AGENDA ITEM: 12

MEETING DATE: May 27, 2015

TO: Board of Directors

FROM: Hardy Bullock, Director of Aviation and Community Services

SUBJECT: Flight Tracking Next Steps

RECOMMENDATION:

Consider the information provided by Staff and the District Flight Tracking Engineering Consultant NavAid Technical Services, Joe LaMacchia.

DISCUSSION:

The flight tracking system continues to be an integral part of our airport. This system along with our Vector camera system, our Vector noise and operations monitoring system, and our geographic information systems provides valuable data throughout the organization. Much of the flight tracking system's value comes from attributes unassociated with its primary use. The system provides analytical data for much of the planning processes the airport undertakes. Local land-use, master planning, comprehensive land-use planning, community annoyance and search and rescue are a few of the uses of the system as it is currently configured. The system's primary function is to analyze, promote, and enforce our noise abatement procedures and supply data related to community annoyance from aircraft overflight.

The District's "Flight Tracking System" is a multi-lateration (MLAT), multi sensor array that uses an aircraft's transponder to triangulate an aircraft's position. There are five remote sensor locations around KTRK on the mountain tops which we own or lease, and actively maintain. The system was originally designed as a passive system meaning that it simply "listens" for aircraft transponder signals that are illuminated by neighboring radar pulses on other aircraft. The system was design by ERA, a Czech Republic company authorized to do business as a domestic entity. At the time, in 2007, and 2008, the only other MLAT installations in progress included the Colorado Ski Town installation and East Hampton Airport. The system was truly at the edge of technology and required a tremendous amount of engineering and design to work within the terrain constrains of the Truckee Tahoe area. Our MLAT system is a non-certified, advisory only system. This means that the data is advisory only, privately used by the Truckee Tahoe Airport District or our designees, and may not be used by air traffic management systems to separate or monitor aircraft positions. After initial installation and testing occurred it quickly became apparent that the flight tracking data was incomplete and did not detect or render all of the

aircraft coming and going from the airport. It was determined that the system required active interrogation of the aircraft. That means that an interrogation device operating in the 1030 MHZ spectrum would be required to "light up" the aircraft's transponder similar to a radar system. The privilege to interrogate aircraft transponders and pulse broadcast within the 1030 MHZ spectrum is heavily monitored and controlled by both the FCC and the FAA. An entity is required to possess a license called a Facility Transmission Authorization (FTA). We received an initial FTA and one renewal. We recently purchased a new interrogator and subsequently received a two year experimental authorization to possess an FTA for that device. The level of activity from staff, consultants, design engineers, and political advocates to complete the FTA process was staggering. The process took over two years to complete and countless hours of staff and consultant time to complete. The current FTA, our authorization to use our interrogator, expires March 1, 2017.

The FAA is actively pursuing completion of the next generation roll out that will be discussed in the following presentation at length. The FAA no longer favors use of the restricted and congested 1030 spectrum that is used by our MLAT flight tracking system, particularly for systems that are not certified to provide IFR separation services to aircraft.

The difficulty in obtaining FTA authority for our MLAT system, the cost of system maintenance, the release of new technology, and next generation air traffic system deployment make it necessary for our airport to reexamine our use of MLAT flight tracking technology.

The benefit that the District receives from surveillance data generated by our MLAT flight tracking system is immeasurable. The airport is not covered by any surveillance radar so the only eyes on an aircraft in flight, over our airport, below approximately ten thousand (10,000 MSL) are from our system. The fact that the District has the ability to see aircraft, generate flight tracks, and possess the data is very unique. It allows the airport to use the system for its purposes and not necessarily be subject to additional oversight or control by an outside entity such as the State of California or the FAA.

IMPORTANT

If the District were to adopt a new system or utilize new technology it is imperative that the Board have a solid understanding of the ramifications. It is acknowledged here that the Truckee Tahoe Airport District strives to reduce impact upon the surrounding community. Limiting annoyance is a primary directive of the Board, staff, local pilots, and all who participate in airport activity and business. Certain options may open the possibility of capacity enhancement. While that is not the goal it may be an unintended consequence of technology updates. This document, supporting documents, and the following presentation is NOT designed to enhance capacity rather to give a holistic portrait of all available options so that the Board may consider each carefully. The information here is advisory only and no decision is currently required. A decision will need to be made in 2015 if our MLAT system or a like kind replacement is to remain operational. The subject is very technical and staff has, wherever possible, simplified the discussion. If additional detail is required, an immense amount exists and Staff will bring that forward upon request.

NavAid Technical Report April 22, 2015 KTRK Flight Tracking Technology Plan

https://www.dropbox.com/s/4pt7p3b1ayny11t/KTRK%20Flight%20Tracking%20Technology%20Plan_530_00100_ver1.1.docx?dl=0

FISCAL IMPACT:

The District spends approximately $200,000.00 annually maintaining the flight tracking system, ground leases for sensors, data storage/backup, hardware maintenance, display technology, web interface, analytics, reports, FAA licensing, consultant activity, and administration. Future impact will be analyzed upon final options determinations.

PUBLIC COMMUNICATIONS:

The Board meetings act as a public forum for many of the flight tracking decisions. It is Staff's goal to gain public input once a determination and path forward are selected by the Board later in 2015.

ATTACHMENTS:

1. NavAid Technical Services presentation.
2. NavAid Technical Services technical report.
3. NavAid Technical Report April 22, 2015 KTRK Flight Tracking Technology Plan **https://www.dropbox.com/s/4pt7p3b1ayny11t/KTRK%20Flight%20Tracking%20Technology%20Plan_530_00100_ver1.1.docx?dl=0**

Acknowledgements

Staff and NavAid, on behalf of the Truckee Tahoe Airport District, acknowledges a few important points related to Flight Tracking at KTRK

- Operations from the Airport have an Impact on the community
- The District works to provide the safest, aeronautical environment while recognizing its role as an airport sponsor, operator, and supporter of Federal Regulation and Sponsorship Assurance
- Technology such as ADSB and UAT Flight Tracking has the potential of enhancing operational capacity at the airport

How ADSB Mandate and Equip 2020 Influences KTRK MLAT Flight Tracking System

Prepared by: Joseph LaMacchia and KTRK Aviation and Community Services
May 27, 2015

Agenda

- KTRK Problem Statement
- History of Flight Tracking System
- FAA Mandate and Equip 2020 Requirements
- What Does the Future Look Like for KTRK Flight Tracking System
- Proposed Flight Tracking System Transition Timeline
- Benefits for the Community and Airport
- Next Steps: 12 Month Picture
- Open Dialog

FAA Mandate and Equip 2020
KTRK Flight Tracking System
"Problem Statement"

- What Does KTRK Flight Tracking System "Look Like" Moving Forward towards the FAA and Equip 2020 Mandates?
- What Type of Aircraft need to be Tracked to Ensure Maximum Safety and Reduce Community Noise Annoyance?
    - Mode 3A/C, Mode S, ADSB, and UAT?
    - Will KTRK Airport Still need an Interrogator? And Why?
- What impact(s) will the Mandates have on KTRK and are there Unintended Consequences?
    - What are KTRK Airspace Requirements and Are They Changing?

History Flight Tracking at Truckee Tahoe Airport

- May 2009: Memorandum of Agreement Signed for GFE Interrogator and FTA Authorized
- May 2011: Flight Tracking System and NOMS System Becomes Operational
- June 2014: NOMS System replaced to integrate departure cameras and MLAT data
- Sep 2014: 1030 ANPC Interrogator purchased to replace FAA-Loaner Unit
- Sep 2014: ANPC Submits for New FTA
- Feb 2015: FTA is Approved for use of ANPC 1030 Interrogator through March 2017

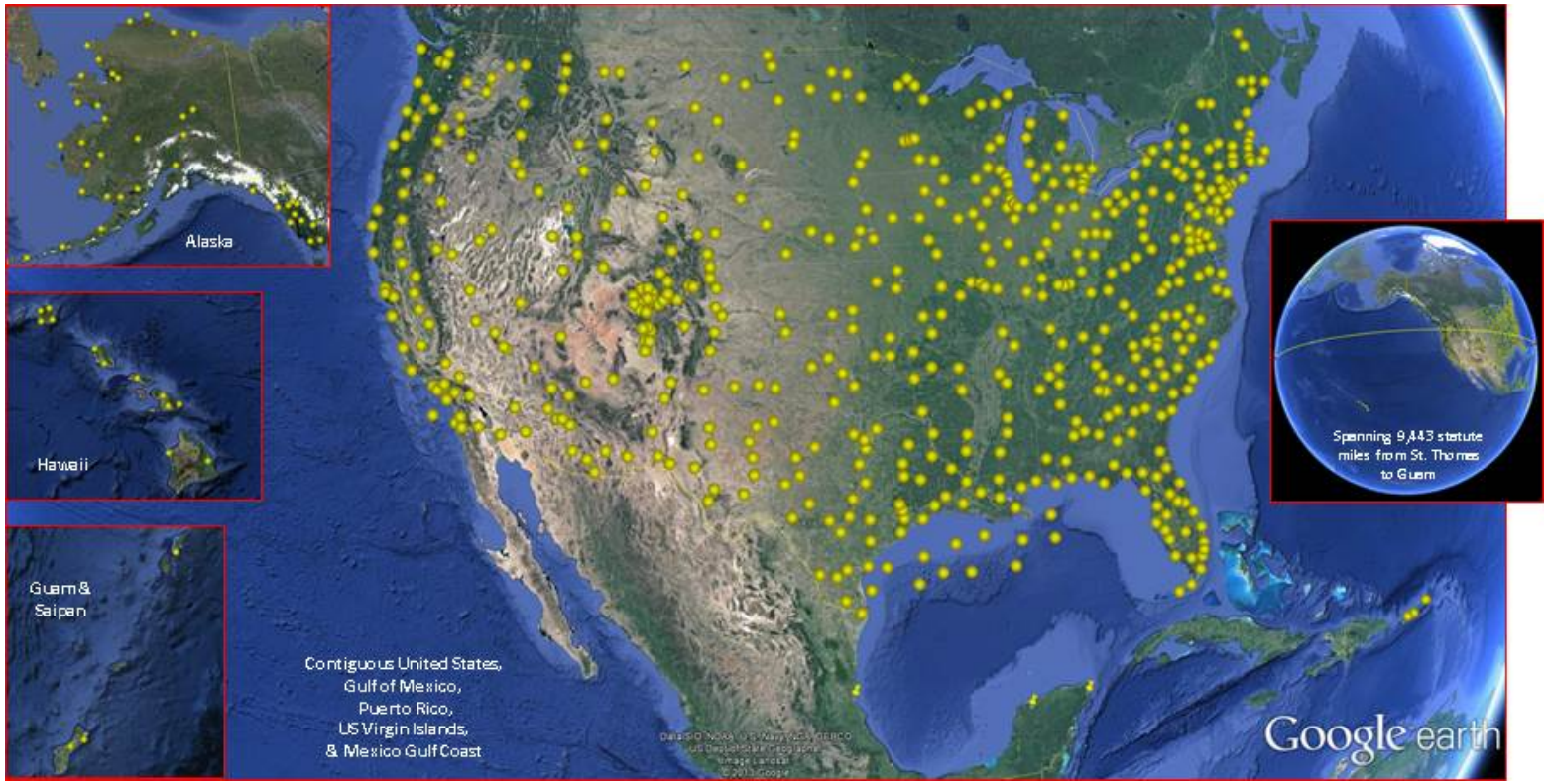
FAA and Equip 2020 Mandate "The Requirements"

FAA Mandate and Equip 2020:

What Does That Mean?

FAA Next Generation Air Traffic System

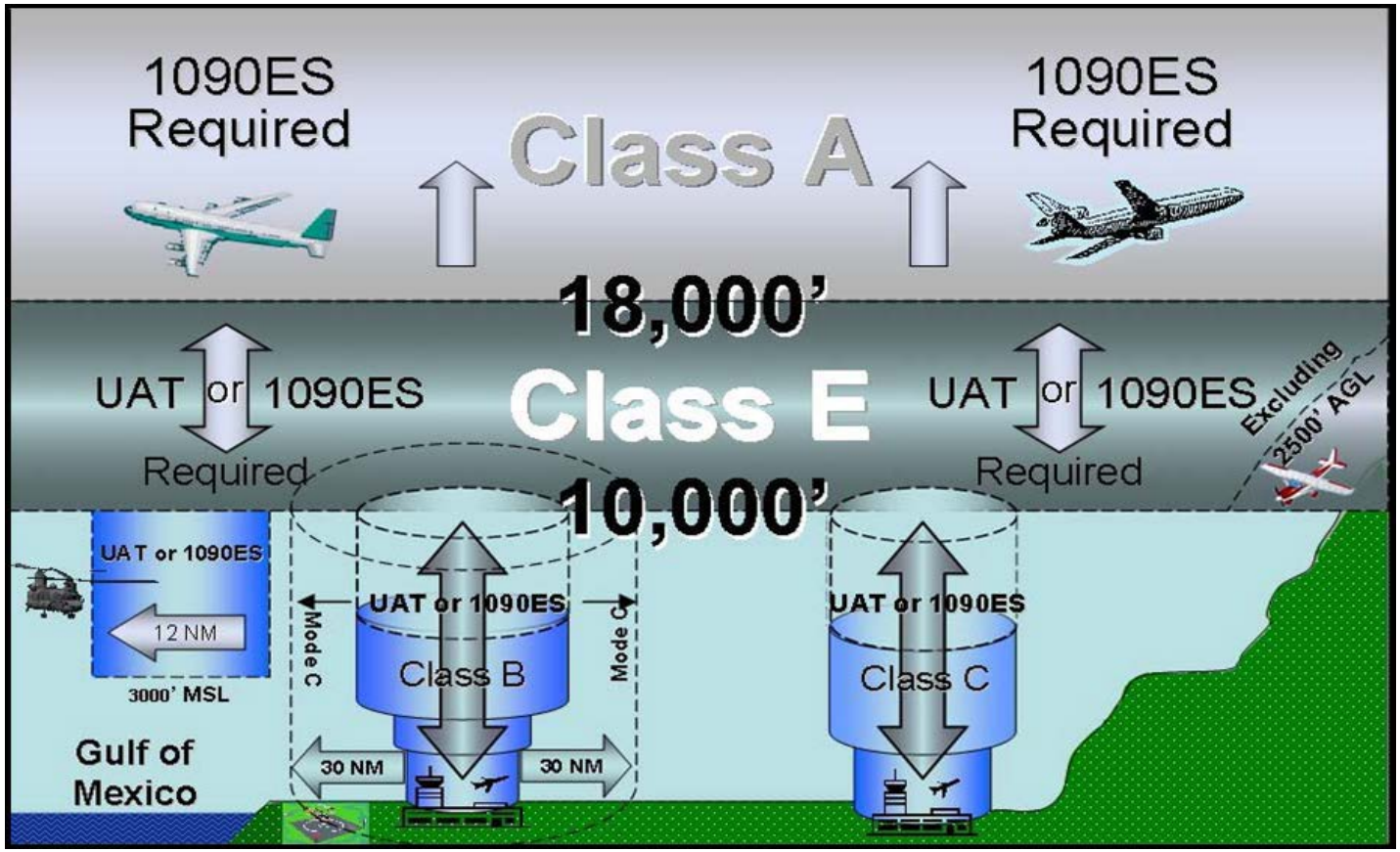
FAA Deployment of ADSB Ground Stations



http://www.faa.gov/nextgen/programs/adsb/coverageMap/

FAA Mandate and Equip 2020 Airspace Requirements

- Equipage by Class of Airspace



ADS-B Out will be required in the following airspace:

General Rules Per 91.225	
Airspace	Altitude
A	All
B	From the ground up within the Mode C ring
C	From the ground up
E	Above 10,000 ft. MSL but not below 2,500 feet AGL

Exception to the Airspace requirements of § 91.225(b) do not apply to any aircraft that was not originally certified with an electrical system or that has not subsequently been certified with such a system installed, including balloons and gliders. These aircraft may conduct operations without ADS-B Out in the airspace specified in § 91.225(d)(2) and (4). However, for other aircraft without ADS-B Out, § 91.225(g) requires ATC authorization prior to operation in ADS-B Out-required airspace.

Why is this Exception Important? KTRK currently tracks Gliders (& Balloons) equipped with transponders

ADSB Ground Station Pictures

What Does the Future Look Like for KTRK Flight Tracking System

Current Benefits of MLAT Flight Tracking

- Safety, Safety, Safety within the Truckee Tahoe Airspace and Surrounding Region
  - Tracks Mode 3A/C, Mode S and ADSB Equip Aircraft
- Provides Analytical Data for:
  - Search and Recuse Activities
  - Noise Monitoring and Operations Systems
  - Provides Critical Information to Reduce Community Annoyance
  - Master Planning and Local Land Use

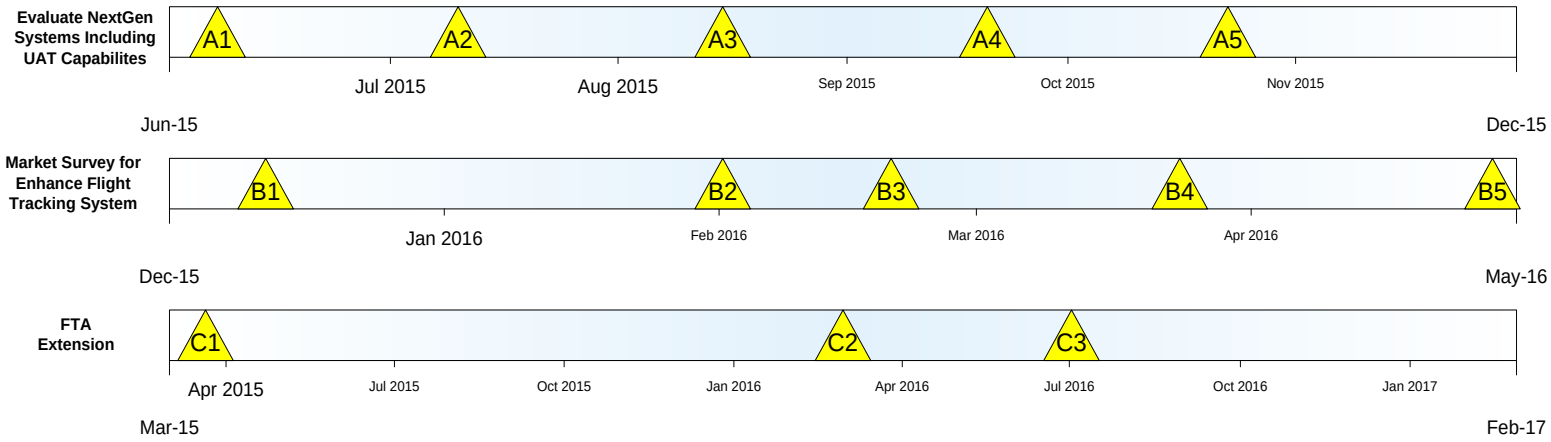
How Does KTRK Prepare for the Future: What's Missing?

- Need to add UAT Flight Tracking Capability
  - ADSB will provide Rebroadcast (ADS-R)
- General Aviation Aircraft Flying Below FL180 Most Likely will Equip with UAT Transponder
    - Significant Cost Benefits to General Aviation Community Equipping with UAT
    - Additional Features such as ADSB-In
      - TIS-B and FIS-B
- New Ground Stations Could work with Existing MLAT Flight Tracking System
  - Multi-Senor Fusion Processor

Why Have Both Flight Tracking Systems

- Mixed Fleet of GA Aircraft
  - Fewer Aircraft will still operate Mode 3A/C Transponders after the mandate
- FAA Mandate and Equip 2020 Could be Delayed
- Maximize KTRK Investment in MLAT
  - Existing MLAT Flight Tracking System is Operational and Would Serve as Safety Back Up As New System is Being Installed
- ADSB and UAT will have Smaller System Foot Print and Lower Life Cycle Costs
  - Only One Station is Required to Received A/C Transponder Information

Proposed MLAT Flight Tracking Transition Timeline



Evaluate and Visit Potential Replacements/Enhancements for Flight Tracking System:

A1: Visit FAA WSC and ZOA to Discuss their Vision for KTRK

A2: Visit ANPC TAOS System to Evaluate LAMS System

A3: Visit CDOT to Evaluate Colorado CMAS System

A4: Brief KTRK Board on Findings and Potential Next Steps

A5: KTRK Board Approves to Proceed to Market Survey

Market Survey for Enhanced Flight Tracking System

B1: Generate Market Survey and Release

B2: Evaluate Responses to Market Survey and Coordinate with FAA As Required

B3: Brief KTRK Board on Vendor Selection

B4: Have Selected Vendor Brief KTRK Board

B5: Final Approval from KTRK Board and Issue Notice to Proceed

FTA:

C1. FTA 2 Year Extension Approval Received

C2. Decision to Pursue Additional FTA Extension

C3. Start FTA Extension Process

Snap Shot of Flight Tracking Companies

"How do they Stack Up"

Company	Current Tracking Capabilities	Future Tracking Capabilities	FAA Type Certified
Era	ADSB	UAT	No
ANPC	ADSB	UAT	Yes
Selex	ADSB and UAT		Yes
Saab Sensis	ADSB and UAT		Yes
Thales	ADSB and UAT		Yes
ComSoft	ADSB	UAT	No
Triple – S	ADSB and UAT		No

All Companies are Mode 3A/C and Mode S Capable

Benefits Realized for the Community and Airport

- Safety within the District's Airspace and Surrounding Region
- FAA NextGen Compliant System with Approvals Provides Stability to KTRK Flight Tracking for the Foreseeable Future 20 years
- Will Detect Gilders, Balloon's, and Unmanned Aerial Vehicles (UAV) that are properly equipped >55lbs
- Improved RNAV Procedures and Airspace Management
- Measurement Tools to Reduce Community Annoyance
- Increase in Airport Revenues and Enhanced Incentives
- Increase FAA AIP Money for Airport Upgrades
- Potential for Enhanced Capacity if System is Integrated into NAS/FAA

Recommendations for the Next 12 Months

- Stakeholder's Approval to move forward with the Discovery Portion of the Transition Timeline
  - Visit Like Size Airports with ADSB / UAT Flight Tracking Systems and FAA, Oakland Center (ZOA)
- Leverage the Current Investment in Flight Tracking as Long as Possible
  - Current Technology Serves Airport Operations and Community Needs
    - Safety, Community Annoyance, Noise, and Master Planning
- Conduct Market Survey for Potential Products, Capabilities, and Costs
- Brief Stakeholders on Progress

Questions?

Thank You for Your Attention

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Abbreviations List

- Advance Navigation Positioning Corporation (ANPC)
- Air Traffic Control Radar Beacon System (ATCRBS Mode 3A/C)
- Automatic Dependent Surveillance Broadcast (ADSB)
- Federal Aviation Administration (FAA)
- Facility Transmitting Authorization (FTA)
- Flight Information System Broadcast (FIS-B)
- Global Positioning System (GPS)
- Government Furnished Equipment (GFE)
- Truckee Tahoe Airport (KTRK)
- Multilateration System (MLAT)
- Next Generation Air Transportation System (NextGen)
- Noise Operations and Monitoring System (NOMS)
- Traffic Information Service Broadcast (TIS-B)
- Unmanned Aerial Systems (UAS)
- Universal Access Transceiver (UAT)
- Wide Area Augmentation System (WAAS)
- Wide Area Multilateration System (WAM)
- Oakland Center (ZOA)

References

- FAA NextGen Priorities 10/17/2014
- FAA General Aviation Report 06/02/2014
- FAA NextGen Get Smart ADSB 06/2014
- FAA NextGen Get Smart WAM 07/2014
- FAA Business Case for NextGen 6/2014
- ADSB Essentials Industry Paper 06/2014
- Stanford University Research Paper Evaluation of UAT vs. ADSB Transponder 05/2014
- FAA Safety Briefing Jan/Feb 2015
- MITRE NextGen Independent Assessment and Recommendations Oct 2014
- NextGen Works for Airports 06/2014