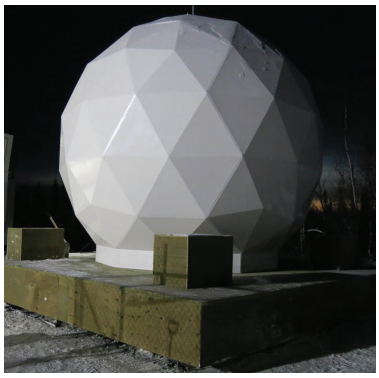
Low/Medium Earth Orbit Satellite Tracking Antenna Systems

Cost-Effective | Precision Tracking | Unlimited Configuration Flexibility

X/Y Antenna Pedestal Technology



Fixed and Deployable Systems and Radomes

Space & Component Technology | **www.trackmysat.com**

COMTECH TELECOMMUNICATIONS CORP.

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Comtech Introduction

Comtech Space & Component Technology has developed a cost-effective X/Y antenna pedestal technology that specializes in precision antenna tracking. Our systems are specifically designed for low and medium earth orbits that support Remote Sensing, Earth Observation, and TT&C applications.

We offer a range of X/Y tracking antennas from 30 centimeters to 11 meters coupled with our installation expertise and worldwide support in extreme environments such as the Arctic, Middle East and Tropics. Comtech Space & Component Technology provides the customer a complete satellite and tracking solution for your ground stations.

Type 1 Deployable with non-ground penetrating mount

Type 1 on a platform

Type 2 ground mount

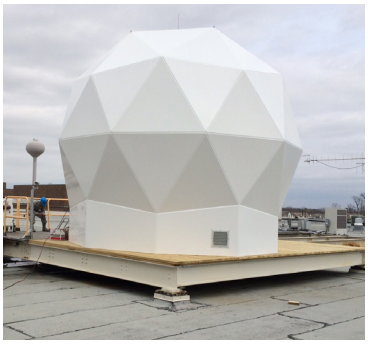
Features:

- 30 centimeters to 11 meters antenna size
- X/Y axis configuration (Series A through Type 6 for increasingly larger dishes)
- Transmit/receive feed technologies through V-band
- Designed for tracking LEO, MEO, HEO and GEO spacecraft
- Applications include Earth Observation, Remote Sensing, Communications and TT&C functions
- Lights-out operation, including ethernet (TCP/IP) and M&C software is provided with Linux-based M&C system, includes SNMP and XML support
- Program and Auto Track Performance
  - Effective program track capabilities that utilize ephemeris data in the form of Two Line Element (TLE) data and other formats
  - Autotrack Capabilites:
    - » Low loss mode coupler tracking system for high frequencies and larger aperture antennas that does not affect G/T performance
    - » Software assisted autotrack - the low velocity tracking dynamic of the X/Y allows the implementation of real time signal level peaking throughout the track by utilizing unique tracking algorithms to control the servo control system

Radome Options:

The Comtech X/Y Antenna Systems do not require a radome for operation, but for extreme locations Comtech can provide a cost-effective radome solution. A radome offers many advantages like protection from extreme weather conditions, extension of component life and provides antenna position concealment.

- Radome Diameter Sizes: 1.5 meters to 20 meters (larger on request) tuned for the frequency or frequencies of interest
- Foam Core Sandwich Composition – three types of construction
  - 'A' sandwich consisting of three layers
  - 'C' sandwich consisting of five layers
  - 'S' space frame design using a fiberglass framing with a reinforced PTFE-impregnated glass fiber (Teflon) fabric (ideal for wideband applications)
  - Wind Speed: Radomes capable of surviving in winds up to 200 km/hr – 300 km/hr (depending on specific model)



Antenna in 5m radome with integrated ring wall

Additional Features & Options:

- Deployable, trailer, truck and skid mounts
- High-performance shaped Cassegrain feed configurations
- Multi-frequency feed systems
- Highly-responsive installation and maintenance services
- Full RF and data chain including:
  - » Frequency converters, spectrum analyzers, RF switching, demodulators/ modems, uplink amplifiers
- Mode coupler auto-track and software RSSI auto-track (ideal for X/Y low dynamic)

Type 1 on trailer mount

Type A Micro Deployable

Type 5 ground mount

Deployable with breakaway X/Y mount

X/Y System Advantages:

Cost Advantage: Simplified and elegant design, advanced manufacturing techniques, and use of commercial components makes the X/Y one of the most cost-effective antenna products available in the industry

High Performance:

- System ***eliminates the "keyhole" at zenith*** or "cone of silence" associated with overhead passes experienced on other pedestal configurations
- ***Less dynamic tracking motion*** of the X/Y antenna over an El/Az provides for ***more accurate pointing***, which is especially important when tracking Ka-band
- Low dynamic of movement greatly ***reduces system wear***, thus extending the system life and reducing maintenance
- ***No cable wrap issues***; no need for rotary joints or slip rings
- Precision gear assemblies ***eliminate drive-system backlash***

Delivery: 14 to 26 weeks (ARO) for the 1st system, delivery schedules will vary based on system requirements, antenna size and factory loading at the time of the order. Some X/Y positioner stock is maintained on the shelf and ready for delivery, please inquire.

Carbon Fiber Reflectors: No need to heat the dish to avoid expansion and contraction as temperatures change; greater gain performance over an aluminum dish, especially at the higher Ka-band through V-band ranges. Heated reflectors for ice and snow removal are available.

Environmental Resilience: System designed for operation in coastal, arctic, and desert environments.

Type 5 on a tower

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Mechanical				
Specifications	**Pedestal** *Weight (lbs) Height (ft/in)*	**Dish Sizes**	**Pedestal** *Weight (lbs) Height (ft/In)*	**Dish Sizes**
Apertures sizes:	Series A *(45lbs)*	30cm to 50cm	Type 3 *(2,700lbs) (9'10"-14'9")*	3.5m—5.5m (Outdoor System) 6.1m (In-Radome System)
	Series B *(90lbs)*	80cm to 1.2m		
	Series C *(165lbs)*	1.4m to 1.8m	Type 4 *(3,850lbs) (9'10"-14'9")*	5.0m (In-Radome System)
	Type 1 *(725lbs) (72" to 94")*	1.8m—3.4m (Outdoor System) 3.7m (In-Radome)	Type 5 *(5,500lbs) (14'9"-20')*	5.0m—7.3m (Outdoor System) 7.6m—9.0m (In-Radome System)
	Type 2 *(2,200lbs) (9'10" - 12'2")*	3.0m—3.7m (Outdoor System) 4.2m—4.5m (In-Radome)	Type 6 *(12,500lbs)*	7.6m—9.0m (Outdoor System) 8.0m—11.0m (In-Radome System)
Point Accuracy	0.1^0 to 0.05^0 (configuration dependent)			
Position Step Resolution	0.0004^0			
Acceleration	$10^0/S^2$ max			
Velocity	5^0/s typical to 20^0max (note X/Y configuration only requires a fraction of the velocity that would be required with a typical El/Az configuration)			
Axis Configuration	X over Y geometry			
Axis Travel	Full hemispheric coverage			
Horizon Limits	-1^0 typical			
RF				
Frequency Ranges	L, S, X, C, Ku, Ka, Q and V bands			
Polarization	Left Hand and/or Right Hand Circular Polarization (linear on request)			
Feed Configurations	Multi-band prime focus and/or Cassegrain configuration			
Autotrack feed options	Mode-coupler mono-pulse or RSSI software tracking			
G/T Performance Samples [1]	2.4-meter S-band 10.7dB/K Prime focus feed 3.0-meter X-band 24.0dB/K Prime focus feed 3.7-meter X-band 27.5dB/K Cassegrain feed 4.2-meter S-band 16.0dB/K Prime focus feed 5.0-meter X-band 29.5 dB/K Cassegrain feed 5.5-meter X-band 30.2dB/K Cassegrain feed 6.1-meter X-band 31.0dB/K Cassegrain feed 7.3-meter X-band 32.6dB/K Cassegrain feed			
Control System				
Monitor & Control	Full Linux based, includes satellite scheduler and TLE propagator.			
Interface	1Gig Ethernet (TCP/IP) (fiber optic interface can be provided), includes SMNP and XML modules			
Power	100/240Vac, 1phase, 15~30A; Types 5 and 6 require 3-phase 208VAC or 380/415VAC			
Environmental (without Radome)				
Wind Speed	80km—100km/hr wind (62 mph) Operational [2] [3] 200 km/hr wind (124 mph) Survivable			
Temperature	-40°C—+70°C (-40°F - +158°F)			
Humidity	100% Relative Humidity			
Driving rain	Up to 10cm/hr (4 in/hr)			

[1] G/T Performance at 5° elevation clear sky
[2] Optional measures (heaters, radomes, HVACS) can be taken to improve operational environmental limits
[3] Depends on pedestal/antenna combination

Contact

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About Comtech

Comtech Telecommunications Corp. (Nasdaq: CMTL) designs, develops, produces and markets innovative products, systems and services for advanced communications solutions. The Company sells products to a diverse customer base in the global commercial and government communications markets. For more information visit www.comtechtel.com.

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