ICE
INTER-COASTAL ELECTRONICS

2023

A DIVISION OF **AROTECH** TRAINING & SIMULATION DIVISION

ANY MISSION, ANY ENVIRONMENT, ANY PLATFORM

ICE is an industry leader that develops, manufactures, fields and maintains high quality instrumentation, test & training equipment, and training services for worldwide applications

HEADQUARTERS

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MATURE BUSINESS

- » Established in 1989
- » DCAA/DCMA Audited
- » ISO/AS9100D Certified
- » Cisco Certified
- » PMP Certified
- » Full & Open Prime Contractor

REMOTE OFFICES

- » Orlando FL
- » Fort Hood TX
- » NTC, Fort Irwin CA
- » JRTC, Fort Polk LA
- » United Kingdom
- » U.A.E.
- » Taiwan

CUSTOMER BASE

- » U.S. Government
- » Dept of Defense
- » International Customers

NOW SERVING WORLDWIDE

- » U.S. Army & Netherlands Apache TESS Maintenance & Training (Fort Hood)
- » U.S. Army ITAS-TESS FTS Maintenance & Training (JRTC & NTC)
- » Apache Collective Training System (CTS) Maintenance & Training (United Kingdom)
- » Apache TESS CLS Maintenance & Training (U.A.E.)
- » Apache TESS CLS Maintenance & Training (Qatar)
- » Apache TESS CLS Maintenance & Training (Taiwan)

CURRENT PROGRAMS

- » AADMS Tower Upgrade (JRTC)
- » AADMS Refresh (NTC, JMRC)
- » Aerial Weapons Scoring System (AWSS) Cyber Security Support (Fort Hood)
- » ATMP for LBA-TESS & ITAS-TESS (NTC, JRTC)
- » HITS Aviation Integration System (Fort Riley)
- » HITS Aviation Upgrades (Nine Locations)
- » LIDAS Training, (WSMR, NM)
- » LUH Offensive Upgrades
- » TSMO MANPADS with Grount Threat Emitter Prototype
- » Netherlands Spares and Repairs
- » Training ASE Stimulation Suite (TASS) (NTC, JRTC, JMRC)
- » TOW ITAS Laser Integrated Field Training System (LIFTS) (Taiwan)
- » UAE II Aviation TESS
- » United Kingdom (UK) Aviation TESS

CERTIFICATIONS, MEMBERSHIPS AND INTERESTS
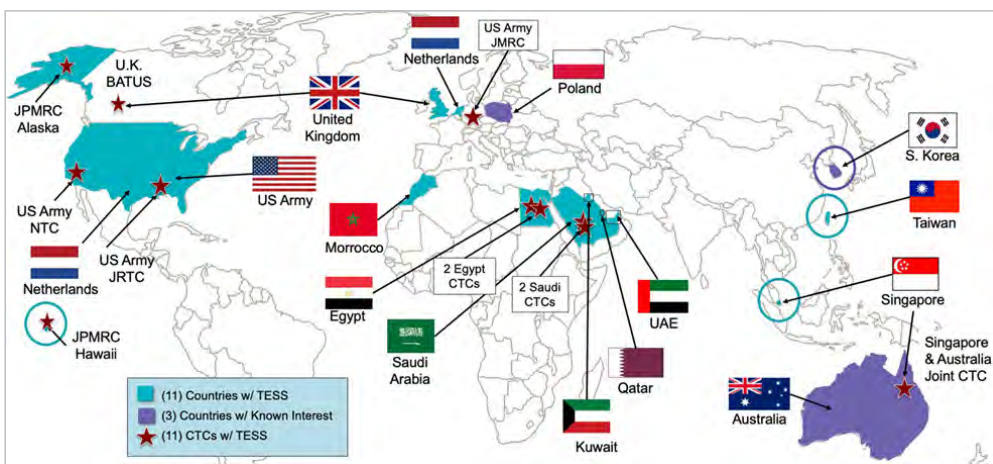
The Global Footprint indicates the growing interest for the ICE Tactical Engagement Simulation System (TESS)

Complex Training Eco-Systems integrating Hardware and Software,
Network Infrastructures, and Real-Time Data Transmission

Vertically Integrated and Matrixed

ENGINEERING

SYSTEMS DESIGN

- Requirements Management
- Life-Cycle Management
- Risk Management

MECHANICAL DESIGN

- Solid Works 3D Design
- Finite Element Analysis (FEA)
- MIL-DTL-3100 and ASME Standards
- Rapid Mechanical Prototyping
  (3D Printed & Machined)

ELECTRONICS DESIGN

- Altium Designer
- PWB & CCA Design
- In-house CCA Prototyping

SOFTWARE DESIGN

- Embedded & Application Design
- 3D Augmented Reality, Virtual Reality
- Model-based Design, Verification &
  Validation

LASER DESIGN

- MILES & OSAG LASER & Detector
  Development
- Class 1-3 Laser Design & Qualification
- Laser Optics Design

NETWORKS & SECURITY

- Certified Aviation & Ground Radio
  Systems
- FIPS-140-2 Encrypted Radios
- Long-Range Radios

CYBER SECURITY

- Information Assurance
- STIG Implementation & Auditing
- Security Engineering – Certified
  Information Systems Security
  Professional

MANUFACTURING

RESOURCES

- 37,000 square foot, climate controlled facility in Mesa, AZ
- Enterprise Resourse Planning (ERP) System
- ISO 9001 / AS9100D Certified Quality Management System
- LEAN Manufacturing Work Process
- Product Designs approved for Air Worthiness Release (AWR) by the Systems
  Readiness Directorate (SRD)
- Depot Repair and Worldwide Logistics

IN-HOUSE DEVELOPMENT

- Requirements breakdown and derivation
- Ground-up solution engineering from multiple discipline perspectives:
  » Systems
  » Software
  » Networking
  » Mechanical
  » Electrical Design
  » EMI/Environmental
  » Manufacturability
- PMP Certified Project Managers
- Documentation in accordance with Industry and Military Standards to include
  User and Maintenance Manuals
- Deployed Contract Field Support Representatives (CFSRs) supporting training
  requirements for multiple Foreign Customers
- Reach-back Support

IN-HOUSE MANUFACTURING

- Complex Cable Harness Builds
- Mechanical Assembly
- Laser Assembly & Testing
- Powder Coat Masking & Coating
- Custom Case & Foam Fabrication
- Complex CNC Milling/Machining
- Automated Testing/Production Test
- ESS Testing to Include Temperature and Vibration
- Cable Testing
- J-STD-001 Certified Technicians

As part of these inclusive capabilities, ICE assembles hardware, loads and
configures software, performs Information Assurance (IA) updates, conducts
subsystem tests, and performs integration and system level testing according
to Customer approved test procedures.
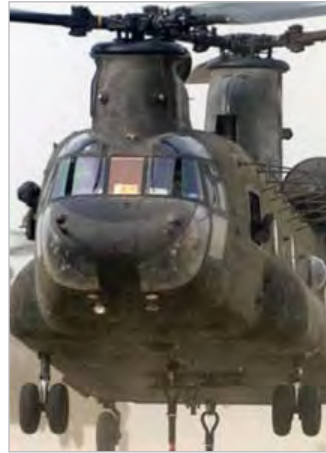
APACHE TACTICAL ENGAGEMENT SIMULATION SYSTEM (TESS)

U.S. Army Program of Record since 1998

LIVE FIRE TRAINING

Apache TESS is used to safely train personnel in the tactical operations of the AH-64D/E Apache Attack Helicopter. Live fire training includes cooperative force engagements, evasive procedures, and the use of Aircraft Survivability Equipment (ASE). Player and event data is transmitted in real-time for tracking and recording on the Modular Mobile Command and Control (MMCC) to provide situational awareness, player-to-player communications, decentralized engagement adjudication, Lethality Effect Assessment Routings (LEAR), Real-Time Casualty Assessment (RTCA), and After Action Review. Apache TESS includes an A-Kit and B-Kit. The A-kit includes the Training Laser Designator (TLD), tray assembly for the Advanced Smart Onboard Data Interface Module (ASMODIM), and modified software in the Multi-Function Display (MFD). The B-kit includes the ASMODIM, TESS Gun Control Unit (TGCU), TESS Training Missile (TTM), GPS and Telemetry Antennas.

WEAPON SIMULATION

TESS enables pilots to safely perform Collective and Combined Arms Force-on-Force training without firing a round. TESS uses a combination of MILES Lasers and Geometric Pairing to perform weapon engagements. SAL Missile and 30mm Gun engagements are simulated with MILES eye-safe lasers. RF Missile and Rocket engagements are simulated with Geometric Pairing. Pilots receive visual and audio cues in real-time.

TRAINING LASER DESIGNATOR

The TLD simulates weapon designation performed by tactical hardware. This self-contained subsystem consists of a collimated Class 3R (ANSI) 904nm eye-safe Laser energy transmitter that sends MILES coded messages to simulate Hellfire Missile engagements. Optics direct the laser beams and associated electronics drive the Laser. Parameters for direct fire routine are in accordance with PMT 90-S002M. MILES IDs range up to 1320 unique Players and 4 Ammo codes.

FORCE-ON-FORCE AERIAL GUNNERY

FORCE-ON-TARGET
LIVE FIRE
(Back-Half Kit)

TLD

TGCU   TTM   ASMODIM   GPS
Antenna
& Cable   Telemetry
Antenna
& Cable

The TLD is manufactured by ICE and permanently embedded within the AH-64E Modernized Day Sensor Assembly (M-DSA) for the M-TADS/PNVS by Lockheed Martin.
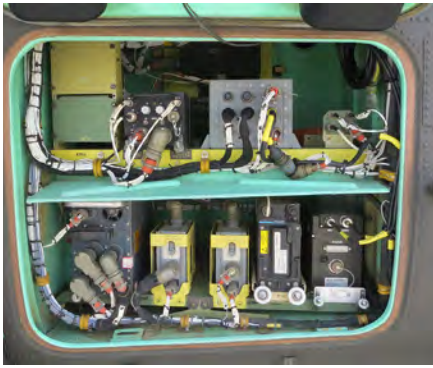
ADVANCED SMODIM

The Advanced Smart Onboard Data Interface Module (ASMODIM) player instrumentation unit interfaces with aviation platforms to provide live fire and simulated weapons training. The ASMODIM interfaces electronically to the Aircraft Weapon System 1553 bus to provide a training mode, simulated weapons inventory, and weapons emulation. It actively monitors, tracks, records, and transmits exercise data to the C2 for analysis and AAR. It has a built-in telemetry radio, GPS receiver, data recorder, and multiple MIL-STD 1553 mux bus processors. The ASMODIM processes weapon engagement data and calculates the outcome for RTCA and LEAR based on Probability of Hit/Kill (PH/PK) as specified in PMT 90-S002M. A reset command will replenish weapon inventory, and a resurrect command will revive the ASMODIM player unit when killed.

Individual, Crew & Collective Training

TESS GUN CONTROL UNIT

The TESS Gun Control Unit (TGCU) includes a 904nm eye-safe Laser that transmits MILES Weapon Code for the 30mm Gun to simulate weapon engagements firing on TESS instrumented targets. It is mounted within the 30mm Gun Turret and receives commands from the aircraft to control the TGCU and TLD. 30mm gunfire is visually indicated to the target in single or multiple burst rates by the FlashWESS when the aircraft weapon trigger is pulled. Pilots receive audio cues over the aircraft intercom.

TESS FEATURES & BENEFITS

» U.S. Army Program of Record since 1998
» FAA/SRD Air Worthiness Certification
» Integrates with TASS and CTCs
» Integrates with other LVC systems

TESS TRAINING MISSILE

The TESS Training Missile (TTM) mounts onto a pylon launcher and interfaces with the aircraft weapons processor to enable training mode and weapons emulation. The TTM replaces and emulates the Hellfire missile in size, shape and weight. A FlashWESS provides visual signals of weapon firing events, and the Aircraft Kill Indicator (AKI) provides visual LEAR status of the aircraft platform.

MONITORED PARAMETERS

» Player ID
» Position/Location and Heading
» Pitch, Roll and Yaw
» Radar Altitude
» ASE Status
» Ammunition Inventories
» Range to Target
» Selected Sight
» Selected Designator Laser Code and Missile Seeker Code
» Sight Azimuth
» Target Position
» Weapon Event/Release
» Missile, Rocket and Gun Firing
» Real Time Casualty Assessment

TESS BATTALION SET GROUND SUPPORT EQUIPMENT

The TESS Battalion Set provides the equipment necessary to instrument stationary and mobile targets with GPS tracking and monitoring for MILES collective training.

Repeater

Modular Mobile Command & Control (MMCC)
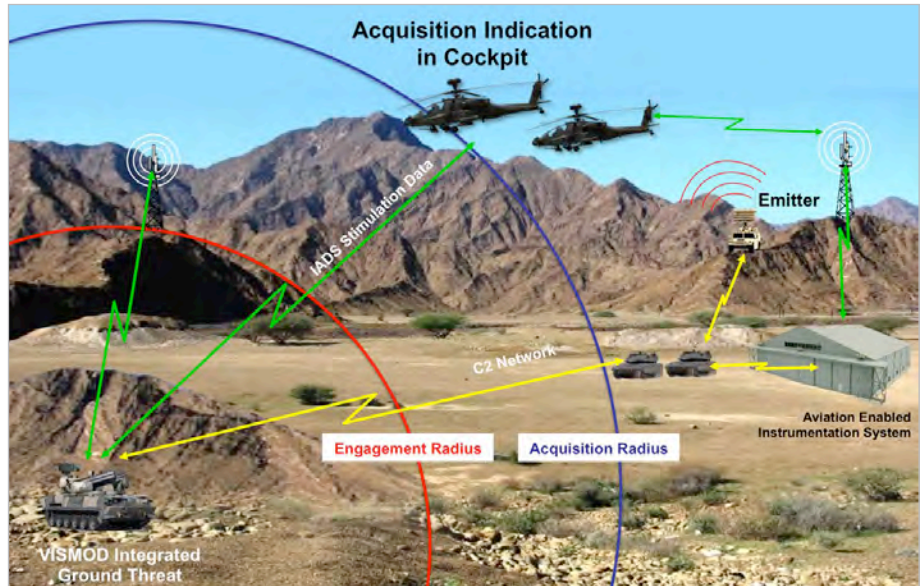
Stationary Target

Mobile Target Set

TRAINING ASE STIMULATION SUITE (TASS)

Modernizing the way the Army conducts Aviation Force-on-Force training against Near-Peer Threats

TASS stimulates the Aircraft Survivability Equipment (ASE) displays and audio warnings when within threat detection and engagement ranges, requiring pilots to take appropriate actions for peer or near-peer threat avoidance. The simulated ASE triggers the correct audio/visual cues to the aircrew, and monitors and tracks Chaff and Flare countermeasure utilization.

TASS consists of components appended to the aircraft that interface with the aircraft, Instrumentation System (IS), and Ground Threat Emitters (GTE). TASS requires the use of the existing Aviation TESS and the Army Aviation Data Management System (AADMS) Network at the CTCs.

TASS replicates enemy IADS threats by providing interrogation, tracking, and targeting of aircraft participating in combined arms training at the CTCs. Incoming aircraft are detected by Opposing Force (OPFOR) acquisition systems. Acquisition data is processed and firing solutions are sent to launch platforms, which engage aircraft by stimulating the ASE B-Kit Emulator (ABE).

Aviation TESS adjudicates these attacks and relays status and performance parameters of the threat for display on the unclassified CTC-IS. TASS then calculates probability of kill results to quantify the outcome of the engagement.

TASS COMPONENTS

» AH/UH/HH/CH TESS B-Kit
» ASE B-Kit Emulator (ABE)
» Aviation MILES Detector Plates (AMDP)
» Ground Threat Emitters (GTE)
» GTE Controller Interface
» CTC AADMS Aviation Network

TASS WITH TRAINING MANPADS

The Training Man-Portable Air Defense System (T-MANPADS) provides the ability for cooperative engagements between air and ground assets, while increasing the complexity and fidelity of Opposing Force (OPFOR) air defenses to challenge aviation training units. The T-MANPADS provides stimulus for the ASE B Kit Emulator (ABE) running on the aircraft instrumentation, as well as a visual target for simulated weapon engagements. It is designed to replicate real world shoulder-launched air defense threats against aviation platforms. Each participant can be engaged with MILES for additional weapon engagements. The T-MANPADS will provide the Rotational Training Unit a realistic short-range threat that challenges the US Army Aviation Aircrews, and enables the training of tasks associated with penetrating, disintegrating, and exploiting the Anti-Access and Area Denial Air Defense Systems at the CTCs.

AVIATION TESS & TASS

Collective Training at U.S. Army Combat Training Centers
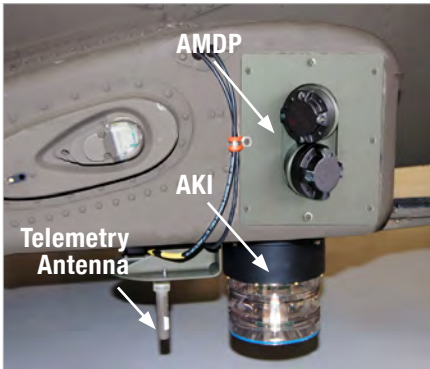
Aviation MILES Detector Plate (AMDP) & Aircraft Kill Indicator (AKI)

Articulating Sensor Package (ASP) with FlashWESS Laser Transmitter (FLT), Weapons Processor & Hand Controller

ASP installed on LUH

TASS requires the use of Aviation TESS (AV-TESS) components to provide instrumented tracking and weapon engagement simulation capability for AH/UH/HH/CH helicopters for collective training at U.S. Army CTCs. AV-TESS provides advanced live training instrumentation for both crew and collective training events by actively monitoring, tracking, recording and transmitting exercise data for real-time observation and playback during AARs. Weapon engagements are performed using MILES Laser transmitters, MILES detectors, Geometric Pairing, and Player to Player communications. Feedback is provided to the crew via aircraft displays and audio interfaces. The Aircraft Kill Indicator (AKI) provides a visual indication of player engagement status by transmitting a high-intensity strobe light for "Hit", "Kill" or "Near Miss" flash sequence indications when MILES Laser energy is detected.

AVIATION MILES DETECTOR PLATE

The AMDP is used in lieu of the AN/AVR-2B Laser Detector Set to "stimulate" the ASE during threat engagements and support IADS training at maneuver CTCs. Engagement adjudication is accomplished through a MILES encoded Laser on the Player platform and MILES Detectors on the Target platform. The AMDP interfaces with the ASMODIM to detect, identify, and characterize MILES Laser engagements. When adjudication results in a kill, the player's weapon systems are deactivated, requiring Player reset or resurrect.

UH-72A LUH-TESS

Observer Controller and Opposing Force Training

O/C AND OPFOR

LUH-TESS provides dual capabilities for the UH-72A LUH to perform as an Observer/Controller (O/C) and Opposing Force (OPFOR). An Offensive Weapons Capability is added to provide target acquisition and simulated weapons for the OPFOR threat aircraft. Weapons are simulated with a MILES coded Laser. New platform integrated components include the Articulating Sensor Package (ASP) with embedded FlashWESS Laser Transmitter (FLT), Weapons Processor, Hand Controller, and two Color Cockpit Displays.

ASP AND FLT

The ASP interfaces to existing LUH-TESS components and is mounted on the forward fuselage. The ASP provides day/night video and communicates with the Weapons Processor for target acquisition and engagements. The FLT employs a 904nm MILES Laser for weapons simulation. The FLT is manufactured by ICE and embedded inside the MX-10 Surveillance Turret and includes an HD Electro-Optical (EO) Infrared (IR) surveillance camera and HD TV.

WEAPONS PROCESSOR

The Weapons Processor is the interface between the ASP and ASMODIM. It controls weapon events and interfaces with audio/video functions. A weapons trigger provides an offensive capability and indicates when the Laser is armed and active. Displays provide situational awareness, targeting, weapon selection, rounds count, range, and trigger pull.

ARTILLERY AND GROUND TRAINING SYSTEMS

Weapons Proficiency training without Firing a Round

MLRS & HIMARS TESS

The MLRS TESS provides munitions simulation for the M270/M270A1 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS) launchers. MLRS TESS interfaces with the onboard Fire Control System (FCS) to provide crew cab fire control panel indications of simulated munitions. All operations are conducted using normal Tactics, Techniques and Procedures (TTPs). Weapon faults require emergency action for realistic training. Loading and reloading is conducted when the vehicle is in stow.

The M109A6 is an integrated simulation system that supports artillery weapons training without using ammunition. Crew members execute fire missions as they would in combat using normal Tactics, Techniques and Procedures (TTPs). Real-time monitoring of crew functions provides operator performance evaluation. The M109A6 links to other Live-Virtual-Constructive (LVC) simulations and operates with existing MILES training systems for force-on-force participation. System installation takes twenty minutes or less.

LIDAS

Launcher Instrumentation & Data Acquisition System (LIDAS) is used for operational testing of MLRS and HIMARS artillery systems. LIDAS provides real-time monitoring and recording of the data buses and interface devices on the platform tactical system. LIDAS incorporates real-time data reduction and simulation to maximize the volume of data collected. LIDAS has been fielded to Germany, UK, France, Korea and Japan. All Live Fire training at the White Sands Missile Range (WSMR) requires LIDAS to be installed on the launchers.

MWSA2 WEAPON SIMULATOR

The MLRS Family of Munitions (MFOM) MWSA2 Weapon Simulator is designed to simulate all munitions fired by the MLRS and HIMARS launchers. It operates in two modes. In tactical mode, the MWSA2 Weapon Simulator performs high fidelity simulation including tactical responses to all mode sequences executed during pre-launch and launch operations. The MWSA2 exercises the launcher's tactical software and circuits in the same manner as a live round. In non-tactical mode, the MWSA2 provides the "Trainer" capability (also supported by the M68A2 Trainer) using the launcher's non-tactical training software.

The Trainer replicates the weapons interface to the crew, but does not activate the tactical interface.

M68A2 MLPA TRAINER

The M68A2 Missile Launch Pod Assembly (MLPA) Trainer operates identical to the non-tactical mode of the MWSA2, functioning as a set of weapon and fault switches read by the launcher to determine which training software is executed. The M68A2 Trainer is a fielded U.S. Army Program of Record and an economical alternative to the MWSA2.

FEATURES & BENEFITS

» Quick installation, minimum support requirements

» Operates on stand-alone power

» Immediate AAR & THP

» Real-Time Data:

• Position/Location

• Targeting

• Weapon Events

• Geometric Pairing

• Real-Time Casualty Assessment

• Paladin Gun Orientation

• MLRS LLM Azimuth & Elevation

ITAS-TESS FIELD TRAINING SYSTEM

A Laser-based system designed to conduct Simulated Live Fire Weapon Engagements

The Improved Target Acquisition System-Tactical Engagement Simulation System Field Training System (ITAS-TESS FTS) provides a capability for the Warfighter to train with the TOW anti-tank weapon system and conduct weapon engagements using normal Tactics, Techniques and Procedures (TTPs). The platform is instrumented as a shooter and a target, mounted or dismounted, in a stand-alone system, or as an integrated component at U.S. Army Combat Training Centers (CTCs).

TOW engagements are adjudicated via MILES laser pairings. Training event data is passively collected and transmitted to the Mobile Command and Control (MCC) for real-time tracking and After Action Review (AAR).

The ITAS Training Missile (ITM) replicates the size, weight, center of gravity, and handling of the actual TOW missile. Audible and visible indications of a weapons launch


OVER 520 SYSTEMS FIELDED

are simulated using an ATWESS pyrotechnics device.

The Laser Module Unit (LMU) is comprised of a MILES Laser and an eye-safe boresight Laser. An LCD displays system status, BIT data, far target location, ammunition status, ARM and SAFE indications. The LMU retains boresight during movement over rough terrain and is easily verifiable to line-of-sight.

The Instrumentation Player Unit (IPU) contains a central processor

for MILES weapon engagements, and is also a target in Geometric Pairing engagements. RTCA is indicated visually by the Vehicle Kill Indicator (VKI) and audibly with a built-in alarm.

The Fire Control System Data Module (FCS-DM) receives Laser range data, missile type, trigger indications and power from the weapons Fire Control System and transmits data wirelessly to the IPU.

| ITM | WLS | LMU | IPU | FCS-DM |
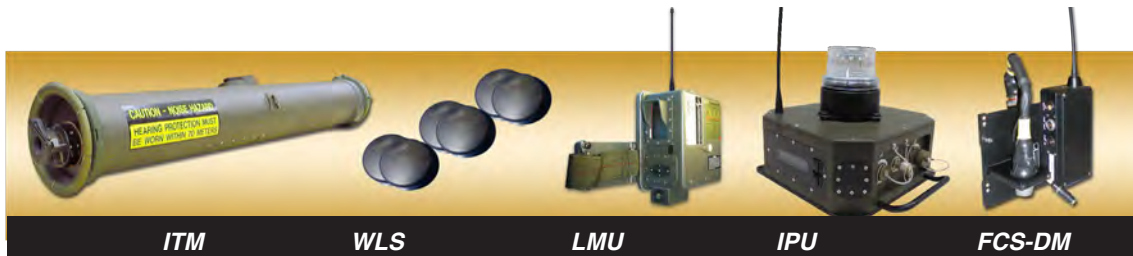
O = PAN COMPONENTS

The IPU and wireless components are transferable to any vehicle (mobile or stationary), providing a versatile and customized mobile training system.

PLAYER AREA NETWORK (PAN)

» LT2 and CTIA Compliant
» 2.4GHz Wireless Technology
» Compatible and interoperable wireless systems
» Connects MILES components
» Compliant to IEEE 802.15.4

MOBILE AND FIXED RANGE NETWORK INFRASTRUCTURES

Network Infrastructures provide monitoring and tracking at U.S. Army Home Stations, Combat Training Centers, and Joint Training Centers Worldwide. Complex end-to-end networking and security solutions are designed and fielded based on customer needs. Mobile and permanent telemetry antenna systems provide scalable RF coverage and transmit live feed across multiple sites.

## AVIATION HOMESTATION INTERIM PACKAGE (AHIP)

AHIP combines the scoring data from the Aerial Weapon Scoring System (AWSS), aircraft position and event data from AV-TESS, and pilot and gunner recorded Through-Site Video (TSV) into a single time-synchronized display. This integrated system displays, monitors and tracks instrumented players during training and weapon engagement exercises with playback capability. AHIP consists of three-dimensional steel targets, an Air Ground-Integration (A-GI) village, and the modular AAR. Aircraft video is uploaded into SMOTAR and subsequently synchronized with the playback of gunnery weapons firing and scoring. The AWSS scoring event data includes Bullet Scoring Data, Rocket Scoring Data, and Laser Scoring Data.

FEATURES & BENEFITS
- » Data Center Systems
- » Collaboration
- » Borderless Networks
- » Backhaul Radio
- » Virtual Private Network (VPN)
- » Information Assurance
- » Fiber/Microwave
- » FIPS 140-2
- » Solar Power Battery Charging

MOBILE HOMESTATION NETWORK

The Homestation Network supports up to seven portable RF telemetry repeaters configured for CONUS or OCONUS locations based on frequency requirements. The Modular Mobile Command and Control (MMCC) workstation is used for player tracking, event recording, and After Action Review (AAR). A configurable Opposing Force (OPFOR) set consists of ten stationary targets and ten mobile targets with a MILES shoot-back capability.
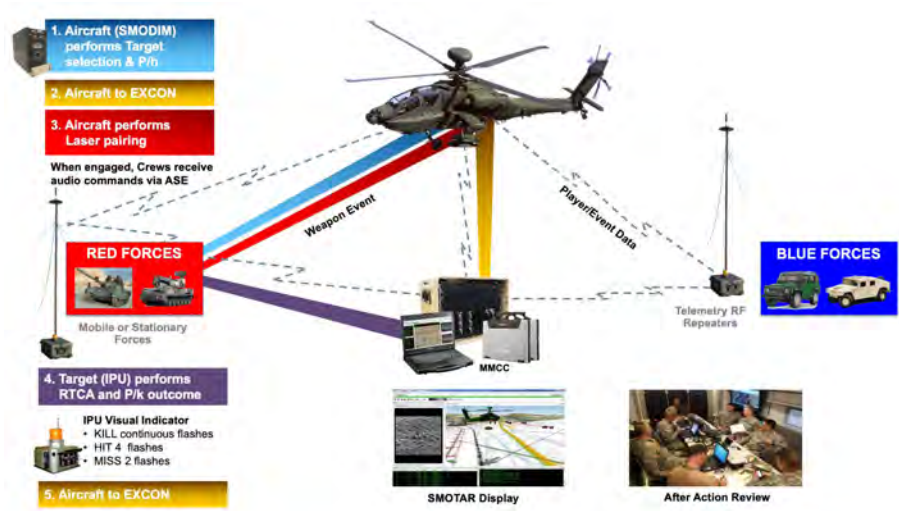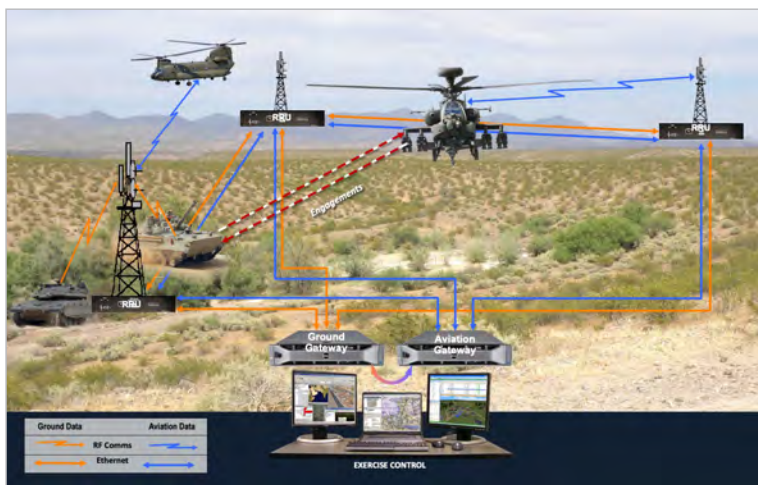
FIXED RANGE NETWORKS

The Aviation Fixed Range Telemetry Network provides the infrastructure for monitoring and tracking players and player events. The telemetry network transmits TESS player instrumentation data to the site-specific Exercise Command and Control (C2) system. Networks provide player-to-player communications and cooperative engagements. This is the common network used at all CTCs, HITS, and Digital Gunnery Ranges to support training participation for Aviation TESS instrumented players at all training locations.

HITS AVIATION

The Homestation Instrumentation Training System (HITS) Aviation is designed to enhance training at home stations by instrumenting Force-on-Force/Force-on-Target live-training exercises for battalion and below units. HITS Aviation leverages AV-TESS to integrate aviation and ground players and provide collective training with real-time performance monitoring and AAR. Player and event data is transmitted to remote towers via the telemetry network, and to the Aviation Gateway located at the HITS EXCON via ethernet. Transmitted data conforms to the approved LT2 Player Unit Interface Control Document (ICD) and is based on the Common Training Instrumentation Architecture (CTIA).

HITS locations will expand beyond Ft Riley, KS in 2022 to include Ft Stewart, GA; Ft Drum, NY; Ft Campbell, KY; Ft Hood, TX; Ft Carson, CO; and Ft Lewis, WA.

COMBAT TRAINING CENTERS

The Army Aviation Data Management System (AADMS) Network is permanently installed at three US Army Combat Training Centers (CTCs), and provides the Air Network Infrastructure required for tracking players and player events. AADMS integrates TESS data from the aircraft SMODIM and Aviation Gateway data translator into the CTC Core Instrumentation System (CIS). AADMS provides improved Radio Frequency (RF) coverage using solar-powered remote-site tower assemblies. Networks include test administration, Observer, Controller (OC) networks, CIS commands, and the AADMS player networks.

AADMS Network at CTCs:

» Joint Readiness Training Center (JRTC), Fort Polk LA
» National Training Center (NTC), Fort Irwin CA
» Joint Multinational Readiness Center (JMRC), Hohenfels Germany

DRTS DAGIR

The DAGIR is the most advanced TESS Force-on-Target (FoT) live fire gunnery range in the US Army. DAGIR receives data from the SMODIM using the Fixed Range network infrastructure. The DAGIR Aviation Gateway utilizes PU-ICD v1.5 compliant Live Training Transformation (LT2) Player Unit XML (PUXML) messages to communicate with the Common Training Instrumentation Architecture (CTIA) and subsequent LT2 components. Like JPMRC and HITS Aviation Gateways, the DAGIR Aviation Gateway communicates directly in PUXML reducing requirements while maintaining fidelity and increasing security. Data is displayed on a Crew Evaluator Workstation (CEW) and recorded for AAR. Two SMOTAR workstations monitor all aviation players on a separate display. and provide the EXCON a birds-eye, real-time view of aviation activity on the range, direct from the Aviation Gateway and independent of CTIA.

PLAYER INSTRUMENTATION

Instruments Personnel, Vehicles and Equipment for Live Training on the MILES Battlefield

Aviation Player Unit

Ground Player Unit

ADVANCED SMODIM

The primary aircraft component is the ASMODIM player unit. The ASMODIM interfaces electronically to the Aircraft Weapon System 1553 bus to provide a training mode, simulated weapons inventory, and weapons emulation. The ASMODIM actively monitors, tracks, records, and transmits exercise data to the C2 for analysis and AAR. It has a built-in telemetry radio, GPS receiver, data recorder, and multiple MIL-STD 1553 mux bus processors.

For TASS, the ASMODIM provides the platform ASE configuration. It hosts the ASE B-Kit Emulator (ABE), and transmits event data from the Ground Threat Emitters (GTE) over the telemetry network.

The ASMODIM processes event data and calculates the outcome for RTCA and Lethality Effect Assessment Routine (LEAR). RTCA and LEAR are based on Probability of Hit/Kill (PH/PK) as specified in PMT 90-S002M. The ASMODIM maintains chaff and flare inventory, which is replenished via Hand-Held Initializer (HHI), Universal Controller Device, or reset command from the CIS. A resurrect command will revive the ASMODIM, and leave the inventory as it was when killed. Collected Data includes:

» Aircraft position/location
» Weapon events
» Aircraft status
» Aircraft heading
» Aircraft velocity
» Sensor Heading
» Sight azimuth
» ASE status
» RTCA status

INSTRUMENTATION PLAYER UNIT

The IPU provides the data interface for a Vehicle Area Network (VAN) integrating with vehicle platforms, weapons systems, and training systems. The IPU contains a central processor and built-in MILES Sensors for simulated weapon engagements.

It is a Mobile Target in Force-on-Force weapon engagements and the primary component of the TASS Ground Threat Emitter (GTE).

MOBILE TARGET SET

The IPU affiliates with the Wireless Shoot-Back Laser (WSBL) and Wireless Laser Sensors (WLS) to create a Mobile Target Set. Player and event data are transmitted to the IPU over the Vehicle Area Network (VAN). The Mobile Target Set instruments vehicles and equipment for live training exercises on the MILES battlefield. Systems integration in a VAN utilize vehicle

weapon systems for Force-on-Force collective training. RTCA is indicated visually by the Vehicle Kill Indicator (VKI) and audibly with a built-in alarm.

The WSBL is a VISMOD rifle equipped with a FlashWESS strobe light for weapon firing emulation that can be viewed at a distance of 1500 meters. It is programmed to emit MILES weapon codes by setting the player type to the

affiliated control unit, enabling the WSBL to be used as an M-16, 105mm, M21 anti-tank, 2.75 rocket and several other weapons.

Wireless Laser Sensors (WLS) instrument vehicles, buildings, infrastructures, and fixed positions to provide increased detection of MILES Laser energy and transmit over the VAN to the IPU.

MILES LASERS

Custom designed for any Weapon System to provide Long Range Target Acquisition and Designation

TLD

FLT

LMU

TGCU
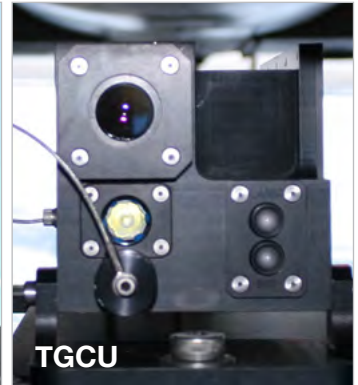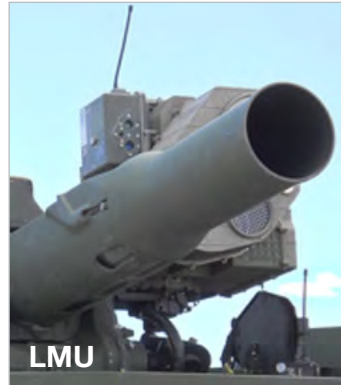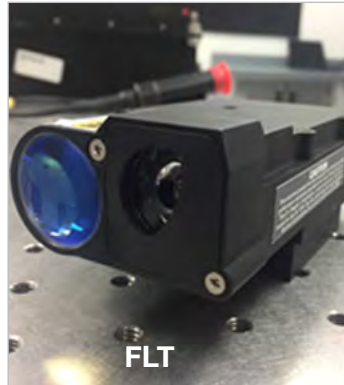
Over 500 TLDs delivered

TRAINING LASER DESIGNATOR (TLD)

The Training Laser Designator (TLD) will be permanently embedded into the Modernized Day Sensor Assembly (M-DSA) for every AH-64E Apache Helicopter. The TLD is a self-contained subsystem consisting of a collimated Class 3R (ANSI) 904 nanometer (nm) Laser energy transmitter. A MILES Laser Transmitter enables simulated weapons when Aviation TESS is installed on the aircraft. The TLD is controlled by the Training Laser Interface Adapter (TLIA) through an RS-485 serial interface. A second "Host" serial interface allows the Modernized Laser Spot Tracker (M-LST) within the M-TADS to receive BIT and status information from the TLD.

FLASHWESS LASER TRANSMITTER (FLT)

The FlashWESS Laser Transmitter (FLT) employs a MILES coded Laser for weapons simulation of missiles, rockets and 30mm cannon for the UH-72A Lakota. The FLT is manufactured by ICE and embedded inside the MX-10 Surveillance Turret manufactured by L-3 WESCAM. The combined assembly is called the Articulating Sensor Package (ASP). The ASP provides day/night video and communicates with the Weapons Processor and Hand Controller for target acquisition and designation engagements. Two color monitors provide a view from the camera angle.

LASER MODULE UNIT (LMU)

The LMU is comprised of a MILES Laser and a boresight Laser. It installed on the ITAS-TESS FTS and operational for target designation up to 4500 meters using MILES sensors. An LCD displays system status, BIT data, far target location, ammunition status, ARM and SAFE indications. The LMU retains boresight during movement over rough terrain and is easily verifiable to line-of-sight.

TESS GUN CONTROL UNIT (TGCU)

The TGCU is mounted within the AH-64D/E 30mm Gun Turret to perform 30mm weapon engagements and is transparent to the aircrew and aircraft. The TGCU is a self-contained subsystem consisting of a MILES coded Laser, a Flash Weapon Effects Signature Simulator (FlashWESS), RS-485 serial communications for control of the ESLRF/D, and a MIL-STD 1553 RT Bus interface that receives commands from the aircraft to control the TGCU Lasers.

3D AUGMENTED AND VIRTUAL REALITY

Training our Warfighters for Peer & Near Peer Threat Avoidance

T-MANPADS

DOOR GUNNER

TRAINING MANPADS

The Training Man-Portable Air Defense System (T-MANPADS) is an Aviation Crew Trainer for Aircraft Survivability Equipment (ASE) intended to replicate real world shoulder-launched simulated air defense threats against aviation platforms. It provides for cooperative engagements between air and ground platforms at the CTCs, while increasing the complexity and fidelity of Opposing Force (OPFOR) air defenses to challenge training units.

This is a customizable targeting module with smoke, light, and noise weapon effects simulation. The system is based on the currently fielded Training ASE Simulation Suite (TASS). It replicates the existing SA-29 Verba, ensuring aircraft are engaged with a system that offers stimulation of the sensors. Visual feedback is provided by a Weapon Effects Signature Simulation augmented by a traditional FlashWESS.

AERIAL DOOR GUNNER

This training solution integrates a helmet-mounted, mixed reality visor with an existing M240 ACME simulator with weapon orientation and aircraft state to enable UH/CH door gunner training anytime, anywhere. This provides live training on an actual aircraft utilizing standard weapon mounts and weapon controls with full force recoil. The mixed reality visor combines live and virtual training and supports human-in-the-loop training while crew members perform normal procedures in a real environment on an air platform.

The Door Gunner live simulator allows crew members to train against instrumented or virtual targets/threats, and includes the ability to inject real-world faults with constructive training inputs and/or via pre-planned training scenarios. Gunnery tables can be objectively scored near instantaneously. Multiple training objectives can be accomplished on a single flight, reducing overall cost while improving crew performance and teamwork.

Instrumentation combined with a mixed reality visor allows virtual tracer rounds to be overlaid in 3D space. When targets and terrain are hit, virtual weapon effects provide immediate feedback to the

Door Gunner. All data is correlated with aircraft instrumentation that provides velocity vectors, altitude, and platform orientation.

This application is designed for all use cases; Virtual, Force-on-Force, and Tactical. It has application for Future Vertical Lift (FVL) programs such as the Future Long Range Assault Aircraft (FLRAA).

» Train on the ground and in flight without live ammunition

» Accurately score events per Aviation Gunnery TC 3-04.3

» Adjust burst on target without using live rounds or adjust via virtual tracer rounds

» Engage force-on-force with MILES-like near miss/kill adjudication and display SA to crew and O/C

» Replicates current US Army and FMS UH/CH Door Gunner hardware

» Simulates weapon malfunctions

IVAS/Hololens 2
ACME M240 Replica

CUSTOMER SERVICES & SUPPORT

Field Engineering | Customer Training | Logistics Support | Operations & Maintenance

FIELD ENGINEERING SERVICES

ICE employs fulltime Field Engineering Service Representatives at the National Training Center (NTC) Fort Irwin, Joint Readiness Training Center (JRTC) Fort Polk, Fort Hood, U.A.E., Taiwan, and the United Kingdom.

Fort Hood personnel have supported TESS training on the Apache Longbow since 1998, and currently support TESS training for U.S. Army and International customers. Services include:

» Program Management
» Site Survey/Preparation
» System Installation & Checkout
» System Integration & Test Support
» System Acceptance Test Events
» Government Acceptance Test Events
» Operation & Maintenance Support
» Contract Engineering & Technical Support
» Sustained Engineering Services
» Field Modifications & Updates

CUSTOMER TRAINING

Specializing in the design and integration of the Tactical Engagement Simulation System (TESS), training solutions are customer focused with full analysis of current service operations. Training activities are performed in operational environments and meet military standard requirements.

» Courseware & Class Instruction
» Mission Planning
» New Equipment Training (NET)
» Hands-on Installation, Operation, Maintenance & Troubleshooting
» AAR Production & Presentation

LOGISTICS SUPPORT

» Warehousing Operations
» Inventory & Asset Management
» Equipment & System Relocation
» Export/ITAR Compliance
» ISO/AS9100 Compliant Quality Management System

OPERATIONS & MAINTENANCE SUPPORT

» Engineering Analysis & Design
» Assembly, Integration, Installation & Test
» Telemetry Network Communications
» Battlefield Effects
» Depot Level Maintenance, Repair & Refurbishment
» Depot Operations & Documentation
» Technology Insertion & Upgrades
» Service Life Extension

TEST & EVALUATION

ICE has supported Limited User Tests (LUT) and Follow-On Test & Evaluation (FOT&E) events since 1986. Most recently, ICE supported the AH-64E FOT&E II conducted at Fort Hood and Dyess/Eglin Air Force Bases (AFB).

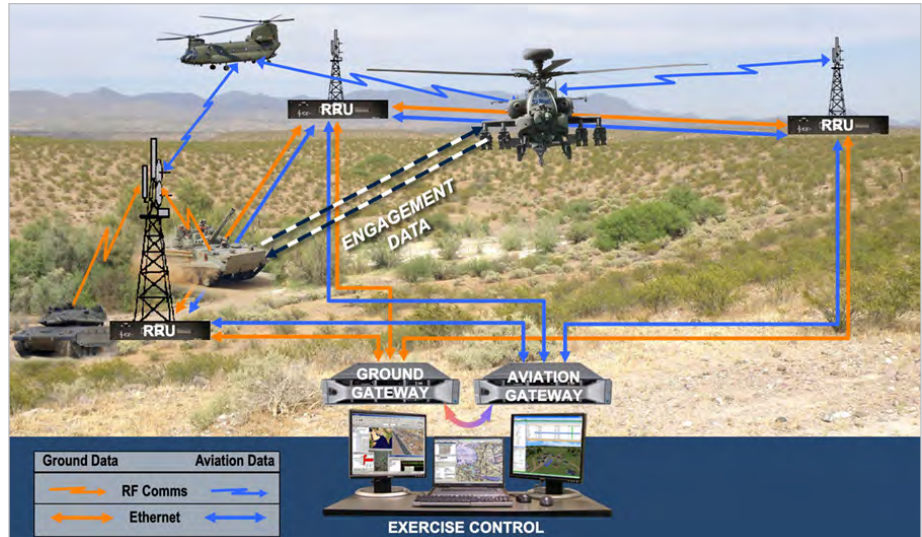| Year	Event	Platform	Location
1986	FOT&E	Sargent York	WSMR
1987	FOT&E	Pedestal Mounted Stinger	WSMR
1989	FOT&E	ATACMS MLRS	WSMR
1994	FOT&E	MLRS IFCS	Ft. Sill
1995	FOT&E	M270A1	Ft. Sill/Ft Hood
1997	FOT&E	MLRS HIMARS	Ft. Sill
1998	FOT&E	AH-64D Longbow	NTC
2002	FOT&E	RH-66 Comanche	Cancelled
2009	LUT II	ARH Support	Ft Hood
2010	LUT	Apache Block 3	YPG
2012	FDT&E/IOTE	Apache Block 3	NTC
2014	FOT&E I	Apache Block 3	Eglin AFB
2019	FOT&E II	AH-64E Apache	Dyess AFB/Eglin AFB

ADVANCED SOFTWARE

Data Translation | Network Configuration | Player Tracking

AVIATION GATEWAY

The Aviation Gateway (AGW) is a software package hosted on a dedicated server or virtual machine that communicates with both the Aviation telemetry network via the Aviation Network Node (ANN), and the gateway for site-specific communication protocol. All communications between the aircraft and CIS are bi-directional, allowing the CIS administrative commands to be transmitted using the established interface. The AGW provides translation of ASMODIM telemetry data, including position/location, weapon fire, RTCA and various other statuses. The collected data is then retranslated into other formats and retransmitted to third parties. The AGW can be configured to act as a generic gateway, translating exercise data to and from a number of formats, including DIS, HLA, CTIA, etc. The AGW provides centralized geometric pairing in CTC environments. It can also communicate with SMOTAR workstations to provide real-time graphical monitoring and administrative control over a training exercise.

NETWORK SOFTWARE

The Aviation Network Node (ANN) family of components includes the Remote Relay Unit (RRU) and Network Control Unit (NCU). The ANN includes a radio transceiver that is collocated with each telemetry network tower. The TESS system utilizing ANNs can support up to 135 air players at a 1 Hz update rate. Up to 15 towers can be used to achieve range coverage. Each ANN receives information from player units and transmits CIS commands within radio range. The ANN translates radio packets into Internet Protocol (IP) based messages that are sent to the AGW via any IP based network.

HAND HELD INITIALIZER

The Hand Held Initializer (HHI) is used to initialize and associate subassemblies and configure a network. It is used to change radio configurations and set Player ID, platform type, weapon types, and weapon loads for TESS/TASS components. It provides a low power, short-range RF wireless area network interface between player units, weapon simulators and wireless sensors.

TELEMETRY TEST KIT

The Telemetry Test Kit (TTK) replicates one or more players on the TESS network. Like other player units, it synchronizes with GPS and the Telemetry network to test coverage, connectivity and player data transmission. Unlike other player units, it allows for the simulation of other player units by reporting as multiple Player IDs from a single radio. The TTK includes a Range Test Unit (RTU) that is assigned a PID and installed on a ground vehicle so it can be driven throughout the training range for testing. It can connect to vehicle power or used with any 12 VDC supply using supplied cables. The RTU can support CONUS or OCONUS operations and is packaged with a magnetic mount GPS and Telemetry antenna assembly. The TTK participates in the same network as the existing player units, transmitting to other players, RRU equipped towers, and MMCC stations. The tablet PC provides immediate feedback of the data transmitted over the air via its SMOTAR 6 display. It also provides a mechanism for enabling scripts to be selected and sent to the RTU for execution. The TTK is used to test the training infrastructure prior to powering up expensive aviation platforms for training.

SMODIM TRACKING, ANALYSIS AND RECORDING (SMOTAR) ~ TODAY'S AVIATION AAR TOOL

*Real-Time Command and Control combined with World Class TESS Training Capabilities*
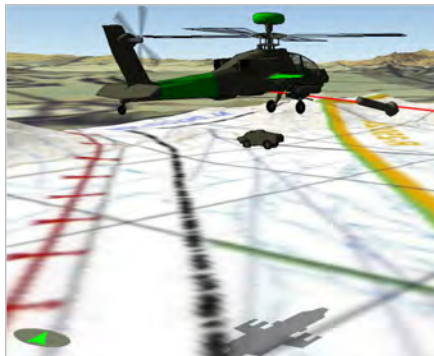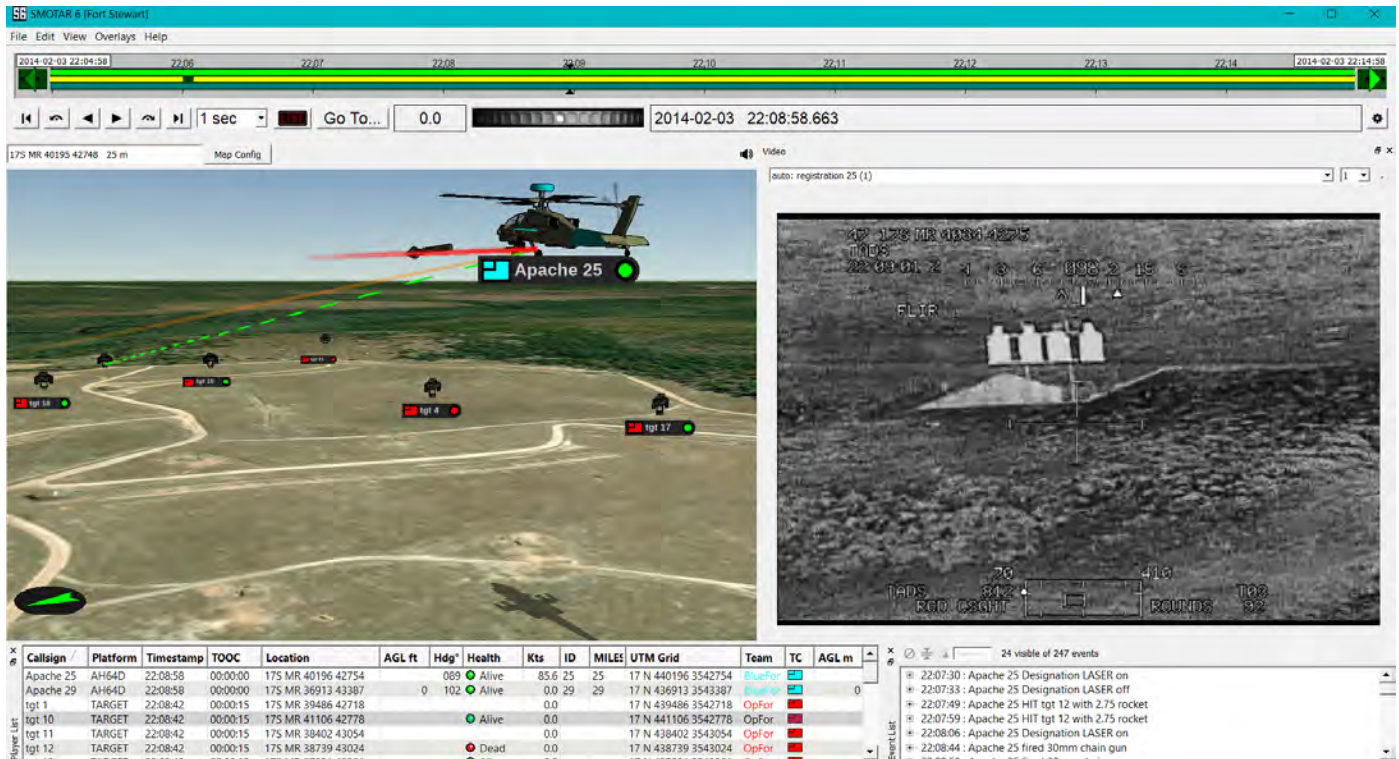
SMOTAR advanced software suite provides a complete overview of the networked area and cooperative players in near real-time. It provides the capability to develop training exercises, monitor live engagements, and record events for playback.

SITUATIONAL AWARENESS

SMOTAR maintains a dynamic position database through player-to-player communications. GPS provides real-time position data as instrumented players are dynamically tracked and recorded.

Player icons are displayed in 3D with color-coded team assignments and user-editable call signs. Player position and status updates are received through the telemetry network with event reports, such as weapon fire and engagement results. SMOTAR creates a 3D rendered visualization using this player position and event data.

Real-time data includes player Position/Location, heading, velocity, sensor heading, sight azimuth, weapon events, dead/alive status, Aircraft Survivability Equipment (ASE) status, and Real Time Casualty Assessment (RTCA).
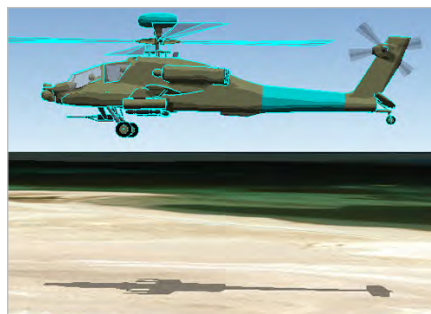
WEAPON ENGAGEMENTS

SMOTAR integrates with TESS for monitoring and tracking Force-on-Force and Force-on-Target weapons training. Weapons are simulated using MILES and Geometric Pairing. SMOTAR automatically adjudicates simulated indirect fires.

SMOTAR also integrates with the Aerial Weapons Scoring System (AWSS) from Meggitt. During live fire training, Command and Control has oversight to deny fires for safety and risk mitigation.

AFTER ACTION REVIEW (AAR)

Aircraft video is collected and imported with Pilot and CPG audio, then synchronized with playback. The user can pause, rewind and fast-forward live data feeds without interrupting recording of new data. Critical events are bookmarked and saved for playback during AAR.
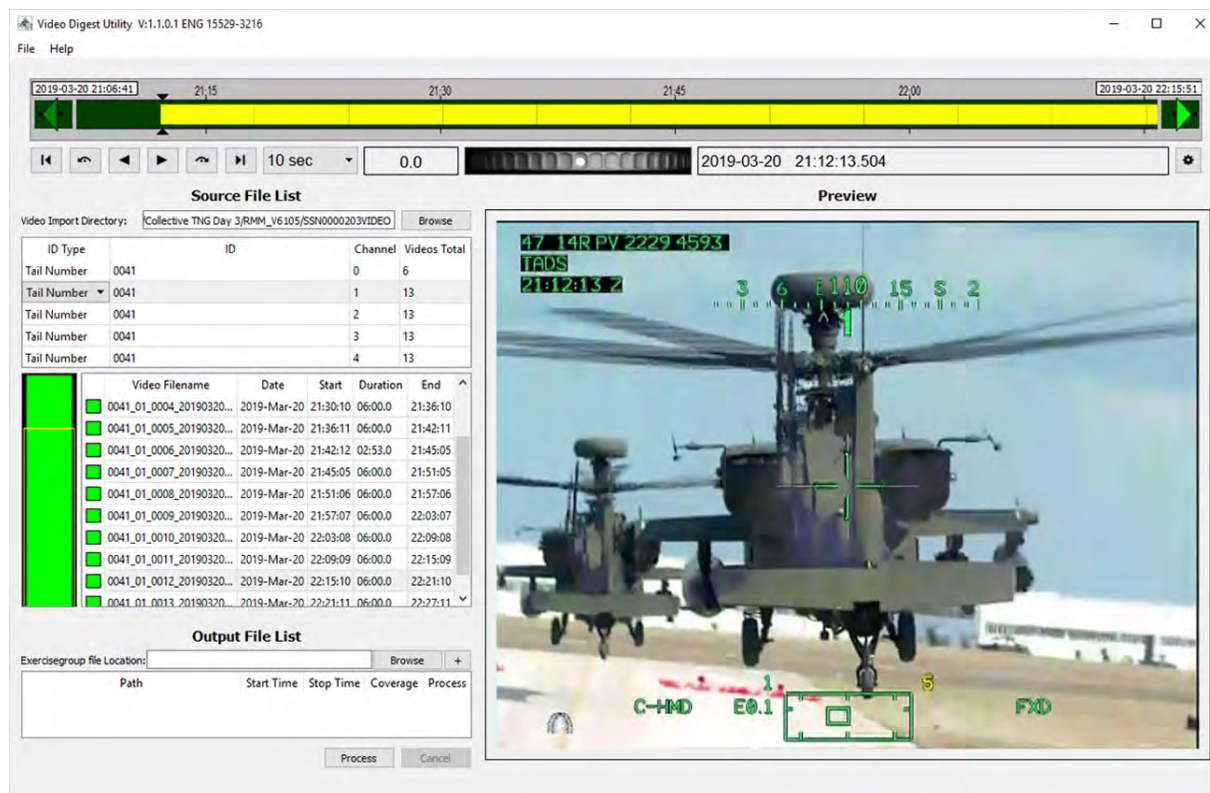
VIDEO DIGEST UTILITY (VDU)

The VDU provides immediate display and seamless playback of aircraft video and audio. This utility is indispensable for Apache Pilots and Co-Pilot/Gunners to evaluate crew and team training, and enhance post mission debriefs and after action reviews. The VDU lists and displays video files and associates each with a Date, Time Stamp, Channel, and Aircraft Tail Number.

The VDU is designed to allow the user to advance quickly through the video and locate events of interest. This evaluation capability could provide increased crew proficiency and result in reduced flight time and ammunition expenditures during training. Users have the option to save video from the aircraft portable mass storage device and view immediately using a supplied USB cable.

ANY MISSION, ANY ENVIRONMENT, ANY PLATFORM

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