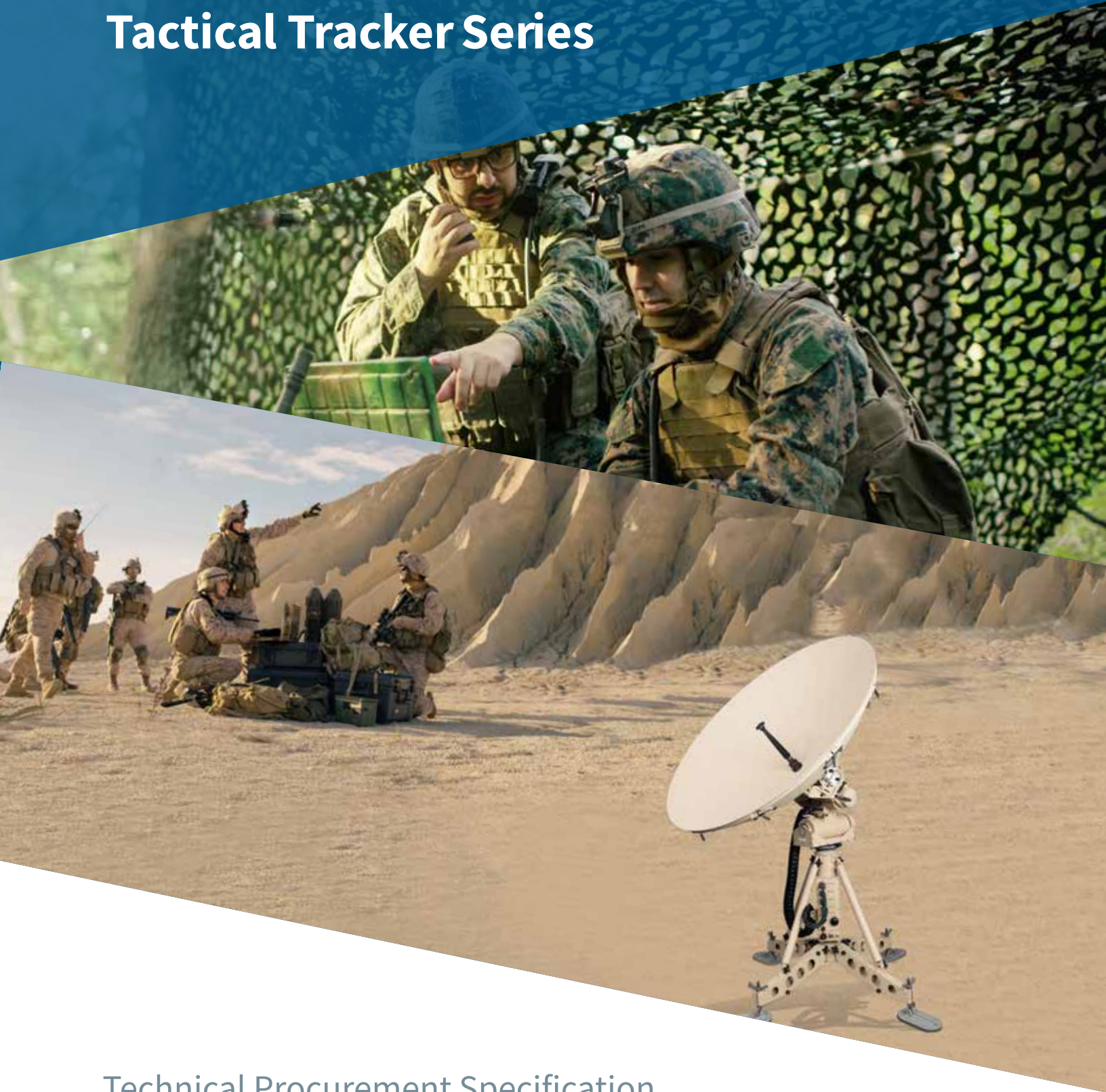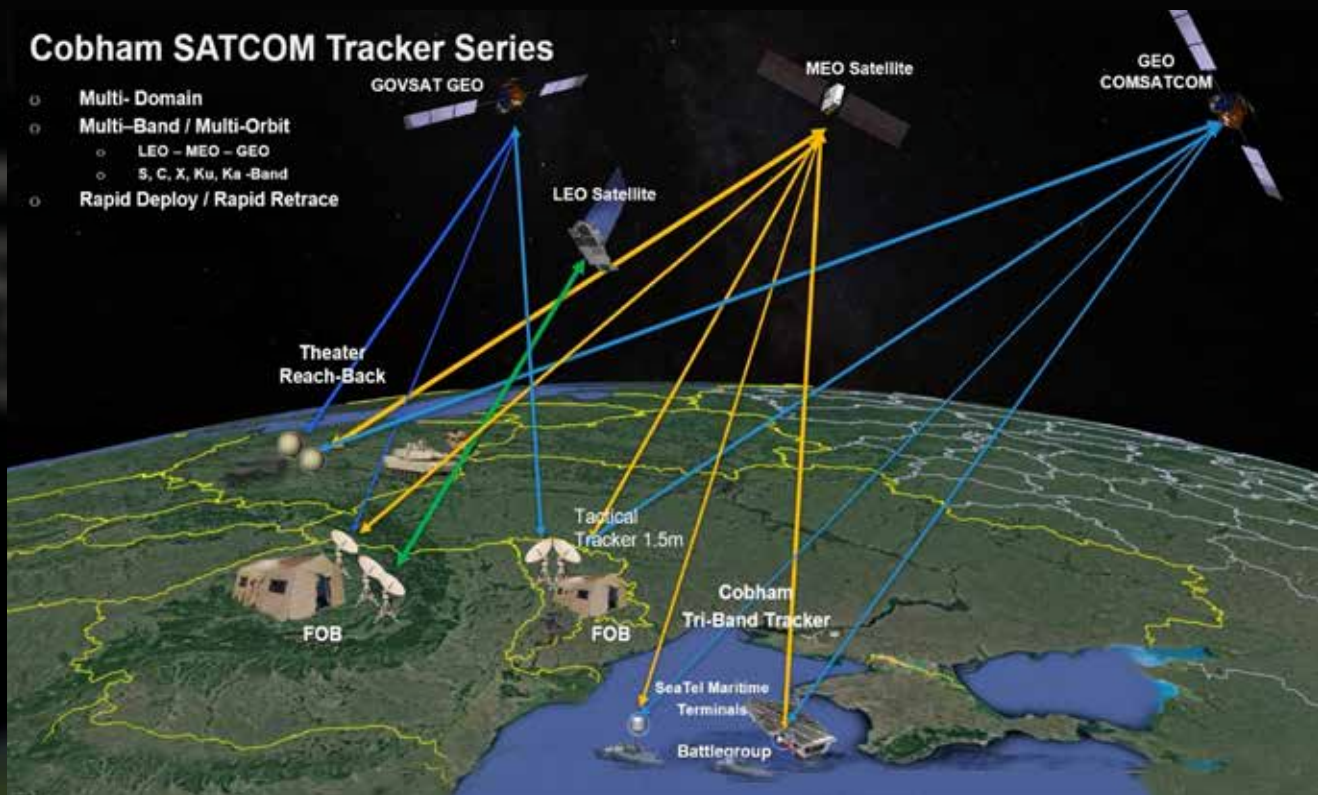# Tactical Tracker Series

Technical Procurement Specification
S/C/X/Ku/Ka-band

Next generation tactical antenna systems | **Optimizing economics and operations**

COBHAM SATCOM

Cobham SATCOM Tracker Series
- Multi- Domain
- Multi–Band / Multi-Orbit
  - LEO – MEO – GEO
  - S, C, X, Ku, Ka -Band
- Rapid Deploy / Rapid Retrace

"Today, the US Military is the single largest user of COMSATCOM across all services, agencies, and COCOMS. Despite the large current dependency on commerical SATCOM, its usages and expenditures continue to grow, couple this with Five Eyes, NATO and US military allies, the demand and scope of the industry is now going through major changes. The need to operate across multiple constellations at LEO, MEO and GEO and at multiple RF Bands is driving the commerical SATCOM industry to develop new and innovative technologies."

Tactical Tracker Series Terminals TTS

Multi-Orbit, Multi-Band, Multi-Operator Network when every mission matters

Cobham Satcom has developed the X-Y Tactical Terminal Series in three aperture sizes of 1.3meter, 1.5meter, and 2.6meter. They can operate individually or in pairs for seamless "Make Before Break" MEO operations or with arbitration for a third antenna with a different mission set, constellation, orbit or RF band. Users can quickly switch between different RF bands, orbits and satellite operators. The X-Y Axis pedestal provides excellent high-speed accurate performance for applications in LEO, MEO, GEO and HEO.

With an upgraded drive motor design and new software, the Tactical Tracker series 1.3meter and 1.5 meter are capable of rapid retrace speeds, (approx. 6 seconds), to enable for a "Break Before Make" single antenna, single modem topology on mPower MEO without dropping encryption. This enables the reduction of SATCOM system complexity by reducing the number of terminals that are essential to the mission requirements. *A single terminal at the FOB!*

> " The overall thrust is to enable mission command at the tactical edge

The Tactical Tracker Series is a compact, modular and cost-effective user terminal that provides secure, mission-critical data and control links for a growing range of defense and government applications. The 1.3m and the 1.5m assembly times are approximately 30 minutes, making this system satellite acquisition ready. The servo systems provide full-motion control for continuous operation designed for high duty cycle LEO/MEO satellite tracking. The shaped/parabolic is a 10-pc segmented carbon fiber composite reflector and a high-performance Y over -X servo control system. Various RF packages and feeds can be exchanged in the field, with optional upgrades for Ku/Ka dual band feed and RF equipment. The Ka-Band feed covers the full 3.5GHz RF bandwidth in order to seamlessly cover all COMSATCOM and MIL requirements.

The Tactical Tracker Series enables "Multi-Band, Multi-Orbit, Multi-Operator" functionalities, giving our customers unparalleled new capabilities demanded by the next generation of spacecraft designs.

- Accurate/reliable antenna beam pointing on LEO, MEO, GEO and HEO constellations
- Full hemispheric coverage, no keyhole effect
- Industry leading satellite pointing software
- 1.3m and 1.5m RF bands, X, Ku, Ka
- Full Ka-Band Tx RF 27.5Ghz to 31.0GHz
- Full Ka Band RX RF 17.7 to 21.2GHz
- 2.6m RF bands S,C, X, Ku and Ka
- Ultra-stiff carbon fiber reflector technology
- User-friendly assembly, operation, disassembly and pack-up (no tools required)
- Meets MIL-STD-1472G two-man lift

TRACKER 1300 TT

RF SPECIFICATIONS /ELECTRICAL (Other RF-Band available upon request)

FEED	4 – PORT KA-BAND		4 – PORT X-BAND	
RF	Receive	Transmit	Receive	Transmit
Frequency (GHz)	17.7 – 21.2	27.5 – 31.0	7.250 - 7.750	7.90 - 8.400
Polarization	CP	CP	CP	CP
Gain (Mid-Band) dBi	46.8	49.4	38.4	38.7
Axial Ratio	1.5	1.0	1.2	2.0
EIRP (dBW) 40w BUC		65.4		54.7
G/T (10deg EL, dB/K)	23.0		14.8	
G/T (40deg EL, dB/K)	24.2		15.7	

Mechanical/Environmental

Reflector	1.3m Carbon Fiber

Servo Control System

Pedestal Mounted with Ethernet interface	90 to 265VAC
Auto locate features	Sun /TLE Tracking

Reflector Configuration

	10 piece Symmetrical
Antenna Travel	Torque Mode Servo
X-Axis	+/-90 > 16 deg/sec
Y-Axis	0-180 > 16 deg/sec

Temperature

Operational	-30 to 60 C
Survival	-40 to 70 C

Winds

Operational (anchored)	30 mph Gusting to 45 mph
Survival (anchored in stowed position)	60 mph

Packaging (3 Cases)

Reflector	26.5 x 26.5 x 15.6 (65lbs)
Positioner	37.5 x 27.5 x 14.5 (90lbs)
Pedestal/Controller	44.9 x 25.3 x 16.5 (115lbs)

TRACKER 1500 TT

RF SPECIFICATIONS /ELECTRICAL (Other RF-Band available upon request)

FEED	4 – PORT KA-BAND		4 – PORT X-BAND		4 - PORT KU-BAND	
RF	Receive	Transmit	Receive	Transmit	Receive	Transmit
Frequency (GHz)	17.7 – 21.2	27.5 – 31.0	7.250 - 7.750	7.90 - 8.400	10.95 -12.75	13.75 - 14.50
Polarization	CP	CP	CP	CP	Linear/Co-Pol	Linear/Co-Pol
Gain (Mid-Band) dBi	47.7	50.3	39.4	39.8	43.3	44.3
Axial Ratio	1.5	1.0	1.2	2.0		
EIRP (dBW) 40w BUC	66.3		55.6			60.3
G/T (10deg EL, dB/K)	23.6		15.6		19.5	
G/T (40deg EL, dB/K)	24.8		16.8		20.7	

Mechanical/Environmental

Reflector	1.5m Carbon Fiber

Servo Control System

Pedestal Mounted with Ethernet interface	90 to 265VAC
Auto locate features	Sun /TLE Tracking

Reflector Configuration

	10 piece Symmetrical
Antenna Travel	Torque Mode Servo
X-Axis	+/-90 > 16 deg/sec
Y-Axis	0-180 > 16 deg/sec

Temperature

Operational	-30 to 60 C
Survival	-40 to 70 C

Winds

Operational (anchored)	30 mph Gusting to 45 mph
Survival (anchored in stowed position)	60 mph

Packaging (3 Cases)

Reflector	26.5 x 26.5 x 15.6 (70lbs)
Positioner	37.5 x 27.5 x 14.5 (90lbs)
Pedestal/Controller	44.9 x 25.3 x 16.5 (115lbs)

TRACKER 2600 TT

FEED	4 – PORT KA-BAND		4 – PORT X-BAND		4 – PORT S-BAND		4 – PORT C-BAND	
RF	Receive	Transmit	Receive	Transmit	Receive	Transmit	Receive	Transmit
Frequency (GHz)	17.7 – 21.2	27.5 – 31.0	7.25 - 7.75	7.90 - 8.40	2.2 - 2.4	2.025 - 2.120	3.80 - 4.20	5.85 - 6.42
Polarization	CP	CP	CP	CP	CP	CP	CP	CP
Gain (Mid-Band) dBi	52.1	55.1	44.1	44.4	33.9	32.5	38.7	41.9
Axial Ratio	1.0	1.0	1.0	1.0	1.0	1.0	2.3	1.3
EIRP (dBW) 40w BUC		71.1		60.4		51.5		58.3
G/T (10deg EL, dB/K)	23.6		20.4		23.6		14.9	
G/T (40deg EL, dB/K)	24.8		21.5		24.8		16.1	

Mechanical/Environmental

Reflector	2.6m Carbon Fiber

Reflector Configuration	10 piece Symmetrical
Antenna Travel	Torque Mode Servo
X-Axis	+/-90 > 16 deg/sec
Y-Axis	0-180 > 16 deg/sec

Servo Control System

Pedestal Mounted with Ethernet interface	90 to 265VAC
Auto locate features	Sun /TLE Tracking

Temperature

Operational	-30 to 60 C
Survival	-40 to 70 C

Winds

Operational (anchored)	30 mph Gusting to 45 mph
Survival (anchored in stowed position)	60 mph

Packaging (3 Cases)

Reflector	172lbs
Positioner	125lbs
Pedestal/Controller	120lbs

The Cobham Satcom Tactical Tracker Series X-Y antenna system is purpose designed to be the industry's premier LEO/MEO/GEO quick deploy tracking antenna with rapid retrace functionality that maintains encryption layer stability. Verified video teleconference, 4 tunnels deep without dropping the link integrity although packet losses do occur during the retrace transition time.

It consists of a lightweight, high-precision carbon fiber reflector driven by a servo-controlled closed-loop positioner. The Tactical Tracker is capable of horizon-to-horizon travel with speeds up to 16.4 deg/s and an acceleration rate of 10 deg/s2. These speeds and acceleration rates are achieved using high-power density BLDC motors driving low backlash gear boxes.

There are three primary electronic components that make up the Integrated Control Unit (ICU):

- The antenna control processing

- The Inertial Measurement Unit (IMU) which is used to indicate to the control system the movement the antenna is experiencing

- The tracking receiver, which can be utilized for initial site calibration when modem RSSI is not available using, sources such as the sun or GEO satellites.

The Tactical Tracker Series make use of Cobham Satcom's trusted Antenna Control Software, (ACS), which performs the configuration, control, management and monitoring of the ICU. ACS runs on the embedded processor of the ICU. ACS provides

multiple user interfaces to the ICU, which include serial, USB and IP via Ethernet. The user interfaces include both a command line interface and an embedded web server, with a completely redesigned GUI being introduced 2022-Q4.

Tactical Tracker Series X over Y motor drive placement

Cobham Satcom's pointing and tracking algorithms are industry leading and have been refined over 3 decades. TLE ephemeris information for the satellite in question is received beforehand and is available in the antenna control unit (ACU) for a complete satellite pass.

From the TLE ephemeris information, the satellite position and

IN DEVELOPMENT

CobhamSatcom is moving quickly with engineering development efforts for expanded GUI features capabilities, RF switching, multi-band feeds and increased retrace speeds on the larger 2.6meter Tactical Tracker.

Future Advanced SATCOM, (FAST), began over a decade ago with CERDEC and has now progressed to where the commercial satellite industry has taken an interest. A significant benefit of FAST architecture is to enable Digital RF/IF processing such that software-defined platforms, and/or software-defined modems, (SDM), can be utilized to meet evolving mission requirements. Secondary benefits would include improved channel topology management for the next generation of satellites with advanced DSP payload architectures.

UPGRADES AND OPTIONS:

- A range of LNAs, LNBs and BUCs, Feeds and Switching configurations
    - Dual Band RF Feeds (Ku/Ka)
    - Full coverage Ka-Band BUCs
    - Wide Band Programable LNB's
- FAST, (Future Advanced SATCOM), ready Digital IF
- IFL
- QD transportable Radome (environmental protection)
- Anchoring Kits
- Grounding Kits
- Spares Kits
- Alternate colors and patterns and Logos

TIME TO RETRACE

The Tactical Tracker Series has the added design feature of a "Break Before Make" capability giving the customer the operational topology options to reduce the number of antenna terminals required at any location for MEO to MEO or MEO to GEO. Performance results are currently 6 seconds before modem and IP layer lock.

No. Satellites	11	MEO
Separation	32.73	degrees
1/2 Separation	16.36	
Accel	10	deg/sec/sec
time	5	sec
Velocity	16.1	deg/sec
distance	32.72	deg
Goal Distance	54	deg
Time	**4.6475**	sec
Velocity	23.2379	deg/sec

Retrace is calculated at the equator but improves with latitude positioning.
Demodulator lock, IP Layer setup latencies not included.

Tactical Tracker Series packing configuration