Market Survey for Replacement / Upgrade to KTRK Flight Tracking System

1.   Services Required

Truckee Tahoe Airport District (TTAD) is seeking Aviation and Surveillance Solutions Providers to supply a response which outlines a solution to replace and or upgrade the District's current Flight Tracking System (FTS).

It is the District's intent to select one contractor for services required by this project through a proposal-based selection process. The contract will be made for services and equipment as defined within the Scope of Work and the District makes no assurance of present or future funding on subsequent phases of the work for this project.

2.   Request for Information (RFI)

The responding company is requested to provide a proposal that outlines their approach and solution to achieve the goals and requirements outlined in the market survey. The proposal must clearly stipulate the technical advantages of the company's solution and detail the costs. It shall also explain the logical approach and life cycle costs associated with their solution and include the company's past experience, illustrating any FAA type certification associated with proposed solution or required by proposed solution.

3.   Receipt of Information

Submit three (3) copies of your response to the Truckee Tahoe Airport District, addressed as follows:

Truckee Tahoe Airport District
Market Survey for Replacement / Upgrade to KTRK Flight Tracking System
Director Hardy Bullock
10356 Truckee Airport Road
Truckee, CA 96161

Responses are due on or before Monday, March 28, 2016, at 5:00 PM, PST. Postmarks are not acceptable. Responses postmarked before the deadline but received afterward will not be considered. Email electronic submissions to hardy.bullock@truckeetahoeairport.com.

The District will respond to questions concerning the preparation of proposals. All questions should be addressed to Hardy Bullock (530.587.4119 x106) and/or Mike Cooke (530.587.4119 x108). Please have all questions submitted no later than February 29, 2016. The District reserves the right to inform all recipients of this Market Survey of the answers to questions submitted, or additional information provided where the District, in its sole discretion, determines that such answers or information are germane to all potential respondents or that they change or alter any material provision of this RFI.

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4.   Proposal Format

An official authorized to bind the proposer to its provisions must sign proposals. For this RFI, the proposal must remain valid for at least ninety (90) days.

The contents of the proposal of the successful bidder will become the basis for contractual obligations if a contract is entered into.

5.   Disclosure of Responses to Market Survey Contents

Information provided in each responses will, to the extent allowed by law, be held in confidence and will not be revealed or discussed with competitors. If a proposal contains any information that the proposer does not want disclosed to the public each sheet of such information must be marked "Confidential."

6.   Purpose

The project's purpose is to recommend a replacement or upgrade to TTAD's Wide Area Multilateration Flight Tracking System. The new or upgraded flight tracking system shall be capable of tracking aircraft within 25 nautical miles from the airport. The new or upgraded system shall surveil Mode 3A/C, Mode S, ADSB and UAT equipped aircraft. Truckee Tahoe Airport is a general aviation, public use, regional airport serving Nevada and Placer Counties with 2 runways. Please visit www.truckeetahoeairport.com for additional Airport information.

7.   Scheduling

Project completion shall be accomplished in accordance with the company's proposed project schedule. It is the desire of TTAD to have the project completed no later than March 30, 2017.

8.   Contract Compensation

The intent of this Market Survey is to understand the technical solutions available within the industry and budgetary pricing information. Two vendors shall be selected for further discussions, engineering procurement and installation services for the new / upgraded KTRK Flight Tracking System. The method and amount of compensation shall be negotiated. **<u>This procurement is a best-value acquisition</u>**. The successful company will be chosen by the combined score of their technical approach, past performance of similar projects, timeline estimation for completion of work, and price.

9. Rejection of Information / Proposals

The District reserves the right to:

- Amend, modify or withdraw this RFI;
- Require supplemental statements or information from proposers;
- Extend the deadline for responses to this RFI;
- Reject any or all proposals received pursuant to this RFI;
- Waive or correct any irregularities in proposals, after prior notice to proposers; and
- Negotiate separately with competing proposers.

10. Incurring Costs

This Market Survey does not obligate the District to award a contract, pay the costs incurred in preparing any proposal or to procure the services described herein. All responses are submitted at the sole cost and expense of the proposer. The District shall incur no liability or obligation to any proposer except pursuant to a written contract for services, duly executed by the proposer and an authorized signatory for the District.

11. Market Survey Scope of Services

The Truckee Tahoe Airport District (TTAD) intends to replace or upgrade the current KTRK Wide Area Multilateration Flight Tracking System. A market survey is being conducted to determine if there are a reasonable number of interested companies to provide the equipment and services to support the following District goals.

- Provide monitoring to enhance the safe operating environment within KTRK airspace boundaries for aircraft enroute, arriving, and departing KTRK
- Ensure compliance and compatibility with the FAA NextGen ADSB Program
- Provide flight tracking data to support the noise and operations monitoring system at KTRK
- Deliver flight track data to be used to reduce community annoyance noise complaints
- System scalability to include additional surrounding airspace and future area surveillance monitoring

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The following are requirements for the TTAD flight tracking system.

- The ability to receive and process UAT transponder messages
- The ability to fuse disparate surveillance data on a common display
- The ability to output traffic alerts and weather data to ADSB/UAT equip aircraft
- The ability to maintain a 1030 Interrogator past the 2020 mandate to accommodate aircraft equipage by type of transponder (New or Legacy)
- A structured orderly transitional approach to replace or upgrade TTAD flight tracking system to meet the FAA Mandate and Equip 2020 programs.
- Display in real time and retain an archive of aircraft movements in the air and on the ground in and around KTRK to the same or higher accuracy standard and coverage area as the current WAM system
- Reliable, consistent long term operation with minimal or no administrative tasks or routine maintenance
- Scalability to accommodate increased coverage volume area to cover entire inside and outside District airspace boundaries
- Fast and accurate target acquisition to aid District staff's situational awareness and safety goals
- Forward and backward compatibility to existing systems using MLAT system outputs

- The ability for the flight tracking system to minimizes and reduce the civil engineering footprint and life cycle costs

For the purpose of this Market Study, 1030 MHZ interrogator certification means that the interrogator has been approved by FAA Spectrum Engineering and is capable of receiving a Facility Transmitting Authorization (FTA) in accordance with the FAA Spectrum Regulations and Procedures as well as the National Telecommunications and Information Administration (NTIA) Regulations for 1030 MHZ.

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12. Required Proposal Content

The services proposed shall include installation, integration and optimization of the new or upgraded flight tracking system hardware and software to meet the required surveillance coverage and the following:

1. Company's Identification
2. Descriptions of Past Project and Experience similar in scope to this project
    - Scope of the project
    - Solution provided
    - Size of the project
    - Dollar value of the project
    - The portion and percentage of the project that was self-performed
    - Any certifications required by customer and obtained from FAA
    - Project timelines
3. Technical Description of solution proposed, including costs
    - Solution proposed, including the ability to surveil what type of aircraft transponders
    - System Architecture Diagram
    - Coverage Analysis
    - System Footprint
    - System Outputs
    - System Back-Haul Capabilities
    - Any certifications required to achieve requirements
    - Any Unique Constraints or System Requirements
    - The system ability to fused multiple surveillance outputs into a common operational picture, including Asterix categories
    - Project timeline

13. Required Proposal Costs and Pricing

- All material costs
- All installation costs
- All integration costs
- All optimization costs
- All civil engineering costs
- All Travel and Living costs
- All Frequency Spectrum Certification Costs to obtain a Facility Transmitting Authorization (FTA) from the FAA

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If a reimbursable agreement is required, it is the contractor responsibility and at the sole discretion of the contractor to execute a reimbursable agreement with the FAA.

14. Technical References and Specifications

The following references should be used as guidelines for the requirements of the new TTAD flight tracking system.

| Documents	Description
ICAO Annex 10	Specification for Transmitters Operating at 1030 MHZ
ED-142	TECHNICAL SPECIFICATION FOR WIDE AREA MULTILATERATION (WAM) SYSTEMS
FAA –E- 3024 Rev -	SBSS Wide Area Multilateration Critical Service Specification
RTCA DO-144A	Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System (ATCRBS) Airborne Equipment
RTCA DO-181D	Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment
RTCA DO-185B	Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance Systems II (TCAS II)
RTCA DO-260B (support for DO-260 message formats versions 0-2)	Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Services - Broadcast (TIS-B)
RTCA DO-282B (support for DO-282 message formats versions 0-2)	Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance - Broadcast
FAA-E-2973	Ground Based Transceiver for Broadcast Services Using the Universal Access Transceiver (UAT) Data Link
NIST SP 800-53	Security and Privacy Controls for Federal Information Systems and Organizations
MIL-HDBK-217F	Reliability of Electronic Equipment
FAA Order 6050.32B	Spectrum Management Regulations and Procedure Manual

The Truckee Tahoe Airport is located in the Serra Nevada Mountain Range and has a diverse environment with mild to extreme temperatures and weather. The following table is a guideline for the contractor:

Environment	-10C to +50C,
System Clock	Oven Oscillator with GPS Stabilization
Maintenance	Integrated browser based maintenance interface SNMP
MTRR	< 30 minutes
Output	Asterix Redundant Ethernet Capable

15. TTAD Current System and Coverage Analysis

The company's solution shall provide the same or enhanced coverage within the KTRK airspace as identified in the following diagram. An electronic version of the below file is available upon email request to TTAD.
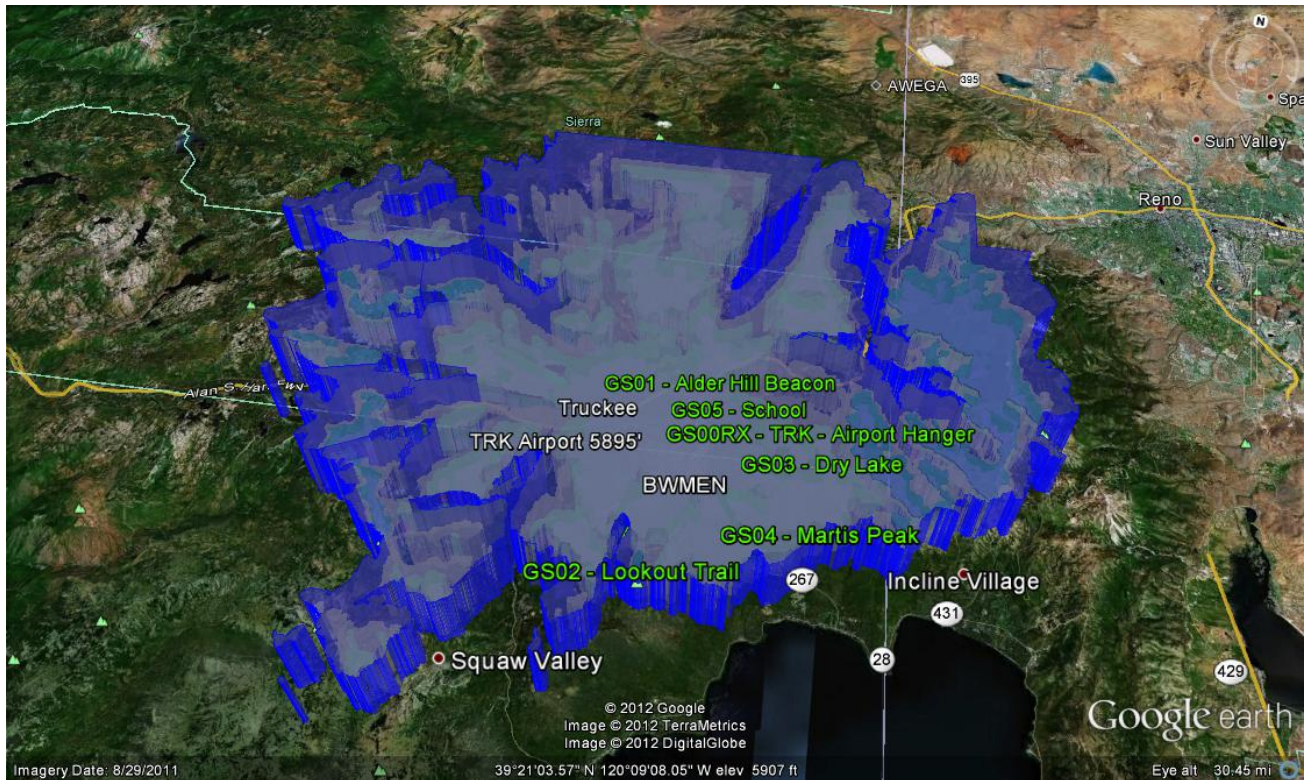
The current system provides the following surveillance from the airport surface to flight level 40.0. The system is capable of surveillance and detecting aircraft with the following equipage:

- Mode 3A/C
- Mode S
- ADSB (1090ES)

The current system uses a 1030 MHZ Interrogator for detection of Mode 3A/C aircraft. The interrogator has an FCC experimental license which expires on March 31, 2017.

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16. TTAD Flight Tracking System Overview

Name	System Description	Function	Manufacture
KTRK Wide Area Multilateration Flight Tracking System	Dual Redundant Central Processing and Six (6) Passive Ground Stations	Provides Safety, Situational Awareness and Flight Tracks to Noise Monitoring System	Era, a.s.
KTRK Provided 1030 MHZ Interrogator	1030 MHz Interrogator	Simulate Aircraft Transponder within Truckee / Tahoe Valley for Mode 3A/C below 12,000 MSL	Advanced Navigation and Positioning Corporation
KTRK Noise Operation and Monitoring System	Web Based Server with community web portal	Provides real time display and Community Portal for Noise Complaints	Vector

17. Current TTAD Flight Tracking System Site Acceptance System Performance

The following table represents the results of the Site Acceptance Test (SAT) conducted at Truckee / Tahoe Airport on the current flight tracking system. This test was preformed December 2014.

Key System Parameter	Prescribed	Measured SAT Test
Probability of Update Rate	>90%	95.96%
Probability of Detection Mode 3 A/C and S Aircraft	>82%	97.5%
Probability of False Detection Mode 3A/C and S Aircraft	<.1%	.05%
Probability of Code Detection Mode 3A/C and Mode S Aircraft	>97%	99%
Probability of False Code Detection Mode 3A/C and S Aircraft	<.1%	.001%
Horizontal Position Accuracy Mode 3A/C and S	<150 Meters RMS	Mode S 85 Meters Mode 3A/C 49 Meters

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Key System Parameter	Prescribed	Measured SAT Test
Aircraft in Meters		
Position Resolution and Detection* (see table below for Separation Definitions)	≥ 60% at Separation 1 ≥ 98% at Separation 2	**Separation 1 = 73%** **Separation 2 = 99%**
Mode A/C code detection (see table below for Separation Definitions)	≥ 30% at Separation 1 ≥ 90% at Separation 2	**Separation 1 = 71% PDMAC; Separation 1 =68% PDMCC** **Separation 2 = 98% PDMAC; Separation 2 = 96% PDMCC**

*Parameter Definition: Position Resolution is the minimum distance between targets whereby the surveillance system may successfully resolve distinct targets

Horizontal separation	Airspace type	
	En-route service	**TMA service**
Separation 1	**3500 m (2 NM)**	**1200 m (0.6 NM)**
Separation 2	**7000 m (4 NM)**	**3500 m (2 NM)**

18. System Outputs
The flight tracking system is capable of outputting the following Asterix formats. The outputs meet all international and domestic standards.

System Output	Function
Asterix Cat 19	**Reports health and status of Wide Area Multilateration System**
Asterix Cat20	**Reports Mode 3A/C and Mode S Tracks to Downstream Systems and Air Situational Display (ASD)**
Asterix Cat 21	**Reports ADSB Track to Downstream System and Air Situational Display (ASD)**

19. Noise Operation and Monitoring System

Integration to the current NOMS system by Vector Airport Solutions is mandatory. The company will provide integration support to ensure the NOMS software application receives flight tracking data correctly. This is accomplished by directing an output data stream via an internet protocol.

The current NOMS system accepts flight data for processing using an Asterix category 20 format. The company's proposed solution should describe the interface with the KTRK approved NOMS provider to optimized the data stream (i.e. throughput) and provide technical guidance on the data formats from the flight tracking system to Vector.

Vector has requested the following compatibility specifications:

Vector currently receives MLAT data via UDP in ASTERIX Cat 20 format. The data is passed along to Vector's cloud-based infrastructure where it is decoded and the altitudes are corrected for pressure before being displayed in real-time and saved into the Vector database.

The data currently includes the Mode-S Address/24-bit ICAO Address, Mode 3/A Code, Flight Number, Track Point Time in fractional seconds from midnight UTC, Latitude and Longitude position in WGS84, Altitude in Feet, and a 4-digit track ID that recycles every several days.

Vector requires the data be delivered via a secure transport (such as SSL) to a reliable message-queue to ensure that no data is lost. Vector currently leverages ActiveMQ and Azure Service Bus for other solutions. The data will be delivered in XML or JSON format with messages compressed to reduce bandwidth. The MLAT provider will ensure at least two simultaneous feeds to the endpoints of Vector's choosing for simultaneous development/test and production use. All data formats and protocols should be accurately documented and provided to Vector with relevant samples for decoding.

Vector would prefer to receive the data to include the following additional fields: a unique track identifier that is only ever sent by the system once, the actual time in UTC seconds or MS, pressure corrected altitude in feet, speed in knots, heading in degrees, tracking system generated confidence value indicating the accuracy of the position, and explicit flagging of positional data that is coasted or otherwise manufactured by the MLAT tracking system vendor.

Any additional integration cost estimates associated with development to meet Vector's *preferences* as stated above should be noted in the pricing section.

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20. Remote Ground Stations Current Locations

Number	Location	RX antenna coordinate - RTK Survey (deg min sec)		
		Latitude (N)	Longitude (W)	Elevation (m)
GS00TX	TRK - Hangar	39°19'11.500518"	-120°8'57.976332"	1785.411
GS00RX	TRK - Hangar	39°19'11.50185"	-120°8'57.97575"	1784.129
GS01	Alder Hill	39°21'9.092376"	-120°11'43.291002"	2054.856
GS02	Lookout Trail	39°15'46.348602"	-120° 8'48.708366"	2443.336
GS03	Dry Lake	39°19'14.707488"	-120°6'14.749122"	1934.536
GS04	Martis Peak	39°17'39.4452"	-120° 2'37.886778"	2426.772
GS05	School House	39°21'46.889634"	-120°6'00.218124"	1795.001

The above chart represents the current system footprint and location of the remote ground stations.