

**Progress Made, but CBP  
Faces Challenges  
Implementing a Biometric  
Capability to Track Air  
Passenger Departures  
Nationwide**





# DHS OIG HIGHLIGHTS

## *Progress Made, but CBP Faces Challenges Implementing a Biometric Capability to Track Air Passenger Departures Nationwide*

**September 21,  
2018**

### **Why We Did This Audit**

U.S. Customs and Border Protection (CBP) has primary responsibility for implementing a capability to track air passenger departures and, using the data obtained, to identify potential visitor overstays. We conducted this audit to evaluate CBP's efforts to develop and implement a biometric exit capability, and determine whether the data collected at pilot locations has improved DHS' ability to verify foreign visitor departures at U.S. airports.

### **What We Recommend**

We are making five recommendations to address technical and operational challenges, as well as ensure stakeholder support for CBP's biometric program.

#### **For Further Information:**

Contact our Office of Public Affairs at 202-981-6000, or email us at [DHS-OIG.OfficePublicAffairs@oig.dhs.gov](mailto:DHS-OIG.OfficePublicAffairs@oig.dhs.gov)

### **What We Found**

In 2017, CBP made considerable progress developing and implementing a biometric capability to track air passenger exits using facial recognition technology. CBP's Biometric Entry-Exit Program conducted a pilot at nine airports and demonstrated ability using this technology to match 98 percent of passengers' identities at departure gates. CBP's progress was due to leveraging existing DHS and airport infrastructure and dedicated funding. CBP expects to build on this progress by supporting airline use of the biometric capability for a greater volume of flights by 2019.

During the pilot, CBP encountered various technical and operational challenges that limited biometric confirmation to only 85 percent of all passengers processed. These challenges included poor network availability, a lack of dedicated staff, and compressed boarding times due to flight delays. Further, due to missing or poor quality digital images, CBP could not consistently match individuals of certain age groups or nationalities. Collectively, the biometric data obtained during the pilot improved DHS' ability to verify 105,000 foreign visitor departures from U.S. airports, as well as 1,300 overstays. However, the low 85-percent biometric confirmation rate poses questions as to whether CBP will meet its milestone to confirm all foreign departures at the top 20 U.S. airports by fiscal year 2021.

Given uncertain airline commitment, CBP still must address longstanding questions on how the program will be funded and staffed. Due to a lack of DHS guidance, the role other DHS components will play in implementing the entry-exit capability at airports also remains in question. Solidifying long-term partnerships with these stakeholders will be key to CBP successfully implementing the biometric capability nationwide as mandated.

### **Management Response**

The Department and CBP concurred with our recommendations.



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Department of Homeland Security

Washington, DC 20528 / [www.oig.dhs.gov](http://www.oig.dhs.gov)

September 21, 2018

MEMORANDUM FOR: The Honorable Kevin K. McAleenan  
Commissioner  
U.S. Customs and Border Protection

Chip Fulghum  
Deputy Under Secretary for Management  
Department of Homeland Security

FROM: John V. Kelly   
Senior Official Performing the Duties of the  
Inspector General

SUBJECT: *Progress Made, but CBP Faces Challenges  
Implementing a Biometric Capability to Track Air  
Passenger Departures Nationwide*

Attached for your information is our final report, *Progress Made, but CBP Faces Challenges Implementing a Biometric Capability to Track Air Passenger Departures Nationwide*. We incorporated the formal comments from the Department in the final report.

The report contains five recommendations aimed at improving CBP's ability to develop and implement a biometric exit capability at airports nation-wide. DHS concurred with all five recommendations. Based on information provided in your response to the draft report, we consider recommendations 1 through 5 open and resolved. Once your offices have fully implemented the recommendations, please submit a formal closeout letter to us within 30 days so that we may close the recommendations. The memorandum should be accompanied by evidence of completion of agreed-upon corrective actions and of the disposition of any monetary amounts.

Please send your response or closure request to  
[OIGTAuditsFollowup@oig.dhs.gov](mailto:OIGTAuditsFollowup@oig.dhs.gov).

Consistent with our responsibility under the *Inspector General Act*, we will provide copies of our report to congressional committees with oversight and appropriation responsibility over the Department of Homeland Security. We will post the report on our website for public dissemination.



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Please call me with any questions, or your staff may contact Sondra McCauley, Assistant Inspector General, Information Technology Audits, at 202-981-6339.

Attachment



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**Abbreviations**

CBP	U.S. Customs and Border Protection
GAO	Government Accountability Office
HART	Homeland Advanced Recognition Technology
IAD	Dulles International Airport
ICE	Immigration and Customs Enforcement
IDENT	Automated Biometric Identification System
IT	Information Technology
JFK	John F. Kennedy International Airport
OBIM	Office of Biometric Identity Management
OIG	Office of Inspector General
TSA	Transportation Security Administration
TVS	Traveler Verification Service



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### Background

Within the Department of Homeland Security, U.S. Customs and Border Protection (CBP) has front-line responsibility for safeguarding America's borders from dangerous people and materials while facilitating lawful international travel and trade. Accomplishing this mission entails reviewing foreign visitors' travel documents, including passports and visas, and determining visitor admissibility to the United States. Equally important is confirming visitor departures prior to the expiration of their visas or authorized periods of admission.<sup>1</sup> A visitor who remains in the country beyond an authorized period of admission is classified as an overstay.

Every day, CBP processes more than 1 million travelers as they enter the United States at air, land, and sea ports of entry. By comparison, more than 1 million travelers also exit the country daily, with approximately 300,000 departing by air. The ability to accurately confirm a traveler's identity and match it to previous encounters with CBP and other government entities is critical to prevent terrorism, enhance national security, and enforce immigration laws.

Having reliable and accurate air, land, and sea departure data is critical for CBP to confirm the departures of all foreign nationals from the United States at the end of their authorized admission periods. During the current visitor screening process, CBP collects biographic data such as traveler's name or date of birth, as well as biometric information such as fingerprints and photos, to confirm identity and document nonimmigrant entry to the country. However, CBP is limited to using only biographic information to confirm that a foreign visitor has physically departed the country. Biographic identity verification alone does not facilitate the ability of CBP officers to identify travelers using fraudulent documents, or detect imposters traveling with genuine documents.

Given the limitations of biographic data, congressional mandates, some issued more than 20 years ago, require the development of an automated entry and exit control system to match the arrival and departure records of foreign visitors entering and leaving the United States, and to enable identification of visa overstays.<sup>2</sup> A major impetus for developing a biometric entry-exit system is the *Consolidated Appropriations Act of 2016*, in which Congress established a

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<sup>1</sup> Each U.S. visa holder, or visitor from a visa waiver country, receives an "admit until date," by which time the individual must exit the country or apply for extended stay.

<sup>2</sup> See, e.g., *Illegal Immigration Reform and Immigrant Responsibility Act of 1996*, Pub. L. No. 104-208, § 110(a) (1996); *Intelligence Reform and Terrorism Prevention Act of 2004*, Pub. L. No. 108-458, § 7208 (2004); *Implementing Recommendations of the 9/11 Commission Act of 2007*, Pub. L. No. 110-53, § 711(d)(1)(F) (2007); *Consolidated and Further Continuing Appropriations Act, 2013*, Pub. L. No. 113-6, div. D, tit. III (2013).



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visa fee that will provide up to \$1 billion in funding over a 10-year period.<sup>3</sup> Another key driver is Executive Order 13780, which directs DHS to expedite implementation of a biometric entry-exit system.<sup>4</sup>

In 2013, CBP assumed responsibility for implementing a biometric solution within DHS. CBP's Office of Field Operations took the lead in this initiative, establishing an Entry-Exit Transformation Office in May 2013. In March 2017, CBP changed the name of the office to the Biometric Entry-Exit Program Office. As of September 2017, the office was fully staffed with more than 70 personnel. CBP's Office of Information Technology helps the program office deploy and support the biometric exit capabilities developed.

An early goal of the Biometric Entry-Exit Program was to implement a biometric exit capability to support 30 international flight departures per day by the end of December 2018. Over time, the program plans to enhance and incrementally deploy biometric capabilities across all modes of travel — air, sea, and land — by fiscal year 2025. By implementing a biometric exit solution, CBP aims to increase national security by achieving higher levels of assurance of foreign visitor identities, with minimal impact on the traveling public. CBP also seeks to improve the reliability of data used to identify overstays and travelers who entered the United States without inspection.

### **Prior CBP Efforts to Conduct Biometric Testing**

Since receiving the entry-exit tracking mission from Congress in 2013, CBP has conducted several pilots to gather information and test different biometric technologies. Specifically, from 2014 to 2016, the Biometric Entry-Exit Program collaborated with DHS' Science and Technology Directorate to test facial recognition, iris scanning, and mobile fingerprint readers in simulated operational conditions at air and land ports of entry.<sup>5</sup> CBP used the results from each test to gauge the feasibility of real-time biometric identification that is traveler-friendly and easy to deploy for travel industry partners. Table 1 provides a summary of these test activities.

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<sup>3</sup> *Consolidated Appropriations Act, 2016*, Pub. L. No. 114-113, div. O, tit. IV, § 402(g) (2015)

<sup>4</sup> Exec. Order No. 13,780; 82 Fed. Reg. 13,209, 13,216 (March 6, 2017)

<sup>5</sup> Facial recognition technology measures and matches the unique characteristics of an individual in a digital image for the purposes of identification or authentication.



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**Table 1: Summary of Biometric Exit Tests from 2013 to 2016**

Test	Biometric Mode	Dates	Location	Results
Air Entry-Exit Re-engineering Project	Test and evaluation of available technologies	2013 to 2015	Laboratory testing	Facial, iris, and fingerprints were all identified as potential biometric technologies.
Southwest Border Pedestrian Exit Field Test	Face and iris scanning	2013 to 2016	Otay Mesa land port of entry (San Diego, CA)	Travelers preferred facial recognition over iris scanning. Limited iris records were available for matching.
Biometric Exit Mobile Air Test	Mobile fingerprint reader	2014 to 2016	10 international airports	Manual process to read fingerprints was inefficient for large-scale exit processing.
1-to-1 Facial Comparison Project	Facial recognition technology	2014 to 2015	Dulles International Airport	Facial recognition technology had minimal impact on visitor entry processing and the traveling public.
Departure Information System	Facial recognition technology	2015 to 2016	Atlanta Hartsfield-Jackson International Airport	Facial recognition technology had minimal impact on the aircraft boarding process and the traveling public.

Source: Office of Inspector General (OIG)-generated based on CBP data

### Atlanta Facial Recognition Test Using Biometric Capture Devices

From the pilot tests, CBP concluded that the facial recognition technology used in Atlanta, GA, was the most operationally feasible and traveler-friendly option for a comprehensive biometric solution. The goal of the Atlanta pilot was to evaluate the effectiveness of biometrically matching a real-time photograph of an individual to a gallery of facial images stored in a database. The pilot began on June 13, 2016, with CBP testing the facial recognition capability once a day on passengers boarding a flight to Tokyo-Narita, Japan. Three months later, CBP switched to testing a daily flight from Atlanta to Mexico City instead. By the end of November 2016, CBP was conducting the tests on an average of seven flights per week.

Throughout 2016, CBP refined its approach to using facial recognition to confirm travelers' identities biometrically. As part of this effort, CBP established a biometric matching system, the Departure Information System, and used commercial biometric capture devices (e.g., digital cameras and display tablets) to take photos and verify the identities of passengers as they boarded a plane. Using facial recognition technology, the Departure Information System compared a passenger's live photo against photos available from previous



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encounters (e.g., U.S. passport and visa checks). CBP also established an end-to-end process to build photo galleries based on flight manifests to confirm passenger identities. Table 2 outlines each step of the Departure Information System process.

**Table 2: Departure Information System Process**

1. Obtain passengers' biographic information prior to flight boarding:	CBP personnel used the airline flight manifest and its Advance Passenger Information System to obtain biographic information, such as name, date of birth, passport number, and nationality for each traveler. <sup>6</sup> CBP used this information to establish a list of passengers on each flight.
2. Create a photo gallery:	CBP used the passenger list to create a repository of digital images, referred to as a "photo gallery." CBP obtained passengers' images by sending electronic queries to Federal departments, such as the U.S. Department of State, to access the individual's historical records (e.g., U.S. passport, U.S. visa, and DHS encounter records). CBP also leveraged photographs on pre-screened passengers from DHS systems, such as the Automated Biometric Identification System (IDENT), to help create the gallery. <sup>7</sup>
3. Capture traveler photos during aircraft boarding:	CBP officers instructed passengers to present their boarding passes to the boarding pass scanner as they approached the camera. Once the boarding pass was scanned, the camera captured a digital image of the traveler's face.
4. Match digital photos to travelers to confirm their identities:	The Departure Information System automatically compared passenger photographs captured during boarding against photo gallery records. When the Departure Information System matched a photograph to an image in the gallery the passenger was instructed to board the plane.

*Source:* OIG-generated from CBP data

**Prior Audit Reports on the Biometric Exit Program**

Since 2013, DHS OIG and the Government Accountability Office (GAO) have completed several audits on DHS' progress in developing a biometric exit capability, as well as its ability to track and report on visa overstays. These audits previously identified longstanding challenges related to funding and inadequate planning as impediments to progress.

- In July 2013, GAO reported that DHS needed to take additional actions to assess data and improve planning for a biometric air exit program.<sup>8</sup> GAO recognized that DHS had a high-level plan in place for a biometric

<sup>6</sup> The Advance Passenger Information System contains information on travelers and crew arriving or departing from the United States by air or sea.

<sup>7</sup> IDENT matches and stores biometric information.

<sup>8</sup> *Additional Actions Needed to Assess DHS's Data and Improve Planning for a Biometric Air Exit Program*, GAO-13-683, July 2013



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air exit capability, but had not clearly defined the steps, timeframes, or milestones needed to develop and implement the plan. GAO recommended DHS assess and document the reliability of its data, and establish timeframes and milestones for a biometric air exit framework. GAO issued two recommendations, both of which have been resolved and closed.

- In February 2017, GAO reported that DHS made initial progress through pilots in 2014–2016 to test and evaluate biometric exit capabilities. Nevertheless, CBP still faced longstanding challenges in developing and deploying the exit system.<sup>9</sup> GAO again emphasized that CBP needed to improve in planning, staffing, and overcoming infrastructural hindrances at air and land ports of entry. GAO issued no recommendations in this report.
- In May 2017, DHS OIG reported that insufficient technology hindered DHS' tracking of visa overstays.<sup>10</sup> Specifically, DHS lacked an exit system to capture biometric data on nonimmigrant visitor departures from the country. Instead, DHS relied on third-party biographic data, such as commercial carrier passenger manifests, to confirm U.S. visitor departures. Further, DHS could not account for the total number of visa overstays in the country published in its annual *Entry/Exit Overstay Report* to the Congress. We issued five recommendations, all of which remained open as of April 2018.

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<sup>9</sup> *DHS Has Made Progress in Planning for a Biometric Exit System and Reporting Overstays, but Challenges Remain*, GAO-17-170, February 2017

<sup>10</sup> *DHS Tracking of Visa Overstays Is Hindered by Insufficient Technology*, DHS OIG-17-56, May 2017



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**Results of Audit**

In 2017, CBP made considerable progress developing and implementing a biometric capability to track air passenger exits using facial recognition technology. CBP's Biometric Entry-Exit Program conducted a pilot at nine airports and demonstrated ability using this technology to match 98 percent of passengers' identities at departure gates. CBP's progress was due to leveraging existing DHS and airport infrastructure and dedicated funding. CBP expects to build on this progress by supporting airline use of the biometric capability for a greater volume of flights by 2019.

During the pilot, CBP encountered various technical and operational challenges that limited biometric confirmation to only 85 percent of all passengers processed. These challenges included poor network availability, a lack of dedicated staff, and compressed boarding times due to flight delays. Further, due to missing or poor quality digital images, CBP could not consistently match individuals of certain age groups or nationalities. Collectively, the biometric data obtained during the pilot improved DHS' ability to verify 105,000 foreign visitor departures from U.S. airports, as well as 1,300 overstays. However, the low 85-percent biometric confirmation rate poses questions as to whether CBP will meet its milestone to confirm all foreign departures at the top 20 U.S. airports by FY 2021.

Given uncertain airline commitment, CBP still must address longstanding questions on how the program will be funded and staffed. Due to a lack of DHS guidance, the role other DHS components will play in implementing the entry-exit capability at airports also remains in question. Solidifying long-term partnerships with these stakeholders will be key to CBP successfully implementing the biometric capability nationwide as mandated.

**CBP Made Progress Developing and Implementing a Biometric Exit Capability for Air Departures**

CBP made considerable progress developing and implementing a biometric exit capability, based on the success of its 2016 facial recognition tests in Atlanta. Throughout 2017, the Biometric Entry-Exit Program expanded its pilot efforts to eight additional airports and achieved many of its goals to validate that facial recognition technology could support real-time flight boarding operations and could be scaled to accommodate additional flights. CBP officials attributed the progress made to the program's ability to leverage existing DHS services, information technology (IT) systems, and airport infrastructure, as well as dedicated funding for developing the biometric exit capability. As a result of the pilot efforts, the program made significant advances in the design and development of a biometric exit air capability that can be leveraged across



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other modes of travel. As such, CBP received DHS approval of program planning documentation in 2017, with a view toward achieving initial operational capability by 2019.

#### **CBP Expanded Biometric Pilot**

To further assess facial matching technology as a viable solution, CBP expanded the facial recognition pilot beyond the Atlanta Hartsfield-Jackson International Airport to additional locations in 2017. CBP added three international airport locations in June 2017, followed by five additional airport locations by October 2017.<sup>11</sup> Consequently, CBP was able to test biometric processing on a total of 10 flights per day across 9 airports nationwide. CBP referred to this expansion as “Sprint 8.” The component was still conducting this pilot when we concluded our audit fieldwork in January 2018.

CBP updated the capabilities of its biometric capability during Sprint 8 to deliver more timely facial recognition confirmation services at each airport location. Specifically, in May 2017, the program replaced the Departure Information System with more advanced automated matching, called the Traveler Verification Service (TVS). Using facial recognition, TVS enables biometric identity verification by transmitting automated queries to locate photos in DHS and U.S. Department of State databases for matching against the unique characteristics of a traveler’s facial features. As designed, this updated capability operates in a virtual, cloud-based infrastructure that can store images temporarily and operate using a wireless network, thereby eliminating the need for the tablets previously used in 2016.

Sprint 8 also incorporated real-time data exchange from TVS to CBP officers’ digital cameras and mobile devices to provide immediate photo matching results. To illustrate, the camera displays a green screen if the photo captured during flight boarding matches a photo in the gallery. Conversely, a yellow screen indicates the photo captured at boarding is poor quality and must be re-taken. A blue screen indicates that the passenger does not match to a photo in the gallery, prompting the CBP officer to conduct secondary passenger screening. Officers receive notification of non-matches on their mobile devices through the Biometric Mobile Application, referred to as “BE-Mobile.” These devices, pictured in figure 1, also read passport barcodes, collect fingerprints, and check alerts to determine whether a passenger should be prohibited from flight boarding.

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<sup>11</sup> June 2017: Washington, DC, Houston Intercontinental, and Boston (operated by JetBlue Airways); October 2017: Chicago, Miami, New York, Las Vegas, and Houston Hobby.  
[www.oig.dhs.gov](http://www.oig.dhs.gov)



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**Figure 1: Biometric Mobile Application Devices Used to Conduct Secondary Passenger Screening**



Source: CBP Officer Training Guidance

At additional airport locations, CBP continued the same biometric processing approach from its 2016 Atlanta pilot, but included TVS capability and BE-Mobile devices. CBP officers conducted the biometric processing in conjunction with existing flight boarding procedures. For example, although officers photographed passengers, the passengers still had to present their boarding passes to airline gate agents for scanning prior to embarking. CBP considered certain passengers out of scope for biometric pilot processing, including individuals under age 14 and over age 79.<sup>12</sup> Once a passenger boarded a plane, TVS transmitted confirmation of a biometric match to other DHS systems to constitute an official departure record.

CBP allowed U.S. citizens to decline participation in the pilot. In such cases, CBP officers would permit the travelers to bypass the camera and would instead check the individuals' passports to verify U.S. citizenship. When a U.S. citizen opted to participate in the pilot but did not successfully match with a gallery photo, the CBP officer would examine the individual's passport but did not collect fingerprints. We observed biometric screening at four airports — a total of 12 flights — during our audit and witnessed only 16 passengers who declined to participate.

### **CBP Made Progress toward Meeting Biometric Program Goals**

CBP's Sprint 8 pilot demonstrated progress toward achieving program goals of deploying facial recognition technology nationwide and integrating with existing airline boarding processes. In May 2016, the Biometric Entry-Exit Program

<sup>12</sup> In-scope status is any person required by law to provide biometrics pursuant to 8 CFR 235.1(f)(1)(ii) to (iv) for entry and 8 CFR 215.8(a)(2)(i) to (iv) for exit from the United States.



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Office established five mission tasks and specific goals to measure day-to-day progress for the duration of the pilot efforts. Table 3 depicts the varying degrees of progress made toward achieving each goal, as of the end of our fieldwork in January 2018.

**Table 3: CBP Biometric Air Exit Pilot Goals and Outcomes  
(As of January 2018)**

<b>Mission Tasks</b>	<b>Goals</b>	<b>Outcomes</b>
1. Facial Photograph Availability	<ul style="list-style-type: none"> <li>Demonstrate that CBP can locate and retrieve photos for every departing passenger to use for exit processing.</li> <li>Demonstrate that the photos are sufficient for automated matching.</li> </ul>	<ul style="list-style-type: none"> <li>Approximately 99% of passengers' photos were located.<sup>13</sup></li> <li>Photos were considered adequate.</li> </ul>
2. Technical Match Rate	Demonstrate that a live traveler photo, searched against a gallery of photos from existing CBP data sources, will yield sufficient accuracy.	Average technical match rate of 98% in December 2017.
3. Scalability	Confirm whether facial identification is feasible as an end-state solution for large-scale exit processing, where real-time match results are required.	Potential for TVS to support 50% of the biometric processing at 20 airports expected to enter the program by January 2021.
4. Boarding Process Impacts	Identify the impacts of facial recognition technology on the boarding process.	TVS' match response rate was reported as 1 second.
5. Match Performance Trade-offs	Identify operational and technical trade-offs between the frequency of mistakenly matching individuals to the wrong passengers in the same gallery (false positive rates) and the frequency of correctly matching individuals to their photos stored in the digital gallery (true match rates).	False positive rate of .03% and false reject rate of .5% in December 2017

*Source: OIG-generated from CBP data*

To determine its progress toward meeting pilot goals, CBP collected and analyzed flight data and gathered feedback from airline stakeholders. For each flight, the program office tracked the number of passengers who had photographs captured prior to departure and whether TVS matched the photos to digital images in the gallery. Additionally, CBP personnel analyzed the photo gallery to determine whether all available historical photographs were accessible in DHS and U.S. Department of State systems. This entailed, for example, checking different types of traveler documents against the images stored in the systems. Additionally, CBP gathered feedback and ideas on how to improve existing biometric capabilities, and how to minimize adverse impacts on flight boarding by meeting with airline managers on a regular basis.

<sup>13</sup> Metrics in this report only included in-scope passengers, which included passengers between the ages of 14 and 79.



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We sought to validate the pilot outcomes reported by conducting our own analysis of CBP's pilot data and visiting four airport locations to observe the boarding processes for several flights. However, we found it difficult to conclude whether CBP had achieved all pilot goals. Specifically, CBP had not previously established definitive target metrics against which to measure outcomes, aside from testing the effectiveness of using facial recognition at airports. In addition, the pilot efforts were still ongoing as of January 2018. Following is a discussion of each mission task area and the pilot results.

### Facial Photograph Availability

CBP demonstrated TVS' ability to locate and retrieve photos for nearly 99 percent of all passenger departures processed as part of the pilot. The remaining 1 percent of the departing passengers without photos included Canadian citizens who did not require visas to enter the country, military personnel who did not need passports, and foreign nationals who had entered the country illegally.<sup>14</sup> CBP estimated that departing illegal immigrants represented only .13 of the 1 percent of all travelers from September to December 2017 who did not have photos in the digital gallery. CBP attributed other instances of passengers lacking photos to incomplete or inaccurate biographic data, such as misspelled names or aliases on manifests. We validated TVS' 99 percent success rate by using CBP data to calculate the average facial photograph availability rate from September to December 2017.

### Technical Match Rate

TVS enabled CBP to biometrically match 98 percent of passengers who had photos taken upon boarding and also had photos in the gallery. These were known as technical matches. CBP's reported results for 2017 were as follows:

- 98.6 percent in August
- 99.3 percent in September
- 98.9 percent in October
- 97.3 percent in November
- 98.1 percent in December

Although program personnel did not establish a target rate for technical matches during Sprint 8, CBP's technical match rate surpassed the 97 percent rate objective for full implementation of the biometric exit capability in 2021. We validated TVS' 98 percent success rate by using CBP data to calculate an average technical match rate from August to December 2017.

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<sup>14</sup> CBP was unable to locate and match military personnel without passports because it lacked access to certain U.S. Department of Defense systems.



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### Scalability

CBP conducted a scalability test in January 2018 and reported that TVS had surpassed the target of supporting biometric processing for at least 50 percent of all international flights at the Nation's top 20 airports. Specifically, CBP tested TVS capability to support up to 1,169 international flights per day. By comparison, CBP's Sprint 8 pilot supported only 10 flights. The scalability test simulated TVS' technical functions (i.e., gallery building, cloud staging, and simulated matching) for biometric processing supporting outbound flights at the seven international airports with the highest passenger volumes.<sup>15</sup> The test did not include simulation of the information exchange between the various systems that provide data to TVS, such as the U.S. Department of State's Consular Consolidated System. CBP considered this scalability test a success, although it had not previously established a metric for supporting a certain volume of biometric processing during Sprint 8.

### Boarding Process Impacts

CBP demonstrated the ability to accomplish biometric matches within a few seconds; however, it could not fully assess its ability to avoid adverse impacts on flight boarding processes. According to CBP reports, TVS exhibited an average of less than 1 second to match passenger photos to the digital gallery from September to November 2017. However, this average only included the time TVS required to match passenger photos automatically; it did not include the additional time to notify CBP officers of the match results. To illustrate, during our visits to four airports we calculated an average of 6 seconds for a passenger to have a photo taken and for a CBP officer to receive a match response from the TVS camera. Although our calculation was higher than CBP's reported results, airline officials we interviewed indicated the processing time was generally acceptable and did not contribute to departure delays. Along with not measuring the full biometric processing time, CBP also did not take into account the number of flights boarded without using TVS, which sometimes occurred due to network outages or operational difficulties.

### TVS Algorithm Adjustments to Maximize the Photo Match Rate

Throughout the pilot, CBP personnel aimed to achieve the best possible biometric match rates, using available technology. Specifically, TVS used an algorithm that was set to yield the highest possible score for correct facial matches. Program personnel closely monitored the TVS match rates each

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<sup>15</sup> The seven airports are John F. Kennedy International Airport, Miami International Airport, Los Angeles International Airport, George Bush Intercontinental Airport, O'Hare International Airport, Newark Liberty International Airport, and Hartsfield-Jackson Atlanta International Airport.



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month and modified the algorithm as needed to limit the number of false rejects. For example, the match threshold could be expanded to all passengers to reduce the likelihood that photos for individuals in certain age groups would fail to match. Lowering the threshold score for a match, however, could increase the likelihood of TVS yielding a false positive in a case where two individuals looked alike. At the conclusion of our fieldwork, personnel continued to adjust the algorithm to achieve a more favorable match rate.

Using the algorithm, CBP's biometric pilot produced the following results from matching air travelers' photos to images stored in the digital gallery in December 2017.

- Approximately 0.03 percent were "false positives," incorrect matches of a passenger's photo to the image of another individual; and
- Approximately 0.5 percent were "false rejects," failures to match a passenger's photo to another image of the same individual.

To calculate these results, CBP only counted passengers between the ages of 14 and 79 who were included in the biometric pilot. CBP officials considered these results a success, although they had not previously established a metric for photo matching. We validated these results by using CBP data to calculate average match rates for December 2017.

### **Factors Contributing to Biometric Program Progress**

Several factors contributed to the progress CBP made through its Sprint 8 pilot. Foremost among these was CBP's ability to leverage DHS IT systems and data, and existing airport infrastructure to develop the biometric exit capability. Additionally, Congress provided CBP dedicated funding to design, develop, and implement the biometric exit capability in the *Consolidated Appropriations Act of 2016*. Executive direction from the President also emphasized the importance of DHS prioritizing implementation of the biometric capability and providing regular progress updates.

#### Leveraging Existing Infrastructure

A key factor to the Sprint 8 pilot success was CBP's strategy to leverage DHS IT systems and data and existing airport infrastructure to the greatest extent possible. Documenting this approach, the program's Concept of Operations included several distinct parameters for the design of a biometric exit solution.<sup>16</sup> For example, the program:

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<sup>16</sup> "Biometric Entry-Exit Concept of Operations," U.S. Customs and Border Protection, September 2017  
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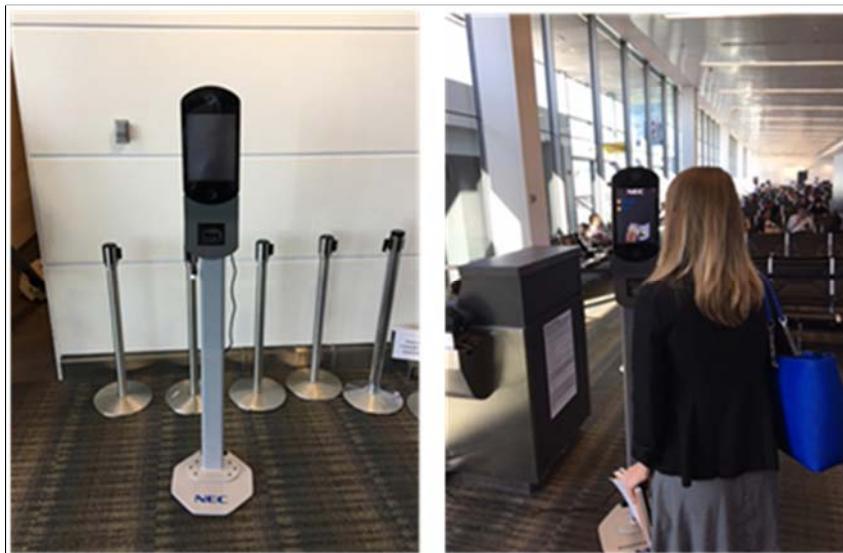
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- could not require infrastructure changes;
- could not add another layer onto the existing airport process;
- needed to build upon existing airline processes; and
- had to use existing IT data and traveler information.

According to the Deputy Executive Assistant Commissioner for CBP’s Office of Field Operations, the program accomplished this strategy by using a number of DHS systems, such as the Advance Passenger Information System and the Arrival and Departure Information System, to obtain biographic information and build photo galleries for biometric confirmation. Appendix C lists the DHS systems that CBP used as part of the biometric identity confirmation process.

Further, CBP designed the biometric capability as a “plug and play” service that airlines could readily deploy within their existing physical space without impeding the flow of travel. Utilizing the existing physical space in airports was an important aspect for CBP to test their planned end-state of airline operated and staffed solution. The program used the same equipment at each airport boarding gate to connect to TVS capability. This equipment included facial recognition cameras and a back-end communications portal, such as wireless connectivity. The cameras were positioned at each airport departure gate to take photos of individuals as they presented their boarding passes. The cameras were mounted on wheeled stands so CBP officers could easily move them between gates or store them when not in use. At most locations visited, we observed while CBP officers operated cameras and instructed passengers where to stand to ensure that quality images were captured. Figure 2 depicts the cameras used to capture photos of departing air passengers.

**Figure 2: Cameras Used at Dulles International Airport (IAD)**



Source: OIG-generated based on airport site visits



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### Congressional Funding and Executive Direction

Congressional funding and executive direction enabled CBP to develop an actionable timeline for fully implementing a biometric capability for confirming visitor exits over the next 7 years. Specifically, Congress provided CBP dedicated funding to design, develop, and implement a biometric entry and exit system over a 10-year period, from FY 2016 to FY 2025. This entailed Congress establishing a funding mechanism, whereby 50 percent of the temporary fee increases collected for L-1 and H-1B visas, up to a total of \$1 billion, would fund development of the biometric capability.<sup>17</sup> In January 2017, the Biometric Entry-Exit Program developed a 10-year plan to execute up to \$1 billion for IT investments, program and operational support, and other requirements. The program also sought DHS Acquisitions Review Board approval in April 2017 for continued biometric recognition testing and technology demonstrations as needed to advance development of the capability.

Additionally, in March 2017, the President issued Executive Order 13780, directing DHS to expedite implementation of the biometric system. Such direction emphasized the importance of DHS prioritizing development and implementation of the biometric capability and providing routine status updates. Over the past year, DHS provided one progress report to the President and had a second report in draft at the end of our audit fieldwork in early 2018.

### **Biometric Pilot Success Has Helped Achieve Key Program Milestones**

Given the success of the Sprint 8 pilot begun in 2017, CBP has been able to advance the Entry-Exit Biometric Program with increased confidence toward achieving initial operating capability by 2019. CBP defines initial operational capability as the ability to provide biometric matching services for 30 international flights each day. Central to achieving this goal is the potential for rapid increases in biometric matching capability as more flights are added over time. As of January 2018, CBP had demonstrated that TVS could provide biometric matching support for 10 flights per day, and could increase services to support more than 1,000 flights per day.

The Sprint 8 pilot also resulted in a forward-thinking strategy to leverage the biometric capability for other modes of travel. Specifically, CBP will use TVS, supporting equipment, and the back-end architecture to support future biometric matching of visitors departing from the United States by land and

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<sup>17</sup> Pub. L. No. 114-113 established the funding mechanism for the biometric program. The L-1 visas cited in the law are for foreign citizens seeking intracompany transfer to the United States, while H-1B visas are for foreign citizens requesting to come to this country to fill specialty positions requiring a bachelor's degree or higher, such as science, engineering, or IT.  
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sea. Other features, such as electronic access to targeted photo galleries, real-time photo capture, biometric matching of exiting visitors, and automatic transmission of results to DHS systems, may also be available at U.S. borders and major seaports.

As of January 2018, DHS had granted approval for various aspects of CBP's biometric program plans, with a view to achieving full operating capability by the end of FY 2021. CBP defines full operating capability as the ability to support biometric matching services at the 20 U.S. airports that process the highest-volume of foreign national passengers. Appendix D provides a list of the Nation's 20 busiest international airports.

To prepare for full operating capability, CBP's Biometric Program Office developed a number of planning documents as required by the Office of Program Accountability and Risk Management, which is responsible for oversight of major programs and investments within the Department. Key documentation included an Operational Requirements Document, a Mission Needs Statement, a Capabilities Analysis Report, and a Concept of Operations. Such documentation was necessary for the Biometric Entry-Exit Program to achieve its next acquisition milestone event as an official "program of record."<sup>18</sup> By the end of our audit in January 2018, the DHS Joint Requirements Council had approved these documents, with a view to advancing the program beyond the pilot stage to support additional flights by 2019.

### **CBP Encountered Technical and Operational Challenges that Prohibited Biometric Confirmation for All Passengers**

From August to December 2017, CBP was unable to biometrically match 15 percent of all passengers included in its pilot. The most significant obstacles were network availability issues, a lack of staff, and demanding airline flight schedules that hindered CBP in taking photos of departing passengers. CBP's TVS also could not consistently match individuals of certain age groups or nationalities due to photo availability or quality. Although the biometric data obtained during the pilot improved DHS' ability to verify 105,000 foreign visitor departures from U.S. airports, as well as 1,300 visa overstays, the low 85-percent biometric confirmation rate called into question CBP's ability to expand its biometric matching capability to meet planned milestones for FY 2021.

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<sup>18</sup> A DHS program of record has successfully achieved formal program initiation and approval from the DHS Office of Program Accountability and Risk Management.  
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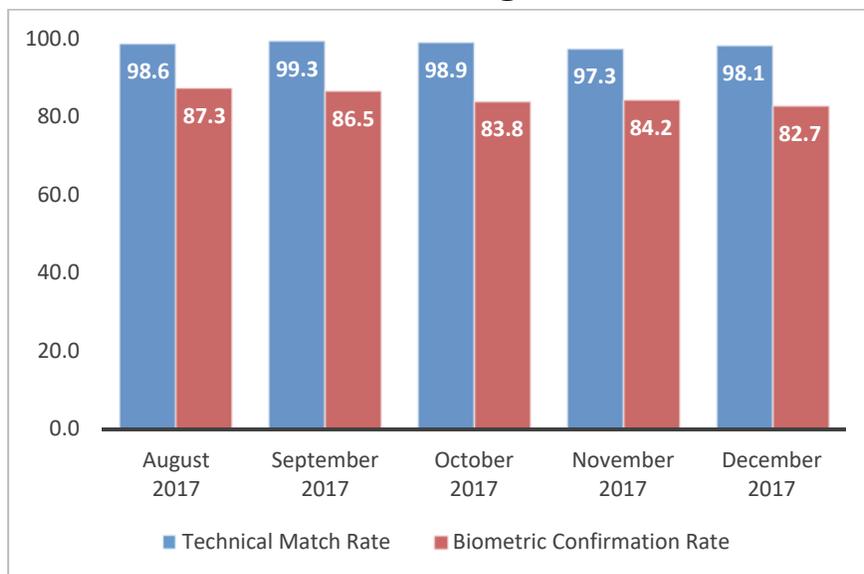


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**Low Biometric Match Rate Due to Difficulties Capturing Passenger Photos**

In 2017, the Sprint 8 pilot yielded a low biometric match rate. Although CBP intentionally did not target a specific match rate during the pilot, the end goal of the program is to biometrically confirm the departures of 97 to 100 percent of all foreign visitors processed through the major U.S. airports. During Sprint 8, from August to December 2017, TVS enabled CBP to technically match the photos of boarding passengers to photos in the digital gallery 98 percent of the time. However, TVS was unable to biometrically confirm 15 percent of all departing passengers included in the pilot. More specifically, the program’s overall biometric confirmation rate only averaged 85 percent during our audit fieldwork, from August to December 2017. Figure 3 illustrates the generally declining biometric confirmation from month to month, between August and December 2017.

**Figure 3: Comparison of Technical and Biometric Match Rates from August to December 2017<sup>19</sup>**



Source: OIG-generated based on CBP pilot data

Technical problems prohibited CBP officers from capturing photos and biometrically matching all passengers included in the pilot prior to their departures. Specifically, digital cameras required network connectivity and sustained linkages to TVS; however, frequent system disruptions hindered photo capture and automated data exchange between the cameras and TVS to support timely biometric matching and response. When network availability

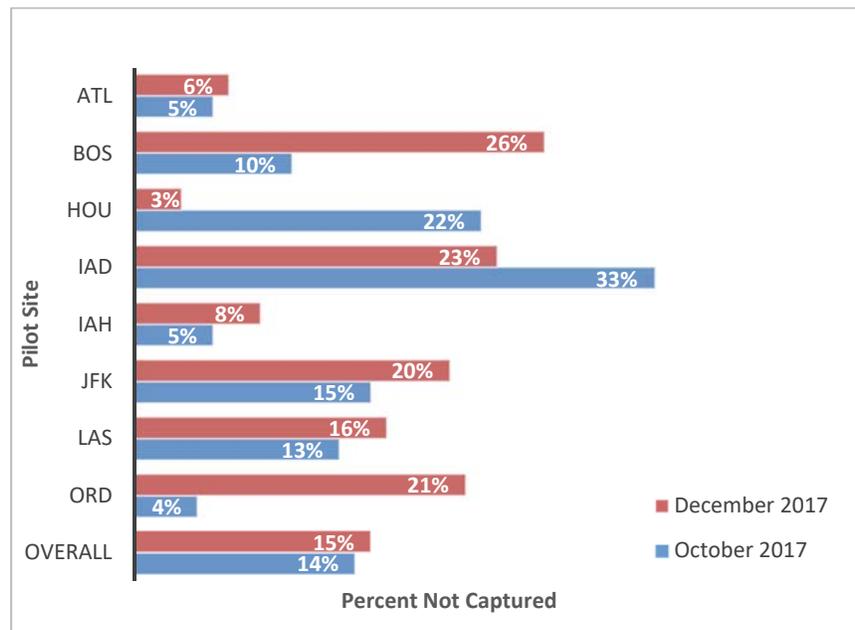
<sup>19</sup> The technical match rate tests the ability of TVS’ algorithm to match captured photos to one in the gallery, while the biometric confirmation rate is the percentage of passengers’ identities confirmed using facial recognition during air exit pilot flights.



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was low, partial or entire flights bypassed the automated biometric matching process to avoid boarding delays. Difficulties capturing all passengers' photos prior to flight boarding occurred at all nine airports included in Sprint 8. For example, as depicted in figure 4, half of the pilot locations failed to capture photos for at least 20 percent of all departing passengers in December 2017.<sup>20</sup> Moreover, all nine airport locations were unable to capture photos for 15 percent of all departing passengers included in the pilot in December 2017.

**Figure 4: Airport Rates of Failure to Capture Photos for Selected Months in 2017**



Source: OIG-generated based on CBP's monthly pilot data

We witnessed or received firsthand accounts of network difficulties at all four pilot sites we visited during our audit. When network disruptions occurred, CBP could not capture photos and biometrically confirm passenger identities until service was restored and the cameras were rebooted, and this wasted time. To illustrate, connectivity was so poor across pilot locations in December 2017 that CBP was unable to process 13 flights. In addition, while we observed biometric pilot operations at John F. Kennedy (JFK) International Airport in October 2017, two cameras briefly lost connectivity, requiring reboot. In one case, the camera reboot took more than a minute; the other required approximately 90 seconds. Passengers were either delayed or continued to board their flights without photo capture and biometric confirmation of their identities.

<sup>20</sup> The biometric pilot at Miami International Airport was not included in failure to capture rates in October 2017. Miami's performance rate for failing to capture photos as part of the pilot was 1.9 percent in December 2017.



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As the worst case that we observed, one camera at IAD airport required five different reboots to support biometric matching for a single flight. This reboot process took about 2 minutes and, as a result, more than 40 passengers boarded the flight without biometric confirmation of their identities. CBP consequently reported performance rates of 33 percent in October 2017, and 23 percent in December 2017, for failing to capture photos at IAD airport.

CBP cited its dependence on wireless networks as the primary cause for poor network connectivity and the failure to capture photos. Given the constraints of network infrastructure in the airport boarding gates, all of CBP's digital cameras operated using wireless connectivity to TVS. The wireless networks that CBP relied upon at eight of nine pilot locations typically had lower signal strength during peak times as large volumes of passengers connected to the Internet. According to a DHS program assessment, this wireless solution was "not optimal and often resulted in failure to capture images due to no connectivity."

Further, operational problems hindered photo capture at the pilot locations to support biometric matching. Specifically, CBP officers faced challenges assuming the new responsibilities required under the pilot in addition to their existing enforcement duties. Sprint 8 relied heavily upon CBP officers being present to operate cameras and assist with boarding passengers at airline departure gates. Officers had to manage the day-to-day setup, take-down, and storage of camera equipment. They also conducted secondary screening when they could not confirm photo matches or when passengers opted out of the biometric matching process. CBP officers at two locations we visited stated they were often busy with their airport enforcement and inspection duties, which took priority, and could not always dedicate the attention needed to carry out their biometric pilot responsibilities. According to CBP's monthly program reports, officers across all pilot locations could not process 10 flights in November 2017 and 18 flights in December 2017.

Demanding flight departure schedules posed other operational problems that significantly hampered biometric matching of passengers during the pilot in 2017. Typically, when incoming flights arrived behind schedule, the time allotted for boarding departing flights was reduced. In these cases, CBP allowed airlines to bypass biometric processing in order to save time. As such, passengers could proceed with presenting their boarding passes to gate agents without being photographed and biometrically matched by CBP first. We observed this scenario at the Atlanta Hartsfield-Jackson International Airport when an airline suspended the biometric matching process early to avoid a flight delay. This resulted in approximately 120 passengers boarding the flight without biometric confirmation.



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To address such problems, CBP planned to institute a single-step boarding process whereby passengers could forego presenting their boarding passes and only take photos for biometric matching prior to boarding their flights. Only in the event of match failures would passengers be required to present boarding passes or passports for identification. At the end of our fieldwork in January 2018, CBP had successfully implemented the single-step boarding process at the Boston pilot location.

### **Inconsistent Match Rates for Certain Passenger Groups**

TVS' inability to produce biometric matches consistently for individuals in certain passenger groups also contributed to the low biometric confirmation rate. Specifically, passengers under age 29 or over 70 had lower match rates than other passengers. Individuals under the age of 29 represented only about 18 percent of all passengers, but accounted for 36 percent of all passengers whose photos could not match to their digital gallery images. Similarly, individuals over the age of 70 represented only 4 percent of all passengers, but accounted for 10 percent of all passengers whose photos could not match to their digital gallery images. CBP personnel partly attributed these challenges to the age of photos stored in the gallery versus the age of the individuals photographed upon encounter. For example, the timespan between when a passport or visa photo was taken and the date of travel may be several years, during which time a person's facial features may have changed.

Matching individuals of certain nationalities also proved problematic for the verification service. U.S. citizens accounted for the lowest biometric confirmation rate and were up to six times more likely to be rejected than non-U.S. citizens. This was largely because U.S. citizens had fewer photos available in the digital gallery than foreign visitors who had to meet passport requirements. Similarly, the United States only requires that its citizens renew passports once every 10 years after the age of 16.

Further, of the non-U.S. citizens, Mexican and Canadian citizens showed the lowest biometric matching rates. For example, in September 2017, Mexican citizens had fewer photographs available in the digital gallery, which CBP attributed to the high volume of Mexican citizens who entered the United States illegally. Alternatively, Canadian citizens did not have the same visa requirements as other nationalities to enter the United States, which also resulted in fewer photos in the digital gallery.

The quality of photos available in the digital gallery or from prior encounters with U.S. authorities was also important for accurate matching. Unsuccessful matching due to poor photo quality resulted in "false rejects" and lack of biometric confirmation for departing passengers. Gallery photos might be



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ineffective for matching if individuals were photographed at an angle. This is sometimes the case with older gallery photos received from U.S. Citizenship and Immigration Services. Additionally, photos from prior encounters with U.S. authorities may be less accurate if passengers' faces are obscured by hats or scarves, or if individuals stand too close or too far away from the camera during photo capture.

### **Overcoming Technical and Operational Challenges Is Critical to Achieving Full-Scale Biometric Goals**

The biometric pilot conducted in 2017 improved DHS' ability to verify passenger departures from U.S. airports, as well as identify visa overstays and those who entered the United States illegally or with false identification. However, the inability to biometrically process all passengers prior to flight departure, and the low percentage of passengers who were biometrically confirmed, calls into question CBP's ability to successfully expand its program to meet full operational capability by the end of FY 2021. CBP's reliance upon airline agreements to expand biometric processing of passengers also poses a significant risk.

#### Pilot Data Enhanced CBP's Ability to Confirm Nonimmigrant Departures

The Biometric Entry-Exit Program has made progress toward its overall goal of improving the reliability of data DHS uses to verify nonimmigrant departures and identify visa overstays. To illustrate, biometric pilot data confirmed a total of 105,000 nonimmigrant air departures last year. Of the 105,000, nearly 1,300 were visa overstays. Notably, on the first day of the pilot, CBP officers at IAD airport identified a woman who had overstayed her visa period by almost two decades.

The biometric exit capability has also increased CBP's ability to identify foreign nationals who previously entered the United States illegally. Specifically, between February 2017 and November 2017, CBP officers identified a total of 240 suspected illegal immigrants who previously entered the country without inspection. During our audit site visits in October 2017, we witnessed CBP's identification of three suspected illegal immigrants traveling from Atlanta to Mexico City. One individual had been living in the country illegally for 24 years, while another had been here for at least a decade. CBP officers in Atlanta told us they typically identified one to two illegal immigrants per flight to Mexico City; at times they have discovered as many as seven. The officers said that, without TVS' biometric matching capability, it would not be possible to identify the illegal entrants.



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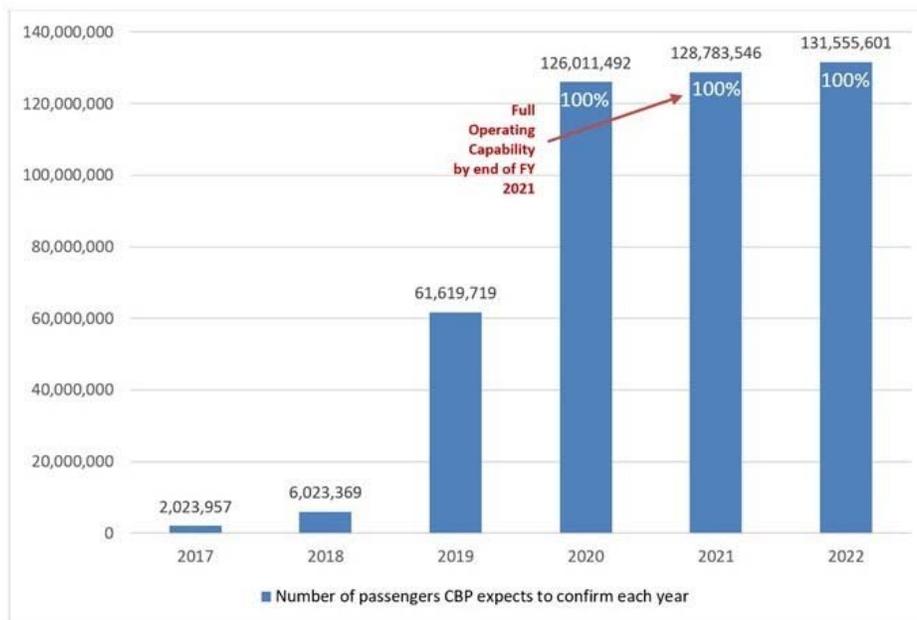
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The biometric technology also provided more sophisticated means of recognizing passengers with false identification, versus sole reliance on physical examination of passports or other documents. For example, in January 2018, a CBP officer at IAD airport identified a Ghanaian national attempting to enter the United States with a fraudulent United States passport.

### Technical and Operational Challenges May Hinder Achievement of Long-Term Goals for Confirming Air Passenger Departures

CBP must address the recurring technical and operational failures that prohibited biometric matching of 15 percent of the departure passengers included in the pilot. Otherwise, it may be unable to meet its long-term goals of confirming air passenger departures nationwide. Figure 5 depicts CBP's expectations to reach full operating capability by the end of FY 2021, and one year beyond.

**Figure 5: CBP's Long-Range Goals for Biometric Confirmation of Departing Air Passengers**



Source: OIG-generated based on CBP Program Plans

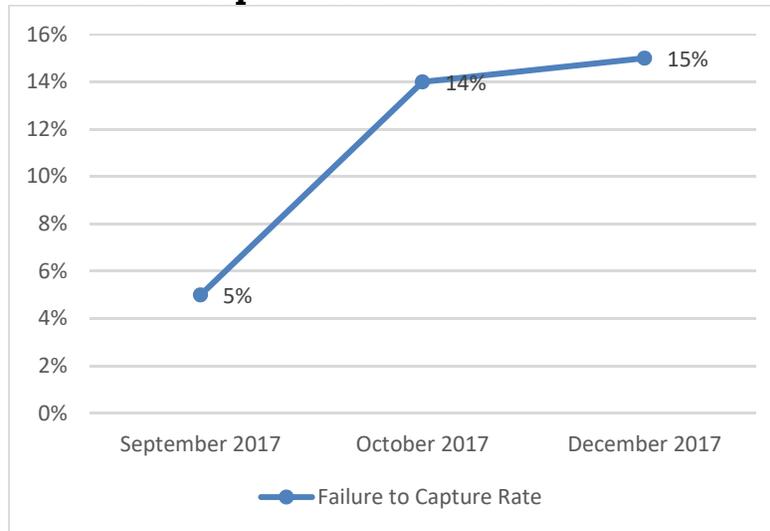
Most concerning is the widespread failure to capture photos and process all passengers prior to flight boarding due to network or camera problems, as demonstrated during the 2017 pilot. CBP had not addressed these problems by the end of our audit in January 2018; however, program personnel planned to upgrade wireless capabilities to ensure adequate bandwidth to support biometric processing.



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Until CBP takes steps to increase network bandwidth, the upward trend in the rate of failure to capture passenger photos is likely to continue. To illustrate, the overall photo capture failure rate was 5 percent in September, but increased to nearly 14 percent in October 2017, and even higher to nearly 15 percent in December 2017. Figure 6 depicts this upward trend.

**Figure 6: Rate of Failure to Capture Passenger Photos from September to December 2017**



Source: OIG-generated based on CBP data

Equally concerning are the operational challenges posed by airline schedule demands and other priorities. Specifically, airlines' recurring tendency to bypass the biometric matching process in favor of boarding flights for an on-time departure frequently prevented confirmation of passenger departures. CBP pilot data indicated that more than 220 flights departed the country from January to November 2017 with fewer than 75 percent of passengers biometrically confirmed. Repeatedly permitting airlines to revert to standard flight-boarding procedures without biometric processing may become a habit that is difficult to break. Airlines may more readily resort to this alternative when flight-boarding times become compressed, CBP officers are unavailable, or other problems such as last-minute gate changes or weather issues arise.

Collectively, these challenges pose significant risks to CBP scaling up the biometric program to process 100 percent of all departing passengers by 2021. Specifically, CBP may be unable to meet expectations for achieving full operational capability, including biometrically processing 100 percent of all international passengers at the 20 busiest airports. This would amount to more than 16,300 flights per week, while CBP managed only .3 percent of this volume during the 2017 pilot.



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It should be noted that, according to July 2017 planning estimates, CBP anticipated processing more than 2 million passengers during the 2017 pilot, but it never achieved this target.<sup>21</sup> Instead, CBP data indicated biometric pilot processing of only 220,000 passengers as of December 2017. Similarly, CBP estimated it would support biometric processing for 4,600 flights during the 2017 pilot; however, it only supported 587. CBP's expectations for achieving the targeted levels for the pilot in 2017 were based on risky assumptions that airlines would agree to ramp up biometric processing of passengers and flights over time. CBP also expected that the program would evolve to airlines assuming responsibility for purchasing and operating the cameras needed to take photos for biometric matching, but this never occurred. Significant action on CBP's part to ensure stakeholder buy-in is warranted, given that major increases in biometric processing and airline involvement remain CBP's goal for the future.

### Recommendations

**Recommendation 1:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, take steps to coordinate with airport and airline stakeholders to increase bandwidth to meet the operational demands of biometric processing at the Nation's top airports.

**Recommendation 2:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, develop an internal plan to institute enforcement mechanisms or back-up procedures to prevent airlines from bypassing biometric processing prior to flight boarding.

**Recommendation 3:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, continue to refine the Traveler Verification Service algorithm to ensure the highest possible passenger match rate, with allowances for photo age and quality.

### CBP Must Address Outstanding Questions before It Can Successfully Advance to Full Program Implementation

CBP's pilot efforts to date have not been sufficient to address longstanding questions regarding how the program will be funded or staffed, which CBP cited as its top two program risks. CBP's inability to validate funding and staffing plans was primarily due to uncertainty regarding airport and airline assistance with funding and biometric operations at departure gates. CBP also was unable to confirm the role other DHS components will play in implementing the biometric capability at airports, due to a lack of DHS

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<sup>21</sup> Based on CBP's July 2017 Life Cycle Cost Estimates  
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headquarters guidance and involvement. Until CBP finalizes its long-term partnerships with its stakeholders, it will be unable to fulfill its mandates to implement a biometric capability to verify foreign visitor departures nationwide.

### **Funding and Staffing for Biometric Exit Capability Implementation Remained Uncertain**

The Sprint 8 pilot did not address the biometric program's top two risks — CBP's reliance on airlines to help fund and staff the program for the long-term. At the conclusion of our fieldwork, program personnel had not yet determined how it would resource the program beyond initial operating capability in 2019. Department-wide guidance regarding the biometric capability implementation also was lacking to ensure involvement and support from other DHS stakeholders.

#### CBP Faced Shortfalls in Long-term Program Funding

CBP may not have all the funds it needs to cover the cost of implementing the biometric capability over the next 10 years. As previously stated, since congressional authorization in 2016, CBP has relied on revenues from L-1 and H-1B visa fees to pay for Biometric Entry-Exit Program implementation. Congress set a cap of \$1 billion on the amount of fee revenues CBP could apply to biometric program operations; this source of program funding would end automatically after 10 years.

As such, in July 2017, program personnel outlined a life-cycle cost estimate for FY 2017 through FY 2025 to implement the biometric exit solution across all operational environments — air, sea, and land — at approximately \$1.08 billion.<sup>22</sup> CBP developed this budget with the expectation of visa fee funding amounting to \$193 million in FY 2017, \$115 million annually from FY 2018 to FY 2024, and \$2 million in FY 2025 covering the total \$1 billion program cost. CBP anticipated having to make up the difference of any costs exceeding this total.

However, beginning in 2017, CBP determined that visa fee revenues would not reach the levels needed or anticipated to help fully fund program implementation through FY 2025. Revenues in the two visa categories dropped 38 percent during 2017 due to a recent reduction in the number of work visa applications. To illustrate, the visa fee revenues fell by \$4.5 million in a single year — from \$11.9 million in the fourth quarter of FY 2016 to \$7.4 million in

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<sup>22</sup> The cost estimate encompasses all activities directly funded by the Biometric Entry-Exit Program through fee funds or appropriated funds. The estimate for the program in the land and sea environments is a "rough order of magnitude estimate," covering operations and sustainment costs only.



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the fourth quarter of FY 2017. Based on this drop in fee-based income, CBP estimated that future revenues from the visa fees would only amount to \$650 million from FY 2016 to FY 2025, resulting in a shortfall of \$350 million to cover the budgeted cost of \$1 billion to implement the program for the 10-year period.

As such, in September 2017, CBP officials reduced its spending plan for the biometric program from \$1 billion to \$650 million to align with the new fee revenue estimates. Under this revised scenario, CBP expected to apply \$545 million of the \$650 million to build the back-end TVS infrastructure and achieve full operating capability by supporting facial recognition processing at 20 airports. CBP planned to use any funds available beyond this amount to help pay for secondary screening and enforcement activities at airports. Otherwise, CBP would have to use its existing appropriations to conduct these additional activities.

### CBP Will Need Airport Stakeholders to Purchase Biometric Processing Equipment

Achieving full operating capability for the biometric program by 2021 may be contingent upon airports and airlines purchasing the digital cameras needed to take passenger photos at boarding gates. CBP would remain responsible for transmitting, storing, and analyzing biometric information using the TVS capability. CBP would also provide real-time notification upon confirming each passenger's identity, and conduct additional screening as required.

However, the Sprint 8 pilot was not effective in securing commercial stakeholder funding. Three airlines conducted pilots independently while five others helped CBP test biometric capabilities at airports; however, by the end of our audit work in January 2018, none had agreed to provide funding or staff to support the biometric program for the long-term. Airline personnel we interviewed voiced apprehension about providing funding support for a government-run program. Additionally, multiple officials from a commercial airline advocacy group stated that DHS, not the airlines, was mandated to implement the biometric exit capability. These officials did not agree that airlines should be responsible for purchasing cameras and capturing photographs to support biometric processing.

CBP's plans to rely upon airport stakeholders for equipment purchases pose a significant point of failure for the Biometric Entry-Exit Program. Program officials we interviewed cited this as the second highest overall program risk, rating the possibility of occurrence as likely, and the severity of impact as critical.<sup>23</sup> In March 2018, program personnel planned to mitigate this risk by

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<sup>23</sup> Biometric Entry-Exit Program Acquisition Event Briefing, September 2017  
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conducting stakeholder outreach to promote airline/airport participation. They also anticipated offering incentives, such as facial recognition processing in place of boarding passes, to enhance the travelers' experience.

#### CBP Will Rely on Airline Staff for Long-term Biometric Processing

Biometric program officials recognized that CBP would not have an adequate number of personnel to achieve full operating capability at 20 airports nationwide by 2021 if the airlines did not agree to provide staff support. As such, the program's September 2017 cost estimate and staffing plan assumed that for the long term, the airlines alone would operate cameras and take passenger photos. CBP planned to hire a total of 441 CBP officers and supervisors to conduct basic mission activities such as enforcement and adjudication activities across the airports' multiple departure gates. CBP would have no staff resources of its own available to conduct biometric processing for departing passengers.

Sprint 8 pilot operations did not reflect CBP's planned approach of relying on airlines to conduct biometric processing while its officers focused on fundamental border protection activities. Specifically, CBP tested its reliance on the airlines to carry out the biometric processing at just two airlines. If TVS did not match passenger photos to the digital gallery, the airlines tended to simply revert to using boarding passes and other forms of identification to confirm passenger identities instead of pursuing the matter. Where this frequently occurred, it had an adverse impact on the statistical results of the pilot.

CBP also did not test having its officers respond to photo match failures across multiple departure gates. Instead, biometric pilot operations were limited to only one gate at each airport, with the exception of JFK airport, which conducted the pilot at two separate gates for a short period. Because airport size and gate layouts vary greatly, it is difficult to gauge the amount of time it can take for CBP officers to go from gate to gate to conduct passenger screening. CBP also could not effectively determine the potential impact of these officers supporting numerous concurrent flights, including flight delays and passenger frustrations.

Further, CBP detailed just 43 officers to carry out biometric processing at 9 pilot locations. This staffing level proved inadequate to carry out the limited biometric processing during Sprint 8. At one point, the biometric program had difficulty supporting a single flight at IAD airport and had to pay officers overtime to ensure adequate personnel were available to operate cameras and take passenger photos for a flight to Dubai. The pilot staffing levels were also an inadequate basis on which to determine the number of personnel it would need for full implementation of the biometric capability nationwide. CBP



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officers at three airports we visited agreed that staffing would pose the biggest challenge to fully implementing the program nationwide.

#### Department-wide Guidance for Biometric Entry-Exit Solution Was Lacking

Due to a lack of department-wide guidance, CBP could not confirm the role that other DHS stakeholders would play in implementing the biometric air exit capability. For example, CBP had outlined an approach to partnering with the Transportation Security Administration (TSA) in using facial recognition technology to confirm passenger identity at airport security checkpoints. This approach was expected to help reduce the number of CBP officers needed for full implementation of the biometric air exit capability. Instead of having to work across multiple gates, CBP officers and cameras would be co-located at TSA checkpoints for conducting any secondary passenger screening activities, thereby reducing the need for potential enforcement actions at the departure gates. This approach would also enable TSA to capture photos to enhance its air passenger screening mission without having to scan boarding passes and other documentation for travelers leaving the country.

However, by the conclusion of our fieldwork in January 2018, CBP and TSA had not reached a final decision on what role TSA would play in future biometric air exit efforts. Rather, TSA was conducting several biometric initiatives to verify passengers' identities at the same time that CBP was building its biometric air exit capability in 2017. One of these initiatives involved CBP and TSA collaborating on a 30-day facial recognition pilot in October 2017. CBP biometric program personnel held meetings with TSA officials to coordinate the facial recognition pilot; however, these meetings were limited to the scope of the pilot and did not address CBP's long-term air exit program implementation plans. Table 4 provides a list of ongoing biometric initiatives by TSA that ran in parallel with CBP's pilot.



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**Table 4: TSA’s Biometric Initiatives**

March 2004 to present	1. TSA regulated a private industry-led initiative at 24 airports that uses fingerprint and iris recognition to enable expedited screening queues at the TSA checkpoint.
July 2013 to present	2. TSA’s Pre-check Program collects fingerprints and biographic data to conduct background checks and identify passengers who qualified for expedited screening.
June 2017 to January 2018	3. TSA tested the use of fingerprint confirmation for identity confirmation and expedited screening of passengers that minimized the need to present boarding passes at two airports.
October 2017 to November 2017	4. CBP and TSA conducted a TVS pilot at JFK airport to test the capability of facial recognition technology to match passenger identities against larger, checkpoint-scale galleries of photos than those CBP used for single flights at international boarding gates.
February 2018 to present	5. TSA conducted a test at Los Angeles International airport to assess e-gates that use facial recognition technology to biometrically confirm passenger identities. <sup>24</sup>

*Source:* OIG generated based on TSA and public data

Further, the Office of Biometric Identity Management (OBIM) was concerned that CBP’s TVS may duplicate existing biometric matching, storing, and sharing capability for the Department, thereby posing a risk for gaps in biometric data available to support all DHS operational missions. As part of its long-term implementation plan, CBP aims to transfer its biometric matching service to OBIM, which is responsible for DHS-wide biometric identity management services. As such, CBP held various meetings and sent memos to share system requirements and specifications with OBIM throughout 2017. At the conclusion of our fieldwork in January 2018, although facial recognition services were available in IDENT, CBP was waiting for OBIM to finish upgrading its IDENT system to a new platform, the Homeland Advanced Recognition Technology (HART), before establishing its long-term biometric capability transition plans because CBP did not believe that IDENT facial recognition services could meet CBP’s operational needs. However, OBIM did not anticipate completing HART system development until 2021, the same year that CBP expects to achieve full operating capability.

Additional headquarters-level direction is needed to ensure that CBP, TSA, and OBIM’s biometric screening and matching activities ultimately converge instead of competing with each other. DHS Office of Program Accountability and Risk Management personnel told us they were aware of the TSA and OBIM biometric initiatives and had suggested that CBP collaborate with the components to share information. Similarly, the DHS Joint Requirements Council had recommended that CBP collaborate with OBIM to define an end-state vision for

<sup>24</sup> An e-gate is an automated biometric self-service checkpoint.  
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maximizing HART to support long-term goals for all operational environments. The Joint Requirements Council also recommended that CBP coordinate with TSA in developing its end-state plans to ensure the concept of operations are all inclusive for all DHS stakeholders. CBP efforts to coordinate DHS-wide were helpful in completing planning documents. However, additional DHS-level direction may be needed to ensure long-term TSA and OBIM support. As of January 2018, TSA had not yet committed to CBP's long-term biometric implementation vision. Further, CBP had no concrete date for transitioning its biometric capability to OBIM.

### **Lack of Stakeholder Commitment Poses Risks to Biometric Program Success**

Until CBP resolves the longstanding questions regarding stakeholder commitment to its biometric program, it may not be able to scale up to reach full operating capability by 2021 as planned. More concerning, until CBP fully implements the entry-exit capability, the Department remains unable to fulfill its mandate to biometrically confirm foreign visitor departures nationwide, which increases the Immigration and Customs Enforcement (ICE) visa overstay tracking workload. Lacking clear headquarters-level direction to unify the components' competing biometric initiatives, the Department may not achieve potentially significant cost and time savings, and is at risk of adding complexity and confusion in transportation security operations.

### CBP Efforts Stalled until It Solidifies Airport Stakeholder Agreements

CBP cannot successfully advance beyond initial operating capability without the airlines' investment and partnership. While CBP had not developed back-up plans for funding or staffing an entirely CBP-operated model, it estimated that costs and staffing levels would increase dramatically without airline support. Specifically, CBP estimated that the biometric program budget would increase from \$1 billion to \$8 billion without airline assistance. Likewise, CBP staffing requirements would increase from 441 to as many as 6,000.<sup>25</sup>

CBP's inability to finalize biometric program funding and staffing plans is a longstanding challenge. GAO identified similar challenges in CBP's program management efforts in a 2017 report that discussed multiple longstanding planning and staffing problems adversely affecting DHS' efforts to develop and implement a biometric exit capability.<sup>26</sup>

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<sup>25</sup> CBP relied on a nearly 10-year old estimate from a 2009 US-VISIT biometric exit pilot, which estimated that between 4,200 and 6,000 officers would be needed to operate a biometric exit capability at 20 airports.

<sup>26</sup> *DHS Has Made Progress in Planning for a Biometric Air Exit System and Reporting Overstays, but Challenges Remain*, GAO-17-170, February 2017  
[www.oig.dhs.gov](http://www.oig.dhs.gov)



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### DHS' Ability to Biometrically Confirm Passenger Departures Nationwide Is at Risk

Until it fully implements the program, CBP will be unable to meet its mandate to biometrically match the identities of travelers departing from airports across the United States. Absent this, DHS will continue to rely on third-party biographic data, such as commercial carrier passenger manifests collected at air and sea ports of entry. We previously reported on the ineffectiveness of such dependency on third-party commercial carrier records, which can include errors.<sup>27</sup> Moreover, reliance on biographic data limits CBP's ability to identify travelers who are in the United States illegally, under alternate identities, or with false identification or invalid identification.

Additionally, without a biometric exit system, DHS lacks definitive records of foreign visitor departures from the country for accurate accounting and disclosure in its annual *Entry/Exit Overstay Report*.<sup>28</sup> Specifically, CBP senior executives acknowledged in testimony before Congress that the number of overstays listed in its 2015 report did not account for all visa holders who visited the United States. Also, without a biometrically-confirmed record of all visitor departures, ICE agents risk investigating individuals who may have already departed the country.

### Coordination across DHS Component Biometric Initiatives Is Essential

DHS leadership may not achieve the potentially significant cost and time savings it could gain from ensuring a unified, enterprise-level biometric entry-exit capability. For example, increased information sharing among CBP, OBIM, and TSA could lead to significant cost savings in biometric matching software development, infrastructure, front-end equipment, and technical support. Further, a joint TSA-CBP solution could decrease the number of staff resources required to conduct secondary passenger screening and enforcement actions, as CBP officers might do so at assigned airport security checkpoints rather than working across multiple gates. Not having to wait for CBP officers to arrive at departure gates to conduct biometric processing would reduce the risks of delayed flight departures and passenger frustrations.

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<sup>27</sup> *DHS Tracking of Visa Overstays Is Hindered by Insufficient Technology*, DHS OIG-17-56, May 2017

<sup>28</sup> *Entry/Exit Overstay Report*, Fiscal Year 2015, January 19, 2016  
[www.oig.dhs.gov](http://www.oig.dhs.gov)



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### Recommendations

**Recommendation 4:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, develop internal contingency plans for funding and staffing the program, in the event that airlines do not agree to partner with CBP in implementing the biometric capability nationwide.

**Recommendation 5:** We recommend the Deputy Undersecretary for Management provide guidance on the biometric activities department-wide to achieve financial, technical, and operational efficiencies.

### OIG Analysis of DHS Comments

We obtained written comments on a draft of this report from the Director of the Department GAO-OIG Liaison Office. We have included a copy of the comments in their entirety in appendix B.

In the comments, the DHS Deputy Undersecretary for Management provided details on CBP's progress developing and implementing a biometric exit capability to track air passenger departures nationwide. Specifically, CBP emphasized its continuous efforts to ensure biometric matching accuracy, airport and airline partnerships, and progress towards its program acquisition decision milestones.

The DHS Deputy Undersecretary for Management concurred with all of our recommendations. We reviewed the Department's comments, as well as the technical comments previously submitted by CBP, National Protection and Programs Directorate, TSA, and the DHS Office of Program Accountability and Risk Management under separate cover, and made changes to the report as appropriate. Following is our evaluation of the Department's formal comments.

**Recommendation 1:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, take steps to coordinate with airport and airline stakeholders to increase bandwidth to meet the operational demands of biometric processing at the Nation's top airports.

### Management Comments

The CBP Executive Assistant Commissioner concurred and requested closure of this recommendation. CBP reaffirmed the program is approaching biometric entry-exit implementation in partnership with airlines/airports to ensure network connectivity to meet complex operational demands for timely aircraft departures.



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### OIG Analysis

We agree with CBP's approach to coordinate with airport and airline stakeholders and provide guidance on connectivity as part of the *Traveler Verification Service Technical Reference Guide*. We look forward to receiving additional details on steps taken to ensure network bandwidth is adequate to support the use of biometrics in the boarding process at the Nation's top airports. This recommendation is open and resolved.

**Recommendation 2:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, develop an internal plan to institute enforcement mechanisms or back-up procedures to prevent airlines from bypassing biometric processing prior to flight boarding.

### Management Comments

The CBP Executive Assistant Commissioner concurred and stated that CBP will develop a plan to institute photo capture enforcement mechanisms as the biometric air exit capability nears full operational capability. CBP expects to complete this plan by July 31, 2019.

### OIG Analysis

We agree with CBP's approach to work in partnership with airport and airline stakeholders to develop a plan to institute photo capture enforcement measures. We look forward to receiving updates, along with documentary evidence, as this plan is developed and implemented. This recommendation is open and resolved.

**Recommendation 3:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, continue to refine the Traveler Verification Service algorithm to ensure the highest possible passenger match rate, with allowances for photo age and quality.

### Management Comments

The CBP Executive Assistant Commissioner concurred and requested closure of this recommendation on the basis that CBP has instituted a rigorous process to review data and metrics associated with biometric facial recognition matching performance. CBP stated that it has continued to monitor match rates since completion of our fieldwork, and has matched 97 percent of travelers who had images captured at the gate and had a photo in the gallery. Also, CBP plans to partner with the DHS Science and Technology Directorate and the National Institute of Standards and Technology to perform additional



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analysis of matching performance starting in December 2018.

OIG Analysis

We agree with CBP's efforts to actively monitor and refine the Traveler Verification Service algorithm to improve the accuracy of the facial recognition technology. This recommendation will remain open and resolved until CBP provides documentary evidence that it has refined the Traveler Verification Service algorithm to ensure the highest possible passenger match rate, with allowances for photo age and quality.

**Recommendation 4:** We recommend the CBP Executive Assistant Commissioner, Office of Field Operations, develop internal contingency plans for funding and staffing the program, in the event that airlines do not agree to partner with CBP in implementing the biometric capability nationwide.

Management Comments

The CBP Executive Assistant Commissioner concurred and reiterated that CBP's approach to the program is based on stakeholder collaboration and building a robust traveler identity service that will enable airports and airlines to opt in to the biometric exit mandate in a way that meets individual operational nuances. CBP stated it has received eight letters from different airports and airlines committing to implement the biometric exit solution. Also, CBP will develop an internal contingency plan by July 31, 2019, for funding and staffing the program in the event that stakeholders do not partner with CBP.

OIG Analysis

We agree with CBP's approach to collaborate with private stakeholders, as well as to develop an internal contingency plan for funding and staffing the biometric exit capability. We look forward to reviewing the internal contingency plans once completed. This recommendation is open and resolved.

**Recommendation 5:** We recommend the Deputy Undersecretary for Management provide guidance on the biometric activities department-wide to achieve financial, technical, and operational efficiencies.

Management Comments

The DHS Deputy Undersecretary for Management concurred and requested closure of this recommendation based on actions completed to date. DHS has established an Executive Steering Committee to be chaired by the Deputy



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Undersecretary for Management to provide guidance on department-wide biometric activities. DHS stated the first committee meeting would take place on September 5, 2018.

OIG Analysis

We agree with the Department's effort to establish a DHS Biometrics Executive Steering Committee to provide guidance on department-wide biometric activities and to seek financial, technical, and operational efficiencies. We look forward to reviewing the DHS Biometric Executive Steering Committee charter, and meeting agenda and minutes once they are provided. This recommendation will remain open and resolved.



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## Appendix A

### Objective, Scope, and Methodology

The DHS OIG was established by the *Homeland Security Act of 2002* (Pub. L. No. 107-296), by amendment to the *Inspector General Act of 1978*. We conducted this audit to assess CBP's efforts to develop and implement a biometric exit capability, and determine whether biometric data collected at pilot locations has improved DHS' ability to verify departures.

As background for our audit, we researched and reviewed Federal laws, executive orders, agency guidance, policies, and procedures related to the Biometric Entry-Exit Program. We obtained documents, congressional testimony, raw data, and newspaper articles regarding the program. Additionally, we reviewed published GAO and DHS OIG reports to identify prior findings and recommendations. We used this information to establish a data collection approach that consisted of interviews with relevant stakeholders, focused information gathering, documentation analysis, targeted site visits, and biometric capability demonstrations to accomplish our inquiry objectives.

We obtained documents, held more than 40 meetings, participated in teleconferences with CBP staff at headquarters and in the field, and met with DHS and external stakeholders to assess the Biometric Exit Program. At CBP headquarters, we interviewed representatives from CBP's Office of Field Operations, the Office of Acquisition, and the Office of Information Technology. These representatives included the Deputy Executive Assistant Commissioner, the Assistant Commissioner of the Office of Acquisition and Component Acquisition Executive, and the Executive Director of Planning, Program Analysis, and Evaluation.

We interviewed DHS headquarters personnel from the DHS Joint Requirements Council, the Office of the Chief Information Officer, the Office of Program Accountability and Risk Management, and the Science and Technology Directorate. We interviewed internal stakeholders at the Office of Biometric Identity Management and the Transportation Security Administration. Further, we met with a number of external stakeholders, including the Airlines for America trade association, Delta Airlines, JetBlue Airlines, and British Airways.

In September 2017, we visited CBP's test laboratory in Kingstowne, VA, to observe operation of the facial recognition technology used in the biometric pilot. In September and October 2017, we visited four pilot sites at the JFK, Hartsfield-Jackson Atlanta, General Edward Lawrence Logan, and IAD international airports. During the site visits, we observed the CBP- and airline-run pilot activities, and spoke to staff about biometric program successes and challenges. We also observed CBP and TSA conducting a TVS pilot at JFK



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airport to test the capability of facial recognition technology to match passenger identities against larger galleries of photos than those used for a single flight. We did not compile or review classified documents to conduct this audit.

We analyzed CBP's monthly pilot data from September through December 2017 to validate CBP's technical match rate. We also assessed CBP's biometric matching results for certain passenger groups of different nationalities and ages, as well as those who entered without inspection. We also assessed the internal controls related to the biometric exit capability. Collectively, our analyses helped confirm CBP's pilot results.

We conducted this performance audit between September 2017 and January 2018 pursuant to the *Inspector General Act of 1978*, as amended, and according to generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based upon our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based upon our audit objectives.



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**Appendix B**  
**Management Comments to the Draft Report**

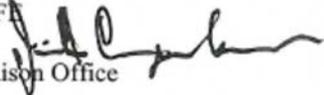
U.S. Department of Homeland Security  
Washington, DC 20528



**Homeland  
Security**

September 13, 2018

MEMORANDUM FOR: John V. Kelly  
Senior Official Performing the Duties  
of the Inspector General  
Office of Inspector General

FROM: Jim H. Crumacker, CIA, CFE  
Director  
Departmental GAO-OIG Liaison Office 

SUBJECT: Management Response to Draft Report, "Progress  
Made, But CBP Faces Challenges Implementing a  
Biometric Capability to Track Air Passenger  
Departures Nationwide"  
(Project No. 17-083-ITA-CBP)

Thank you for the opportunity to review and comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the Office of Inspector General's (OIG) work in planning and conducting its review and issuing this report.

The Department is pleased to note the OIG's positive recognition that "... U.S. Customs and Border Protection (CBP) has made considerable progress developing and implementing a biometric capability to track air passenger exits using facial recognition technology." The OIG's report complements a U.S. Government Accountability Office (GAO) report published last year (February 27, 2017) that also noted progress had been made in planning for a biometric air exit system.

By 2013, when CBP assumed responsibility for designing and implementing a system that could biometrically track travelers exiting the United States, the government had been wrestling with the challenge for years. Technology was part of the problem, but how to integrate that technology into the existing infrastructure at airports without driving up costs and adversely impacting airport and airline operations was a conundrum. As evidenced by the OIG and GAO reports, CBP is successfully creating a more seamless air travel experience for everyone. CBP remains committed to developing a system that

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provides biometric exit data in a way that does not disrupt air operations, but, rather secures and facilitates travel and trade.

It is important to note that OIG's report was based on fieldwork completed in January 2018, and thus does not fully reflect the current state of DHS and CBP efforts to implement a Biometric Air Exit capability. There have been many significant advancements made in implementing this capability during the last nine months, advancements we believe are worthy of sharing with readers (including Congress and the public) of this report because of the context this provides for OIG's conclusions, findings, and recommendations. These advancements include progress made with the technical measurements of biometric matching accuracy, the number of airport/airline partnerships, and CBP's programmatic status along the Acquisition Decision Event (ADE) lifecycle. More specifically:

- CBP improved the Sprint 8 Biometric Air Exit technical demonstrations connectivity by using a more reliable form of cellular Wi-Fi hardware, known as a "cradle." These devices significantly improved technical reliability for CBP-led technology demonstrations.
- On March 19, 2018, the Traveler Verification Service (TVS) achieved the deployment of all technical features and functions described in the Operational Requirements Document (ORD) for Initial Operational Capability. The TVS can support 100 percent of the required transaction load as defined in the ORD, as was demonstrated in a Production Load Test conducted on January 26, 2018.
- DHS Joint Requirements Council staff met with CBP analysts and reviewed data and metrics for on-going biometric entry-exit operations. Match rates are very high and consistent with the reported 97 percent average.
- The Biometric Air Exit program achieved ADE-2A<sup>1</sup> on May 2, 2018, which resulted in the creation of the Biometrics Executive Steering Committee (ESC), chaired by the Deputy Under Secretary for Management. The ESC will provide Department-wide guidance on the biometric activities to achieve financial, technical, and operational efficiencies. The first meeting was held on September 5, 2018.

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<sup>1</sup> ADE-1 validates the need, and the program subsequently enters the analyze/select phase. Based upon the successful completion of analyze select activities, the program achieves an ADE-2A and enters the obtain phase where the program develops, tests, and evaluates the selected options.



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- As of July 31, 2018, CBP has conducted departure operations on more than 3,300 flights with a total of 621,000 passengers; of those travelers images were captured at the gate and, a photo in the gallery 97 percent were successfully matched.
- CBP received ten letters of commitment by various airport/airline stakeholders to implement Biometric Air Exit. CBP also met with dozens of others stakeholders who have indicated their support for the program. CBP expects additional letters of commitment to follow in the coming months.
- CBP is working with DHS Science and Technology Directorate to continue to develop and refine methods to analyze differences in matching performance (e.g. age, gender, and citizenship) based on the available data garnered thorough biometric entry-exit operations. CBP is also moving towards formalizing partnership with the National Institute of Standards and Technology for ongoing validation of CBP's biometrics program.

We look forward to the OIG's independent review and validation of these advancements.

The draft report contained five recommendations, all with which DHS concurs. Attached find our detailed response to each recommendation. Technical comments were previously provided under separate cover.

Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Attachment



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### Attachment: Management Response to Recommendations Contained in the Draft Report for Project No. OIG-17-083-ITA-CBP

The Office of Inspector General (OIG) recommended that the U.S. Customs and Border Protection (CBP) Executive Assistant Commissioner, Office of Field Operations (OFO):

**Recommendation 1:** Take steps to coordinate with airport and airline stakeholders to increase bandwidth to meet the operational demands of biometric processing at the Nation's top airports.

**Response:** Concur. CBP is approaching biometric entry-exit implementation in partnership with airline/airport operator's network, connectivity is a key topic with regard to implementing the program. While CBP is not identifying specific hardware or bandwidth requirements, the connectivity information is included in Section 2 of the Traveler Verification Service Technical Reference Guide, which is available to all airport and airline stakeholders. Given that airports and airlines are beginning to incorporate the use of biometrics in their own business processes (e.g., aircraft boarding), it is in their interests to ensure adequate connectivity so that they can meet the complex operational demands for ensuring timely aircraft departures.

We request that OIG consider this recommendation resolved and closed, as implemented.

**Recommendation 2:** Develop an internal plan to institute enforcement mechanisms or back-up procedures to prevent airlines from bypassing biometric processing prior to flight boarding.

**Response:** Concur. As the biometric air exit capability nears full operational capability, CBP, in partnership with airport and airlines stakeholders, will develop a plan to institute photo capture enforcement mechanisms. The plan will include operating parameters, standard operating procedures, and an enforcement ramp up period to allow travelers, airlines, and airports adequate time to adjust operations and ensure compliance with biometric air exit.

Estimated Completion Date (ECD): July 31, 2019

**Recommendation 3:** Continue to refine the Traveler Verification Service algorithm to ensure the highest possible passenger match rate, with allowances for photo age and quality.

**Response:** Concur. CBP has instituted a rigorous process to review data and metrics associated with biometric facial recognition matching performance. Since the completion of the OIG's field work in January 2018, and as of the end of July 2018, CBP has

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conducted departure operations on more than 3,300 flights with a total of 621,000 passengers; of those travelers images were captured at the gate and a photo in the gallery 97 percent were successfully matched. CBP data does not currently demonstrate any significant difference in match rate between citizenship, age, or gender based on CBP's continuous monitoring and incremental improvements to the matching algorithm. CBP's biometric matching service utilizes a number of tools to minimize and mitigate algorithmic performance including:

- 1) Use of diverse training sets;
- 2) Matching against a limited set of faces based on the flight, cruise, or border crossing;
- 3) Continuous monitoring for performance; and
- 4) Execution of a variety of statistical tests to bolster performance thresholds and minimize any matching discrepancies

To further ensure a high performance of the algorithm, CBP has partnered with the DHS Science and Technology Directorate and is currently in the process of partnering with the National Institute of Standards and Technology, to perform an independent and comprehensive scientific analysis of CBP's operational face matching performance, including impacts due to traveler demographics and image quality. CBP expects to begin this work no later than December 31, 2018.

CBP will continue to actively monitor and refine the performance of the algorithm and associated operational processes in order to make incremental improvements and ensure the high accuracy of facial matching for all travelers, regardless of ethnicity, age or gender.

We request that OIG consider this recommendation resolved and closed, as implemented

**Recommendation 4:** Develop internal contingency plans for funding and staffing the program, in the event that airlines do not agree to partner with CBP in implementing the biometric capability nationwide.

**Response:** Concur. The OIG's draft report indicates that collaboration with the private sector is a significant point of failure for the biometrics program; however, CBP believes otherwise. Specifically, CBP's viewpoint is that not collaborating with the private sector is a far greater risk, as evidenced by the lack of biometric exit progress between 2004 and 2014, and further demonstrated by airline/airports comments and concerns expressed during the 2008 Notice of Proposed Rule Making process, which put the burden of biometric exit squarely onto air carriers. CBP's partnership approach allows CBP to build and maintain a robust traveler identity service ecosystem that enables airports and airlines to approach the biometric exit mandate within their own modernization plans and in a way that meets individual operational nuances. The alternative is a government



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wholly owned solution that could add layers to an already complex travel environment with limited regard to traveler experience and individual airline/airport facility and operational realities. Since the OIG completed its fieldwork in January 2018, CBP has received eight letters from different airports and airlines committing to implement biometric exit in collaboration with CBP.

CBP recognizes that a collaborative approach with the private sector is new, does not necessarily fit into current government acquisition or project management processes, and may present a certain uneasiness with oversight authorities with regard to project schedule and funding. Although, CBP is confident that partnership is the right approach for implementation of biometric exit, CBP will develop an internal contingency plan for funding and staffing the program in case airlines and airports do not partner with CBP.

ECD: July 31, 2019.

The OIG recommended that the Deputy Undersecretary for Management:

**Recommendation 5:** Provide guidance on the biometric activities department-wide to achieve financial, technical, and operational efficiencies

**Response:** Concur. The Acquisition Decision Memoranda for the Biometric Entry/Exit (BEE) program, signed June 12, 2018, approved the establishment of a DHS Biometrics Executive Steering Committee (ESC), chaired by the Deputy Under Secretary for Management, to help provide guidance on department-wide biometric activities, and to achieve financial, technical, and operational efficiencies. The ESC will have representation from all DHS components and the appropriate headquarters offices, including CBP's BEE and the DHS National Protection and Programs Directorate's Office of Biometric Identity Management programs. Supporting documentation concerning these actions was previously provided to the OIG under separate cover. The first ESC meeting occurred on September 5, 2018 (a copy of that meeting agenda and associated meeting minutes will be provided to OIG under separate cover).

We request that OIG consider this recommendation resolved and closed, as implemented.



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### Appendix C Key Systems Used for Biometric Confirmation and Recording of Departures

System	Purpose	Agency Owner
Automated Targeting System – Unified Passenger	Law enforcement tool used to collect, analyze, and share information on persons and entities and identify high-risk travelers, such as terrorists, for additional screening. This tool uses existing system interfaces to create galleries for facial biometric confirmation.	CBP
Advanced Passenger Information System	Contains information on travelers and crew arriving or departing from the United States by air or sea.	CBP
Automated Biometric Identification System (IDENT)	Matches and stores biometric information.	Office of Biometric Identity Management, National Protection and Programs Directorate
Consular Consolidated Database	Contains passport and visa photos for travelers to and from the United States.	U.S. Department of State
Arrival and Departure Information System	Consolidates entry, exit, and admission status information on foreign nationals to identify potential visa overstays.	CBP

Source: OIG-generated from CBP data



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**Appendix D**

**Top 20 International Airports in the United States**

<b>Acronym</b>	<b>Airport Name</b>	<b>Location</b>
ATL	Hartsfield-Jackson Atlanta International Airport	Atlanta, GA
BOS	General Edward Lawrence Logan International Airport	Boston, MA
CLT	Charlotte Douglas International Airport	Charlotte, NC
DFW	Dallas/Fort Worth International Airport	Dallas, TX
DTW	Detroit Metropolitan Wayne County Airport	Detroit, MI
EWR	Newark Liberty International Airport	Newark, NJ
FLL	Fort Lauderdale International Airport	Fort Lauderdale, FL
HNL	Daniel K. Inouye International Airport	Honolulu, HI
IAD	Washington Dulles International Airport	Dulles, VA
IAH	George Bush Intercontinental Airport	Houston, TX
JFK	John F. Kennedy International Airport	New York, NY
LAS	McCarran International Airport	Las Vegas, NV
LAX	Los Angeles International Airport	Los Angeles, CA
MCO	Orlando International Airport	Orlando, FL
MIA	Miami International Airport	Miami, FL
MSP	Minneapolis-Saint Paul International Airport	Minneapolis, MN
ORD	Chicago O'Hare International Airport	Chicago, IL
PHL	Philadelphia International Airport	Philadelphia, PA
SEA	Seattle-Tacoma International Airport	Seattle, WA
SFO	San Francisco International Airport	San Francisco, CA

*Source:* OIG-generated from CBP Data



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**Appendix E**  
**Office of Information Technology Audits Major Contributors to**  
**This Report**

Kristen Bernard, Division Director  
Tuyet-Quan Thai, Division Director  
Scott Wrightson, Division Director  
Craig Adelman, Audit Manager  
Anna Hamlin, Senior Program Analyst  
Michael Thorgersen, Auditor  
Theresa Lowell, Program Analyst  
Sonya Davis, Referencer



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**Appendix F**  
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