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Figure 2. L3 ProVision 100 with ATR (production version)

DOT&E Assessment of Test and Evaluation Adequacy

In general, the Operational Test Agent conducted FOT&E as described in the approved Test and Evaluation Master Plan (TEMP) and Operational Test Plan (OTP). The scope of the evaluation effort focused on the contributions of the AIT ATR system in supporting the TSA’s passenger screening mission. [REDACTED]

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[REDACTED]
[REDACTED] The FOT&E adequately spanned the scope of the approved adequately followed the approved Operational Test Plan, with emphasis on system requirements and associated performance metrics likely to be affected through implementing the ATR modification on existing L3 AIT units. [REDACTED]

[REDACTED] operational testing of the L3 AIT ATR was complemented by Qualification Testing conducted at the DHS S&T Transportation Security Laboratory, to assess system specification requirements and selected key operational capabilities (including anomaly detection) that could not be fully demonstrated in the field environment.

The field portion of the FOT&E was conducted at three separate airport checkpoint locations, with typically-trained, representative TSOs operating the modified AIT units for passenger screening in accordance with the approved standard operating procedures and general concept of operations, as follows:

- Passengers were screened via the AIT as presented during typical checkpoint operations, with TSOs serving as divestment “coaches,” to remind passengers to fully divest articles per the SOP.
- Passengers entering the AIT were instructed by the Screening Operator (or SO, which is to be the same sex as the passenger) to assume the proper scanning position. Once the passenger is positioned, the SO initiates the scan.
- The Screening Operator reviews the information provided by the AIT with ATR enabled. If the system indicates a clear, the passenger continues through the aviation checkpoint screening process. If the system indicates that anomalies are present (as displayed on the control console and avatar), these are resolved in accordance with the current Screening Checkpoint SOP.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] While utilization profiles, passenger base, interactions with TSOs, etc., can vary considerably between airports (and even within an airport, at different checkpoint locations), there is a reasonable expectation that FOT&E findings can be generally extrapolated as to expected AIT performance for screening passengers for domestic travel nationwide.

Summary of Key Findings

The LOA focuses on data and findings as described in the approved TSA System Evaluation Report (SER) dated 6 May 2011 for the FOT&E. The LOA also includes findings and conclusions provided by complementary technical testing and evaluation efforts, primarily those conducted by the DHS Transportation Security Laboratory (TSL) as conveyed in the final Lab Qualification Test report dated 9 May 2011, as well as system detection performance data

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provided by the TSL in various classified briefings and reports, and observations gleaned by DOT&E during test bed site visits.

Based on test results, all Key Performance Parameters (KPPs - Table 1 below) as defined in the approved ORD were satisfied based on Qualification Test results, as well as results obtained through the FOT&E at ATL, DCA, and LAS under the noted test conditions.

Table 1. Key Performance Parameters*

Key Performance Parameter		Threshold / Objective
Section 3.1.1	Probability of Detection (Pd)	[REDACTED]
Section 4.7.2.1	Safety	
Section 3.1.1.2	Throughput	
Section 4.5	Availability**	

* Per ORD dtd (b)(3), 49 USC 114(r)

** Later updated to [REDACTED]

Additional system performance details are as follows:

1. Mission Performance –

- a. **Sensitivity (Probability of Detection) –** The L3 ProVision 100 AIT system with ATR modification satisfied the objective KPP technical requirement (as defined in ORD and detailed in the [REDACTED]

[REDACTED] for overall detection of prohibited

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items, as demonstrated through anomaly detection testing [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Finally, based on the results of an excursion conducted at the TSL, the ATR-enabled system demonstrated the capability to accurately [REDACTED]
[REDACTED]

[REDACTED] Although not objectively assessed during OT&E, the increased precision with respect to anomaly location (as conveyed visually through the avatar), may also result in enhanced effectiveness and efficiency in secondary screening.

- b. **Selectivity (False Alarm Rate)** – The system satisfied technical requirements with respect to false alarm rates (defined as the system indicating an anomaly when no object was present) as referenced in the approved ORD during laboratory testing. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] The overall impacts on checkpoint resources associated with ATR implementation, as well as achieved throughput, were not quantified. However, the OTA’s qualitative assessment stated that overall checkpoint operations were not adversely affected.

- c. **Throughput** – The ATR-enabled AIT system demonstrated the ability to satisfy the threshold KPP system throughput requirement as stated. However, as noted above, the impact of enabling ATR on achieved throughput (accounting for the impact on the overall screening process) was not quantified. Based on current understanding of system capabilities, over 99% of passengers not otherwise precluded from undergoing AIT screening could be processed with ATR enabled.

- 2. **Interoperability** – Security Technology Integrated Program (STIP) functionality, designed to enable remote system access, was deferred for this program, and is expected to be assessed as part of legacy transportation security equipment (TSE) test and evaluation efforts. No interoperability or interference issues were noted during checkpoint operations. In addition, implementation of ATR functionality removed the requirement for voice communication between the Image Operator and Screening Operator, which occasionally presented challenges in the airport environment. Finally, modification of existing AIT units with ATR functionality did not present any significant concerns, and no integration issues were noted, nor limitations with respect to operating in the intended environment.

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3. **Reliability, Maintainability, and Availability (RM&A)** - The revised threshold KPP requirement for Operational Availability [REDACTED] was satisfied with the ATR modification enabled. In addition, the system achieved the revised threshold ORD requirement for Mean Time Between Critical Failure (MTBCF) over the test period within the operational environment, as defined by a failure rendering the system unable to support mission requirements and requiring maintenance personnel intervention to correct. The point estimate for overall Mean Time Between Failure, which addresses both critical and non-critical failures affecting mission performance, was approximately [REDACTED] considering all systems under test. The majority of non-critical failures noted were software-related, and required minimal TSO intervention and associated downtime.
4. **Logistics Supportability** – No significant supportability issues were noted, aside from noted concerns regarding the adequacy of the vendor-supplied [REDACTED]
5. **Human-system Integration (HSI)**
 - a. **Manpower** – Implementation of ATR on current AIT will eliminate the need for Image Operators (IOs), thus potentially reducing manpower requirements associated with AIT deployment over the current configuration. However, given demonstrated system operating characteristics and the potential for increased active passenger engagement with ATR, a 1-for-1 decrease in manpower may not be realized in practice. The SER did not quantify the potential overall impact on manpower resources within the checkpoint environment associated with ATR deployment. As observed during test, the revised staffing model appears to be adequate to support continued operations. There is also strong evidence historically that the TSA has successfully improved checkpoint efficiencies over time, and the DOT&E expects these optimization efforts to continue under ATR.
 - b. **Personnel** – No significant increases in personnel skills were noted. However, the HSI Subject Matter Expert (SME) did note the need for considerable personal communications skills in all relevant TSO duty positions (including divestment) in maximizing overall system performance, given close interaction with the travelling public, and enabling efficient and effective operation.
 - c. **Training** – TSO training on both system operation and on standard operating procedures was deemed adequate.
 - d. **Human Factors Engineering (HFE)** – No significant HFE-related issues were noted by the SME. The Operator Control Panel (OCP) is cleanly and simply designed and adequate to support system operation, including initiating and clearing a scan, as well as presenting an adequate avatar image (and associated suspect boxes and scan results) to successfully enable the ATR-specific targeted resolution protocols. Similarly, most TSOs found the system with ATR enabled easy to operate. Once in place, scan times were minimal and the actual scanning process was obvious to the passenger, with a reasonable wait time [REDACTED] between scan completion and presentation of results.

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- e. Safety and Health – No critical safety and/or health hazard concerns were noted with the millimeter-wave based technology. The HFE SME did note some minor concerns and recommendations for improvements.

6. **Information Assurance** – No Information Assurance (IA) issues were noted. [Redacted]

[Redacted] In addition, selective functionality was not enabled per specific access level as in accordance with specification.

Conclusions

All Key Performance Parameters relative to ATR implementation were satisfied as tested. Qualification Testing at the TSL [Redacted] demonstrated adequate system detection performance IAW KPP and ORD requirements. [Redacted] testing results during the FOT&E were consistent with QT&E results, and support the finding that ATR implementation results in increased detection performance. There is also evidence to support the assertion that detection performance consistency is increased with ATR. Demonstrated ATR system throughput in the operational environment was significantly greater than with the IO-based system, [Redacted]

[Redacted] The overall screening process was smooth and efficient, resulting in a positive passenger experience; in particular, DOT&E considers this to be reflective of the particularly close collaboration and coordination observed between TSA elements to enable the ATR capability. System availability satisfied user requirements and the operational need as stated in the ORD and KPP language, and (aside from the potential manpower concern noted below) there were no significant human system integration issues noted for the emerging technology.

While ATR offers considerable demonstrated and potential benefits in terms of passenger screening effectiveness and efficiency, in transitioning from the IO-based technology (with passenger imagery reviewed by TSOs), to the ATR-based technology (in which the system response conveys a primary determination as to status) [Redacted]

[Redacted] (b) (3) 49 USC 114(r) [Redacted]

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(b) (3) 49 USC 114(r)

[REDACTED]

Given the system performance and the noted concerns, the DOT&E concurs with the OTA findings, and determines the system to be effective and suitable in support of the TSA's passenger screening mission. As noted above, there is no evidence at this time to suggest that the system is ineffective or unsuitable. However, to address the above concerns, DOT&E recommends

[REDACTED]

Recommendations for Future Test and Evaluation – DOT&E recognizes that there is no “cookbook” approach to testing and evaluation. The T&E community considers the system under test, including underlying technologies, defined and inferred requirements, and component mission, as well as the overarching acquisition strategy (amongst other factors) in developing and tailoring each approach. In addition, the DOT&E recognizes that the T&E efforts discussed in the LOA are intended to support acquisition efforts and are designed to minimize performance risk, and that this risk is considered in light of available resources and schedule. DOT&E considers that that T&E community adequately balanced this risk in planning and implementing the T&E strategy for this assessment. However, as with any new technology, as understanding of the technology matures, T&E strategies and efforts should likewise mature. Consistent with that philosophy, the DOT&E recommends the following:

- [REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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