

Attachment B - Types of Weapons Detection Systems

This attachment documents the research conducted by SSLE staff on the different types of technology available for weapons detection, the advantages and disadvantages identified, and the valuable information provided to staff by peer agencies and community partners regarding first-hand account and in-person experience with the operation of different weapons detection systems.

Based on the nature of our transit infrastructure, staff began this research effort focusing on high influx environments currently unstaffed, SSLE identified a need for units with:

- High portability, wireless connectivity;
- Indoor/outdoor operability; and,
- Integrations with existing electronic security systems.

This narrowed the list of potential systems to the following four widely used systems: (1) a portal-type system, (2) a compact pillar-type system, (3) a dual-lane system that employs electromagnetic detection and additional sensors, and (4) a millimeter wave-based detection system with AI.

The following tables summarize the advantages and disadvantages of each type of system. Wide variations in manufacturers and models exist in each of the four categories evaluated. The variance in features, accessories, and specifications is not reflected in the evaluation conducted by staff.

Table 1: Portal Type System

Portal Type System	
Advantages	Disadvantages
<ul style="list-style-type: none">• Accurate detection of various types of metals.	<ul style="list-style-type: none">• Higher cost compared to simpler metal detectors.
<ul style="list-style-type: none">• Personal items do not trigger alarms.	<ul style="list-style-type: none">• Complex setup
<ul style="list-style-type: none">• 60 pin-pointing zones for precise threat location.	<ul style="list-style-type: none">• Specific spacing requirements.
<ul style="list-style-type: none">• User-friendly features.	<ul style="list-style-type: none">• System will need to be near a power outlet.
<ul style="list-style-type: none">• Maintains performance in various environmental conditions.	<ul style="list-style-type: none">• Cannot be used onboard rail or bus fleet.

Table 2: Pillar-Type System

Pillar-Type System	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Screens many people quickly. • Individuals do not need to remove items from their bags. 	<ul style="list-style-type: none"> • Higher initial cost. • Relying on an app might pose challenges if there are technical issues with the app.
<ul style="list-style-type: none"> • Designed to operate effectively in both indoor and outdoor environments. 	<ul style="list-style-type: none"> • Cannot be used onboard rail or bus fleet.
<ul style="list-style-type: none"> • The system offers flexible power options. 	
<ul style="list-style-type: none"> • The system is engineered to minimize false alarms. 	
<ul style="list-style-type: none"> • Easy installation and can be managed remotely via a smartphone or tablet app. 	
<ul style="list-style-type: none"> • The system is lightweight (only 25 lbs.) and sets up in less than one minute. 	





Table 3: Dual-Lane System

Dual-Lane System with Artificial Intelligence	
Advantages	Disadvantages
<ul style="list-style-type: none"> • System can scan up to 3,600 people per hour. 	<ul style="list-style-type: none"> • The initial investment can be high.
<ul style="list-style-type: none"> • System uses sensor technology and AI to detect concealed weapons. 	<ul style="list-style-type: none"> • Regular updates and maintenance are necessary.
<ul style="list-style-type: none"> • Analytics helps security teams make smarter decisions. 	<ul style="list-style-type: none"> • Possibility of occasional false positives.
<ul style="list-style-type: none"> • Integrates with existing CCTV VMS cameras. 	<ul style="list-style-type: none"> • Security personnel need to be trained to effectively.
<ul style="list-style-type: none"> • Tablet interface makes it easier to train new users. 	<ul style="list-style-type: none"> • Use of advanced AI and data analytics raises potential privacy issues.
<ul style="list-style-type: none"> • The system has received several awards, including "Best in Fan Experience Technology" and "Best in Sports Technology" for 2024. 	<ul style="list-style-type: none"> • Extreme weather conditions might affect its performance. • Cannot be used onboard rail or bus fleet.

Table 4: Millimeter Wave (MMW) Detection Based System with Artificial Intelligence

Millimeter Wave (MMW) Detection-Based System with Artificial Intelligence	
Advantages	Disadvantages
<ul style="list-style-type: none"> Accurately detects concealed weapons. 	<ul style="list-style-type: none"> Higher costs for advanced technology and AI.
<ul style="list-style-type: none"> Contactless screening. 	<ul style="list-style-type: none"> Additional training for operation and maintenance.
<ul style="list-style-type: none"> Process large numbers of people quickly. 	<ul style="list-style-type: none"> Privacy concerns regarding data handling.
<ul style="list-style-type: none"> Functions indoors and outdoors. 	<ul style="list-style-type: none"> 99% accuracy with 1% risk of false positives.
<ul style="list-style-type: none"> AI improves the system's ability to learn and enhance threat detection over time. 	<ul style="list-style-type: none"> Deployment may require significant changes to existing infrastructure.
	<ul style="list-style-type: none"> Buses cannot accommodate non-standard power requirements.
	<ul style="list-style-type: none"> Rail cars cannot accommodate non-standard power requirements.

After evaluating each system's advantages and disadvantages, staff conducted an additional analysis to understand their overall footprint and the technology employed, how these systems meet the agency's needs, and how they integrate with the agency's current technological capabilities. That evaluation is summarized in the table below.

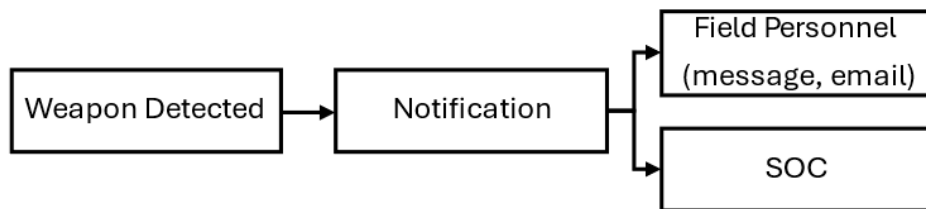
Ratings: ✓ Low ✓✓ Medium ✓✓✓ High				
	Portal-Type	Pillar-Type	Dual Lane	MMW
Technology	Electromagnetic	Electromagnetic	Electromagnetic Thermal Imaging Advanced Imaging	Millimeter Wave Video Analytics
Portability (Battery Option)	✓✓	✓✓✓	✓	✓
Outdoor Operability	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Throughput	✓	✓✓	✓✓✓	✓✓✓
Data Analysis	✓✓	✓✓	✓✓✓	✓✓✓
Network Connectivity	✓	✓	✓✓✓	✓✓✓
Video Analytics	None	None	✓✓✓	✓✓✓
VMS Integration	None	None	✓✓✓	✓✓✓

Peer Agencies

Metro Board Director Butts extended an invitation to Metro staff to attend the demonstration of a weapons detection system being evaluated through a pilot in Inglewood facilities and public spaces. Staff were impressed by the system's capability, reliability, advanced analytics, and ability to integrate with the new Genetec Video Monitoring System (VMS); hence staff's recommendation to pilot the technology at Metro facilities as well. This technology is included in the evaluation of technologies discussed in this report. The system combines AI with Millimeter Wave (MMW) radar signals and ultra-fast signal processing to follow a pre-designated security policy plan. MMW radar detects the type of threat and speed of approach. AI camera identifies and locks onto the threat and tracks its movement.

An instant alert with a snapshot of a weapons threat provides a who, what, when, and where silent notification to:

1. Field staff within the area via email/SMS
 - a. Immediate situational awareness to conduct consensual interviews and/or interdict, as appropriate
2. Concurrent notification to the Metro Security Operations Center
 - a. Security Control Specialist will coordinate and communicate with contract and local law enforcement, ROC/BOC, and other resources on the system



Notification sequence for weapon detection.

Additionally, auto pre-programmed systems can be integrated to secure facilities by locking doors (if compatible systems are available) and opening a safe path to secure areas while denying threat access to sensitive locations.

Staff also reached out to TSA to inquire about any research being conducted in the field of weapons detection. Information beneficial to Metro's own research was provided by its federal partner. In accordance with 49 Code of Federal Regulations (CFR), Part 1520, the information cannot be disclosed in this public document due to its classification as Sensitive Security Information (SSI). Metro will continue its collaboration with federal partners to ensure Metro stays abreast of current and future technologies that improve the safety for Metro riders and employees.

Meanwhile, New York MTA lauded its experience using an advanced, Dual-lane multi-sensor system with video analytics, and it performed close to 22,000 screenings as part of its pilot program. According to senior staff at NY MTA, the system has been

successfully deployed several times in difficult environments throughout their system in which traditional portal-type and pillar-type systems underperform given the vast quantity of metal and radio interference present. The testing conducted has proven that any technology, even Dual-lane, multi-sensory systems, comes with limitations, primarily in misidentifying large personal electronics such as laptops and tablets and underperforming in detecting small-edged weapons. However, it has been NY MTA's experience that, as a baseline, the advanced Dual-lane system detects the presence of medium caliber handguns, improvised explosives, and large-edged weapons to a great degree of accuracy. This is consistent with what Metro experiences on the system with respect to handguns and large-edged weapons. The system NY MTA employed is in the category of Dual-lane type screening systems discussed in this report. Currently, NYPD is working to complete a report on all the testing performed as part of the pilot program. SSLE staff will continue to coordinate with NY MTA and NYPD for a review of findings.

SSLE staff made use of the information obtained as part of this research effort, including the information shared by partner agencies to determine the appropriate course of action Metro should follow as it considers the implementation of weapons detection systems, finally concluding to pilot the millimeter wave and dual-lane type systems as they most closely align with the site conditions and user throughput in our transit system.