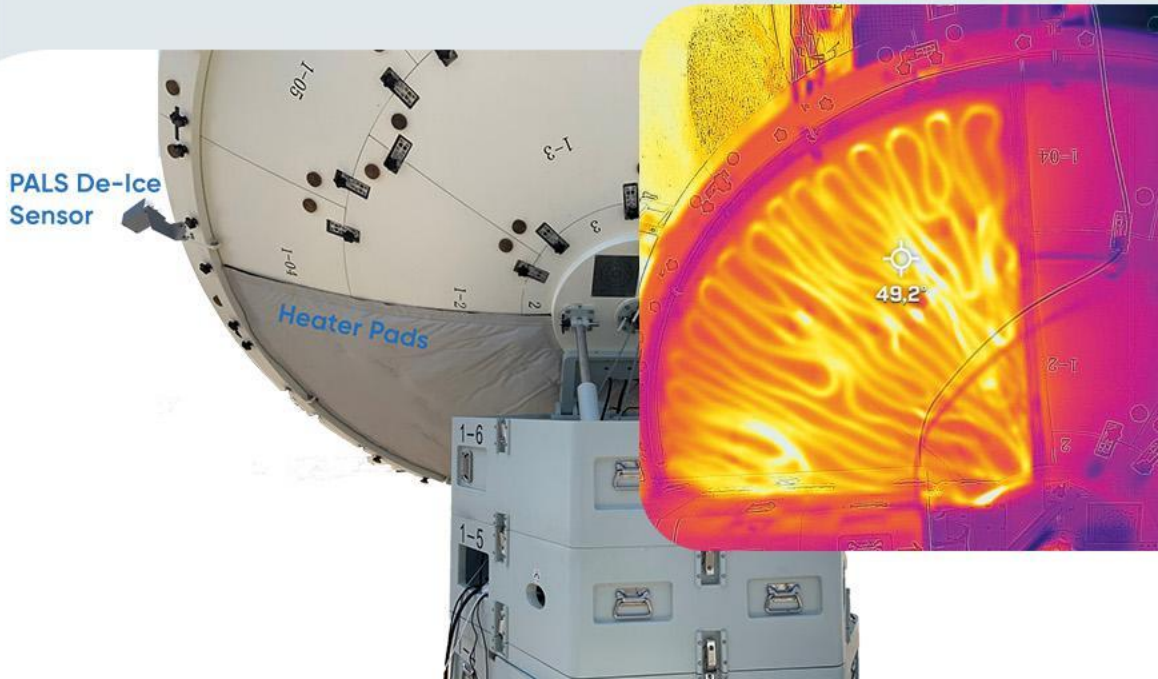
DE-ICE

The PALS De-icing system consists of a factory pre-wired control unit, heater pads for reflector coverage. All systems are engineered to be easily assembled, installed and operated.
The control unit has three modes of operation: Automatic, Manual Off, and Manual On. The Automatic mode allows the control to monitor the ambient temperature and sense the presence of precipitation. An ambient temperature of fewer than 4 degrees °C and the presence of precipitation activate heaters. The heaters will remain on for a factory preset time of one hour longer than conditions warrant. Control units are factory preset to operate on 120 to 240 volts single or three-phase powers. The larger systems have a control unit with a remote snow sensor.
The heater pads consist of heater wire sandwiched between layers of aluminum foil and high-density isolation material under outdoor ecstatic fabric. Heater pads allow for a faster install without the need for templates. Watt density of the heater pads, depending on the reflector, is standard 360 w/m^2 with 700 w/m^2 high version. The aggressive acrylic adhesive adheres to a variety of substrates and will not release when pad temperature increases. Heater blankets have water-resistant military-compliant connectors that plug into the cables from the control unit.

* PALS PAC-550 antenna control unit is compatible with PALS De-Ice System and it can control it without PALS De-Ice Controller.



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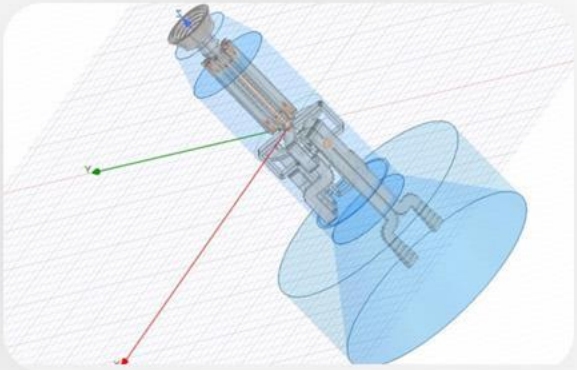
PASSIVE COMPONENTS

PALS Passive Components are being integrated to PALS Antennas for years. Their insertion lose is low but RF performance is high.

Durable aluminum structed PALS Dummy Loads has a cooling capacity. PALS Rotary joints has a high RF performance and has very low input & output lose.

TX and RX Reject Filters in X-Band has very high rejection values and has a very low input & output lose. Band pass and band stop filter models are available.

The flanges of the passive components are complied with all standards around the world.



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HYBRID NETWORK SOLUTIONS

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IP MESH NETWORK SYSTEM (L and C Band Products)

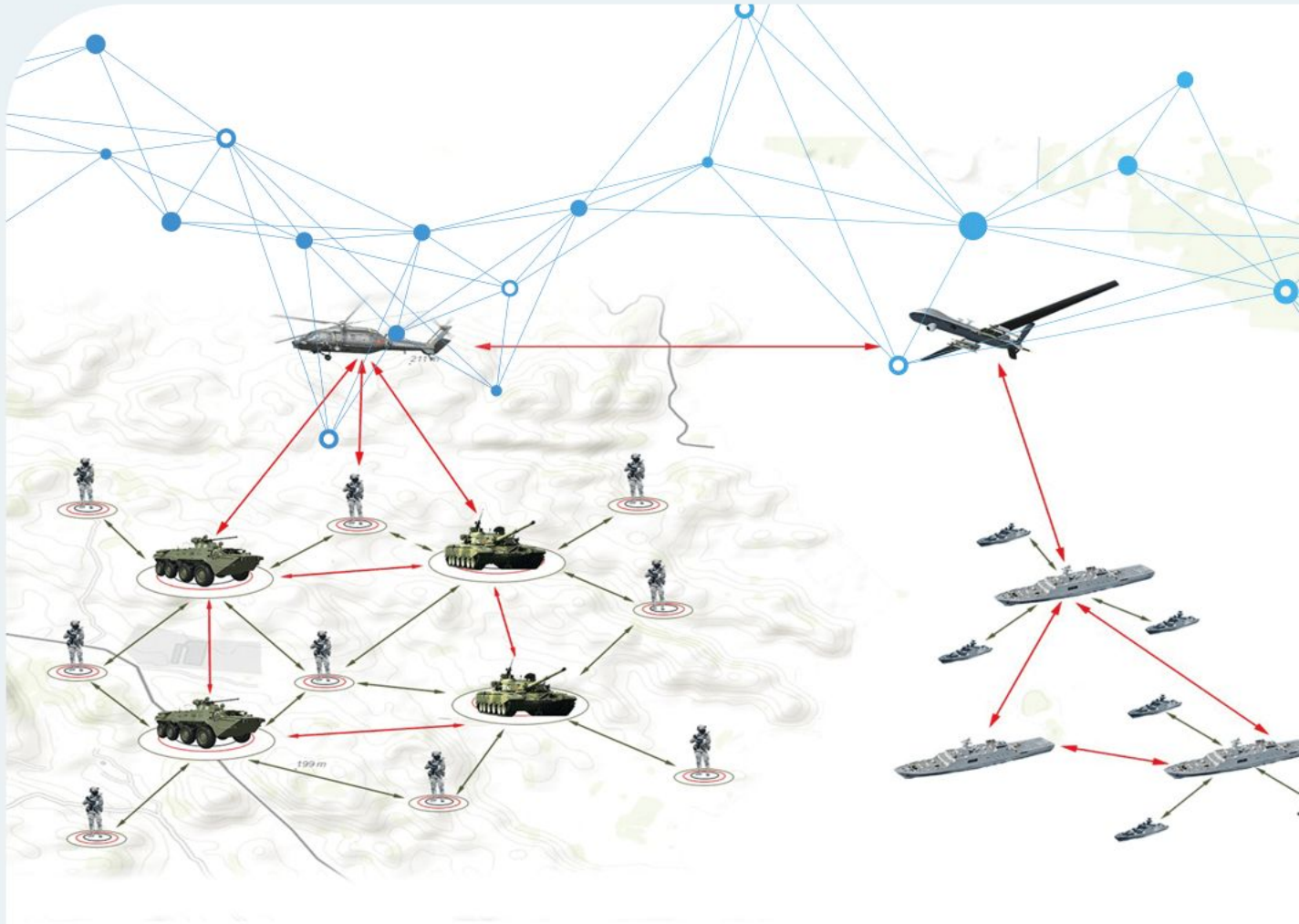
MAN-PACK
(Customized Options)

HAND-HELD
(Customized Options)

AIRBORNE/VEHICLE
(Customized Options)

COMMAND STATION
(Customized Options)

VEHICLE RUGGER
(Customized Options)



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Emergency, Border Security and Surveillance Mesh Communication Smart Solutions

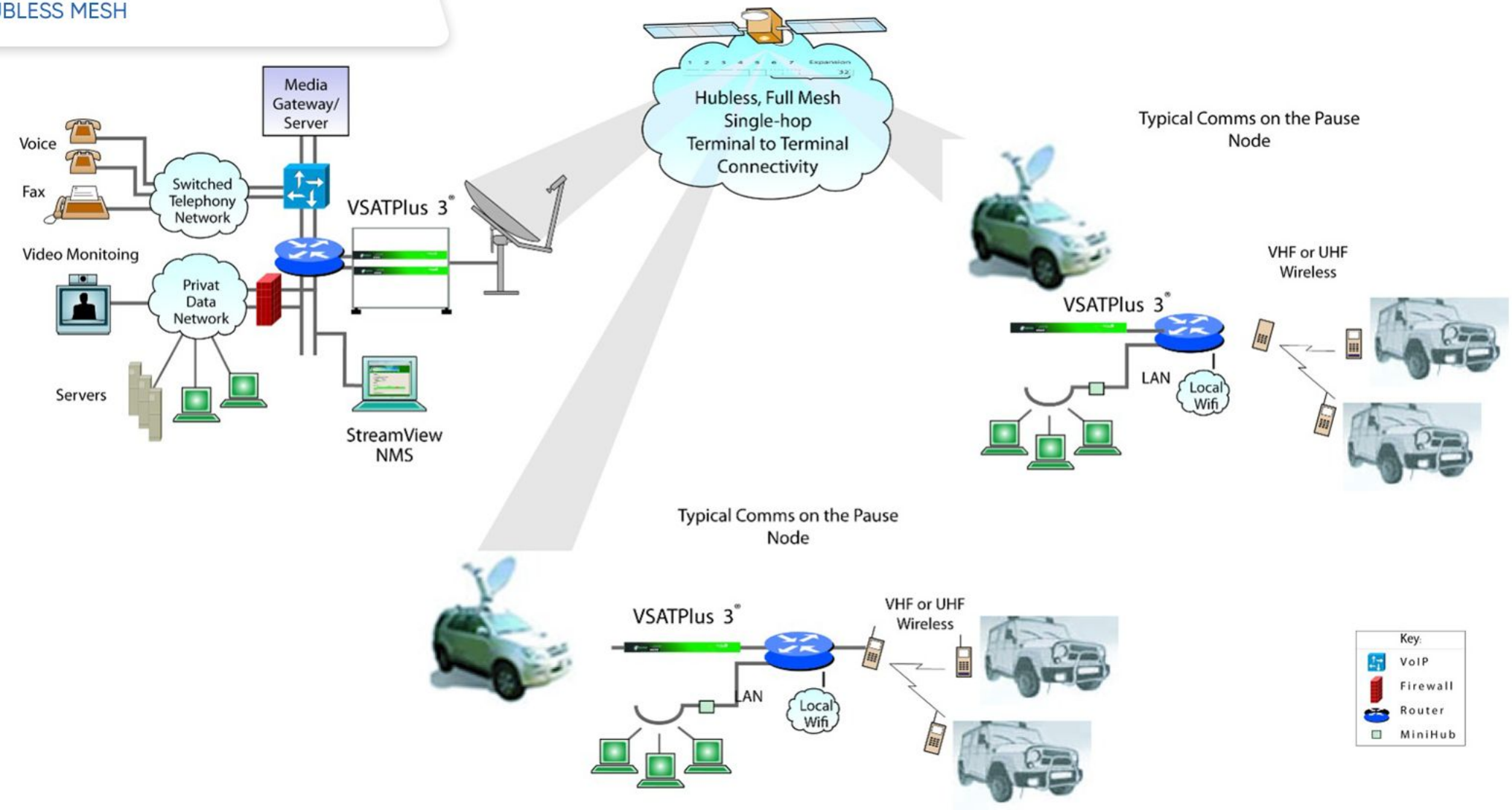
The smart unattended station consists of a system platform, satellite communication terminal, AI-powered intelligent identification video head, photovoltaic power supply system, and a smart monitoring box. It offers connectivity through WiFi, 4G base stations, AD hoc fusion communication modules, and various sensors, making it suitable for areas with limited or no network coverage.

Applications:
Versatile Usage: Ideal for energy, forestry, water conservancy and hydrology, and tailings management.
Advanced Services: Provides visual data transmission, intelligent AI early warning, and identification services.
Emergency Communication: Ensures coverage for inspection personnel and emergency command during network, power, or circuit disruptions.

Automatic High-Throughput Satellite Antenna enables one-click, automatic network access with maintenance-free operation.

UNIFIED COMMUNICATION SYSTEMS

SATELLITE HUBLESS MESH



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EARTH STATION LEO SATELLITE X/Y TRACKING SOLUTIONS

LEO Satellite X/Y Tracking

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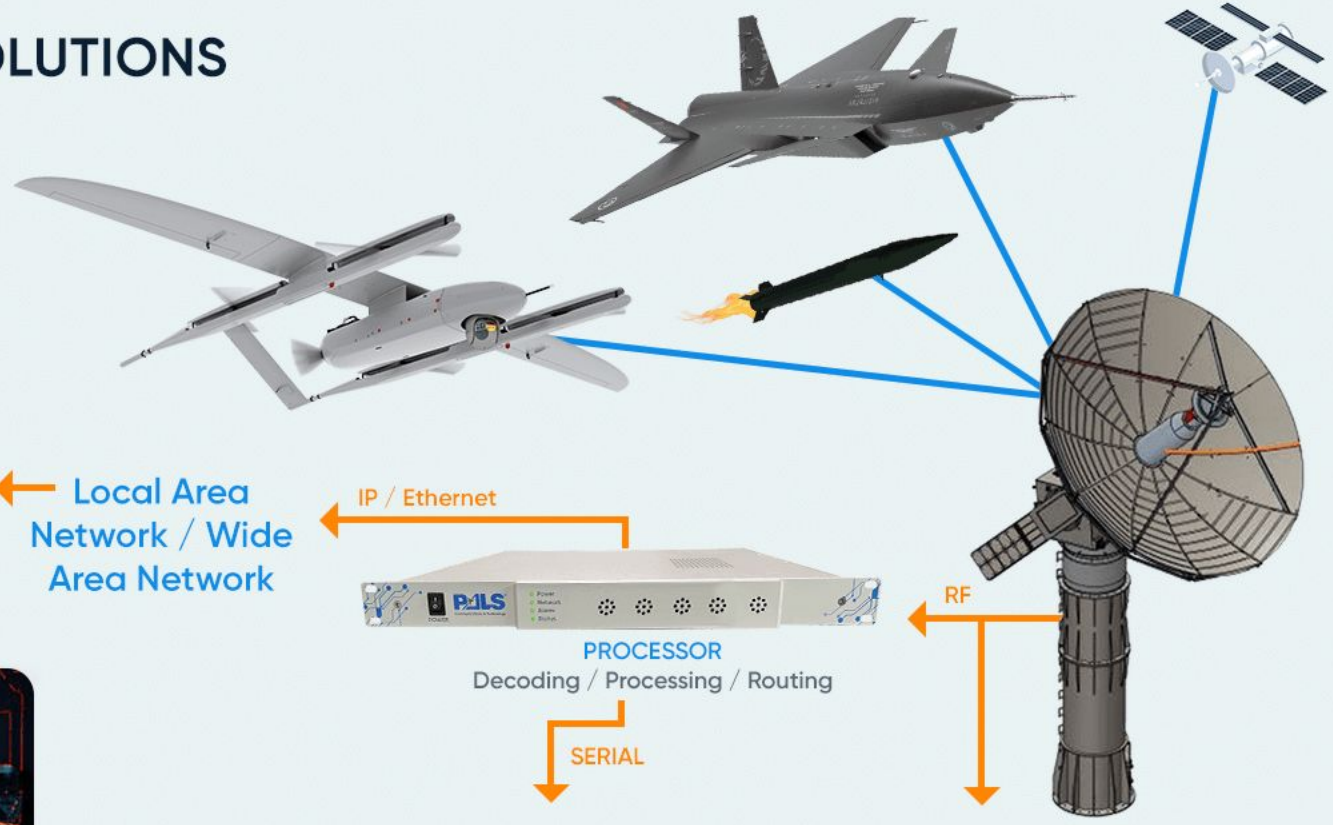
TELEMETRY & TRACKING SYSTEM SOLUTIONS

CONTROL COMMAND CENTER



Monitoring Software

Local Area Network / Wide Area Network

IP / Ethernet

PROCESSOR

Decoding / Processing / Routing

RF

SERIAL

RECEIVER

ANTENNA CONTROL UNIT

Data Analysis Software

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MISSION CRITICAL COMMUNICATION AND COMMAND CENTER SOLUTIONS

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MOBILE AND SHELTER SYSTEM SOLUTIONS

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OUTSIDE BROADCASTING SOLUTIONS

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PALS PROJECT & MANUFACTURING PROCESS

- Project Management
- Quality Management
- Configuration Management
- Risk Management Plan
- Detailed Work Schedule
- Critical Design
- Technical Requests Verification Matrix
- Test Evaluation Plan
- Critical Design Verification Plan
- Prototype Approval Test and Verification Plan
- COTS Technical Document Set of Configuration Unit
- Installation and Commissioning Test and Acceptance Plan
- Reliability, Availability, and Maintainability Analyzes and Plans
- Logistics Support Plan
- Test and Measurement Instruments Technical Documents
- Training Plan
- System Engineering

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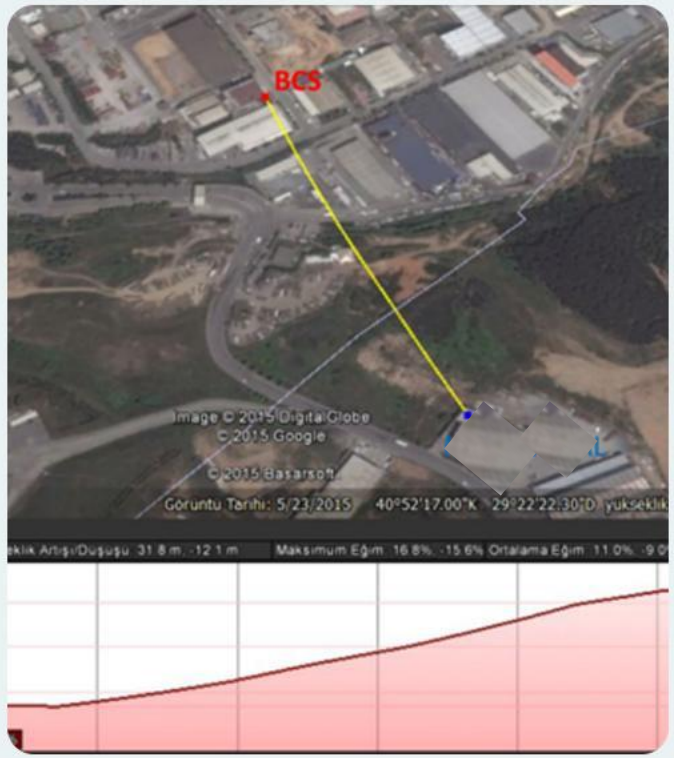
FAR FIELD PLATFORM

FAR Field Test Range



FAR FIELD TEST

Far-field antenna test is the most reliable method to extract radiation pattern of an antenna. It leaves no room for estimation or predictions and provides most accurate RF data about antenna which manufactured. Therefore it is vital part of antenna qualification to comply international radiation and Q&A standards. PALS has it's own far-field testing capabilities and puts every antenna PALS manufactured in far-field tests in order to make sure customers have their products at top quality.

MILITARY TESTS

PALS applies military tests to each military products with the guidance of PALS military standart test engineers.

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Enviromental Test

MIL-STD-810G	Method 501.5	High Temperature
MIL-STD-810G	ESOG-120	WIND SPEED
MIL-STD-810G	Method 506.5	RAIN
MIL-STD-810G	Method 507.5	HUMIDITY
MIL-STD-810G	Method 505.5	SOLAR RADIATION
MIL-STD-810G	Method 516.5	SHOCK
MIL-STD-810G	Method 510.5	Sand and Dust
MIL-STD-810G	Method 503.5	Thermal Shock
MIL-STD-810G	Method 521.3	Icing and Freezing Rain Testing

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EMC / EMI Tests

MIL-STD-461F	CE102
MIL-STD-461F	CS101
MIL-STD-461F	CS114
MIL-STD-461F	CS115
MIL-STD-461F	CS116
MIL-STD-461F	RE102
MIL-STD-461F	RS103

Acoustics Tests

MIL-STD-1472

RF Tests

MIL-STD-188-164A

ITU-RS-580

ITU-RS-465-6

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