

Antennas, Patterns, Capabilities & Letters of Recommendation

April 2020



▶ We <u>welcome you</u> to the world of Alpha Satcom, Inc.

The oldest, new antenna company on the planet.

- ASI is dedicated to bringing to you, the discerning customer, worldclass products and services at <u>the right price and at the right time</u>.
- Comprised of a team of Engineers and Satellite Professionals, both of whom with a stellar history <u>reaching back to the beginnings of</u> <u>the Satellite Industry</u>, ASI is uniquely qualified to bring to the market new, modern, state-of-the-art, antennas that will provide years of exceptional service.
- Coupled with a network of <u>select customer focused companies</u>, ASI can address the various requirements your particular business plan requires.
 - We <u>invite you</u> to step into the professional world of Alpha Satcom, Inc.

Company Overview

- Alpha Satcom is a privately owned, well financed, USA Company with HQ in Longview, Texas.
- We have access to all Engineering Disciplines and experienced Program Management needed to fully implement any given program.
- Our engineering portfolio consists of Limited & Full Motion Mid Size antennas, Carbon Fiber Fixed,, Man-Pack, Terrestrial & Maritime COTM products.
- Present designs: 13.2, 11.3, 9.0, 7.3, 6.2 & 4.2-Mtr plus a Turning Head Pedestal capable of supporting up to a 9 Mtr reflector system & a wide range of Man-pack & COTM antennas.
- All of our structures can be interfaced to any Step-Track or Mono-pulse Controllers.

Who Are Our Customers

- STS-Global USA
- Global Eagle Entertainment (EMC)
- DataPath USA/Military
- GSI/Hispasat USA/Spain
- Eurosatcom France Telcom Orange
- SES USA
- Comlink USA
- Aircom Pacific USA
- INSTER NATO Spain
- Sigma Communications– USA
- Thaicom- Thailand
- Wancom China
- Speedcast Philippine Army
- China Satcom Hong Kong
- China Unicom Beijing

- * Datacom-Hong Kong
- * O'Connors Singapore
- * UniSat Indonesia
- * ChinaSat Hong Kong
- Selindo Alpha Indonesia
- * iForte Indonesia
- * Waldo Systems Korea
- * Digital Solutions Myanmar
- * MeaSat Malaysia
- * Secure Networks -Myanmar
- * Paradise Communications Jakarta
- * Loxley Thailand
- * China Unicom Australia
- * TSGN/APT Malaysia

| | Ant | enna System Component & Subsystem Comp | arison | | | | | |
|------|---------------------------------|---|--|--|--|--|--|--|
| ltem | Description | Alpha Satcom | Brand X | | | | | |
| 1 | Panels | All panels are fabricated on Air Craft Quality panel tools and will support operation up to 20 GHz. | Panels are hand selected & tested at extra cost. | | | | | |
| 2 | Azimuth Travel | 190 deg in two 120 degree segments is standard. | 120 deg std, extended travel at extra cost | | | | | |
| 3 | Relocation of az segments | Az jack is attached to pedestal. Change to 2nd position can be done in 15 minutes by one man without any lifting equipment. | Majority of designs require lifitng equipment to change segments | | | | | |
| 4 | Hub dimensions | Hubs are significantly larger providing more space for the inclusion of electronics. The larger hub provides also additional structural stiffness. | Smaller hubs result in less structural stiffness and reduced volume for the mounting of electronics | | | | | |
| 5 | Antenna structure | All structures are designed for Ka-band stiffness and operation. | Quality of pedestals varies | | | | | |
| 6 | All steel structures | Homogonous structure provides better Ku and Ka-band performance during the dailey passing of the sun over the structure. | Mixed structural materials can result in the warping of the reflector on a daily basis. | | | | | |
| 7 | Feeds | LP Feeds have internal polarization adjustment. Therefore both LP and CP feeds have same interface and external pol drive systems are not required. | Typical LP feeds require external polarization sub assemblies. | | | | | |
| 8 | Feed horn design | Fixed with flashing to prevent rain and sand from entering the hub. | Rotating feed tube difficult to keep water and sand from entering the hub. | | | | | |
| 9 | Feed window rain blower | Incorporated into the feed. | External to feed requiring mounting of blower motor in the backup structure and running of the ductwork extraneous to the feed. | | | | | |
| 10 | Reflector Alignment | All reflectors are aligned at the operational look angle using either optical or photogrammentry. This provides the best possible adherance to the RF design and therefore the best RF performance | Some antennas are offered as bolt together which will only provide optimum performance at the angle to which the tool was designed. Obviously, as the tool wears out so does the performance of the antenna. | | | | | |
| 11 | Hardware | Galvanized and Stainless Steel - Metric | US Standard. | | | | | |
| 12 | Hardware, bearings and bushings | Sourced in the USA. | Unknown. | | | | | |
| 13 | Sub reflectors | All subreflectors are measured with a coordinate measuring machine (CMM) after manufacture. | Unknown. | | | | | |
| 14 | Foundation hardware | Included in basic price. | Extra charge. | | | | | |
| 15 | Hub closeout | Tightly sealed rolling door. | Unknown. | | | | | |
| 16 | Upper Platform Access | Safety staircase as opposed to a ladder. | Unknown. | | | | | |





Wancom: 13.2-Mtr LMA with Hybrid Feed (Quantity 2)





13.2-Mtr C-band Receive Pattern



On the Drawing Board:

Our existing 13.2-mtr Limited Motion Antenna will soon have a new 180 degree, azimuth turning head pedestal. With stiffened panels, and a counter weighted reflector backup structure, the antenna system will easily provide Ka-band service.





9.0 & 7.3-Mtr Ku-band Twin Antennas-Tianjin China







Tianjin: 9.0-Mtr Ku-band Receive Pattern



9.0-mtr Ka-band with Smart Step-track SpeedCast Teleport Adelaide





9.0-mtr Ka-Band Patterns - Adelaide



Elevation Tx diagram, SUT: AUS_ADL_01, ERS: EUT-HWI-02, Satellite: E172B @ 172E, COPol xdr: EF1, CrossPol xdr: EF1, Date:





9.0-Mtr Ka-Band Monopulse - Madrid







Spain: 9.0-mtr Ka-band Receive Pattern





9.0-Mtr 6-Port DBS Band







9.0-mtr 6-Port DBS Antenna





Unisat Jakarta: 9.0-Mtr Ku-Band Antenna





9.0-Mtr Ku-band Receive Pattern - Jakarta





Golden Eagle Entertainment: 9.0-Mtr Ku-band LO-PIM Antenna



9.0-Meter Ku-Receive





GHZ

4.5

StarBridge Communications Inc. Longview, Texas USA 75601 www.starbridgecom.com



GHZ S 4 S て £ S て 7-1 9.0-Mtr Ku-Lo-PIM 10.

> StarBridge Communications Inc. Longview, Texas USA 75601 www.starbridgecom.com

5/22/2016

| Passive Intermodulation Products (TX Horiz / RX Horiz Feed Ports) | | | | | | | | | |
|---|--------------|----------------|--------------------------------------|----------------------------------|------------------|-----------------------|-----------------------------------|--|--|
| F <u>1</u> (MHz) | F 2 (MHz) | I'MOD (MHz) | Aggregate Feed Flange Power (dBm) | l'Mod Level at Spec An. (dBm) | LNA Gain (dB) | Cable Loss (dB) | l'Mod Level at LNA Input (dBm) | | |
| 12,750 | 14,500 | 11,000 | 50.00 | -85.08 | 63.00 | -4.17 | -143.91 | | |
| 13,000 | 14,500 | 11,500 | 50.00 | -81.68 | 61.80 | -4.10 | -139.38 | | |
| 13,125 | 14,500 | 11,750 | 50.00 | -82.11 | 61.90 | -4.12 | -139.89 | | |
| 13,250 | 14,500 | 12,000 | 50.00 | -76.79 | 62.20 | -4.53 | -134.46 | | |
| 13,500 | 14,500 | 12,500 | 50.00 | -80.14 | 61.97 | -4.75 | -137.36 | | |

+57.5 dBm (560 W)

HPA Aggregate Output Pwr: ~ Azimuth Angle= 145.00 Elevation Angle= 60.00 Pol Angle= -25.4 By:Michael B. MaleyWitness:Charley CorbinDate:3-Jul-16

9.0-Mtr Ku-Lo-PIM 10.7-12.5 & 12.75 - 14.5 GHz





Golden Eagle Entertainment: 9.0-Mtr Ku-band





S 2 9.0-Mtr Ku-Lo-PIM 10.7-1

GHZ

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12

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5/10/201

Longview, Texas USA 75601 www.starbridgecom.com



GHz S • 4 - 1 S 2 đ S 9.0-Mtr Ku-Lo-PIM 10.7-12

> StarBridge Communications Inc. Longview, Texas USA 75601 www.starbridgecom.com

5/10/2017

Myanmar KBZ: 7.3 Mtr C-Band Antenna







7.3-Mtr C-Band- Myanmar KBZ





ALPHA SATCOM



Hispasat Mexico: 7.3-mtr Ka-Band with Air-Conditioned Hub





7.3-mtr Ka-Band Antenna - Hispasat - Mexico





7.3-mtr Ka-band Pattern - Mexico





Unit 1: 7.3-mtr Ka-band Antenna TSGN Malaysia





7.3-mtr Ka-band - TSGN Malaysia





SES: 7.3-mtr C-Band Somis California





RX Antenna Azimuth Sidelobe Pattern

V~V



Quantity Two 6.2-Mtr C-band High Wind Antennas - Hong Kong

Antennas at Roof Level Antennas 29 Stories AGL!







DKET 4.2-mtr Carbon Fiber X-band Lo-PIM, Ku & Ka Gregorian Antenna





Hughes: 4.2-mtr Ka-band Turning Head







^{17.7}ghz rx lhcp azimuth.grf

Sample of Feed Network Offerings

| Band | RX [GHz] | TX [GHz] | Polarization | Options* | | | | |
|--|-----------------------|---------------------------------------|----------------------------|-----------------------|--|--|--|--|
| С | 3.625 - 4.2 | 5.85 - 6.425 | LP, CP, or CP/LP | HP, TE21 | | | | |
| | 3.4 - 4.2 | 5.725 - 6.725 | LP, CP, or CP/LP | HP, TE21 | | | | |
| | 4.5 - 4.8 | 6.725 - 7.025 | LP, CP, or CP/LP | HP, TE21 | | | | |
| Х | 7.25 - 7.75 | 7.9 - 8.4 | СР | HP, LoP, TE21 | | | | |
| Ku | 10.7 - 12.75 | 13.75 - 14.5 | LP, CP, or CP/LP | HP, LoP, TE21 | | | | |
| | 10.7 - 12.75 | 13.0 - 14.8 | LP, CP, or CP/LP | HP, LoP, TE21 | | | | |
| Ku/DBS | 10.7 - 12.75 | 17.3 - 18.4 | LP, CP, or CP/LP | HP, LoP, TE21 | | | | |
| | 10.7 - 12.75 | 13.75 - 14.5 17.3 - 18.4 | LP, CP, or CP/LP | HP, LoP, TE21 | | | | |
| Ka | 17.7 - 21.2 | 27.5 - 31.0 | LP, CP, or CP/LP | HP, LoP, TE21 | | | | |
| | 19.2 - 21.2 | 29.0 - 31.0 | СР | LT | | | | |
| Note: Feed horns are available for all of our feed networks to your specifications, including antenna RF performance predicts. | | | | | | | | |
| Options | : HP: High-Power, LoP | P: Low PIM, TE21 : TE21 | Monopulse Tracking, /LT: L | ight/Small packaging. | | | | |



NEYRPIC® ACU550

New generation of ACU for geostationary and low/medium orbit satellite tracking



- Monopulse, steptrack and orbital tracking
- Ephemeris tracking: Intelsat, CNES, AZ/EL/T, Norad TLE
- Monopulse autophasing function automatically cancels pointing errors on AZ and EL axes and nulls the crosstalk
- IPOP: Intelligent Progressive Orbit Prediction
- 64 satellite configurations, 128 RF configurations
- Can control 24 digital I/O's and 10 SPDT lines
- Full azimuth range antenna (< and > 360°)
- AZ-EL, X-Y, turning head, wheel and track mount
- 1.8 to 32.5m diameter antenna
- Transportable and mobile antenna
- Beacon receiver remote control
- Beacon signal variation compensation to eliminate noise components (running average and rms)

- Tilt compensation for fixed and transportable antennas
- Automatic antenna movement fault detection
- RF inhibit control
- Position sensor non-linearity compensation per 1°
- 3-axis position encoders
- Compatible with AC, DC and brushless motors
- Webserver for backup and restore, I/O monitoring, collection of raw data points
- Position offset nulling via webserver interface
- ARM Cortex[®] A8 600 MHz CPU
- 800x600 24-bit color touch screen



Model 8200 ACU

The commercial industry's most-advanced antenna control system meets the requirements of retrofits^{*} as well as new installations.



*With the retrofit option, the 8200 ACU is compatible with legacy drive-cabinet interfaces and positionfeedback devices such as absolute rotary optical encoders, standard single-speed brushless size 11 resolvers, and two-speed brushless size 20 resolvers.

Features

- Touchscreen controls for all operations
- Efficient, intuitive graphical user interface
- Hardware jog buttons with LED indicators
- Data and parameters secured in nonvolatile storage
- Innovative setup wizard eases installation
- Secure TeamViewer integration for remote and shared ACU operation
- Field-proven in critical applications



RC4500 AIU-7

RC4500 Antenna Controller with ntegrated Antenna Interface Unit



Take advantage of RCI's vast experience with embedded antenna controllers, cost savings and simplified installation when using the AIU-7 variable speed outdoor antenna controller with integrated RC4500 ACU.

5G Considerations

- 5G Interference signals will be powerful enough to saturate receiving systems
- Gain compression occurs when total power at LNB input reaches P1dB level.
- Noise Floor degradation will increase the C/N leading to an increase in the BER
- <u>Unwanted intermod products</u> can fall into the operating spectrum of the LNB causing further interference or reduce the linearity of the LNB.
- Each case must include an understanding of the relationship between the antenna and the interfering signal.
- Near field or far field function of the satellite antenna diameter.
- Is the interfering signal on the boresight of the antenna or off axis.
- The elevation look angle of the antenna.
- The 5G signal power decreases with the distance between the antennas free space loss.
- For new systems an Interference Mitigating 5G LNB is sufficient to mitigate the risk of interference if the if the offset angle is 25-degrees or more.
- In some cases where the interference power is higher, a combination of a 5G filter plus the 5G LNB will be required.
- For existing systems a 5G wave guide filters can be installed to suppress the interference before it enters the LNB.



9.0-Mtr Pedestals - Prior to Machining



ALPHA SATCOM

7.3-mtr and 9.0-mtr Hubs







<u>The DaVinci Hub</u> 5.97 Cu Ft Ready for RF <u>& GCE</u>



9.0-mtr Ku-band Lo-PIM - Global Eagle (EMC)





7.3-mtr C-band - Hughes Myanmar





7.3-mtr Ka-band Hub - Mexico









7.3-mtr and 9.0-mtr Hub Typical Ka-band Integration





Se VIIII

| | | Doc 9 | 00-0018_C | -Band, Ku | -Band, Ka- | Band 7 M | eter Typica | I On Site I | nstallation | n Sequence | | | | | | | |
|--|--------------|------------|------------|------------|-------------|------------|-------------|-------------|-------------|------------|--------|--------|--------|--------|--------|--------|---|
| | | | | | | | | | | | | | | | | | |
| NOTE | : Typical 7. | 3M Install | requires 2 | technician | ns and 1 Al | pha Satcoi | n, Inc. app | roved Sup | ervisor | | | | | | | _ | |
| | | | | | | | | | | | | | | | | | |
| | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 | Day 8 | Day 9 | Day 10 | Day 11 | | | | | | |
| ANTENNA STRUCTURE ONLY | | | | | | | | | | | | | | | | | |
| Unload and Inventory | | | | | | | | | | | | | | | | | |
| Install Pedestal | | | | | | | | | | | | | | | | | |
| Assemble Reflector | | | | | | | | | | | | | | | | | |
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| Lean up site / Touch up Paint / Torque | | | | | | | | | | | | | | | | | |
| MOTORIZATION / CONTROL | | | | | | | | | | | | l | | | | | |
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| | Day 12 | Day 12 | Day 14 | Day 15 | Day 16 | Day 17 | Day 19 | Day 10 | Day 20 | Day 21 | Day 22 | Day 22 | Day 24 | Day 25 | Day 26 | Day 27 | |
| NTENNA STRUCTURE ONLY | Duy 12 | Duy 15 | Duy14 | Duy 15 | Duy 10 | Duy 17 | Duy 10 | Duy 15 | Duy 20 | Duy 21 | Duy 22 | Duy 25 | Duy24 | Duy25 | Duy 20 | Duy21 | |
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Upgrades and Services History



US Electrodynamics Brewster, WA - 2016

- Vertex 6-Mtr Antenna
- Replaced old ACU with a Radeus RL 8200 ACU



EMC - New Jersey : 2016

Replaced failed elevation jack on Vertex 11-mtr Antenna



EMC Hawaii: 2017

- Replaced two GD 7200 Controllers and one ASC controller with Radeus RL-8200 ACU's with embedded Tracking Receiver.
- Removed and replaced original motors with new units.



EMC New Jersey: 2017

- Relocated existing Vertex 6-Mtr manual antenna
- Replaced original Ku-band Feed with an Extended Ku-band Feed
- Added Tx Integration from hub to pedestal mounted amplifiers
- Installed Gear-Motors
- Added a Radeus RL 8200 Control System and Beacon Tracking Receiver
- Installed new Walton Gas Fired Heaters



EMC New Jersey: 2017

- ASC 9M C-Band, Vertex 11M Ku-Band, and 13M C-Band Antennas
- Replaced Motors
- Control Systems
- Tracking Receivers
- Provided Tx Integration to IFL interface



SysElectron Mexico: 2017

 Installed and aligned previously owned Vertex 9M Ku-band antenna and a new GD 11Ku-Band Antenna



SES Hawaii: 2017

- Vertex 11-Mtr Antenna
- Replaced corroded structural members and all new panel hardware, balanced and focused -



<u>SES: 2017</u>

- 6.0-Meter Antennas
- Integration of cabling for routers and servers to M&C system to enable remote control.
- Laredo, Texas
- Cedar Hill, Texas
- Spokane, Washington



Loxley/CAT - Thailand 2018

- 8.0-Meter Vertex Communication Antenna
- Replaced outdated 7200 OPT controller with a new 'Legacy' Radeus RL 8200 ACU.
- Integrated Beacon Receiver.
- Fabricated and installed new encoder bracketry.
- Fabricated and installed new Limit Switch bracketry.
- Note: Legacy 8200 is a 'Drop In' replacement for the 7200 OPT.







Date: 10 October 2016

William Anton CEO Alpha Satcom

Sub : Letter of commendation

Ref : Myanmar 7.3 Meter C Band System

Dear Bill,

This letter is to inform you of how satisfied we are with not only the performance of your C band 7.3 meter antenna installed on a rooftop in a remote location Myanmar under very severe weather conditions but also the performance of your company and installation people on site.

The project was delivered to site on a very tight schedule and erected on time. Excellent antenna patterns were achieved with little subreflector adjustment, the hub space was large enough to easily accommodate the HPA subsystem with plenty of space to allow maintenance.

I want to thank you for helping make our project a success and I can highly recommend Alpha Satcom products based upon our experience.

Thank you and your crew for a job well done.

Done

David Hershberg CEO STS Global



STS Global Inc. CEWIT Bldg #231, 1500 Stony Brook Road, Stony Brook, NY 11794-6040 631 246-5000 www.STSglobal.com info@STSglobal.com



SES^{*}

30 June 2015

Subject: Letter of Support

To Whom It May Concern,

Please be advised that we know, and have worked with, the staff of Alpha Satcom in a project in Africa. We are comfortable with their capabilities and product. We believe that you will find Alpha Satcom to be a professional and trusted supplier of products into your network. The Netherlands Tel. +31 (0)70 306 4100 Fax +31 (0)70 306 4101 www.ses.com

Chamber of Commerce Registration Number 30146277

New Skies Satellites B.V. Rooseveltplantsoen 4 2517 KR The Hague

Yours sincerely,

Glen Tindal Vice President, Sales, Asia Pacific









Technical and Professional Capacity Statement

We, Maritime Telecommunications Network an EMC Company, purchased a 9 Meter, 4 Port Tx/Rx Ku-Band, Low PIM, antenna system including full reflector deicing from Alpha Satcom, Inc. that was installed at our Holmdel, New Jersey site. The Installation began on April 24, 2016 and was completed on July 6, 2016. Six people were involved in the installation and testing of the antenna.

8-1-16 Date

Mark Desantis, Director Teleport Operations

I have been involved in allot of installations throughout my 30 years in the industry and this crew was the most professional and gualified team I have ever seen. They provided me all the documentation I needed and communicated every step of the installation so I knew my completion date. I would use them again on my next antenna installation.



Dear Eric,

Herewith I confirm that your earthstation

CHN-TIA-001 7.3 m Ku-Band, "Alpha Satcom TianJin Factory" Tianjin, CHINA manufactured by Alpha Satcom, LLC

is approved for operation on SES' satellites.

| On-axis cross-pol isolation | | : 31 dB |
|-----------------------------|---|---|
| G/T measurement | : | not possible via Y-factor measurement |
| Rx Gain | : | 58.1 dBi |
| Rx patterns | : | compliant with 29 - 25 log (theta) within +/- 4 degrees |

| Tx Gain | : | 59.3 dBi |
|-------------|---|------------------------------------|
| Tx patterns | : | compliant with 29 - 25 log (theta) |

Please let me know if you wish to obtain an SES Earth Station Approval Letter with a signature.

With kind regards, Anja Anja Ellerbrock Sales Engineering



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