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Transportation Security Administration

Office of Security Technology

Airport Perimeter Security Projects for FY06

FINAL REPORT

San Francisco International Airport (SFO)

Perimeter Enhancement Common Operating Picture

U.S. Department of Homeland Security
Transportation Security Administration
Office of Security Technology
Advanced Surveillance Program
701 South 12th Street
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[redacted]

OVERVIEW

INTRODUCTION

In fiscal year (FY) 2006, the Transportation Security Administration (TSA) announced opportunities for general perimeter security enhancement projects at airports with typical configurations and existing barriers, such as fencing and concrete barricades. The announcement requested information from airport authorities on existing airport perimeter security vulnerabilities and proposals to mitigate those vulnerabilities through the inventive use of available technologies at intended perimeter access points (such as vehicle gates), perimeter boundaries, and terminals.

In FY 2008, TSA reissued the Airport Perimeter Security (APS) announcement to all airports, along with a second announcement addressing small to medium-sized airports with few or no barriers around their perimeters. The second announcement was for the Virtual Perimeter Monitoring System (VPMS) project intended to test a more elaborate solution that would better fit a smaller airport. The VPMS solution was developed by the Navy.

TSA requested airports provide white papers explaining the security deficiencies to be addressed and proposals, including technologies to be deployed and full life-cycle project cost estimates. 65 airports responded to the FY 2006 request and 35 airports responded to the FY 2008 requests. The airports proposed projects of varying complexity, from installation of a single piece of equipment to sophisticated, integrated systems.

Six airports were selected in FY 2006 to participate in the APS projects. In FY 2008 and 2009, TSA selected six additional airports for participation in APS and three airports for VPMS projects.

The attached report covers the test results of only one of the 15 total test sites. TSA plans to release each report singularly as the test results are completed and made available.

IMPLEMENTATION

San Francisco International Airport (SFO) determined [redacted]

National Safe Skies Alliance (Safe Skies) provided independent verification and validation (IV&V) services and operated along with airport authorities to verify that the Common Operating Picture enhancements met the airport's security expectations. The IV&V was concluded December 31, 2008.

The system piloted at SFO is an integrated enhancement that utilizes existing Air Surface Detection Equipment (ASDE-3) radar, new surveillance infrastructure, video analytics, wireless communication systems, and Global Positioning System (GPS) vehicle tracking technology. The technologies are coordinated at the SFO SOC in the form of two separate Common Operating Pictures (COP):

Intergraph COP – The Intergraph COP is a security integration tool that utilizes a development program to bring security/alarm data from multiple devices into a single console. Technology Service Corporation (TSC), Vidient, Sight Logix, and ID Systems alarms come into the system via an Ethernet connection. Data history, alarm resolution procedures, time stamps, radar tracks, and video can be recorded from this console.

TSC COP – The radar-tracking COP component is provided by TSC. This component utilizes the existing ASDE-3 radar system to provide tracking information for small targets (i.e., people) that may be in or around the airport. The ASDE-3 radar was initially [redacted]

Sight Logix Thermal Imaging Cameras – These cameras are used in areas where ground cover is prevalent. [redacted]

PTZ Cameras – These are high-resolution [redacted] The TSC COP uses four cameras for its object tracking features, and the others are integrated into the Intergraph COP.

Vidient Video Analytics Software – The Vidient analytics program monitors camera images for [redacted]

ID Systems GPS Tracking for Vehicles – ID Systems GPS tracking updates the locations of [redacted]

The Safe Skies Lead Test Engineer (LTE) generated a site survey document based on a preliminary survey of the locations prior to the deployment of the security technology improvements. The LTE developed operational testing procedures used as the basis for determining if the system met the security requirements of SFO airport authorities. Representatives of TSA, Safe Skies, and SFO convened to discuss and verify the system requirements prior to the implementation of evaluation procedures. The resulting operational data was analyzed by the Safe Skies statistical team and combined with the site survey information to generate the final report.

SUMMARY

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[redacted]

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	March 2009 Final Report	

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16. Supplementary Notes
This report was prepared by John Hunsucker of National Safe Skies Alliance

17. Abstract

This report documents the field testing results of perimeter security enhancements that have been installed at SFO. The pilot system is a combination of technologies that are directed at resolving, preventing, and/or recording perimeter security violations at perimeter areas around the facility. Safe Skies witnessed and can verify testing that was performed by the vendor and integration personnel August 25 – 30, 2008 and September 2 – 5, 2008. Additionally, Safe Skies performed testing November 17 – 20, 2008.

Testing of this system was made possible through funding and resources allotted from the TSA Airport Perimeter Security program. The statements included in this document are in reference to the Critical Operational Issues that were approved in the project's Final Test Plan (DHS/TSA 2600.02.01.08-195, October 2008).

18. Key Words
Air Surface Detection, GPS Tracking, Perimeter, Remote Security, SFO, Video Analytics

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[redacted]

APPENDIX D – TSC AIRPORT SECURITY DISPLAY PROCESSOR TECHNICAL SPECIFICATION SHEET

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EXECUTIVE SUMMARY

San Francisco International Airport (SFO) utilized Airport Perimeter Security (APS) Program resources, provided by the Transportation Security Administration (TSA) to purchase and implement a security enhancement that improves automated surveillance at the airport perimeter and Air Operations Area. As required by the APS program, National Safe Skies Alliance (Safe Skies) provided operational test and evaluation services and operated with airport authorities to verify that the response of the security technology met the airport's security expectations.

The system piloted at SFO integrates existing Air Surface Detection Equipment with a combination of devices and technologies to create a new surveillance network. Thermal and pan-tilt-zoom (PTZ) cameras, video analytics, wireless communication systems, and GPS vehicle tracking technology are coordinated at the SFO Security Operations Center (SOC) in the form of two combined Common Operating Pictures (COP). The purpose of the COP is to minimize user latencies associated with multiple systems by presenting all system information in a single functional user interface.

Overall, the system is capable of identifying, tracking, and alarming on targets that are moving through restricted areas both inside and outside of the AOA. A camera network is integrated with the radar system to track targets in real time. When the radar system detects movement in a restricted area, a camera automatically turns and zooms in on the target.

[redacted]

Safe Skies conducted scenarios and collected data from the surveillance network's calibrated areas of coverage. The figure below illustrates the layout of SFO, and the associated Test Locations:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

ACRONYMS

ACB&P	Access Control, Biometrics, and Perimeter
AOA	Air Operations Area
APS	Airport Perimeter Security
ASDE-3	Air Surface Detection Equipment
COI	Critical Operational Issue
COP	Common Operating Picture
FAA	Federal Aviation Administration
GPS	Global Positioning System
IR	Infrared
LTE	Lead Test Engineer
MOE	Measure of Effectiveness
MOP	Measure of Performance
OT&E	Operational Testing and Evaluation
PTZ	Pan-Tilt-Zoom
SAT	Site Acceptance Test
SFFD	San Francisco Fire Department
SFO	San Francisco International Airport – FAA designation
SOC	Security Operations Center
SIDA	Security Identification Display Area
TSA	Transportation Security Administration
TSC	Technology Service Corporation

[redacted]

[redacted]

1. INTRODUCTION

San Francisco International Airport (SFO) determined [redacted]

1.1 Background

The TSA established the APS program to support the expansion and implementation of security technology at the perimeters of United States airports. Through this program, commercial off-the-shelf technologies are incorporated into an airport's security network to enhance the overall perimeter security infrastructure. As a requirement of the program, participating airports are required to submit the security technology improvement for operational testing and evaluation (OT&E) by an independent evaluator. At the request of the TSA, National Safe Skies Alliance (Safe Skies) provides OT&E services and operates along with airport authorities to verify that the response of the security technology meets the airport's security expectations.

1.2 Purpose of Document

This report illustrates the implementation of the pilot system equipment, assesses the primary detection capabilities of the technology, and provides general feedback of SFO personnel users. The results reference Critical Operational Issues (COI) that were approved in the project's Final Test Plan (DHS/TSA 2600.02.01.08-195, October 2008).

2. SCOPE

2.1 Objective

Safe Skies' OT&E was conducted in order to verify that the piloted security system met SFO authorities' expectations in that it enhances perimeter security by allowing operators in the airport SOC to identify perimeter activity quickly and efficiently.

2.2 Limitations/Risks/Assumptions

Safe Skies verified some COI measures by observing scenarios conducted by the integration team, airport personnel, and San Francisco Fire Department (SFFD). The Site Acceptance Test

[redacted]

(SAT) Report (attached as Appendix A), which was produced by the integration team[1], outlines the complete results of these scenarios in SAT Sections 4.1.1 – 4.2. With the exception of Section 4.1.3, Safe Skies can confirm the scenarios were valid and complete. These scenarios Additional scenarios were observed and operational capabilities verified by Safe Skies and all records of Safe Skies-conducted scenarios are included in Section 5, Results.

3. SYSTEM AND PROCESS DESCRIPTION

3.1 System Description

The system piloted at SFO is an integrated enhancement that utilizes existing Air Surface Detection Equipment (ASDE-3) radar, new surveillance infrastructure, video analytics, wireless communication systems, and GPS vehicle tracking technology. The technologies are coordinated at the SFO SOC in the form of two separate Common Operating Pictures (COP):

Intergraph COP – The Intergraph COP is a security integration tool that utilizes a development program to bring security/alarm data from multiple devices into a single console. Technology Service Corporation (TSC), Vidient, Sight Logix, and ID Systems alarms come into the system via an Ethernet connection. Data history, alarm resolution procedures, time stamps, radar tracks, and video can be recorded from this console.

TSC COP – The radar-tracking COP component is provided by TSC. This component utilizes the existing ASDE-3 radar system to provide tracking information for small targets (i.e., people) that may be in or around the airport. The ASDE-3 radar was initially

[1] The Integration Team consisted of personnel from Quatrotec, TSC, Intergraph, Vidient, ID Systems, and SFO.

[redacted]

[redacted]

Sight Logix Thermal Imaging Cameras – These cameras are used in areas where ground cover is prevalent. [redacted]

PTZ Cameras – These are high-resolution [redacted] The TSC COP uses four cameras for its object tracking features, and the others are integrated into the Intergraph COP.

Vidient Video Analytics Software – The Vidient analytics program monitors camera images for [redacted]

ID Systems GPS Tracking for Vehicles – ID Systems GPS tracking updates the locations of [redacted]

3.2 System Layout

All testing was conducted on SFO property. As seen in Figure 2 below, there are four primary sites of concern for testing. The new surveillance equipment was oriented to cover these areas:

[redacted]

[2] *Slew-to-queue* refers to cameras that can respond to location coordinate values from another system to automatically zoom to and track a target.

[redacted]

[redacted]

[redacted]

4. METHODOLOGY

Portions of Safe Skies' evaluation were based on the verification and validation of SAT performed by the integration team. The SAT report is attached as Appendix A.

4.1 Sites and Schedule

Testing was conducted between August and December 2008, for which Safe Skies was either verifying the SAT operations or performing scenarios independently of the integration team.

The testing sites were along [redacted]

[redacted]

[redacted]

4.2 Equipment

The integration team utilized SFO and SFFD equipment and personnel in order to complete the SAT operations. SAT required the following equipment:

- GPS
- [redacted]
- Multiple communication sources (cellular phones, two-way radios, etc.)

4.3 Critical Operational Issues (COI)

The COIs are the primary objectives of the assessment. The procedures and data collection processes are based on Measures of Effectiveness (MOE) and Measures of Performance (MOP) that generate qualitative and quantitative data to address the identified COIs.

- **COI 1: What is the current legacy perimeter security infrastructure present at the Test Locations?**
- **COI 2: Does the security enhancement meet SFO physical security expectations?**
- **COI 3: Does the security enhancement enhance operations within the SOC?**

COI 1: What is the current legacy perimeter security infrastructure present at the Test Locations?		
MOE	**MOP**	
1 Identify the perimeter security infrastructure of the improvement areas	**A**	Document the improvement area and current security/technology.
	B	Describe the operational use of present security technology/equipment.
	C	Describe the security processes and procedures.

[redacted]

[redacted]

COI 2: Does the security enhancement meet SFO physical security[3] expectations?			
MOE		**MOP**	
1	Does the enhancement effectively identify and alarm on targets[4] within the detection area of Test Location #1 and #4?	[redacted]	
2	Does the enhancement effectively identify and alarm on targets within the detection area of Test Location #2?		
3	Does the enhancement effectively identify and alarm on targets within the detection area of Test Location #3?		
4	Does the GPS tracking enhancement effectively track vehicles [redacted]	A	Determine the target acquisition time of the GPS enhancement.
		B	Verify that the enhancement provides tracking information for a target moving through the detection area.

[redacted]

[redacted]

[redacted]

COI 3: Does the security enhancement improve operations within the SOC?			
MOE		**MOP**	
1	Does the security enhancement effectively alert personnel in the SOC?	A	How do SOC personnel respond to the alarm signal?
		B	Are there any features about the security enhancement Graphic User Interface (GUI) that SOC personnel like or dislike?
		C	What is the time/process required for the SOC personnel to resolve an alarm from the enhancement?
2	Are there any maintenance or normal use issues?	A	Are there any maintenance requirements of the enhancement? If so, identify them.
		B	Does the enhancement generate nuisance alarms? If so, attempt to identify the conditions of the alarm.
		C	Does the enhancement generate false alarms? If so, attempt to identify the conditions of the alarm.

5. RESULTS

A goal in data collection is to gather sufficient information to characterize all parameters of interest. Sometimes, when data is collected in an operational environment, events may occur that limit the amount of data collected for a given combination of parameters. To account for these situations, Safe Skies has established general guidelines for reporting summary statistics and associated confidence intervals:

- For sample sizes of less than *10*, only minimum and maximum observations or the range will be reported.
- For sample sizes of at least *10* but less than *15*, percentiles and confidence intervals for the percentiles may be reported.
- For sample sizes of at least *15*, percentiles and associated confidence intervals, and the mean and its associated confidence interval may be reported.

5.1 COI 1

This issue illustrates some of the basic security elements and infrastructure that were present prior to the installation of the new enhancements. It should serve an informal basis for comparing effectiveness in security awareness.

[redacted]

[redacted]

5.1.1 MOE 1.1: Existing Infrastructure

MOE 1 was designed to illustrate the infrastructure and perimeter security elements in place within the improvement area. Only pertinent details were recorded to reflect installation efforts.

5.1.1.1 MOPs 1.1A, 1.1B, & 1.1C

[redacted]

5.2 COI 2

This issue was designed to illustrate how the security enhancement met the expectations of airport security personnel. For this assessment, Safe Skies worked with the integration team to develop test scenarios and metrics for verification and validation. Safe Skies' role was to observe the scenarios as they were being implemented to ensure that the testing was meeting the highest standards of performance and that no information was being biased.

5.2.1 MOE 2.1

This measure was designed to illustrate the effectiveness of the system in identifying and alarming on targets that move within [redacted]

[redacted]

[redacted]

5.2.1.1 MOPs 2.1A, 2.1B, & 2.1C

[redacted]

5.2.1.2 MOPs 2.2A, 2.2B, & 2.2C

[redacted]

[redacted]