STAR TOWER

Star✧Tower

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Why Our Aerostats

- Provide persistent wide-area coverage for surveillance, sensing, networking and communications
- Affordable, environmentally sensitive system
- Transportable, easy to relocate
- Adaptable to a wide range of missions

Payload Line of Sight Ranges							
Aerostat Altitude (m)	152	305	457	610	914	1,219	1,524
Payload Coverage Area (km^2)	6,107	12,214	18,322	24,429	36,641	48,852	61,064
RF Line-Of-Sight (km)	43	61	76	87	108	124	138

General Description

- Self-contained, highly transportable, remote-area capable and scalable aerostat system
- Patented envelope shape and operationally oriented ground system deliver superior performance
- Evolved, modular design offers the agility to meet different mission requirements with a single aerostat system:
  - Ground system is available in truck, trailer, or pallet-mounted configurations, airlift capable for most aerostats, helo-lift capable for smaller aerostats
  - Modular payload system permits payload change out in minutes to meet changing mission requirements

Family of Aerostats

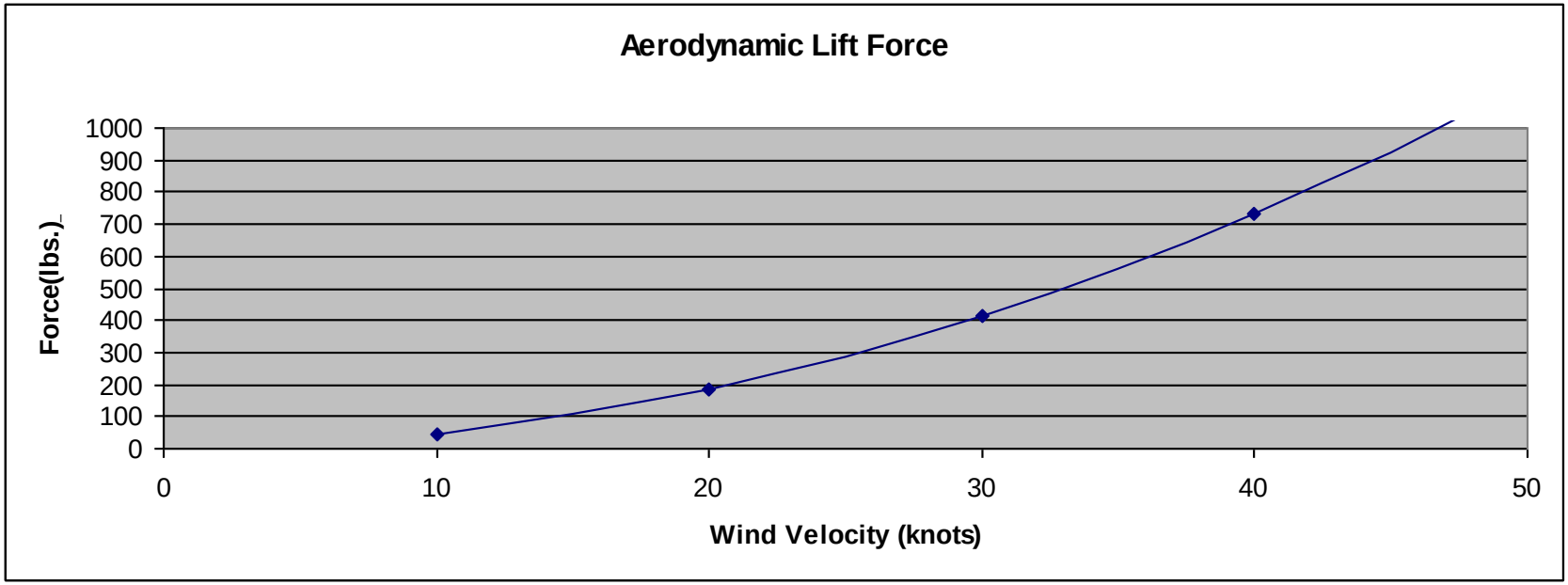
- Star✧Tower aerostats are available in a range of sizes to deliver optimum performance for each customer's requirements
- All Star✧Tower aerostats deliver the same high performance

	Star✧Tower 100-12		Star✧Tower 100-25		Star✧Tower 200-40		Star✧Tower 200-57		Star✧Tower 500-91		Star✧Tower 500-116	
Envelope Size	13.1 m length 360.6 m^3		16.5 m length 713.6 m^3		19.2 m length 1133.9 m^3		21.6 m length 1622.5 m^3		25.3 m length 2593.0 m^3		27.4 m length 3306.0 m^3	
Payload Altitude Above Ground	152 m AGL	305 m AGL	152 m AGL	610 m AGL	152 m AGL	701 m AGL	152 m AGL	914 m AGL	152 m AGL	1219 m AGL	152 m AGL	1676 m AGL
Payload Wt	45.4 kg	27.2 kg	172.4 kg	45.4 kg	344.7 kg	90.7 kg	621.4 kg	113.4 kg	1043.3 kg	226.8 kg	1360.8 kg	226.8 kg
Excess Buoyancy at Payload Altitude	68.0 kg		108.2 kg		145.1 kg		181.4 kg		294.8 kg		417.3 kg	
Operating Crew for Setup, Launch & Recovery	2		4		4		5		7		7	
Normal Operating Crew	2		2		2		2		3		3	

Gas Envelope Shape

- Patented shape
- High lift to drag ratio
- Inherent pitch stability
- Non-inflating tails
- Non-conformal payload system
- Scalable to all sizes and preserves same flight characteristics

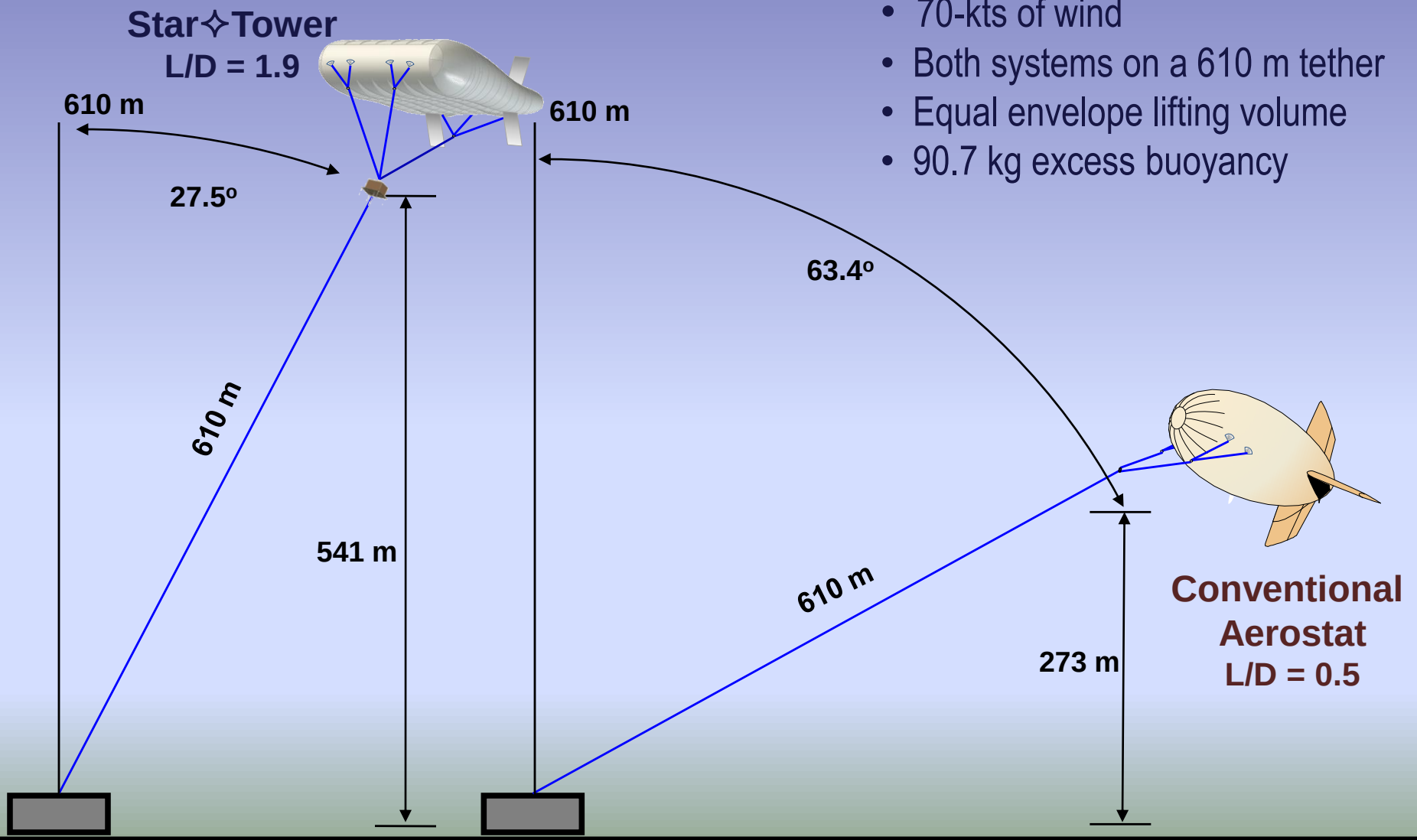
Aerodynamic Lift



- Aerodynamic lift from wind is significant
- 20kts of wind provides an additional 200 lbs of lift
- Ship-based operations can support a smaller gas envelope because of sea level operations

Impact of Star✧Tower Aerodynamic Lift

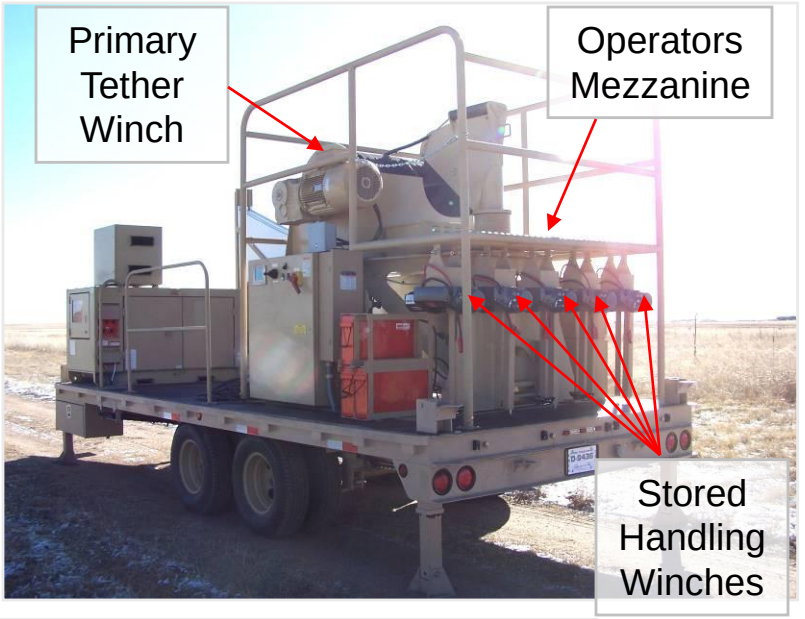
- 70-kts of wind
- Both systems on a 610 m tether
- Equal envelope lifting volume
- 90.7 kg excess buoyancy

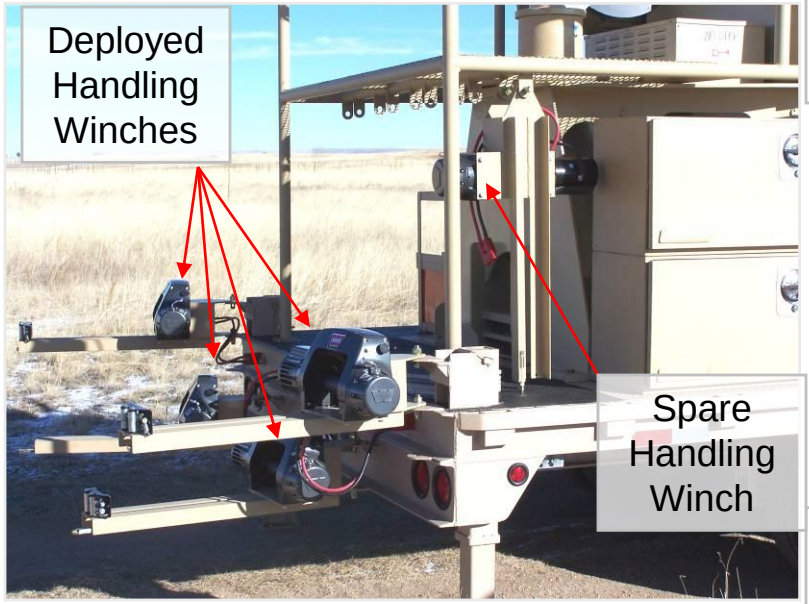


Star✧Tower provides twice the coverage in half the operating zone

Star✧Tower 200 Ground System
(Medium Aerostat)

- Trailer or truck-mount options
- Fully self-contained, self-supporting system
- Highway and off-road capable
- Airlift and helo-lift capable
- Can be enclosed and climate controlled





Ground System Cover

- Cover extended for road march or inclement weather
- Cover can be partially extended or fully extended during flight operations
- Cover is easily retracted and stowed at the front of the trailer
- Cover material is insulated and water resistant

Star✧Tower 100
(Small Aerostat)

GLOBAL NEAR SPACE SERVICES

STAR✧TOWER

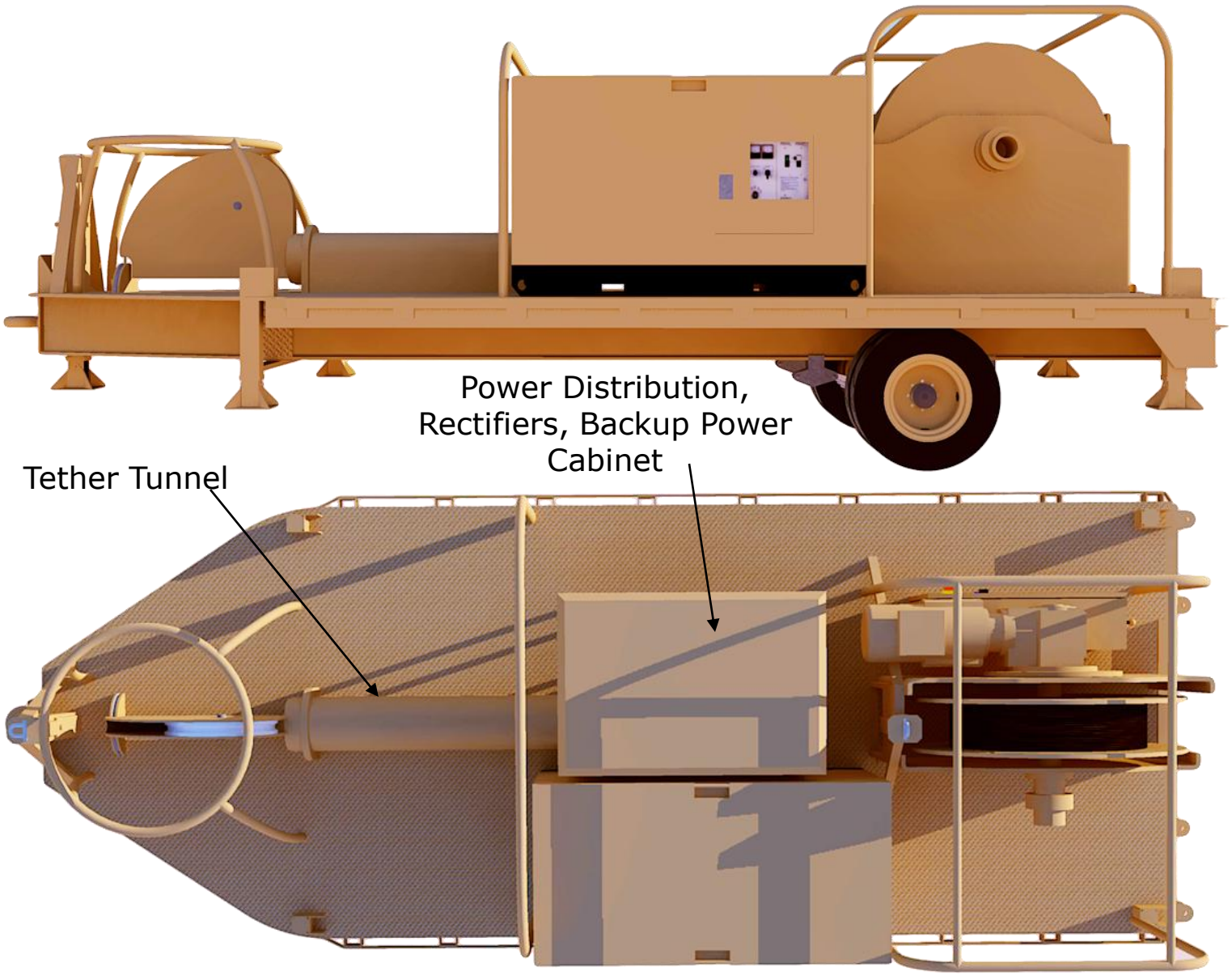
Star✧Tower Air Vehicle

Star✧Tower 100
Base Station

Star✧Tower 100

Aluminum Trailer with Helo Sling Points, RORO

Star✧Tower 100



Advanced Star✧Tower Features

- *Fully instrumented digital dashboard* to allow crew to remotely monitor/control aerostat and payload
- *Powered angle of attack trim system* (optional) to optimize aerostat performance in changing wind conditions and provides the means to shed moisture
- *Consolidated tether and handling winch control* to reduce manpower and simplify launch, recovery of aerostat
- *Multiple ground system configuration options* to best suit employment including remote, mobile and fixed base operations

Operational Performance

Feature	Benefits
Hybrid envelope airfoil shape delivers high wind tolerance	• Aerodynamic lift combines with buoyancy to deliver a high positive lift-to-drag ratio • High lift-to-drag ratio enables aerostat operations in 70 knot winds with only 28 degrees of tether lean • Delivers twice the coverage and smaller operating cone in high winds compared to conventional aerostats
Powered Angle of Attack (pitch) Trim Control	• Automated, powered trim system adjusts the length of the aft harness lines to provide the optimum envelope AOA for the wind conditions • Controls wind forces on tether by providing the low drag AOA for wind speed • Increases pitch to rapidly shed moisture (rain, snow)
Inherent pitch stability	• Reflex camber of the airfoil provides natural pitch stability • Minimizes the effects of downdrafts by pitching up into the downdraft and reducing the surface area exposed to the downdraft
Enhanced Operations	• Consolidated winch controller. A single joystick permits one crew member to operate the primary hoist and the four handling winch during launch and recovery reducing workload and providing greatly aerostat control during critical phases of flight • All aerostat and payload instrumentation is shown on a single computer display or laptop to include flight information, telemetry, and aerostat subsystem functions and status
Two stage aerostat	• Non-conformal payload system provides greater stability for the payload sensors and eliminates blind spots that conformal aerostat payloads suffer
Weather mitigation	• Ability to shed water and snow through envelope pitch control
Mission Responsiveness	• Self-contained, transportable system • Field repairable, robust system spare integrated into system

Payload System

Non-conformal payload system offers advantages over conformal aerostat payload system:

- Delivers higher sensor stability; eliminates sensor blockage from envelope
- Eases maintenance; permits rapid change of sensor; swap-out of payload box takes only minutes
- More survivable, less expensive, easier logistics

Available Payload Sensors

Sensor	Purpose
High Definition Electro-Optical & Infrared Camera Surveillance Sensor (Day/Night Full Motion Video): • Wide Field of View, Narrow Field of View • Geo-reference	• Detect, identify, and track objects of interest • Provide real-time high resolution imaging to security personnel • Increase situation awareness
Interoperable Communications Radio: • Software Programmable Radio • VHF-UHF, Cellular • VOIP	• Allow different radios (Military, Police, Fire, Medical, etc.) to communicate with each other • Enables multi-agency communications, and consolidated command & control with legacy communication
Long Distance, High Data Rate Communications Relay: • Microwave Link • 150 MB/second • Voice and Sensor Data	• Move communications and sensor data between nodes, users, and command centers • Links are controlled will be frequency management agencies
Radio Frequency and/or GPS Identification: • Displays location and ID tags of objects and personnel carrying RFID or GPS ID transmitters	• Electronic identification and tracking of vehicles, security forces, and critical objects • Provides situational awareness of security forces

Applications

Commercial	Security/Defense	Education/Science

▪ Telecommunications
▪ Broadband
▪ Imaging
▪ Hyperspectral Imaging
▪ Digital Mapping
▪ Security
▪ Agriculture
▪ Weather
▪ Public Services:
  ▪ First Responders
  ▪ Weather Alerting
  ▪ Emergency Information
  ▪ Wild Fire Monitoring & Analysis
  ▪ Search & Rescue
  ▪ Medical
	▪ Communications and Command & Control beyond line-of-sight
	▪ Networking of the Battlespace
	▪ High Rate Data Transfer Surveillance (EO, IR, Spectral, RF)
	▪ Security (borders, base perimeters, ports)
	▪ Disaster/Humanitarian Response
	▪ Signal Collection
	▪ Digital Mapping
	▪ Weather
	▪ RF Identification, Tracking, and Reporting
		▪ Education
		▪ Distance Learning
		▪ Environmental Research & Data Collection
		  ▪ Climatology
		  ▪ Air Quality
		  ▪ Water Quality & Quantity
		  ▪ Natural Habitat
		  ▪ Endangered Species
		  ▪ EPA Compliance
		▪ Weather Data
		▪ Scientific Research
		▪ Technology Testing

Summary

- ✓ Star✧Tower is a *next generation aerostat system*
- ✓ Innovative, **remote area capable design** delivers…
  - ✓ Unprecedented operational performance (70 knot winds)
  - ✓ Unmatched mission agility
  - ✓ Worldwide responsiveness
  - ✓ Superior system performance
  - ✓ **Low total cost of ownership**
- ✓ First system can be delivered in 120 days, up to 8 additional systems per month thereafter (dependent on suppliers)

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