



Communications
& Technology

SOLUTIONS & COMPANY PROFILE





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 its 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 indigenous technologies to the market innovatively. Our values are "Honesty, Reliability, Customer-Oriented, Innovation, Quality"

PALS LOCATIONS



THE REPUBLIC OF TURKEY
MINISTRY OF FOREIGN AFFAIRS

95091151-520.55-2021/32847542

FACILITY SECURITY CLEARANCE CERTIFICATE (FSCC)

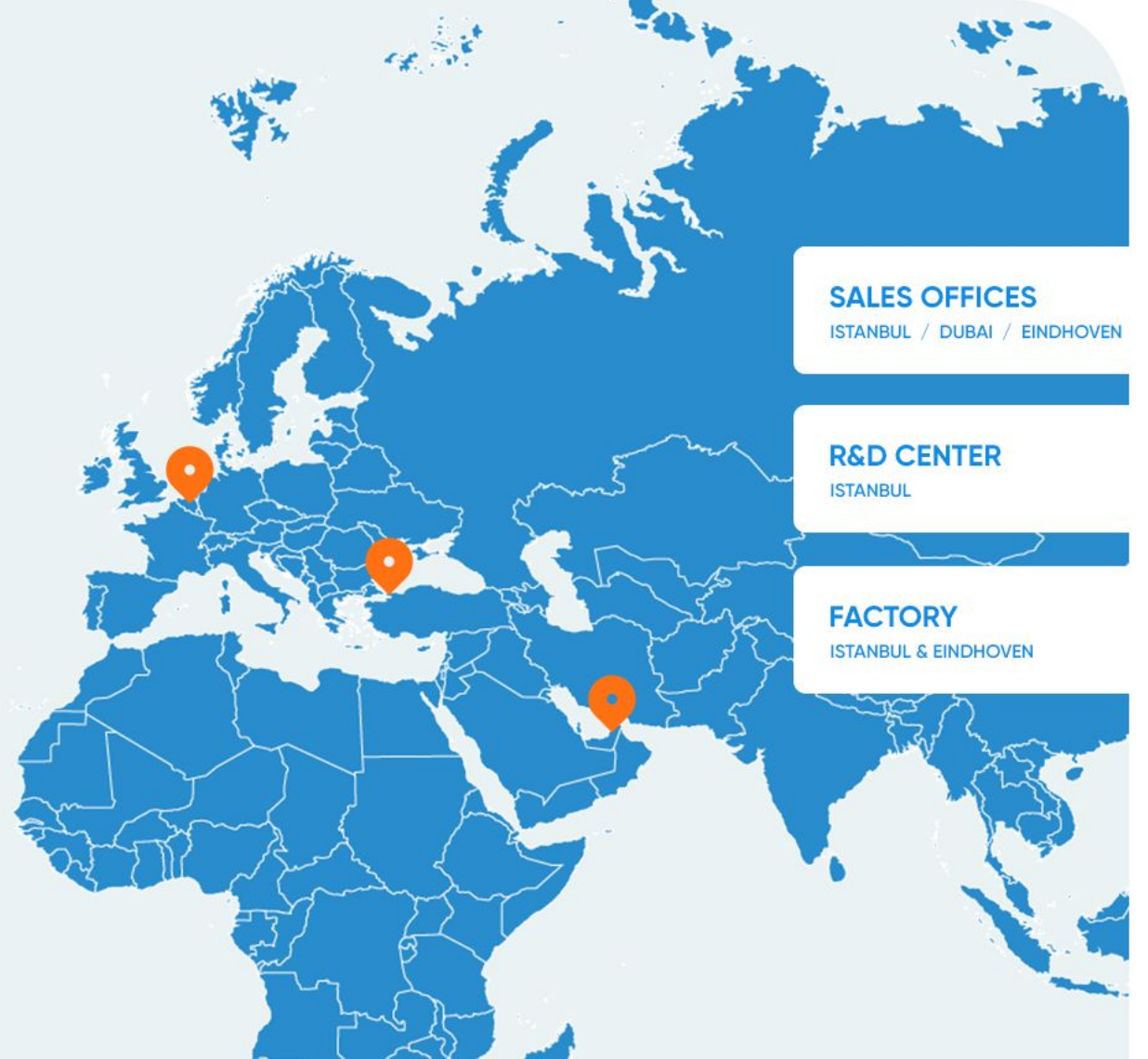
This is to certify that facility security clearance was granted to Pals Elektronik Sanayi ve Ticaret Ltd. Şti. (located at Dudullu OSB Mahallesi 1. Cadde Onaysan Apt. No:18/1 Ümraniye/İSTANBUL) by the National Security Authority of the Republic of Turkey on **1 June 2021** in accordance with the provisions 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 ERZİ

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



SALES OFFICES

ISTANBUL / DUBAI / EINDHOVEN

R&D CENTER

ISTANBUL

FACTORY

ISTANBUL & EINDHOVEN



PALS PRODUCT CAPABILITIES

SATCOM PRODUCTS

Earth Station Antennas

SOTM Antennas

SOTP Antennas

Man-Pack Antennas

Fly-Away Antennas

Transportable Antennas

X/Y Antennas

Fixed / Motorized Antennas

Antenna Control Unit



SYSTEM INTEGRATION CAPABILITIES

EARTH STATION

Installation
Retrofit & Relocation



MOBILE / SHELTER

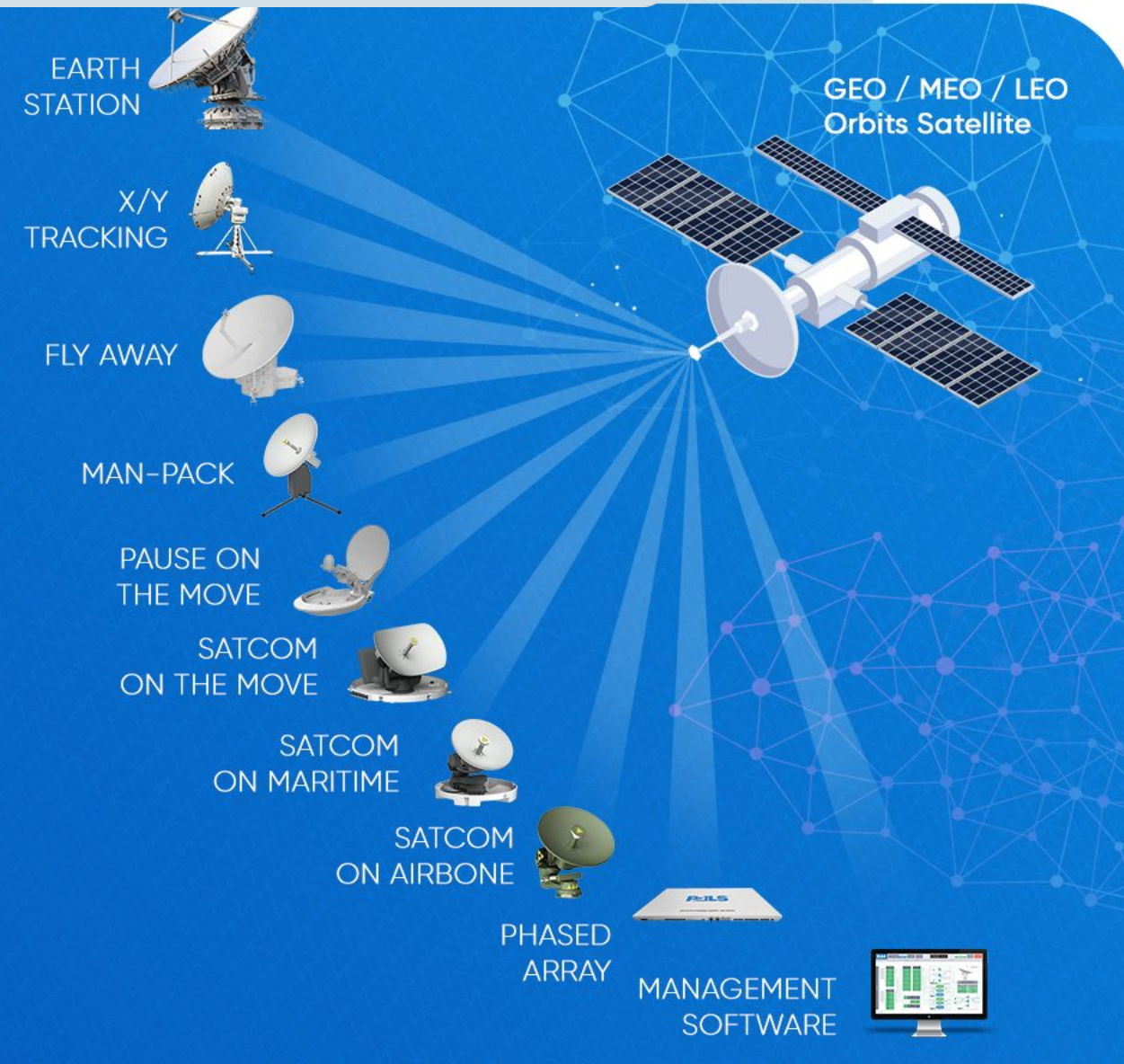
Mission Critical
DSNG / OB-Van
Shelter



HYBRID NETWORK SOLUTIONS

COFDM - IP MESH
LTE / 5G NTN





Your End-to-End SATCOM Partner

We design, develop, manufacture, and test state-of-the-art SATCOM antennas.

- ✓ Every product is tested to rigorous commercial & military standards.

COTS Antennas for Global Deployment:

- ✓ Mobile: On the Pause & On the Move Systems
- ✓ Portable: Fly-Away & Man-Pack
- ✓ Fixed Motorized & Earth Stations with GEO/LEO Tracking
- ✓ Advanced Technology: Phase Array Technology
- ✓ Military Grade Antenna Control Units
- ✓ Network (NMS) & Environmental (EMS) Monitoring & Management Systems.
- ✓ From Architecture to Turnkey Delivery complete system design & integrated turnkey projects
- ✓ Beyond our portfolio, we specialize in fully customized products



SOTM - Land, Marine, Air



Starts with 0.35m up to 1.0m

- ✓ Supports X, Ku, and Ka-Bands
- ✓ 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
- ✓ 3-Axes stability 4-Axes tracking system
- ✓ Defines zones in azimuth for transmission lock to manage blockages
- ✓ Transmit Lock is achievable through both hardware and software settings
- ✓ Supports automatic satellite switching via OpenAMIP (Automatic Beam Switch)
- ✓ Military version is available

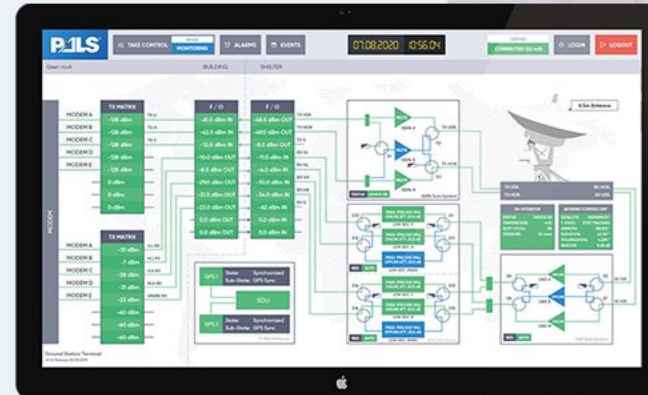


EARTH STATIONS



Starts with 1.8m Up to 13m

- ✓ S, C, X, KU, DBS, KA, Q and V Bands options are available
- ✓ 400° or full 360° continuous Azimuth rotation
- ✓ Servo motors azimuth and elevation drivers
- ✓ Structure Type: A+E type, A+E-T type, X-Y Type
- ✓ Full-motion option is available
- ✓ Entirely zero-backlash mechanical drive system
- ✓ Inclined orbit tracking
- ✓ Optional beacon tracking
- ✓ Optional low consumption De-Ice
- ✓ Military version is available
- ✓ Uplink Control System
- ✓ Optional Equipment Shelter



FLY-AWAY



Starts with 1.80m Up to 3.70m

- ✓ Splash plate antenna with segmented reflector
- ✓ Carbon-Fiber reflector with light weight, high strength
- ✓ one person can finish the installation within 2 minutes
- ✓ Easy acquisition without any training and tools
- ✓ Fast and high-quality transmission at anytime and anywhere
- ✓ Stable tripod and High resistance for toughest weather conditions (wind, rain, sun...) support legs
- ✓ Support Ku and Ka Band as an option





MAN-PACK SERIES

Auto/Motorized



Starts with 0.60m Up to 1.20m

- ✓ X, Ku, Ka, DBS Band options are available
- ✓ LEO/MEO Overhead Tracking Option
- ✓ Lightweight, high-strength carbon-fiber reflector with an accuracy of R.M.S 0.25mm
- ✓ 3-Axes simultaneous motorisation
- ✓ Integrated GPS, Compass, Beacon / DVB Receiver
- ✓ Integrated / External modem (iDirect, Comtech, Newtech, Hughes)
- ✓ Supports OpenAmp
- ✓ IATA Standart Back-Pack
- ✓ Encryption Option
- ✓ Optional 4G / 5G / LTE supported modem for load balancing and bonding solutions
- ✓ Wind resistance (120 km/h survival) - (72 km/h operational)



MAN-PACK SERIES

Manual & Accesories

- ✓ X, Ku and Ka Band Available
- ✓ Integrated Sat-Finder and Modem Box
- ✓ High resistant Carbon-Fiber tripod support legs
- ✓ Powered by Mains or Battery
- ✓ Integrated / External modem (iDirect, Comtech, Newtech, Hughes)
- ✓ Encryption Option

SAT-FINDER

- ✓ Confident Satellite Identification Using Beacon Signals and DVB-S Signatures
- ✓ Integrated GPS module to provide accurate antenna location data
- ✓ Supports TCP/IP wireline access control

PSM-1200

- ✓ High-speed broadband iP connectivity over satellite using VSAT
- ✓ Provides advanced routing, VLAN, and other IP-based user services
- ✓ Supports DVB-S2/S2X and ACM on the outbound and A-TDMA on the inbound





ON THE PAUSE



Starts with 0.74m Up to 2.40m

- ✓ C, X, KU, KA, DBS Band options are available
- ✓ 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
- ✓ Manual drive tool kit for emergency situations
- ✓ High gain and very good cross polar rejection (> 35 db)
- ✓ Optional hand-held control unit





TRANSPORTABLE & FOLDABLE



Starts with 2.4m Up to 7.3m

- ✓ Modular Multi-Band Capacity (C, X, Ku, Ka Bands)
- ✓ Elevation over Azimuth Antenna tracking system
- ✓ High-Accuracy GPS & Anti-Interference Electronic Compass
- ✓ Single 10-20ft (6M) ISO 1C skid configuration
- ✓ Multiple mounting options for different platforms
- ✓ Supports manual and auto tracking features
- ✓ High-Accuracy GPS & Anti-Interference Electronic Compass
- ✓ Convenient installation with different mounting platform options
- ✓ Side wing electrical deploy and stow
- ✓ High gain, low side-lobe, high accuracy and very good cross-pol rejection
- ✓ High accurate GPS and anti-interference electronic compass
- ✓ Manual drive tool kit for emergency situations
- ✓ Optional Beacon Tracking
- ✓ Optional De-Ice System



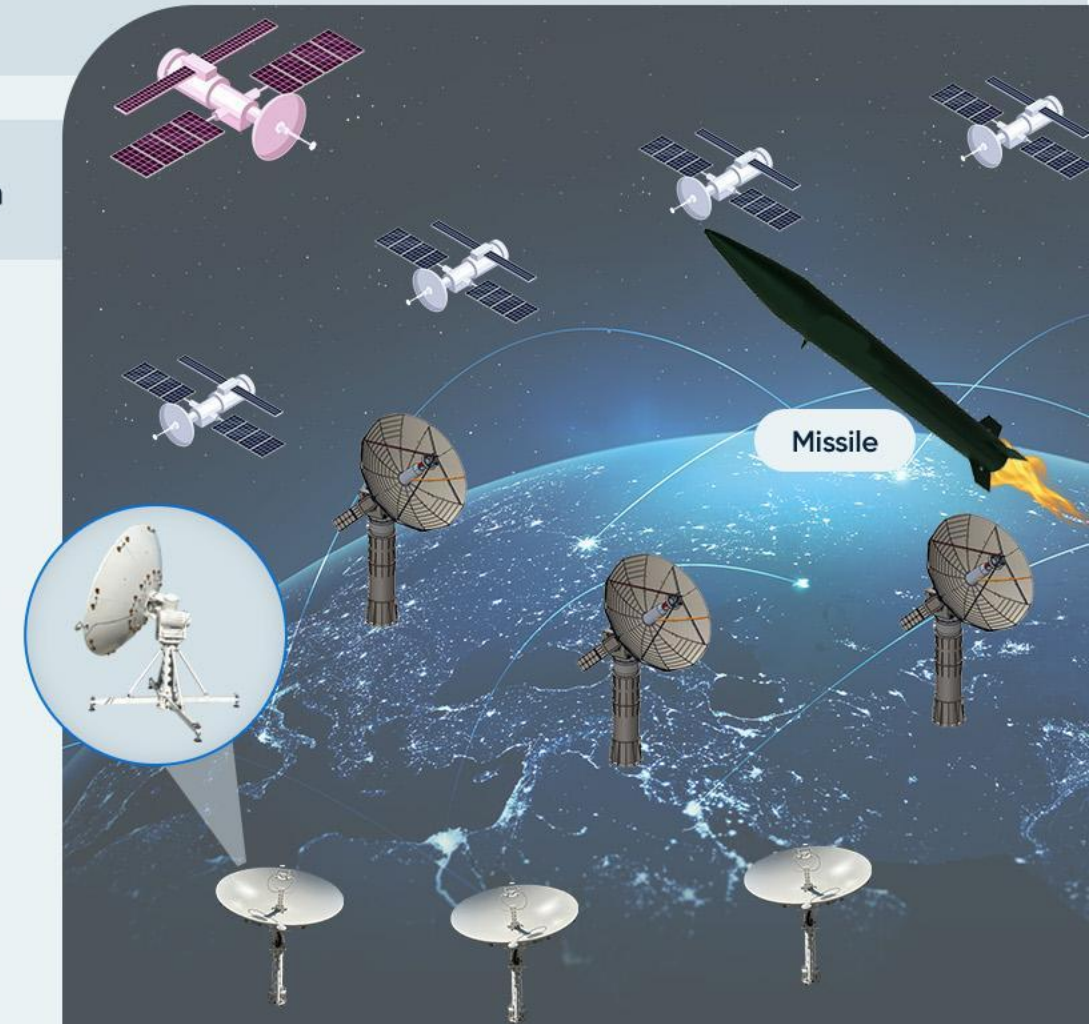


X/Y TRACKING SOLUTIONS



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





PKA SERIES



0.74m, 0.98m, 1.20m

- ✓ Intelligent Satellite + GSM Auto-Switch
- ✓ Optional 4G / 5G / LTE Modem
- ✓ Load Balancing & Bonding Ready
- ✓ One-Touch Operation
- ✓ Fast & Easy Vehicle Integration
- ✓ Open AMIP Compatible
- ✓ The PKA Series features dual-transceiver support for Newtec, Hughes and any state of art modems modem platforms
- ✓ Its advanced IP Router includes dual Nano-SIM/eSIM for global cellular failover and local network management



PHASE ARRAY ANTENNA



MODELS:
SOTM/ UAV /HYBRID

- ✓ Electronic beam scanning delivers unparalleled beam tracking speed
- ✓ Supports multi-waveform Open AMiP compatible modems
- ✓ GEO/MEO/LEO interoperability with
- ✓ Simplified Installation
- ✓ Seamless Connectivity
- ✓ Flexible Network Integration
- ✓ SAR System Compatibility
- ✓ Enhanced Accuracy





MAN-PACK OTM

- ✓ 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

PPA-IOT

- ✓ Flexible Network Integration
- ✓ Rapid Deployment
- ✓ SAR System Compatibility
- ✓ Enhanced Accuracy
- ✓ Reliable design requiring no recalibration and minimal servicing



SYSTEM CONTROL & MONITORING SOFTWARE SOLUTIONS

 **SIGHT**



 **VISION**

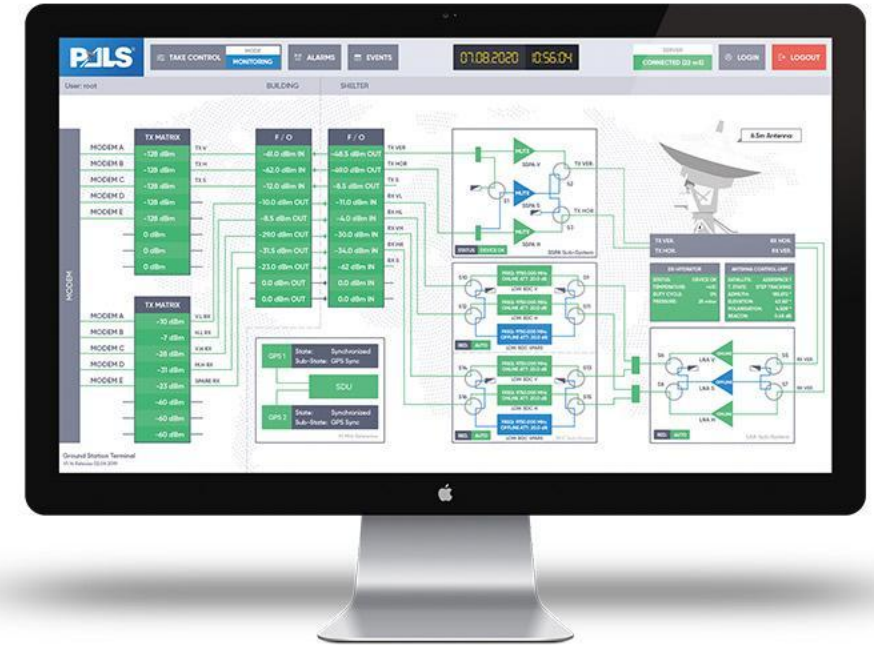


POINTSAT



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



SIGHT

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



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





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.

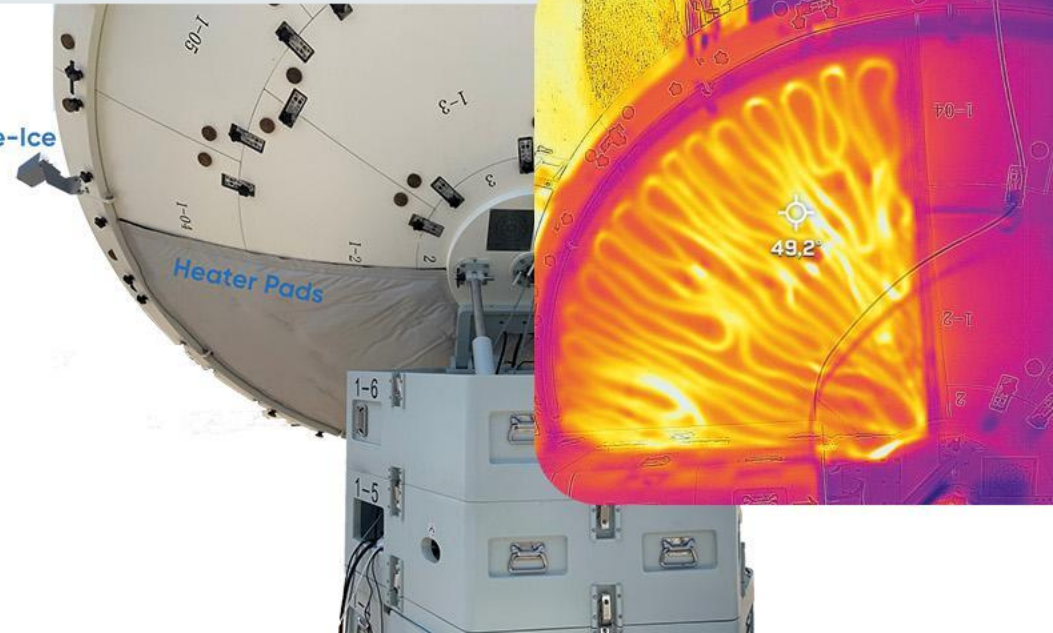
The control unit has three modes of operation: Automatic, Manual Off, and Manual On. The Automatic mode allows the control to monitor the ambient temperature and sense the presence of precipitation. An ambient temperature of fewer than 4 degrees °C and the presence of precipitation activate heaters. 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 ecstastic 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/m² with 700 w/m² 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.



PALS De-Ice
Sensor





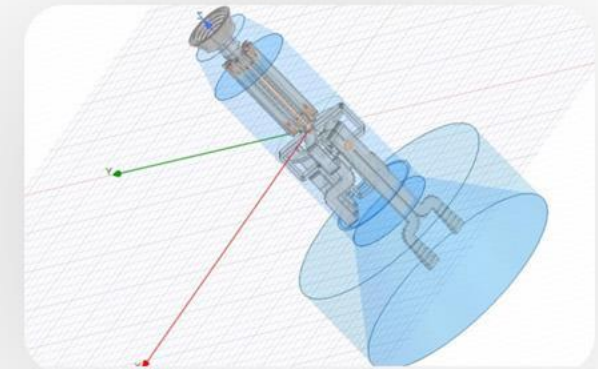
PASSIVE COMPONENTS

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

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

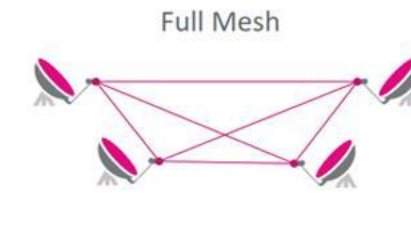
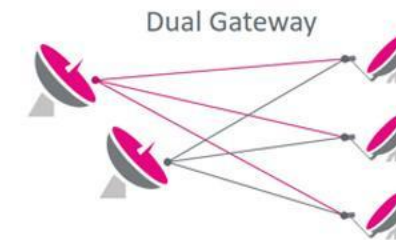
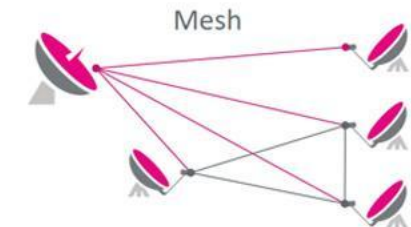
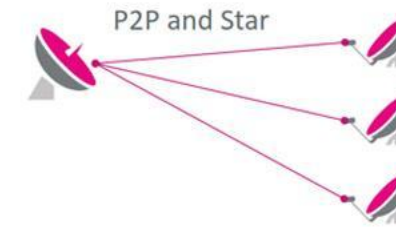
TX and RX Reject Filters in X-Band has very high rejection values and has a very low input & output loss. Band pass and band stop filter models are available.

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



MODEM SOLUTIONS

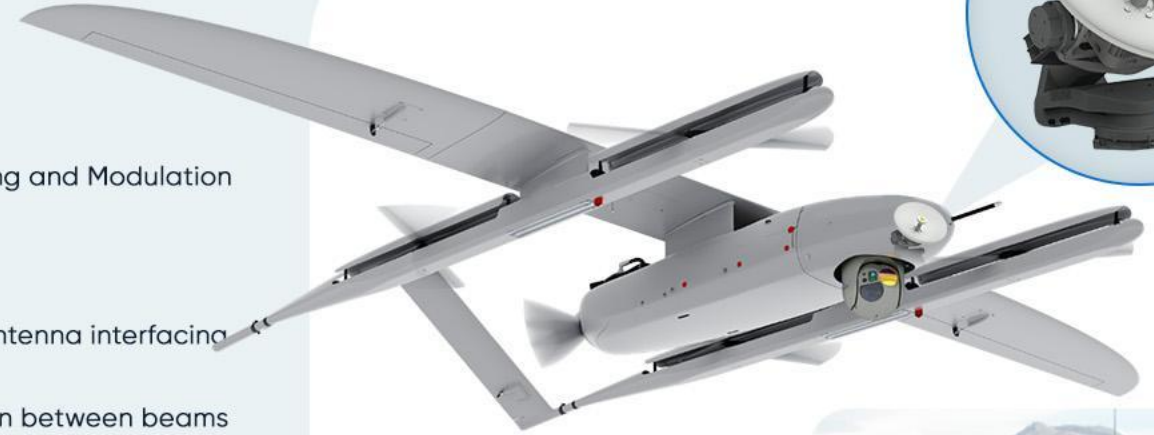
- ✓ Universal Hardware Platform: Available in various enclosures
- ✓ Software-Activated Features (remotely activated and transferable) allowing for flexible and scalable functionality adjustments;
 - ✓ Scalable Virtual Smart HUBs
 - ✓ Dynamically assigned network roles
 - ✓ Smart redundancy and diversity
 - ✓ 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)





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 rapidly
- ✓ Load balancing of channels and beams with predefined priorities
- ✓ Satellite Router Board is designed for seamless integration into antennas



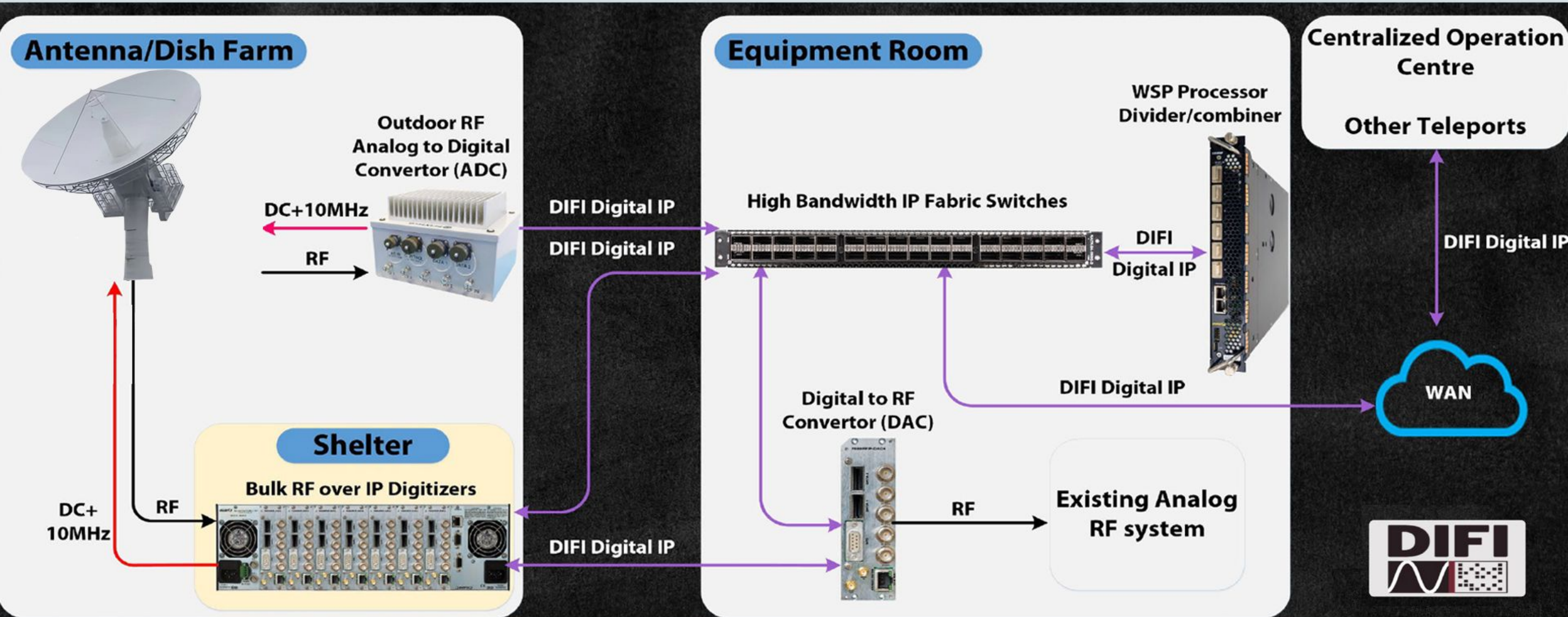


MODEM SOLUTIONS - MISSION CRITICAL

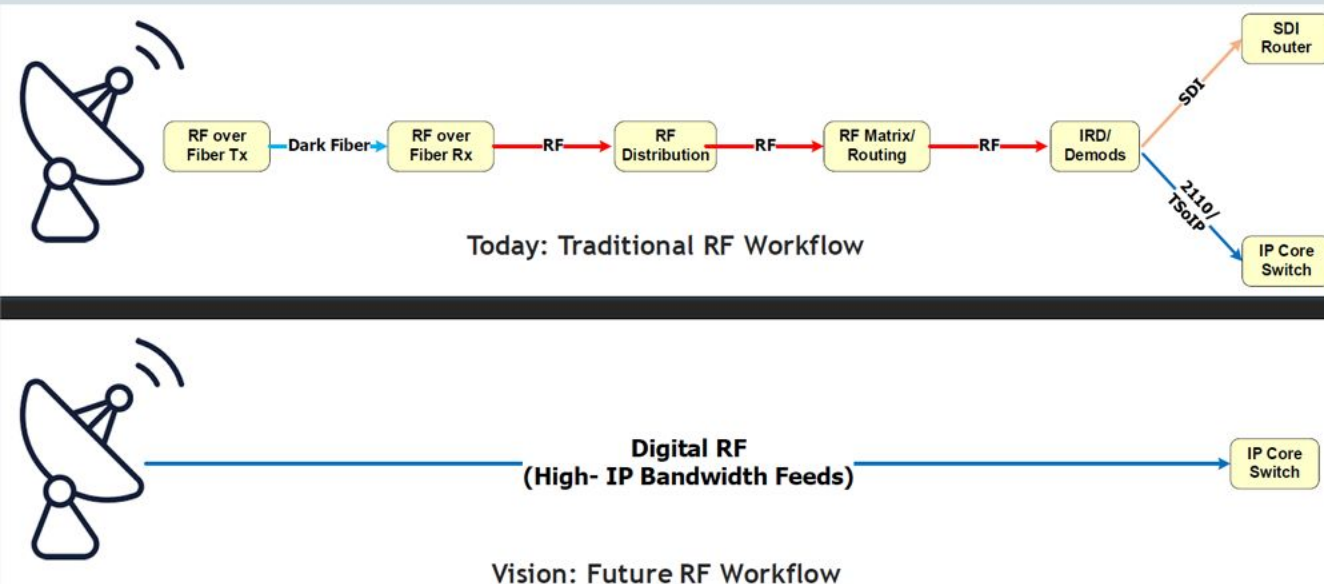
- ✓ Dynamic topologies and M:N redundancy for enhanced reliability
- ✓ Designed for seamless integration with manpack antenna systems
- ✓ Ultra-Fast Startup for rapid initialization and operation across extended temperature ranges
- ✓ Superior network Reliability and Survivability in various conditions
- ✓ 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



END TO END DIGITAL RF OVER IP SOLUTIONS



RF EVOLUTION: GAME CHANGE IN RF INDUSTRY AND ITS CHALLENGES



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 (highlighted in green)
Uplink or Military/Gov (highlighted in orange)



Digitization of unwanted Transponders

➤ Waste of IP Bandwidth

WHO NEEDS RF OVER IP SOLUTIONS



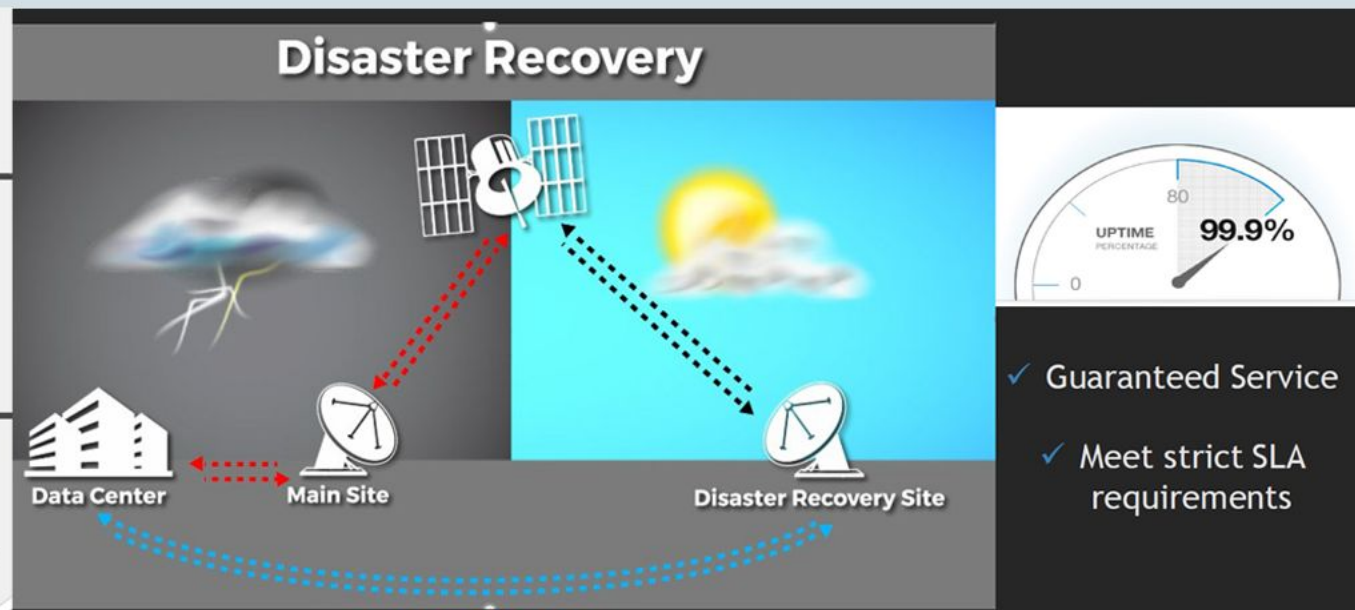
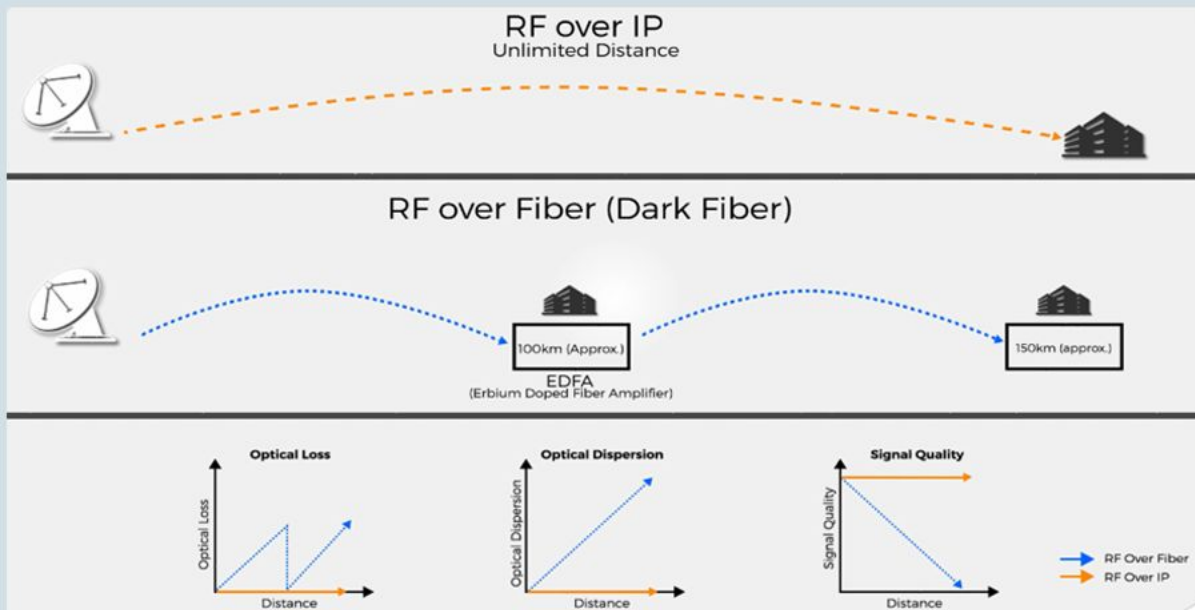
Existing Customers with a DWDM RF over Fiber System

Customers with Disaster Recover (DR) sites Teleports and Broadcasters

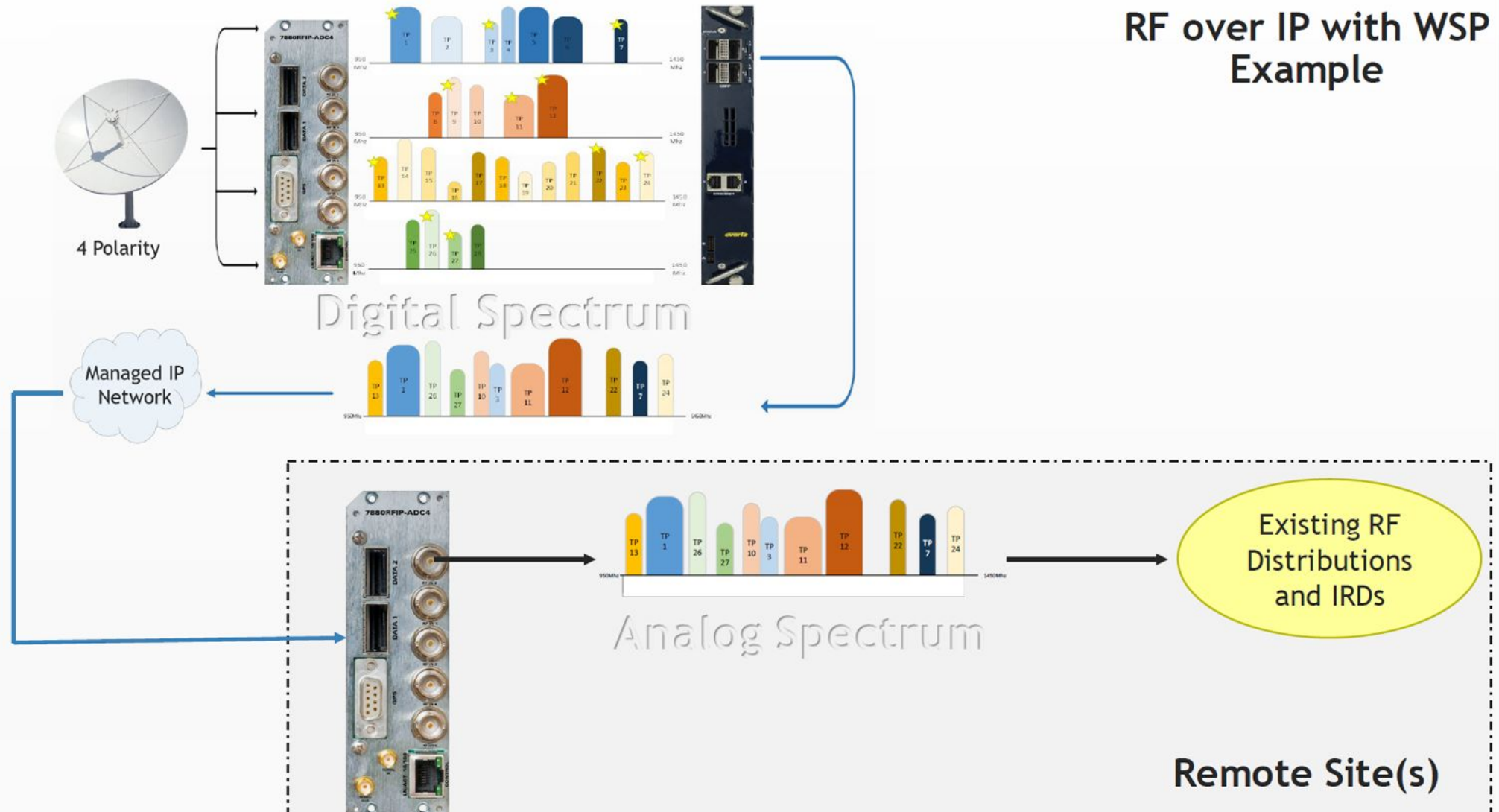
Telecommunication Providers

Government and Defense

APPLICATIONS & BENEFITS: LONG HAUL TRANSPORT & DISASTER RECOVERY



RF OVER IP WITH WSP EXAMPLE





HYBRID NETWORK SOLUTIONS

IP MESH / COFDM
MULTIDIMENSIONAL NETWORKING

Reconnaissance UAV

Patrol Vehicle

Soldier

Patrol Vehicle

GEO / MEO / LEO
Satellites

www.pals.com.tr

Satellite & Integrated Tactical Radio Communications

SATELLITE ▼

COFDM ▼

LTE/5G ▼

MESH ▼



IP MESH NETWORK SYSTEM (L and C Band Products)

MAN-PACK (Customized Options)



HAND-HELD (Customized Options)



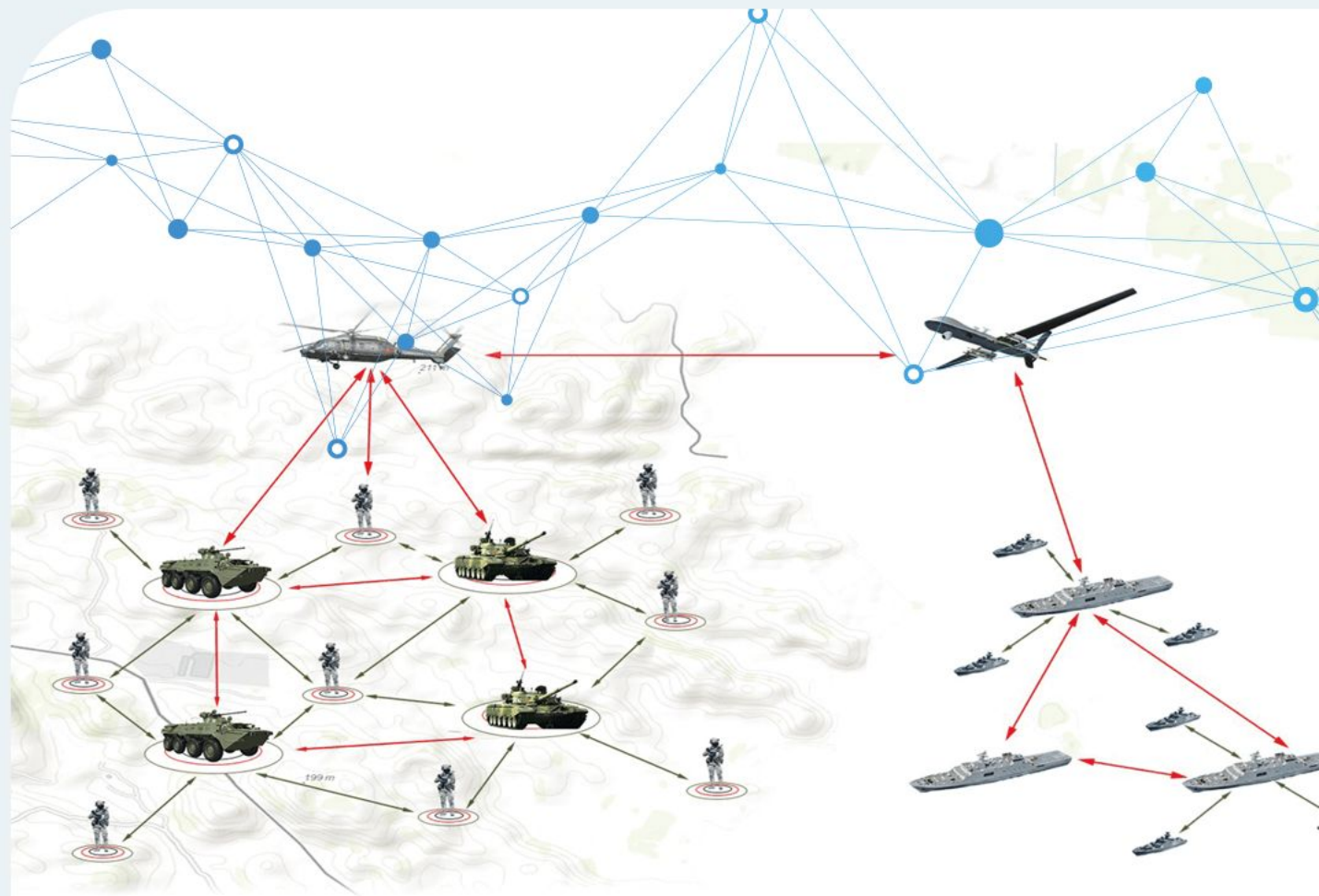
AIRBORNE/VEHICLE (Customized Options)



COMMAND STATION (Customized Options)



VEHICLE RUGGER (Customized Options)





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.

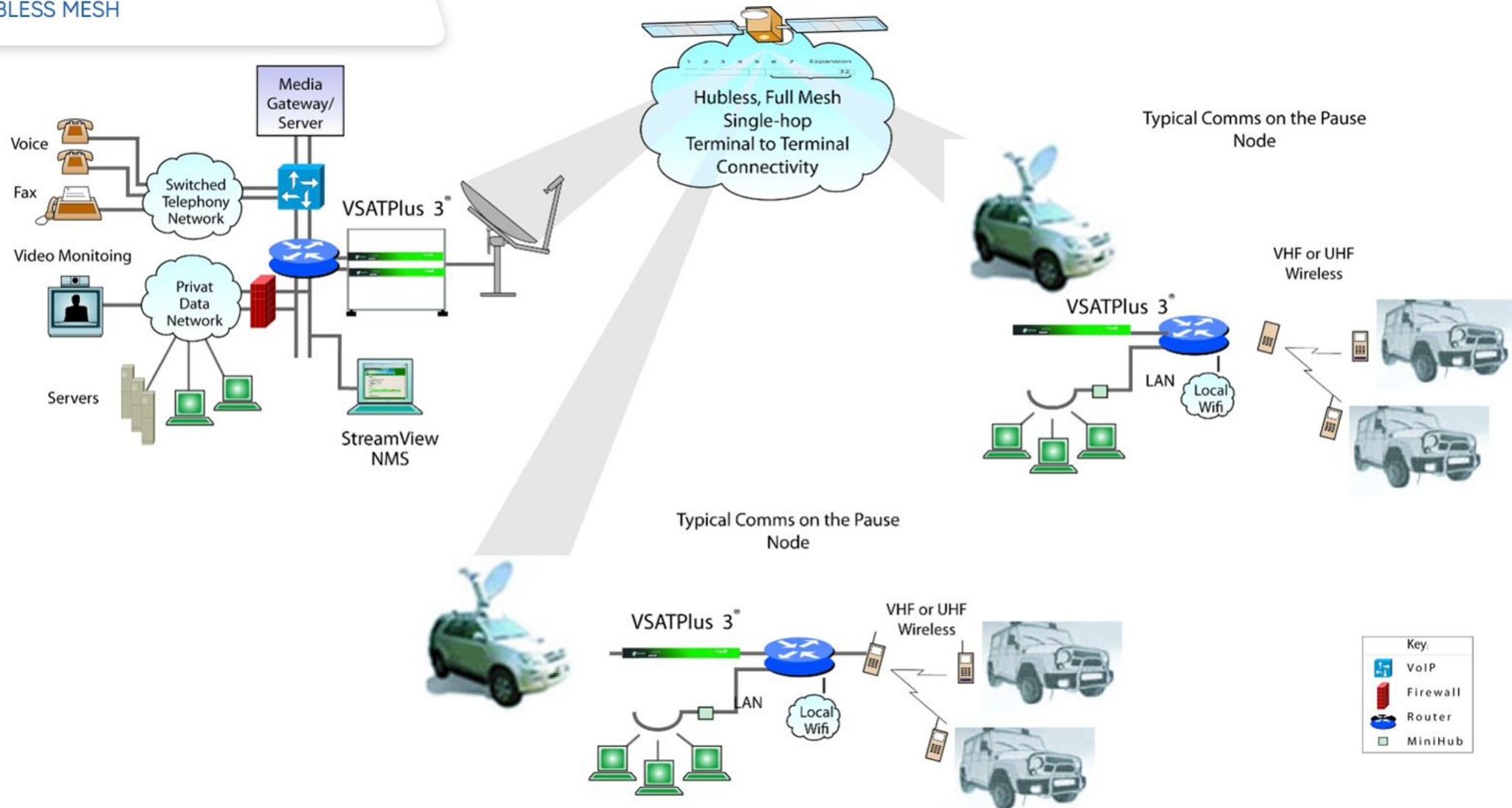
Emergency Communication: Ensures coverage for inspection personnel and emergency command during network, power, or circuit disruptions.

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



UNIFIED COMMUNICATION SYSTEMS

SATELLITE HUBLESS MESH





EARTH STATION LEO SATELLITE X/Y TRACKING SOLUTIONS



LEO Satellite X/Y Tracking



TELEMETRY & TRACKING SYSTEM SOLUTIONS





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OUTSIDE BROADCASTING SOLUTIONS





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



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.



Enviromental Test

MIL-STD-810G	Method 501.5	High Temperature
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 Test
ESOG	Section 11	Eutelsat Wind Load



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



PARTNERS



PARTNERS

KRATOS®

Viasat™

CPI
Communications
& Power Industries

TERRASAT
Communications, Inc.
Engineered to Endure

SMW®
SWEDISH MICROWAVE AB

Apollo
microwaves

ANARE®

MOBILE
viewpoint

everltz

etl

BHE

PolarSat
The Leader in Full Mesh Hubless VSAT

ACTOX

ADVANTECH
WIRELESS

MediaKind



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