U.S. Department of Homeland Security

SCIENCE AND TECHNOLOGY DIRECTORATE

Remote Identity Validation Tech Demo Challenge

Science and Technology

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April 8, 2024

Outline

- Congratulations on your conditional acceptance to participate in RIVTD Track 3 as an Active Presentation Attack Detection (PAD) System

- Scenario Test Overview
- VIP Day

- Final Acceptance Requirements
  - Hardware & System Safety
  - Software & Application Programming Interface (API)
  - Cooperative Research and Development Agreement (CRADA) & Communication
  - System Installation at Maryland Test Facility (MdTF)

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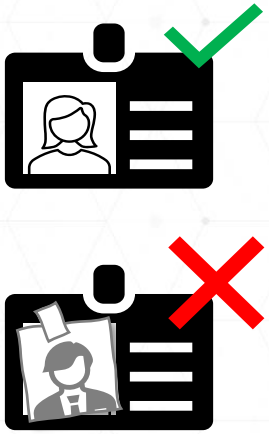
RIVTD Tracks

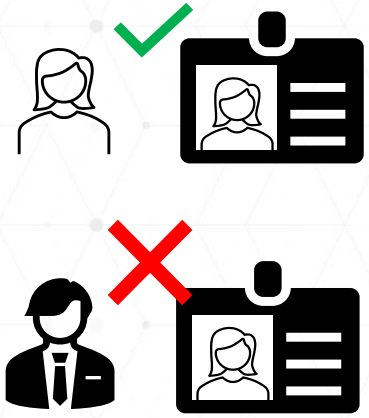
Track 1:
ID Validation

- Information Check
- Tamper Check
- Security Check



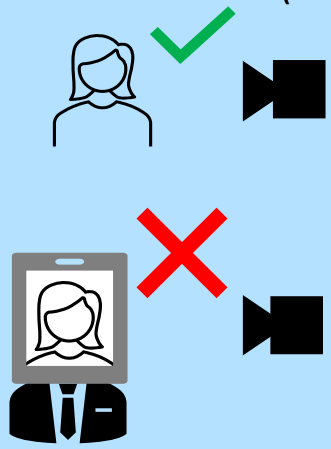
Track 2:
Match to ID

- 1:1 Verification



Track 3:
Liveness and Presentation Attack Detection (PAD)

- Reject screens and printouts
- Reject masks and other Presentation Attack (PAs)



Current focus is Track 3: Liveness and Presentation Attack Detection

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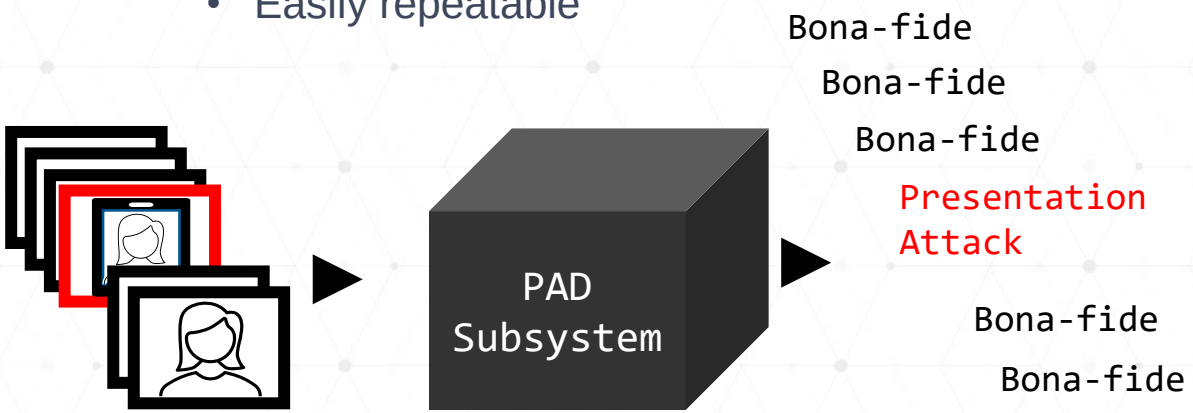
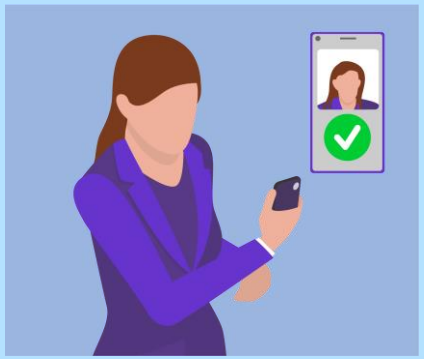
Technology Tests vs. Scenario Tests

- Technology Testing:
  - Focus on performance of a multiple presentation attack detection subsystems (e.g., bona fide biometric samples, masks, replay videos)
  - Passive PAD Subsystems
  - Easily repeatable



- Scenario Testing:
  - Assess performance of PAD application in the context of use
  - Real people interact with the system
  - Active PAD subsystems
  - Costly to repeat



PAD
Application

Active PAD systems will be tested using scenario testing.

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Test Requirements

- Scenario Test Logistics
- Scenario Test Station
- Scenario Test Process
- Presentation Attack Instruments

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About the Maryland Test Facility (MdTF)

- Active PAD subsystems will be demonstrated at the MdTF
  - Conveniently located in Maryland near Washington DC
- Collaborator will be responsible for physically installing systems and any supporting hardware or equipment at a dedicated station
- Collaborator staff must be available remotely to address break/fix issues encountered during testing
- **No access to the internet is provided or allowed during the demonstration**

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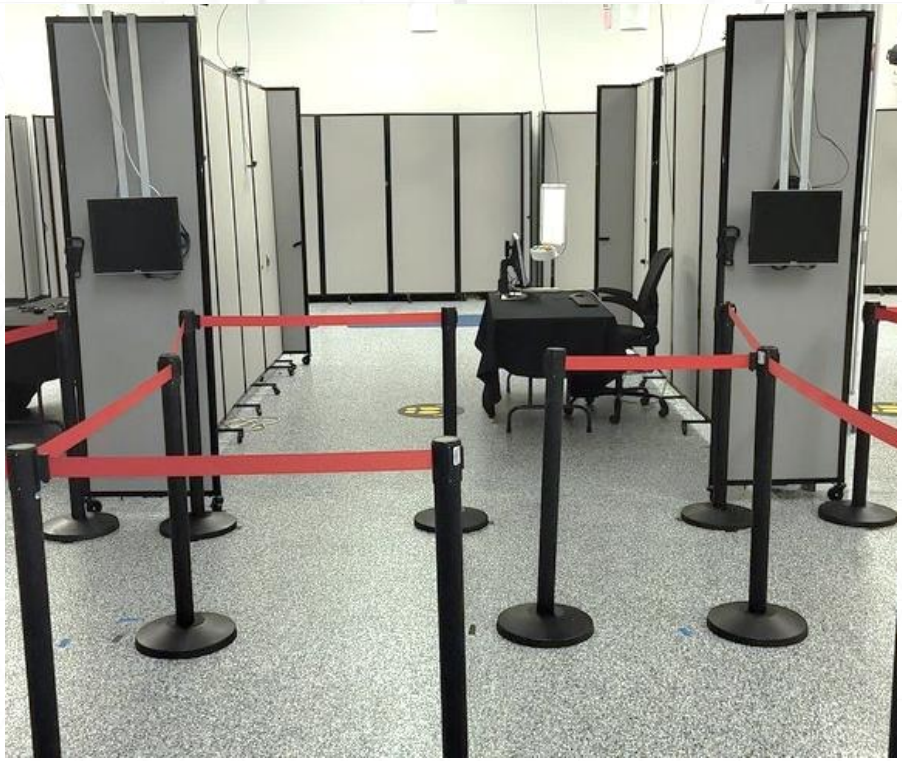
Scenario Test Station

- Collaborators will be assigned a test station at MdTF
- At each station, the MdTF shall provide:
  - A 5' long table to stage collaborator PAD systems
  - A 6 outlet 120v power strip for system use
  - Network connectivity and up to **three** static IP address assignments to interface with the API backend
    - Encrypted wireless access point connectivity
    - Connectivity to one wired access point
  - A maximum current draw of up to 5 amperes (running draw)
- Collaborators shall ensure all hardware is contained within the designated station area, including any required internal system interconnectivity (cabling, switches, hubs, etc.)
- Collaborators shall ensure that a minimum 36" wide pathway for volunteers to pass through the station is maintained
- **No access to the internet is provided or allowed during the demonstration**



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Scenario Test Process

B MdTF Staff member starts transaction and volunteer enters station.

C MdTF Staff member provides volunteer collaborator's device with installed PAD application. Volunteer initiates and performs one **PAD transaction** using the device.

The PAD transaction may be either bona-fide or a presentation attack.

A Volunteers queue at station.

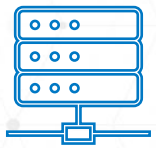
Ground Truth

Beam Break 1

Beam Break 2

Satisfaction

D Volunteer rates experience.



MdTF Server

E PAD data is sent to MdTF server.

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Presentation Attack Instruments

Level A	Level B	Level C
• Printout on Paper • Display on Screen	• Paper Masks • Video Replay on Screen	• Attacks requiring special hardware and significant effort/cost to perform

- The number and specific species of PAIs will not be disclosed
- PAD performance will be assessed per PAI species

System Requirements

- Active PAD System Requirements
- System Hardware & Safety
- PAD Application & API

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Active PAD System Requirements

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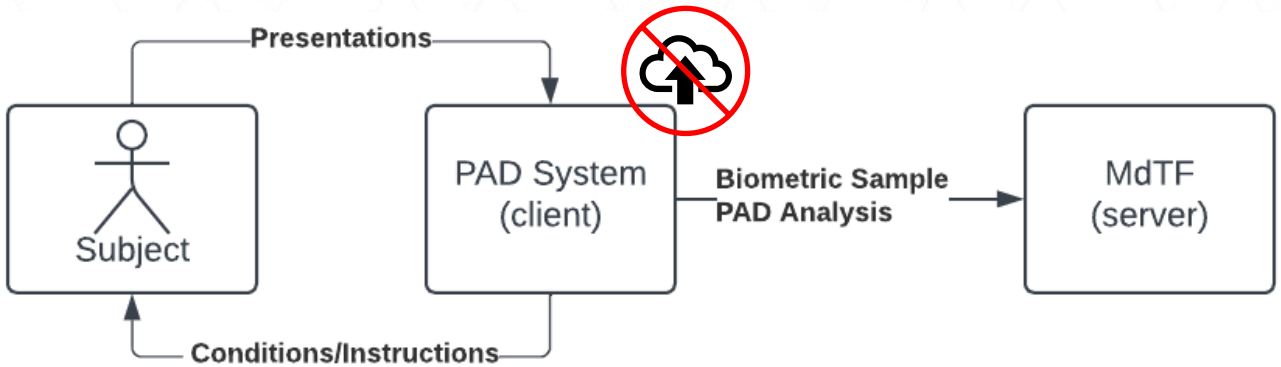
Active PAD Subsystem Requirements (1)

- Shall be **installed by collaborator staff** in a physical test station **at the MdTF**
- Shall operate without access to the internet / cloud
  - Smartphones shall be configured to operate in “airplane mode”
- May leverage any additional compute resources installed within the test station
- Shall implement the RIVTD Active PAD subsystem API
- May instruct the subject and use standard hardware / sensors on the smartphone
- Shall cost share ($25K) with DHS S&T non-recurring engineering costs (e.g., scenario test planning, engineering, volunteer compensation)



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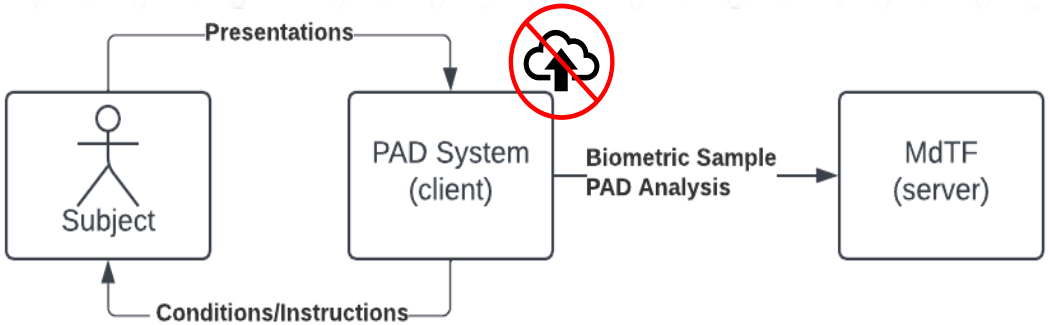
Active PAD Subsystem Requirements (2)

- Collaborator shall **provide BOTH an Android and iOS device** with the installed **PAD application** for testing
- Application shall have an interface to allow subject to initiate and complete transactions with a 30 second transaction timeout
- Application shall be able to configure “station name” and IP address of the MdTF API endpoint
- No biometric comparison is required
- Collaborator shall provide thresholds for operating points at BPCER=(1:10,1:100,1:1000,1:10000)

iPhone 14

Samsung Galaxy S22

- Shall provide the following to the MdTF server for each transaction:
  - Station ID, Mobile Platform, Biometric Sample
  - PAD Outcome: (true or false)
  - PAD Score: (0 – 1)
  - PAD Properties (key value pairs)



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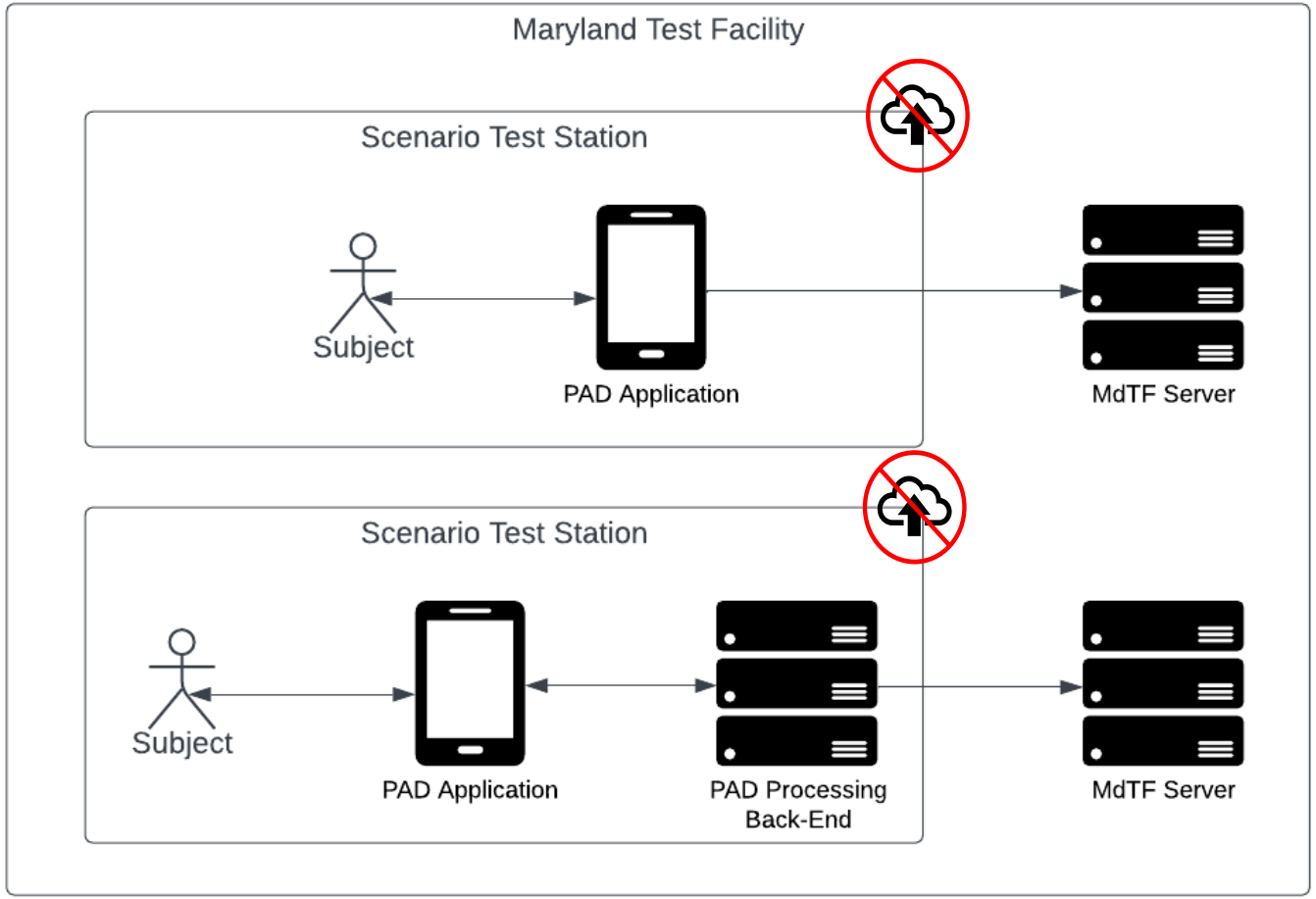
System Hardware & Safety

Hardware and System Safety

- The MdTF provides a positive, safe, and inclusive space for scenario test volunteers
  - Institutional Review Board (IRB) Requirements
  - Americans with Disabilities Act (ADA) Requirements
  - Safety Requirements
- During the scenario test volunteers will interact with collaborator-provided hardware
- To ensure volunteer safety:
  - All collaborator-provided devices shall be demonstrated as safe to the satisfaction of DHS Technical Point of Contact (POC) and MdTF staff
  - All systems shall be inspected "as installed" in their designated station to ensure:
    - Conformance with hardware requirements
    - A minimum 36" wide volunteer pathway through the station is maintained
    - No electrical, physical, or ergonomic safety concerns exist
- All conformance/safety issues shall be corrected prior to accepting the system installation for scenario testing
- Stations with outstanding conformance/safety issues will not participate in scenario testing

Sample Hardware Setup at MdTF

- Option 1:
  - All processing performed on mobile device
  - Mobile device sends results to MdTF Server
- Option 2:
  - Some processing performed on collaborator-furnished back-end server in the test station
  - Collaborator back-end server sends results to MdTF Server



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PAD Application & API

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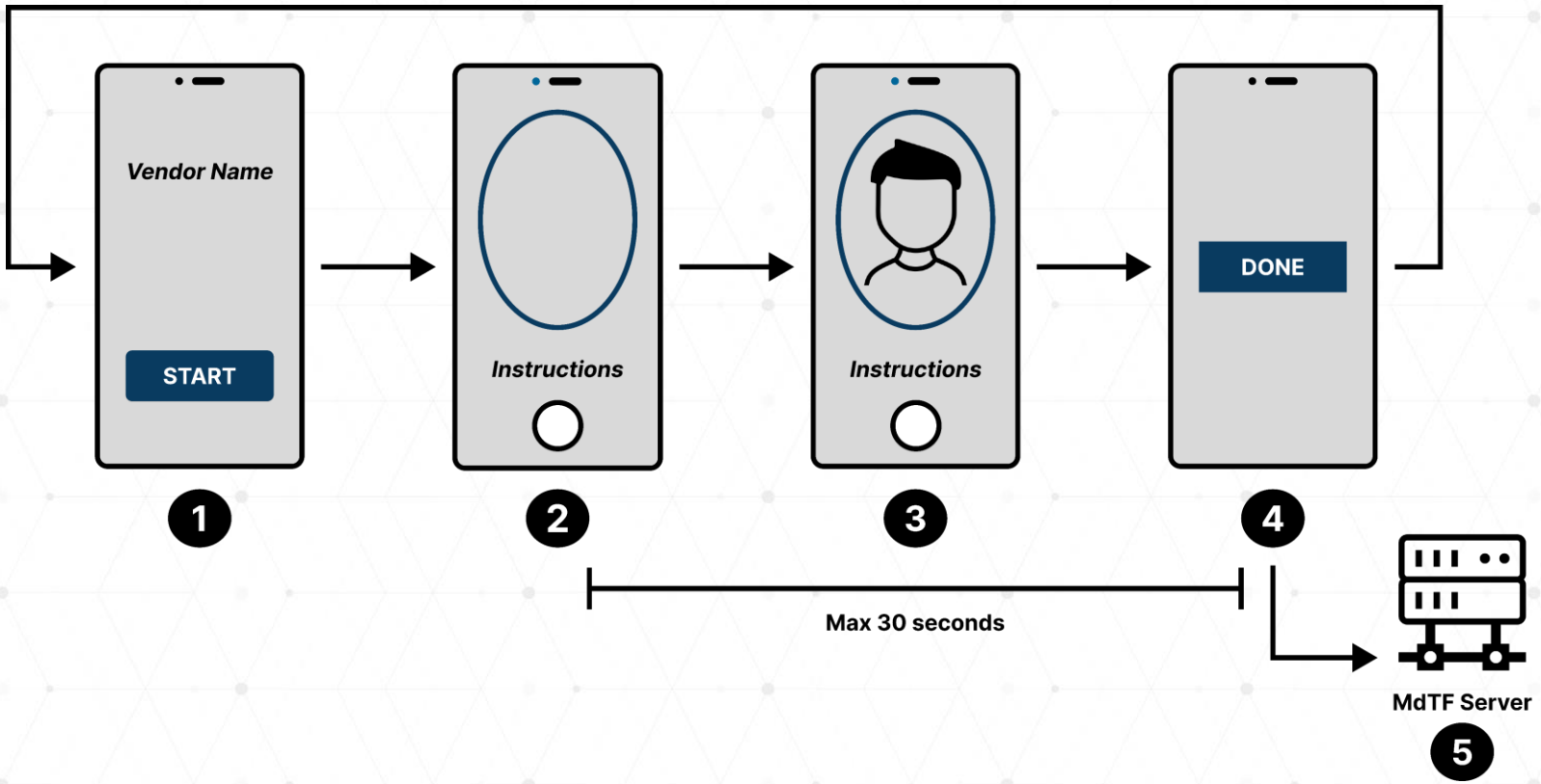
Sample PAD Application

1. **Home Screen**
   - Contains a button to start capture
   - Proceed to Capture (2) on tap
2. **Biometric Capture Screen**
   - Provides instructions
   - Captures a face sample using front camera
3. **Volunteer Interaction**
   - Volunteer follows instructions
4. **Done**
   - Sample Acquired and Classified → proceed to API Response (5)
   - 30 second limit reached → reset to Home Screen (1)
5. **API Response**
   - Send response to MdTF Backend
   - Reset to Home Screen (1)



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Active PAD API

The Maryland Test Facility Active Presentation Attack Detection System Interface

2.0.0 OAS 3.0

Data Submission

POST `/v1/capture-data-with-pad` Create a biometric data capture with associated PAD information.

- Active PAD subsystems shall send:
  - Station ID
  - Mobile Platform
  - Biometric Sample
  - PAD Outcome (true or false)
  - PAD Score (0-1)
  - PAD Properties (key value pairs)
- API Documentation is available at:
  - https://github.com/TheMdTF/mdtf-public/tree/master/apis/pad-systems

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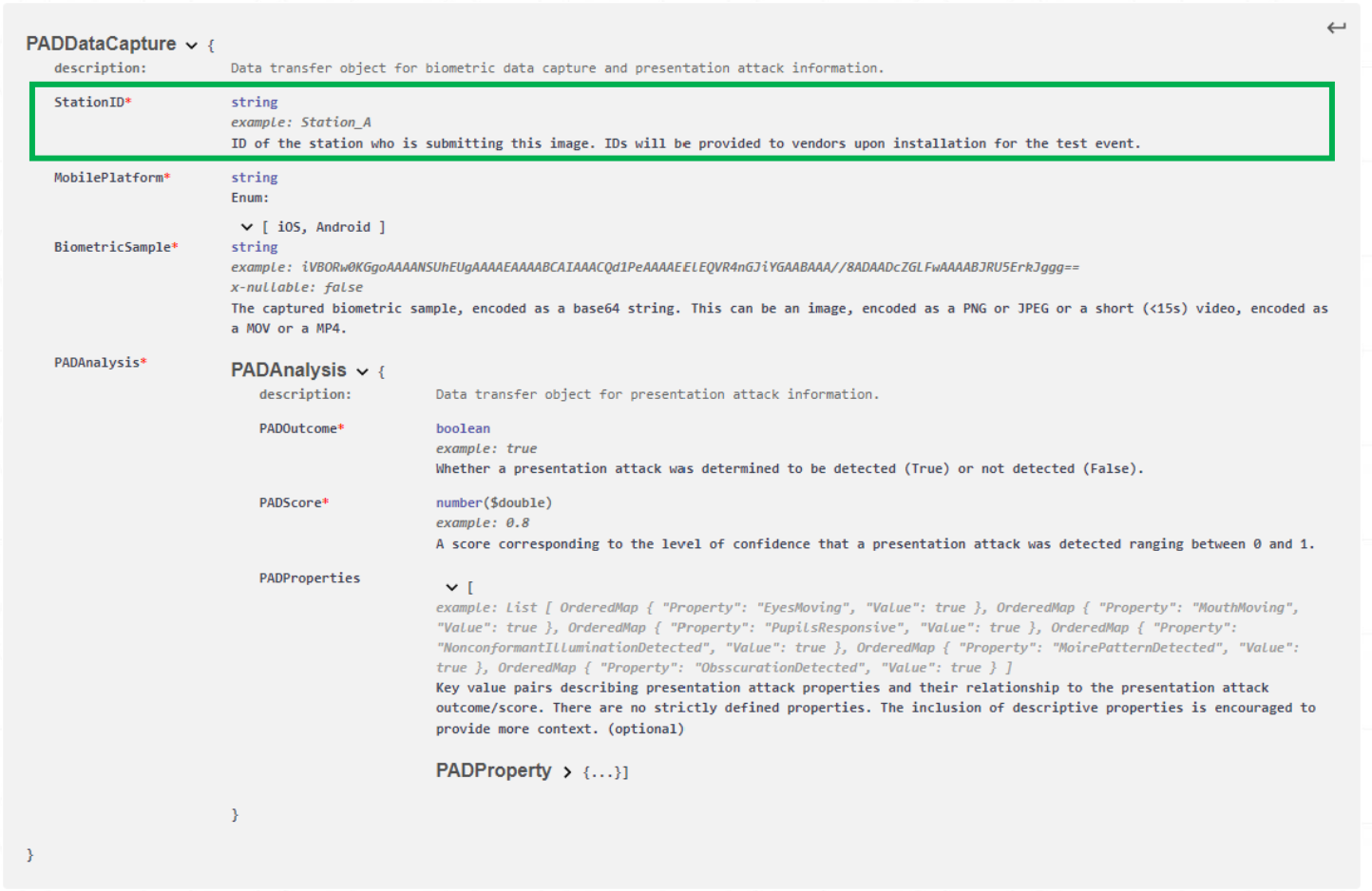
Station ID

- PAD subsystems shall set their **StationID** as the MdTF-provided “station name”
  - E.g., “Station A”



PADDataCapture {

description: Data transfer object for biometric data capture and presentation attack information.

StationID* string
example: Station_A
ID of the station who is submitting this image. IDs will be provided to vendors upon installation for the test event.

MobilePlatform* string
Enum:
[iOS, Android]

BiometricSample* string
example: iVBORw0KGgoAAAANSUhEUgAAAAEAAAABCAIAAACQd1PeAAAAEElEQVR4nGJiYGAABAAA//8ADAADcZGLFwAAAABJRU5ErkJggg==
x-nullable: false
The captured biometric sample, encoded as a base64 string. This can be an image, encoded as a PNG or JPEG or a short (<15s) video, encoded as a MOV or a MP4.

PADAnalysis* PADAnalysis {

description: Data transfer object for presentation attack information.

PADOutcome* boolean
example: true
Whether a presentation attack was determined to be detected (True) or not detected (False).

PADScore* number($double)
example: 0.8
A score corresponding to the level of confidence that a presentation attack was detected ranging between 0 and 1.

PADProperties [
example: list [OrderedMap { "Property": "EyesMoving", "Value": true }, OrderedMap { "Property": "MouthMoving", "Value": true }, OrderedMap { "Property": "PupilsResponsive", "Value": true }, OrderedMap { "Property": "NonconformantIlluminationDetected", "Value": true }, OrderedMap { "Property": "MoirePatternDetected", "Value": true }, OrderedMap { "Property": "ObsscurationDetected", "Value": true }]
Key value pairs describing presentation attack properties and their relationship to the presentation attack outcome/score. There are no strictly defined properties. The inclusion of descriptive properties is encouraged to provide more context. (optional)

PADProperty > {...}]

}

}

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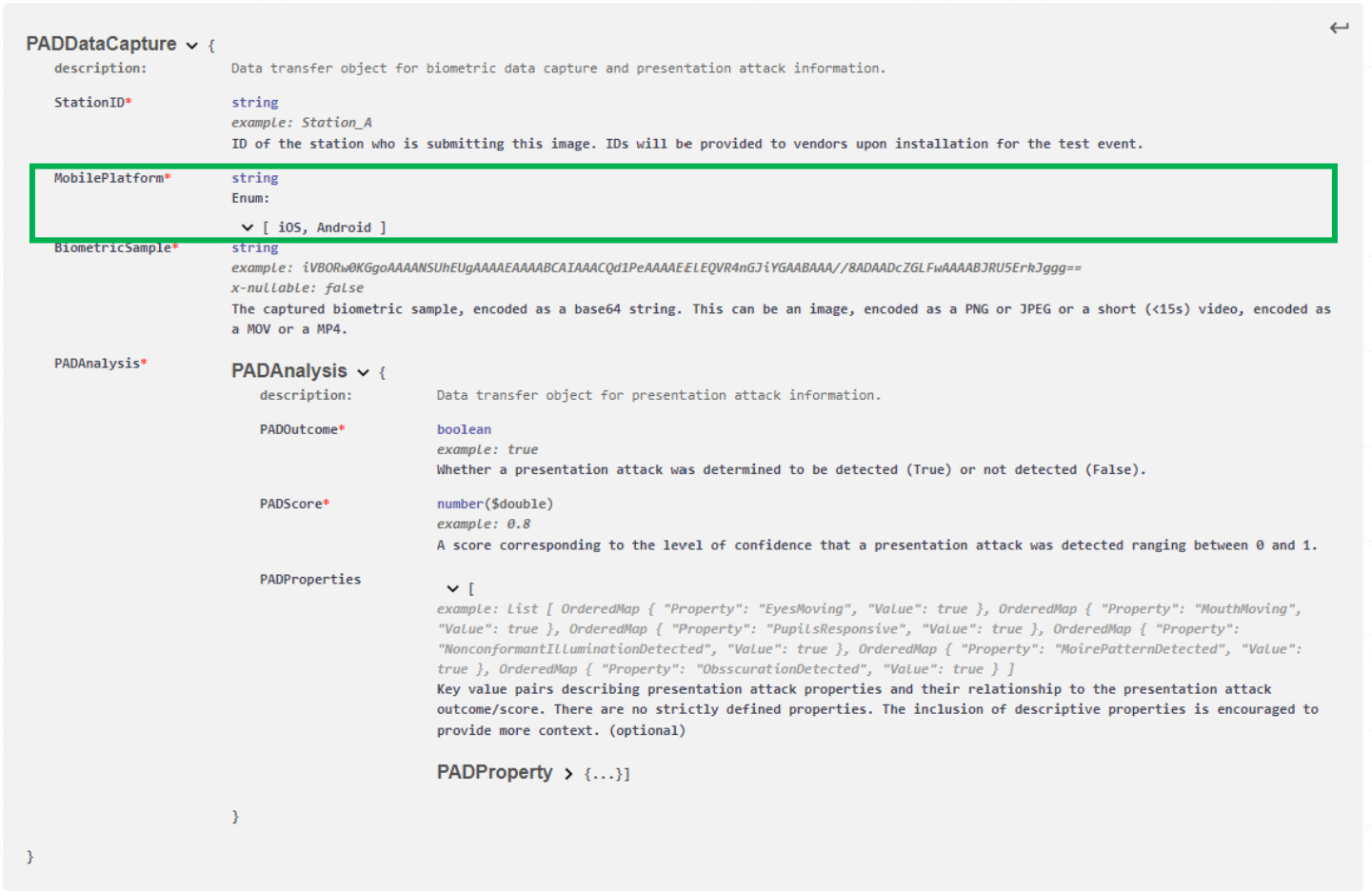
Mobile Platform

- PAD subsystems shall set their **MobilePlatform** as the OS on which the system is running:
  - Active PAD systems on iPhones shall be configured to return “iOS”
  - Active PAD systems on Android phones shall be configured to return “Android”



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Key value pairs describing presentation attack properties and their relationship to the presentation attack outcome/score. There are no strictly defined properties. The inclusion of descriptive properties is encouraged to provide more context. (optional)

PADProperty > {...}]

}

}

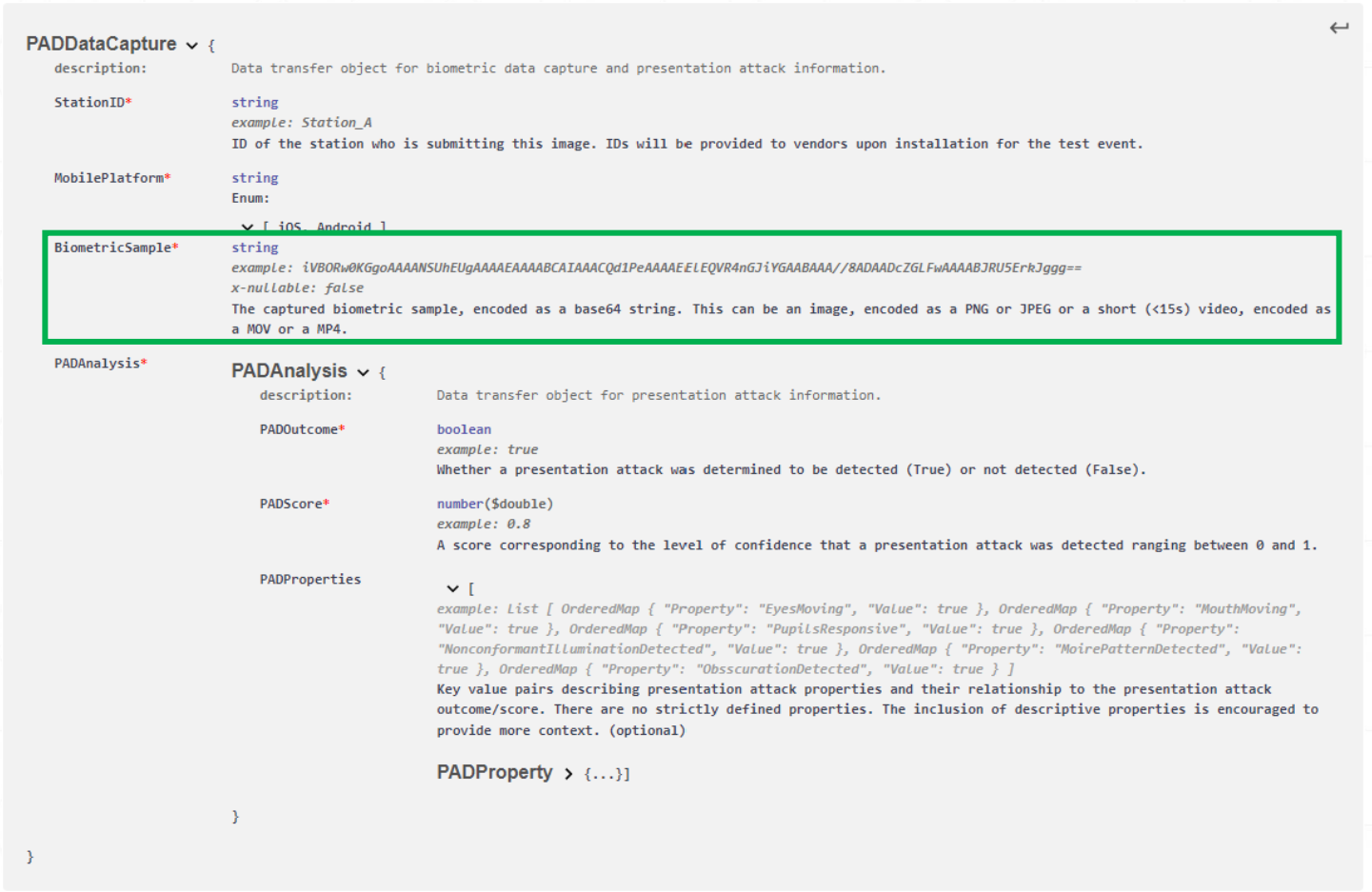
Biometric Sample

- PAD subsystems shall provide **BiometricSample** data

- The biometric sample should best represent the PAD decision:
  - If bona-fide, it's the sample that best represents the bona-fide face
  - If presentation attack, it's the sample that best represents the attack

The biometric sample can be a still image or a short video clip (<10 seconds)

Please reach out if your media format is not supported



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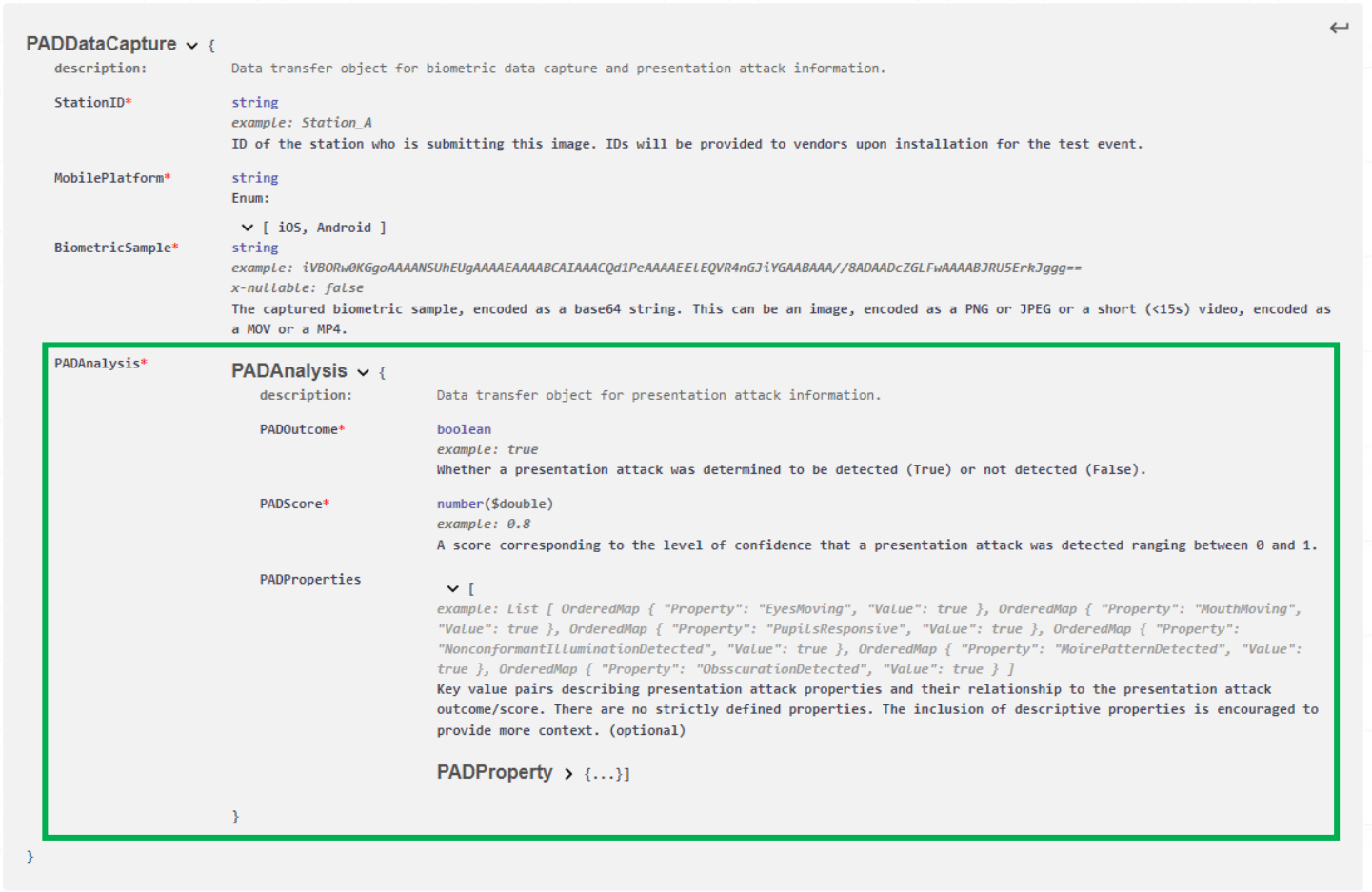
PAD Outcome and PAD Properties

- Each **PADDataCapture** shall provide **PADAnalysis** results
- **PADOutcome** shall specify whether the biometric sample is a presentation attack (True) or a bona-fide (False)
- **PADScore** shall indicate level of confidence on whether the biometric sample is a PA:
  - 1 means 100% certain it's a PA
  - 0 means 0% certain it's a PA (i.e., its bona-fide)
- **PADProperties** are key value pairs indicating any properties used by the PAD subsystem to determine PAD outcome and the values of those properties



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Final Acceptance Requirements

- Staff List
- CRADA
- Communications
- API Integration
- PAD System Delivery & Installation

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System Provider Staff List

- PAD system providers must email a list of staff members who will participate in RIVTD Track 3 activities rivtd@mdtf.org and peoplescreening@hq.dhs.gov with the subject line of **“<Company Name> RIVTD Track 3 Staff”**

- PAD system providers additionally need to list:
  - Slack channel staff (people to be given access to Slack)
  - People that will come to the MdTF for System Installation
  - People that will provide remote break/fix support for the PAD system
  - People that will come to the MdTF for the RIVTD Track 3 VIP Day
    - Include citizenship information for people that will come to the MdTF

- List due by 10am ET **April 15, 2024**

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Slack Channel Access

- Identify up to three (3) individuals from your company to serve as **Slack Channel Staff** to communicate with the MdTF Technical team

- Technical POC should send the list to rivtd@mdtf.org with the subject line of **"<Company Name> RIVTD Track 3 Slack Channel Staff"**
  - **To ensure timely access, this list is due by 10am ET April 19, 2024**

- Each **Slack Channel Staff** must email rivtd@mdtf.org with the subject line of **"<Company Name> RIVTD Track 3 Account Request"**

- Originating e-mail must be listed in a prior e-mail from the technical POC

Cooperative Research and Development Agreement (CRADA)

- Agreement between each System Provider (COLLABORATOR) and DHS S&T (SPONSOR)
  - Defines the roles and contributions of the COLLABORATOR and SPONSOR
  - Provides the basis for involvement in RIVTD Track 3 activities
  - Exempt from Freedom of Information Act (FOIA) process

- Must be signed by Corporate Officer

- Submission instructions will be provided when the CRADA is emailed. Signed CRADA is due by 10am ET **April 26, 2024**

PAD System API Integration

- PAD system providers are required to demonstrate that they have integrated their system with the MdTF Active PAD API
  - http://github.mdtf.org

- PAD systems shall demonstrate API integration by submitting a PADDataCapture to the appropriate endpoint
  - NOTE: the location of this API endpoint will need to be re-configured at MdTF

- Email rivtd@mdtf.org once a PADDataCapture has been submitted and the MdTF will verify submission. This is a prerequisite for final acceptance:
  - Deadline: 10am ET **April 26, 2024**

PAD System Delivery

- PAD system providers are responsible for getting their systems to the MdTF
  - System providers are responsible for ALL international shipment logistics, including US Customs arrangements
  - PAD system shipments will be received and staged in the assigned station 1 week prior to installation – any shipments received before **April 29, 2024** will be rejected

- Address:

  Maryland Test Facility
  1221 Caraway Court, Suite 1070
  Upper Marlboro, MD 20774
  Attn: Colette Bryant (301) 909 - 9300

- Please label all packages with your company name and appropriate POC

- PAD system providers will be responsible for return shipping
  - Scenario testing may continue through **August 30, 2024**

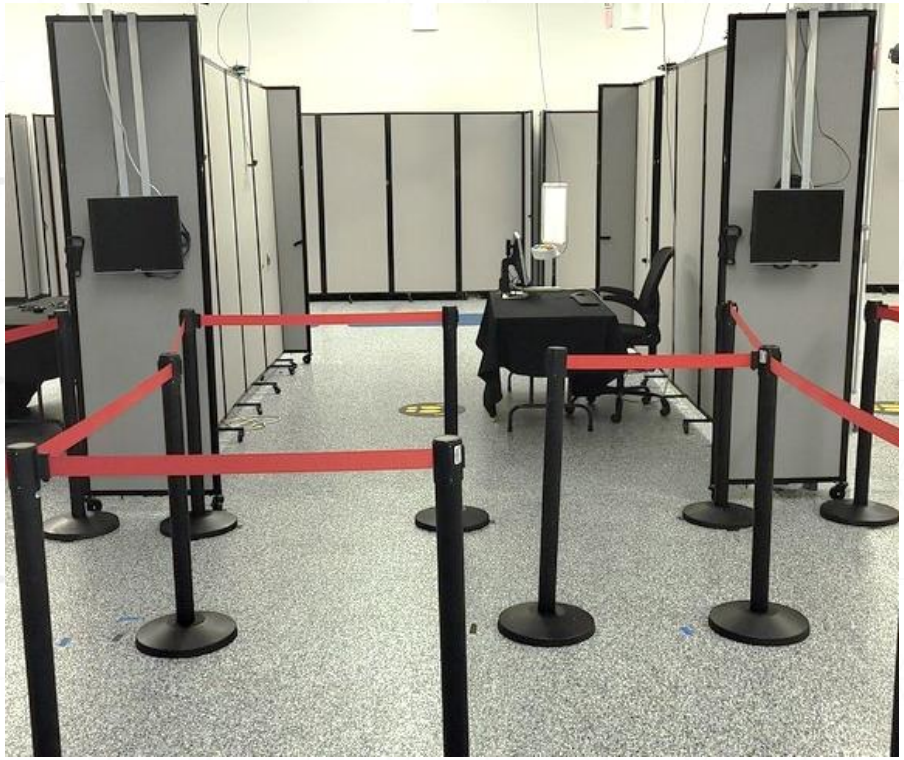
PAD System Installation

- PAD system providers are responsible for getting all required hardware to the MdTF

- There will be multiple stations at the MdTF, each labelled with a letter
  - You will be assigned to one of these stations upon arrival (e.g., “Station A”)

- PAD system provider shall configure:
  - Up to three MdTF assigned static IP addresses for their systems
  - The IP address of the Active PAD API endpoint
  - Their “station name” to use for API requests

- There will only be ONE (1) day for system installation, **May 6, 2024**



The Active PAD API endpoint will be different from the endpoint used for demonstrating API integration

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After Installation

- VIP Day
- Break/Fix Support

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VIP Day

- VIP day will be held at MdTF on **May 7, 2024**
- VIP day is an opportunity for your organization to pitch your system to stakeholders from DHS, other federal and international government agencies, and various trade associations that may attend
- VIPs will be divided into groups that will visit each collaborator station
- You will have ~10 minutes with each VIP group to demonstrate and promote your system
- You may also bring materials, such as promotional posters, to set up in your station
  - All promotional materials must fit within your station and must be removed following VIP day
- You may bring up to **three** personnel to the MdTF on VIP day, as long as you have provided the required information for those personnel to come to the MdTF
  - Non-USCs must be cleared by DHS in advance, names needed by 10am ET **April 15, 2024**

Break / Fix Support

- System provider shall make staff available and will be solely responsible for addressing any break/fix issues encountered with their system during testing
- The MdTF will provide internet connectivity to handle break/fix interventions remotely when testing is not being performed
- Scenario testing will be carried out between **May 8, 2024** and **August 30, 2024**
- Intensive testing is expected between **May 8, 2024** and **May 24, 2024**
- System breakdowns during testing may result in missing data from scenario test transactions and missing data will be treated as a system error
- Failing to address system issues will result in lower measured system performance

Resources & Where to Ask Questions

- A detailed Statement of Work (SOW) will be provided in the CRADA
- All legal and logistics questions should be directed to peoplescreening@hq.dhs.gov
- Technical communication pertaining to RIVTD Track 3 should be handled via Slack (chatroom):
  - API Integration and Implementation, Metrics
- Technical questions can be sent to rivtd@mdtf.org, but Slack is preferred
- These slides will be available on http://mdtf.org/rivtd