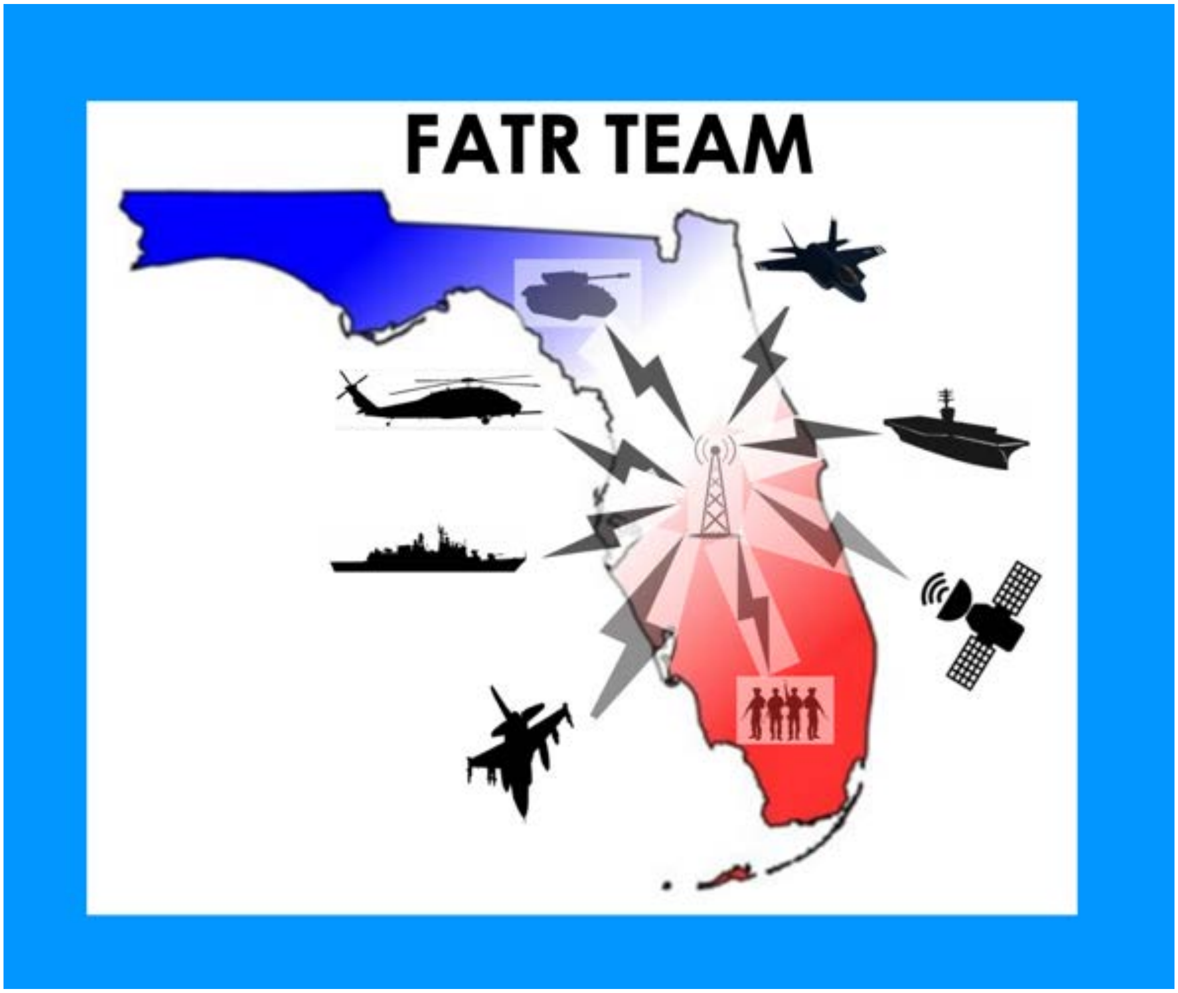
Final Report on Phase 1A
Florida Advanced Training Range (FATR)



30 Jun 2023

FATR TEAM

Robert Polumbo, Maj Gen (ret) USAF, Mumbles Group, LLC
HD Polumbo Jr., Maj Gen (ret) USAF, The Polumbo Group, LLC
David Lowe, LCDR (ret) USN, Streaker Lowe , LLC
Richard Miller, CAPT (ret) USN, PHAROS Mission Critical Solutions, LLC
James Philpitt, CAPT (ret) USN, Subject Matter Expert
Leonard Coleman, Col (ret) USAF, Scientific Research Corporation/VP, Operational Testing
Jeremy Jetton, Scientific Research Corporation/Chief Technology Officer

Overview

In the Spring of 2022, The Roosevelt Group (TRG) published “***From the sea floor to outer space*: *The value of Florida Ranges to existing and future military missions”*** (see Reference 1). The report, commissioned by the Florida Defense Support Task Force (FDSTF), highlighted the need to develop a “range-of-the-future” for joint force testing and training to ensure America’s continued global reach and power. General (Ret) Mike Holmes, former Commanding General of Air Combat Command, summarized this requirement by stating “Future success for the US military must be built on a foundation of joint test and training-across the barriers posed by domains and services. Florida ranges possess all the tools future leaders will need to build and train the forces America needs.”

In the report, TRG stated “Florida’s range of the future must provide demanding, high-fidelity, next-generation environments for the development of relevant joint warfighting capability. They must also facilitate a wide range of advanced training, from tactical employment exercises to theater-level rehearsals.” The development of the Florida Advanced Training Range (FATR) is the next step in advancing the recommendations identified in the report:

- Harness Available Capacity & Modernize Florida’s Range
- Sustain Mission Assurance
- Develop the Integrated All-Domain Range of the Future

Through a grant from the FDSTF, the University of West Florida (UWF) assembled the FATR Team consisting of consultants, subject matter experts (SME) and an industry partner, Scientific Research Corporation (SRC), to execute the recommendations of TRG report and complete Phase 1 of the FATR. The objective of this phase is to provide the development and proof of concept of a joint, all-domain training environment for Florida military units shown in Figure 1.

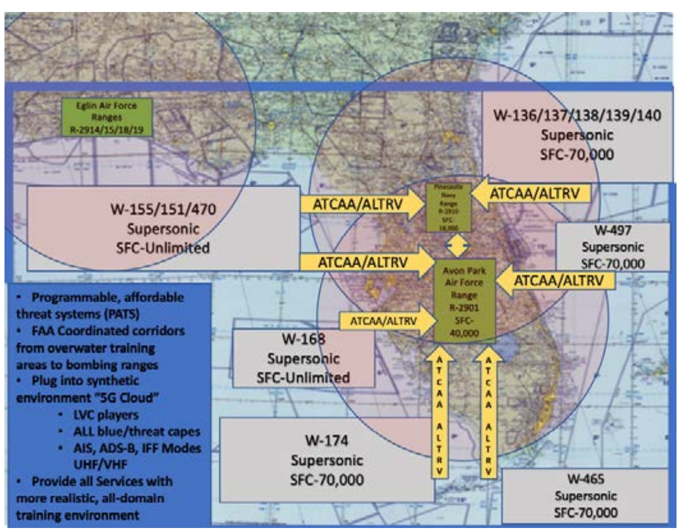


Figure 1: Florida Military Training Areas

Table of Contents

List of Acronyms

Advanced Battle Management System……ABMS
Air Combat Command……ACC
Agile Combat Employment……ACE
Air Combat Maneuvering……ACM
Air Combat Simulator……ACS
Adaptive Electronic Steerable Array……AESA
Air Education and Training Command……AETC
Area Frequency Coordinator……AFC
Air Force Frequency Management Agency……AFFMA
Air Force Materiel Command……AFMC
Air Force Reserve Command……AFRC
Air Force Research Laboratory……AFRL
Air Force Special Operations Command……AFSOC
Air Interdiction……AI
Altitude Reservation……ALTRV
Advanced Live, Virtual, Constructive……ALVC
Air Mobility Command……AMC
Army Spectrum Management Office……AMSO
Avon Park Air Force Range……APAFR
Air Refueling……AR
Air Route Traffic Control Center……ARTCC
Anti-Submarine Warfare……ASW
Air Traffic Control……ATC
Air Traffic Control Assigned Airspace……ATCAA
Atlantic Undersea Test and Evaluation Center……AUTEC
AESA Extensible Emitter Emulator……AXEE
Basic Fighter Maneuvers……BFM
Basic Surface Attack……BSA
Chinese Aerospace Science……CSA
Close Air Support……CAS
Command and Control……C2
Combat Mission Ready……CMR
Common Operating Picture……COP
Composite Training Unit Exercise……COMPTUEX/C2EX
Contiguous United States……CONUS
Combat Search and Rescue……CSAR
Deputy Assistant Secretary of Defense……DASD
Defensive Counter Air……DCA
Destruction of Enemy Air Defense……DEAD
Department of Defense……DoD
Digital Integrated Air Defense System……DIADS

Distributed Interactive Simulation……………………………………………………………………………………….DIS
Digital Radar Warning Receiver……………………………………………………………………………………DRWR
Deployed Unit Complex………………………………………………………………………………………………..DUC
Electronic Attack………..EA
Environmental Assessment……………………………………………………………………………………………..EA
East Area Frequency Coordinator…………………………………………………………………………………..EAFC
Eglin Gulf Test and Training Range……………………………………………………………………………EGTTR
Electromagnetic Interference………………………………………………………………………………………….EMI
Environmental Impact Study……………………………………………………………………………………………EIS
Enterprise Range Plan………………………………………………………………………………………………………ERP
Equipment Spectrum Guidance Permanent Working Group……………………………………….ESGPWG
Electronic Support Measures…………………………………………………………………………………………ESM
Electronic Warfare………EW
Federal Aviation Administration………………………………………………………………………………………FAA
Fleet Area Control and Surveillance Facility Jacksonville………………………………………FACSFAC JAX
Frequency Assignment Subcommittee………………………………………………………………………………FAS
Fifth Generation Advanced Training Waveform………………………………………………………….5G-ATW
Florida Air National Guard………………………………………………………………………………………….FLANG
Florida Army National Guard…………………………………………………………………………………….FLARNG
Florida Advanced Training Range……………………………………………………………………………………FATR
Florida Defense Support Task Force……………………………………………………………………………..FDSTF
Fiber Optic Towed Decoy………………………………………………………………………………………………FOTD
Frequency Panel………FP
Fallon Range Training Complex………………………………………………………………………………………FRTC
Gulf Area Frequency Coordinator…………………………………………………………………………………..GAFC
Gulf of Mexico Water/Airspace…………………………………………………………………………………..GOMEX
Government Reference Architecture………………………………………………………………………………GRA
Hardware-In-The-Loop…………………………………………………………………………………………………….HITL
High-Level Architecture……………………………………………………………………………………………………HLA
Helicopter Maritime Strike Wing Atlantic……………………………………………………………….HSMWLANT
In Accordance With………IAW
Integrated Air Defense System…………………………………………………………………………………………..IADS
Infantry Brigade Combat Team……………………………………………………………………………………………IBCT
Institute of Electrical and Electronics Engineers……………………………………………………………….IEEE
Interdepartmental Radio Advisory Committee……………………………………………………………………..IRAC
Information Security………………………………………………………………………………………………..INFOSEC
Information, Surveillance and Reconnaissance…………………………………………………………………….ISR
Information Technology……………………………………………………………………………………………………….IT
Joint, All-Domain Command and Control……………………………………………………………………….JADC2
Joint, All-Domain Operations…………………………………………………………………………………………..JADO
Jacksonville Range Complex and Operation Area…………………………………………………….JAXOPAREA
Joint Frequency Allocation-to-Equipment Process………………………………………………………….JFAEP
Joint Spectrum Center……JSC
Joint Spectrum Interference Resolution……………………………………………………………………………..JSIR

Key Leader Engagement……KLE
Logistic, Equipment and Training………………………………………………………………………………………LET
Large Force Exercise………LFE
Live Mission Operations Center……………………………………………………………………………………LMOC
Large Scale Combat Operations………………………………………………………………………………………LSCO
Military Communications-Electronics Board…………………………………………………………………MCEB
Mission Data File………MDF
Medical Evacuation……………………………………………………………………………………………………MEDEVAC
Multi-Domain Emitter Threat…………………………………………………………………………………………MET
Multi-Function Display……………………………………………………………………………………………………MFD
Multifunction Information Distribution System-Joint Tactical Radio System……………………..MIDS-J
Man-In-The-Loop………MITL
Military Operations Area…………………………………………………………………………………………………MOA
Maintenance, Repair and Operation………………………………………………………………………………MRO
Major Range and Test Facility Bases………………………………………………………………………MRTFB
Modeling & Simulation……………………………………………………………………………………………………M&S
Military Training Routes…………………………………………………………………………………………………MTR
Naval Air Forces Atlantic……………………………………………………………………………………………AIRLANT
National Airspace System………………………………………………………………………………………………NAS
National Defense Strategy………………………………………………………………………………………………NDS
National Guard Bureau……………………………………………………………………………………………………NGB
National Guard and Reserve Equipment Account……………………………………………………………NGREA
Next Generation Jammer…………………………………………………………………………………………………NGJ
Non-classified Internet Protocol Router……………………………………………………………………NIPR
Navy, Marine Corps Spectrum Center………………………………………………………………………………NMSC
National Telecommunications and Information Administration…………………………………………NTIA
Naval Surface Warfare Center…………………………………………………………………………………………NSWC
Operating Area……OPAREA
Offensive Counter Air………………………………………………………………………………………………………OCA
Operation Control Center…………………………………………………………………………………………………OCC
Outside Continental United States………………………………………………………………………………OCONUS
Operational Flight Program……………………………………………………………………………………………OFP
Operations and Maintenance……………………………………………………………………………………………O&M
Organization, Management and Operational Structure…………………………………………………OMOS
Operational Security………………………………………………………………………………………………………OPSEC
Open System Enclave………………………………………………………………………………………………………OCE
Office of Primary Responsibility…………………………………………………………………………………OPR
Office of the Secretary of Defense………………………………………………………………………………OSD
Operational Test and Evaluation……………………………………………………………………………………OT&E
Off-The-Shelf………OTS
Operation Test and Training Infrastructure………………………………………………………………OTTI
Programmable, Affordable Threat System…………………………………………………………………………PATS
Program Executive Officer Tactical Aircraft……………………………………………………………PEO-TACAIR
Pinecastle Range Complex…………………………………………………………………………………………………PRC

Ready Aircrew Program……RAP
Real-Time Electromagnetic Defense Capability……REDCAP
Red Force Command and Control……RFCC
Range Operating Authority……ROA
Range Operation Control Center……ROCC
Radio Relay Unit……RRU
Radar Warning Receiver……RWR
Software Defined Radio……SDR
Suppression of Enemy Air Defense……SEAD
Secret Internet Protocol Router……SIPR
Synthetic-Inject-To-Live……SITL
Spectrum Analyzer……SA
Surface-to-Air Missile……SAM
Strike Coordination and Reconnaissance……SCAR
Secure LVC Advanced Training Environment……SLATE
Spectrum Management Office……SMO
Spectrum Planning Subcommittee……SPS
Scientific Research Corporation……SRC
Space Systems Command……SSC
Special Use Airspace……SUA
Surface Warfare……SUW
The Adjutant General……TAG
Tactical Datalink……LINK16
Tactical Intercepts……TI
Technology Maturation……Tech Mat
The Roosevelt Group……TRG
Technology Readiness Level……TRL
Threat System Management Office……TSMO
Tactics, Techniques and Procedures……TTP
Test and Training Space Needs Statement……T/TSNS
Unit Operation Center……UOC
United States Air Force……USAF
United States Army……USA
United States Coast Guard……USCG
United States Marine Corps……USMC
United States Navy……USN
United States Space Force……USSF
University of West Florida……UWF
Undersea Warfare Shallow Water Training Range……USWTR
Virginia Capes……VACAPES
WarRoom-In-A-Box……WIAB

Executive Summary

The Florida peninsula offers a unique environment well-suited for joint, all-domain training not available or accessible anywhere else in the contiguous United Sates (CONUS). The air, land and sea training areas offer a world-class, realistic environment for military units to train like they will fight in future conflicts. By the end of this decade, over three hundred 5th generation F-35 aircraft will be based in the southeastern region of the US not to mention hundreds of other aircraft from all four branches of the military that operate in the air domain (Figure 2).

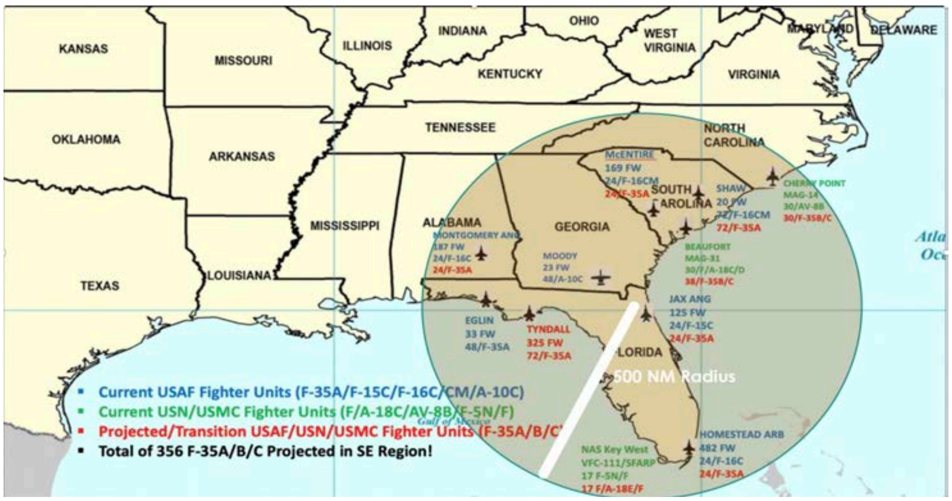


Figure 2: Fighter Units and Aircraft in Southeast Region

Land, sea, space and cyber forces will also join the air domain to conduct joint, all-domain training and mission rehearsals utilizing Florida's training areas reflecting similar geography of pacing threats. Figure 3 depicts the similarities in geography of an overlay of the southeastern US and the mainland of China.

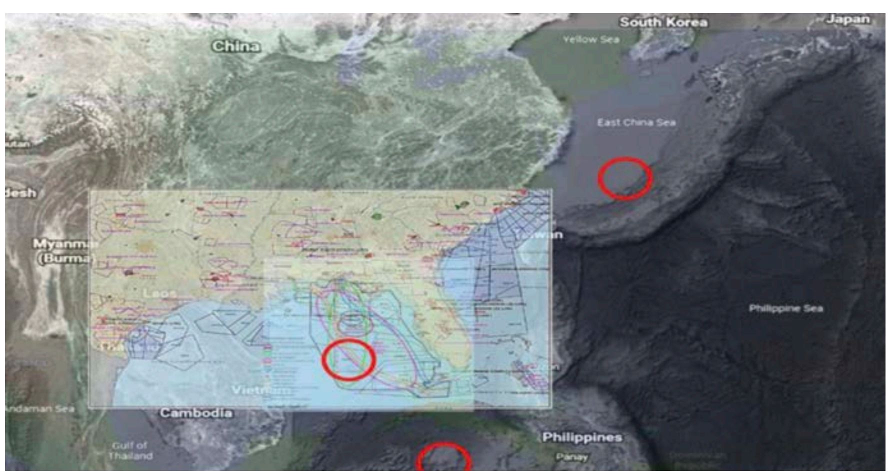


Figure 3: Overlay of Florida Training Areas on the South China Sea

Actual combat battlespace will be contested and congested with strategic, all-domain integrated air defense systems (IADS), air, land and seaborne threats, long range-hypersonic weapons, electronic warfare and space/cyber effects. Our training ranges must be able to replicate this environment for our military units. Currently, Florida ranges can't simulate this battlespace which forces units to deploy to ranges in the Western US or as far as Alaska to train against a realistic threat scenario. In Phase 1 of the project, the FDSTF tasked the FATR team to provide the concept development to create a training environment extending from Gulf to Atlantic over the entire peninsula of Florida.

Three major areas require significant effort and coordination with federal, state and local agencies. Technology innovation, special use airspace (SUA), and new electromagnetic spectrum (ESM) certifications are the most challenging areas facing the development of the FATR. The technology innovation with the most promise in the next two years (technology readiness level/TRL 9), are programmable, affordable threat systems (PATS) networked with an advanced live, virtual, constructive (ALVC) architecture. The team's industry partner, Scientific Research Corporation (SRC), has created a family of PATS called Multi-Domain Emitter Threat systems (MET). These mobile systems, in Figure 4, are a new generation of affordable threat emitters being contracted and tested by the US Army's, Threat System Management Office (TSMO). Figure 5 shows the specific capabilities of each system and the area of electromagnetic spectrum (ESM) requiring certification. The team successfully utilized the MET-Low system in the Phase 1A demonstration described in the Deliverable B section of this report.

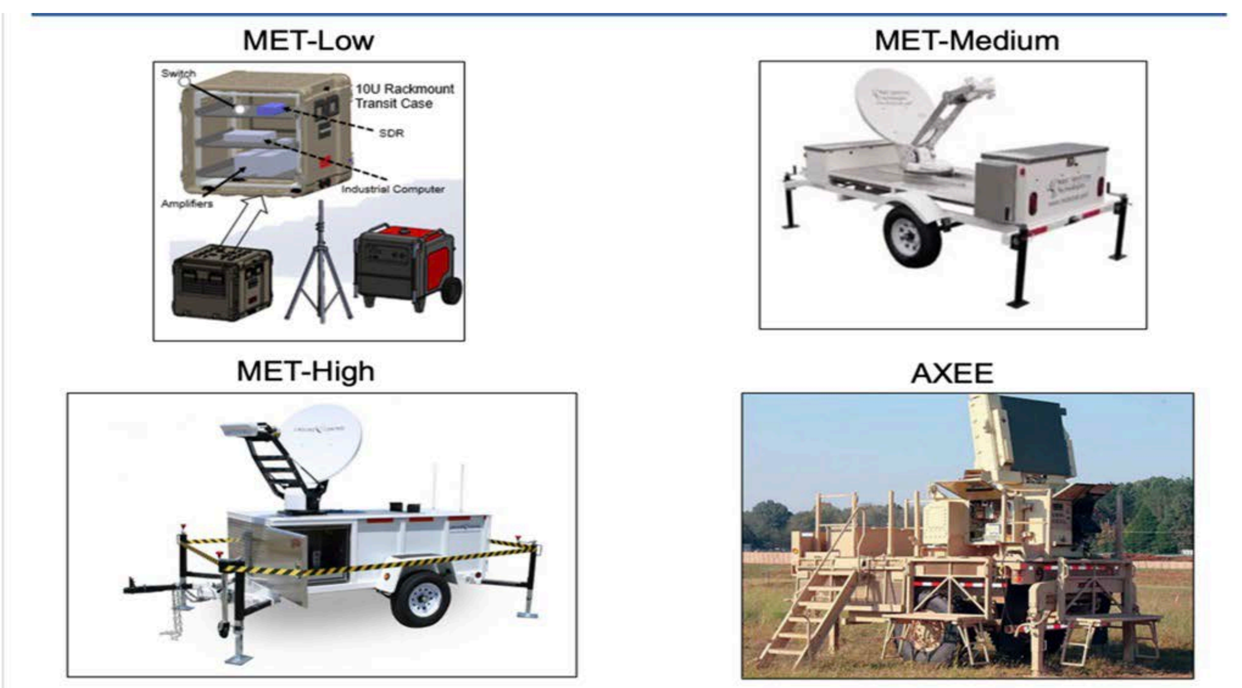


Figure 4: PATS-Multi-Domain Emitter Threat (MET) Systems

Capabilities		Low	Medium	High
Frequency Range		70 MHz - 6 GHz	70 MHz - 6 GHz	70 MHz - 18 GHz
Waveform Types	Electronic Warfare	CW, AM, FM, FSK, BPSK, QPSK, OOK, Narrow and Broadband Noise	CW, AM, FM, FSK, BPSK, QPSK, OOK, Narrow and Broadband Noise	CW, AM, FM, FSK, BPSK, QPSK, OOK, Narrow and Broadband Noise
	Radar	Acq Radar, BPSK Pulsed	Acq Radar, BPSK Pulsed, FM/Swept FM, Chirp	Acq Radar, BPSK Pulsed, FM/Swept FM, Chirp
	Communications	AM, FM, FSK, BPSK, QPSK	AM, FM, FSK, BPSK, QPSK	AM, FM, FSK, BPSK, QPSK
Instantaneous Bandwidth		50 MHz	50 / 120 MHz	200+ MHz
RF Transmitter Power		~20 Watts	~200 Watts	> 200 Watts
Antenna Type		Dipole / Fixed	Directional (Horn / Dish) Manuual Az / El	Directional (Horn / Dish) Automatic Az / El
Receiver Capabilities		Basic Electornic Warfare (Basic) Spec Monitoring (amp/Freq & Waterfall)	Basic Electronic Warfare (Basic, Look through, Auto/Preset) Spec Monitoring (amp/Freq & Waterfall)	Basic Electronic Warfare (Basic, Look through, Auto/Preset) Spec Monitoring (amp/Freq & Waterfall)
Size		Single Case / Enclosure, Mast	Multiple Case / Enclosure, Mast	Multiple Case / Enclosure, Mast
Power		Low Cost Generator	Moderate Cost Generator	Moderate Cost Generator
Operational Temp Range		-20° to +50° C	-20° to +50° C	-20° to +50° C
Portability		Trailer / Transportable	Trailer / Transportable	Trailer / Transportable

Figure 5: MET Systems Capabilities

The second technology improvement, and the most technically challenging, is the development of an ALVC environment. Currently, the Department of Defense (DoD) has created an LVC environment utilizing the Link 16 datalink network (Figure 6). However, 5th generation aircraft,

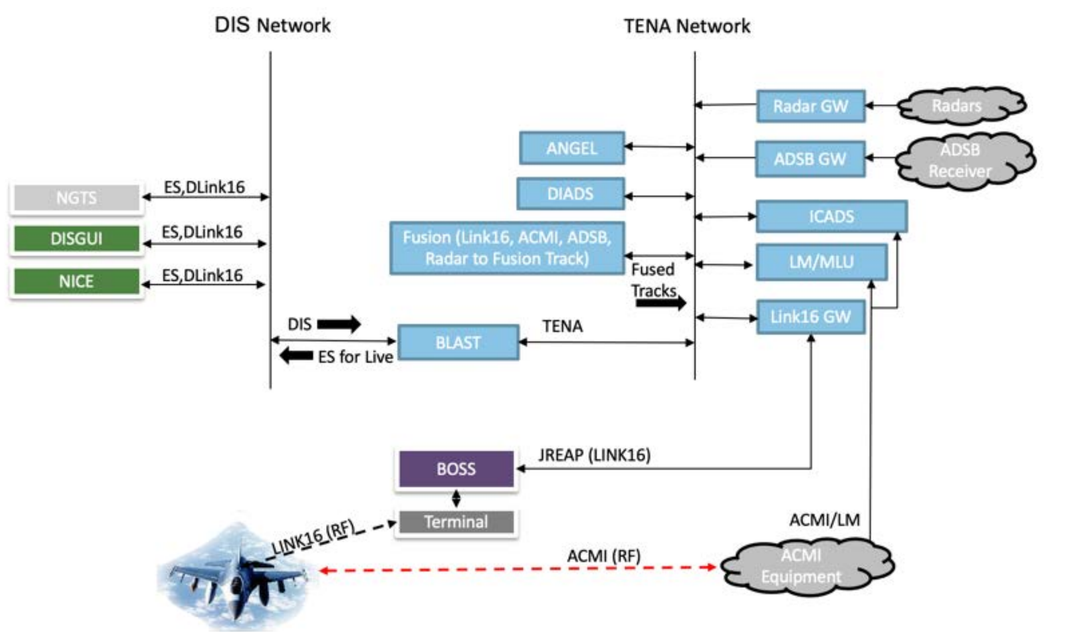


Figure 6: Current Link 16 LVC Architecture

including the F-22 and F-35, are unable to fully participate in this architecture due to technological issues. The Air Force Research Laboratory (AFRL) at Wright-Patterson AFB, OH in concert with ACC's Fed Lab at Beale AFB, CA are working to resolve the issues for 5th generation and future weapon systems. Figure 7 depicts four significant areas of on-going research.

- Open Systems Enclave (OSE)
- Government Reference Architecture (GRA)
- 5G-Advanced Training Waveform
- Sensor Fusion

Figure 7: 5th Generation Technology Innovation

The experts working these issues are confident the technology will be ready for testing in CY2025. In the meantime, the FATR team will utilize the current Link 16 architecture utilizing the government-owned Digital Integrated Air Defense System (DIADS) during the development and demonstration of the prototype MET/ALVC system. The transition to a synthetic-inject-to live (SITL) ALVC architecture using 5G-Advanced Training Waveform (5G-ATW) will occur during the build out of the joint, all-domain FATR in Phase 3. This blended LVC technology depicted in Figure 8 will be a significant future upgrade for the Florida ranges.

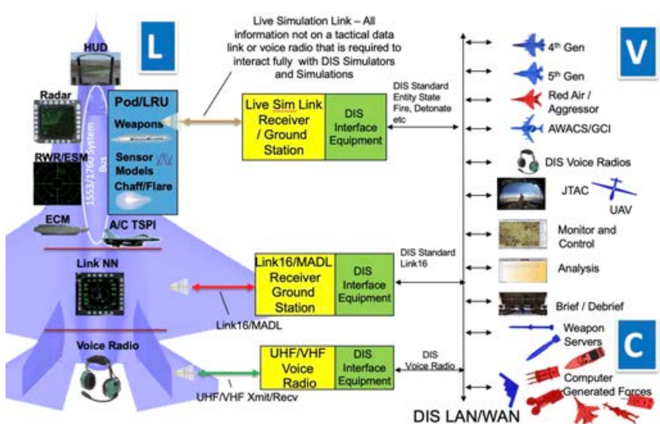


Figure 8: Future, ALVC Architecture

In Phase 1, the FATR team worked in coordination with Air Combat Command (ACC), Florida Air and Army National Guard (FLANG/FLARNG), Air Force Reserve Command (AFRC), Air Force Material Command (AFMC), Air Education and Training Command (AETC), Air Mobility Command (AMC), Air Force Special Operations Command (AFSOC), Naval Air Force Atlantic (AIRLANT) and Space Systems Command (SSC). The primary objective of Phase 1 is to show proof of concept of combining live threat emitters with a blended live, virtual, constructive environment to provide Florida units the capability to conduct realistic, all-domain training. Due to FDSTF grant timelines, Phase 1 was divided into two subphases 1A an 1B. The effort in Phase 1A, reflected in this report, includes the demonstration of the PATS/ALVC architecture to TRL-6 in a controlled environment. Phase 1B will expand the technology demonstration of the prototype system to TRL 7 on location at Avon Park Air Force Range (APAFR). Our primary customer for developing the FATR is the FLANG/FLARNG. The FLANG is scheduled to transition to F-35A aircraft in CY 24, which requires an advanced training range complex that supports 5th gen capabilities and functionality to prepare our military for a potential all-domain fight with a peer competitor. Ultimately, the intent of the FATR is to improve the training and test environment for all Florida stakeholders to include the units listed in Figure 9.

Florida Air and Army National Guard

- 125th Fighter Wing
- 53rd Infantry Brigade Combat Team
- 111th Aviation Battalion

Air Force Reserve Command

- 482nd Fighter Wing
- 920th Rescue Wing
- 927th Air Refueling Wing

Air Combat Command

- 325th Fighter Wing
- 53rd Wing
- 23rd Wing/598th Range Squadron
  Avon Park Air Force Range (APAFR)
  MacDill AFB Deployed Unit Complex (DUC)

Air Education and Training Command

- 33rd Fighter Wing

Air Force Materiel Command

- 96th Test Wing/Eglin Gulf Test Range

Air Mobility Command

- 6th Air Refueling Wing

Air Force Special Operations Command

- 1st Special Operations Wing

Navy

- Naval Air Forces Atlantic (AIRLANT)
  - Carrier Strike Group FOUR (CSG4)
  - NAS Jacksonville/P-8 and HSM units
    - Fleet Area Control and Surveillance Facility Jacksonville (FACSFAC JAX)/Pinecastle Range Complex (PRC)
  - Naval Station Mayport/HSM units
- Naval Air Station Key West (NASKW)

Space Systems Command

- Space Launch Delta 45

Figure 9: Stakeholders/Florida Units

All Phase 1A deliverables and tasks were completed on budget and on schedule to the extent possible given the subdivision of tasks and short duration of the phase. The following deliverables are still in coordination and will be fully implemented when the appropriate service branch completes the approval process:

- Deliverable A-FATR operations manual approval by United States Air Force (USAF)/United States Navy (USN)
- Deliverable C-Airspace proposal approval by Federal Aviation Administration (FAA)
- Deliverable D-MET spectrum certification by USAF/USN spectrum management offices (SMO)

The following report will provide a detailed account of the team's in-depth effort to develop a viable concept for creating the Florida Advanced Training Range to provide world-class training for Florida military units. All material highlighted in YELLOW indicates work in progress.

Scope of Project

The overarching objectives of Phase 1 were to develop the resource requirements, operational processes, technological architecture and airspace/spectrum authorizations required for the FATR. The phase was further divided into two sub-phases 1A and 1B to meet the requirements of the FDSTF fiscal year grant cycle. The tasks and deliverables for Phase 1A are listed below:

PHASE 1A

Tasks

1.1 Define logistics, equipment and unit training requirements
1.2 Develop organizational, management and operational structure of FATR
1.3 Develop and demonstrate PATS/ALVC prototype system (TRL 6)
2.1 Coordinate and seek FAA and Air Traffic Control (ATC) approval for airspace framework and processes
2.2 Coordinate and seek spectrum certification for threat emitters and communication network
3.1 Coordinate support and utilization of DoD resources and installations

Deliverables

A. Operational manual (draft) outlining the requirements, organizational structure and processes for the FATR
B. PATS and ALVC prototype system demonstrated in a controlled environment
C. Coordinated and approved ATC corridor procedures to link regional military airspace to utilize the FATR
D. Coordinated and approved frequency spectrum management procedures

Tables 1-3 below, list Florida's warning and restricted areas and the military units that utilize the airspace.

Table 1: Warning Areas Utilized for Training

Warning Area	Location	Unit Utilization	Service/Command/ARTCC
W-155/151/470	GOMEX/Panhandle	33FW/325FW/53WG/1SOW	USAF/96 TW/JAX Center
W-168	GOMEX/Sarasota	6ARW/927ARW/33FW/325FW Deployed units	USAF/23WG /MIA Center
W-174	GOMEX/Key West	482FW/CSG/Deployed units	USN/NAS Key West/MIA Center
W-465	FL Straits/Miami	482FW	USN/NAS Key West/MIA Center
W-497	Atlantic/Cape Canaveral	125FW/920RQW/SLD45	USSF/SSC-SLD45/JAX Center
W-136/137/138/140	Atlantic/Jacksonville	125FW/CSG4/VP-8/HSM	USN/JAX Center
EWTA 1-6	GOMEX/Gulf of Mexico	33FW/325FW/53WG/1SOW	USAF/96 TW/JAX Center

Table 2: Restricted Areas Utilized for Training

Restricted Area	Location	Unit Utilization	Service/Command/ARTCC
Avon Park Air Force Range R-2901	Avon Park FL	33FW/325FW/125FW 482FW/920RQW	USAF/23WG/MIA Center
Pinecastle Range Complex R-2906/2907/2910	Ocala National Forest FL	CSG4/33FW/325FW/125FW 482FW/111AR/53IBCT/HSM	USN/FACSFAC JAX/JAX Center
Eglin Ranges R-2914/15/18/19	Eglin AFB FL	33FW/53WG/325FW/1SOW	USAF/JAX Center

Table 3: Military Units Utilizing Florida Training Areas

Military Unit/Service/Command	Location	Weapon system(s)/Mission
125th Fighter Wing/USAF/FLANG	Jacksonville ANG Base FL	F-35A/Operational Fighter Unit
53rd IBCT/USA/FLARNG	Camp Blanding FL	HMMWV/Motorized Infantry
111th Aviation Regiment/USA/FLARNG	AASF#1 Cecil Field FL	CH-47F, UH-60M/Air Assault, Air Mobility
325th Fighter Wing/USAF/ACC	Tyndall AFB FL	F-35A/Operational Fighter Unit
33rd Fighter Wing/USAF/AETC	Eglin AFB FL	F-35A/Formal Training Unit
53rd Wing/USAF/ACC	Eglin AFB FL	A-10, F-15C/E/EX, F-16, F-22, F-35A, MQ-9, HH-60G/W, HC-130J/Operational Test & Evaluation
482nd Fighter Wing/USAF/AFRC	Homestead ARB FL	F-16/Operational Fighter Unit
920th Rescue Wing/USAF/AFRC	Patrick Space Force Base FL	HC-130J/HH-60G CSAR, Air Refueling, Airdrop
6th Air Refueling Wing/USAF/AMC	MacDill AFB FL	KC-135 (KC-46 CY24)/Air Refueling
927th Air Refueling Wing/USAF/AFRC	MacDill AFB FL	KC-135/Air Refueling
1st Special Operations Wing/USAF/AFSOC	Hurlburt AFB FL	AC/MC-130, CV-22, MQ-9, U-28, SpecOps
Multiple P-8 and HSM units/USN/CNAL	NAS Jacksonville FL	P-8/ASW, SUW, ISR//MH-60R ASW/SUW/SAR
CSG 4/USN/CFFC	Naval Station Norfolk VA	Multiple aircraft types/Carrier Strike
HSM-40, 46, 48, 60/USN/CNAL	Naval Station Mayport FL	MH-60R/Maritime Strike/ASW
Space Launch Delta 45/USSF/SSC	Patrick Space Force Base FL	Multiple spacecraft/Space Launch Unit

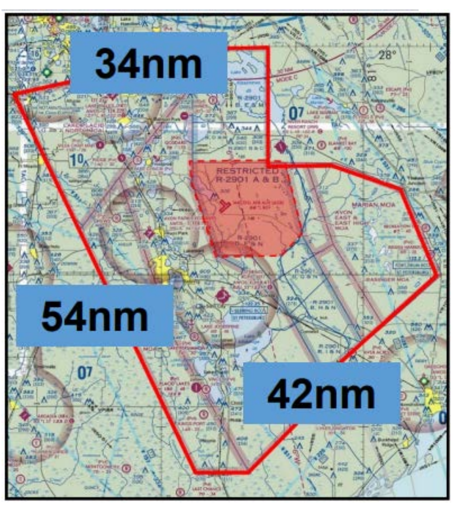
From December 2022-June 2023, UWF, the FATR team and SRC completed Phase 1A. A project of this magnitude, duration and limited funding was divided into distinct phases. Phase 1 is funded by the FDSTF and is limited in scope to developing a single prototype system for demonstration at APAFR to be ready for a one-year technology demonstration in Phase 2. The tasks included in Phase 2 includes installing an additional system prototype system on PRC and linking an operation/communication network across the peninsula. When appropriate, the report includes information on resources and funding necessary to complete the development of FATR through Phase 2. This report will only focus on these two phases and will detail the tasks and deliverables of Phase 1A. The report will also utilize information developed during this phase to update the tasks and deliverables for Phase 1B.

Deliverable A: Develop Operation Manual Outlining Requirements, Organization and Processes

Overview

Deliverable A included the development of an operation manual outlining the requirements, organizational structure and processes of the FATR. The tasks required to complete this deliverable were divided into two sub-tasks: Task 1.1- Define Logistics, Equipment and Training Requirements; Task 1.2-Develop the Organizational, Management and Operational Structure. The primary land ranges and over-water airspace to be utilized during Phase 1 and 2 of the FATR project are depicted in Table 2 and 3 on page 9. The build out of the FATR from Gulf to Atlantic in Phase 3 will include the panhandle land impact ranges, military operations areas (MOA) and the Gulf of Mexico over-water airspace (GOMEX).

The primary land range for Phase 1 and 2 is Avon Park Air Force Range, located in the center of Florida (Figure 10). The range (R-2901) is operated by the 598th Range Squadron (598 RANS) under the command of the 23rd Wing (23 WG) at Moody AFB, GA. The range provides joint, air/land training for active and reserve component military units. Figure 11 depicts AFM13-212_APAFR_Supp which provides operating instructions for the range (see Reference 1).



BY ORDER OF THE COMMANDER
23D WING
(ACC)

AIR FORCE MANUAL 13-212 VOLUME 1

AIR COMBAT COMMAND SUPPLEMENT

AVON PARK AIR FORCE RANGE

ADDENDUM A

August 2021

Space, Missile, Command, and Control

RANGE PLANNING AND OPERATIONS
WEAPONS RANGES

Figure 10: Avon Park Air Force Range Figure 11: AFM13-212 APAFR Supplement

Additionally, Pinecastle Range Complex (Figure 12), located in the northern part of Florida, is a Navy range operated by Fleet Area Control and Surveillance Facility Jacksonville (FACSFAC JAX). The complex includes restricted areas R-2906/2907/2910 providing joint, air/land training for active and reserve component military units. Figure 13 depicts the Pinecastle Range Complex Handbook which provides operating instructions for the range (see Reference 2).

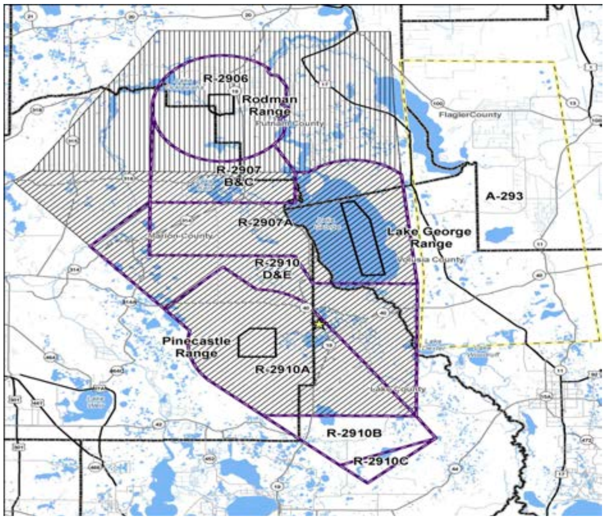


Figure 12: Pinecastle Range Complex   Figure 13: PRC Handbook

Objective

The FATR will be a blended LVC environment overlaying current land ranges and over-water airspace. The environment will be utilized by units to enhance specific training requirements, develop unique scenarios and execute mission exercises. Task 1.1 included defining necessary logistics, essential equipment and most importantly each unit's training requirements. Task 1.2 included the development of the organization, management and operation of the FATR culminating in an operation manual to be utilized by each unit to optimize their mission training. The overall objective of Phase 1B will culminate in a three-week technology demonstration in an operational environment to show proof of concept of a functional OCC and a MET/ALVC prototype system located at APAFR. In addition, a FATR operation manual, included in this report (initial draft in Appendix A.2), will be fully completed and submitted for incorporation in the APAFR and PRC range manuals at the end of Phase 1B.

TASK 1.1-Define Logistics, Equipment and Training Requirements

Task 1.1 was essential to framing the requirements, organizational structure and processes for the FATR in Phase 1 and 2. Through key leader engagements, cross-tell with military range experts and development of the ALVC strategy, a list of critical resources and requirements for installations, training ranges and units were identified. Using this list of requirements, our team conducted installation visits, range site surveys and interviews with Florida military units to develop an operational plan to resource FATR through Phase 2. The development strategy for Phase 1 was primarily influenced by the unit training requirements received through interviews with the commanders and training managers for each unit. Each unit listed in Table 3 was interviewed and/or researched to determine their specific missions and training requirements. A unit requirements worksheet (reference Appendix 1) was completed for the Florida units currently utilizing APAFR and PRC training ranges. Table 4 depicts each unit's specific mission training requirements based on threat, missions and weapon employment events.

Table 4: Unit Training Requirements

Unit	Threat	Missions	Live/Inert weapons employment
125 FW	Strategic/Integrated, all-domain system (IADS)	OCA-SEAD/DEAD/ESCORT, AI, CAS, DCA, ISR	Y/Y
482 FW	Strategic/Integrated, all-domain system (IADS)	DEAD, OCA, DCA, AI, CAS, CSAR	Y/Y
920 RQW	Tactical/Integrated, all-domain system (IADS)	CSAR, Air Refueling, Airdrop, Command and Control	Y/Y
33 FW	Strategic/Integrated, all-domain system (IADS)	OCA-SEAD/DEAD/ESCORT, AI, CAS, DCA, ISR	Y/Y
325 FW	Strategic/Integrated, all-domain system (IADS)	OCA-SEAD/DEAD/ESCORT, AI, CAS, DCA, ISR	Y/Y
53 WG	Strategic/Integrated, all-domain system (IADS)	Operational Test & Evaluation All Conventional Missions	Y/Y
6 ARW/927 ARW	Strategic/Integrated, all-domain system (IADS)	Air Refueling, Command and Control (ABMS/JADC2)	N/N
VP-8	Strategic/Integrated, all-domain system (IADS)	Anti-Submarine Warfare, Surface Warfare, C2, ISR	N/N
HSM-40/46/48/50/60	Tactical/Integrated, all-domain system (IADS)	Maritime Strike, ASW, SUW, SAR, MEDEVAC	Y/Y
CSG 4	Strategic/Integrated, all-domain system (IADS)	OCA-SEAD/DEAD/ESCORT, AI, CAS, DCA, ASW, ASUW, ISR	Y/Y
53 IBCT	Tactical/Force-on-force Surface and Air Threats	CAE, Maneuver force on force, CAS, Air Assault, Recon	Y/Y
111 AR	Tactical/Integrated, all-domain system (IADS)	LSCO, Air Assault, Air Mobility	Y/Y

The development strategy was significantly influenced by the limited funding available to successfully demonstrate proof of concept for the blended LVC environment at the two locations initially identified. After receiving the FDSTF funding for Phase 1B, it was determined only (1) MET/ALVC prototype system and (1) OCC could be setup and demonstrated. APAFR was selected as the optimum location to set up the OCC and a MET/ALVC prototype system. No UOC will be included in Phase 1B. Since an OCC and UOC are very similar in form and function, the absence of the UOC will not detract from the 3-week operational demonstration of the MET/ALVC prototype system. In addition to the OCC, MET/ALVC prototype system, other critical logistic, equipment and personnel (LEP) requirements are required for Phase 1B to include radio relay units (RRU), software defined radios (SDR), antennae arrays, Link 16 datalink networks, classified communication systems, and a logistic/operation contract. Table 5 summarizes the LEP requirements and costs to develop the OCC and MET/ALVC prototype system for the demonstration in Phase 1B. The overall LEP cost for Phase 1B is $140K. The table includes (in yellow highlights) the option to locate a MET system at PRC during a future Navy Composite Training Unit Exercise (COMPTUEX). The funding requirement for this effort is $40k and currently not funded under the FDSTF Phase 1B grant. The team is currently negotiating with the Threat System Management Office (TSMO) and SRC to seek their funding support for this initiative. If the effort is successful, the results of the MET demonstration at PRC will be included in the Phase 1B final report. In addition, the 325 Fighter Wing at Tyndall AFB in Panama City, FL was offered a MET system to utilize for a 3-week period from unit funding of $80k to transport, setup and operate the equipment with certified technicians from SRC. As of the submission of this report, no agreement has been reached. If the effort is successful, the results of the MET demonstration at Tyndall will be included in the Phase 1B final report. Figure 14 shows a geographic depiction of the LEP laydown for the Phase 1B demonstration.

Table 5: Phase 1B Logistic, Equipment and Personnel (LEP) Requirements

Location	OCC UOC Cost	MET/ALVC Cost	RRU/SDR Cost	LINK 16 Cost	SIPR Cost	Secure Storage Cost	Transport/Setup 3-wk Demo Cost	Total Cost
APAFR	OCC $20K	MET-H/ALVC TSMO/$40K	Y SRC	* $0	* $0	* $0	Y $80K	**$140K**
PRC	N $0	MET-L (C2EX) TSMO	* $0	N $0	N $0	N $0	$40K	**$0** **$40K**
TOTAL ITEM COST	**$20K**	**$40K**	**$0**	**$0**	**$0**	**$0**	**$80K** **$40K**	**$140K** **$180K**

* Denotes installation/unit will have service funded equipment by the end of Phase 1B

In Phase 2, a significant amount of LEP requirements will need to be completed prior to the start of the estimated 12-month technology demonstration. The procurement and setup of MET/ALVC systems, OCCs/UOCs and communication network will be required to have a functional environment for units to participate in the technology demonstration. The planning also includes operation and maintenance personnel supplied by a contract between the funding source(s) and the company identified to lead the FATR project in Phase2. This effort will only be completed with significant funding from sources most likely at the federal level to include Congress, Office of the Secretary of Defense (OSD), service branches, National Guard and Reserve Equipment Account (NGREA) and Combatant Commands (COCOM). The optimum plan will be to locate an OCC at the MacDill DUC and FACSFAC JAX for command and control (C2) of APAFR and PRC operations, respectively. In addition, each participating unit will require a UOC to schedule, develop scenarios, interact with LVC environment and debrief demonstration events. Table 6 lists the estimated LEP requirements and cost to resource every unit identified for Phase 2 inclusion. The ability to resource the entire list of units will be dependent primarily on funding but also on the unit's availability to participate, technology to connect the unit's weapon system to the network and ability to provide appropriate facilities to locate a UOC at the location for Phase 2.

Table 6: Phase 2 Estimated Logistic, Equipment and Personnel Requirements

Location	OCC UOC Cost	PATS Cost	RRU/SDR Cost	LINK16 Cost	SIPR	Secure Storage	# Ops/Mnx 1yr-Contract	Total Cost
APAFR	UOC $0	MET-H $400K	* $0	* $0	* $0	* $0	2/1 $1.1M	$1.5M
PRC	UOC $60K	MET-H $400K	Y $2K	N $0	N $0	N $0	2/1 $1.1M	$1.562M
MacDill DUC	OCC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
FACSFAC JAX	OCC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
125 FW	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
482 FW	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
920 RQW/ SLD 45	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
33 FW	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
325 FW	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
53 FW	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
6/927 ARW	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
VP-8	UOC $20K	N $0	* $0	* $0	* $0	* $0	2/0 $175K	$195K
HSM Units	UOC $20K	N $0	* $0	* $0	* $0	* $0	2/0 $175K	$195K
CSG4	UOC $20K	N $0	Y $2K	* $0	* $0	* $0	2/0 $175K	$197K
111 AR	UOC $20K	N $0	Y $2K	N $0	* $0	* $0	2/0 $175K	$197K
53 IBCT	UOC $20K	N $0	Y $2K	N $0	* $0	* $0	2/0 $175K	$197K
TOTAL COST	**$340K**	**$800K**	**$26K**	**$0**	**$0**	**$0**	**$4.65M**	**$5.816M**

* Denotes installation or unit will have service-funded equipment at the beginning of Phase 2

The total LEP estimate for Phase 2 is approximately $5.816M. This estimate does not include the support each service will need to contribute to modify/upgrade their weapon systems to “connect” to the ALVC network. These upgrades may include operational flight program modifications (OFP), pods mounted on the weapons system, inclusion of a software defined radio (SDR), embedded training modules and other necessary equipment. This list of installations and units is the complete list of all organizations interviewed during Phase 1A. If a limitation in funding or technological issues is identified, Phase 2 can be completed with fewer units participating in the technology demonstration. The goal is to have at least one unit from each of the Air Force, Navy and Army to participate in the one-year demonstration to show capability for joint force LVC training.

TASK 1.2-Develop the Organizational, Management and Operational Structure

After defining the requirements in Task 1.1, the organizational, management and operational structure (OMOS) of the FATR was developed. The main objective of Task 1.2 was to develop the FATR as a blended LVC environment overlaying current airspace and ranges to minimize changes or additions to current operations for military units. The OMOS was also developed to conform to current command and control (C2) architecture, datalink, and communication networks recognized by the services. The focus areas for developing the OMOS centered around these five pillars:

- Cross-tell and best practices of other military test and training ranges
- Previous blended LVC technology demonstrations
- Current, DoD-owned, affordable, off-the-shelf (OTS) technology (TRL 7 and higher)
- Service research laboratory development to insure compatible technology transitions
- Incorporate the AF Operational Test and Training Infrastructure (OTTI) plan

Organization

The concept development of the OMOS for Phase 1/2 of FATR was limited in scope to only include APAFR and PRC land impact ranges (yellow/red) and the overwater warning areas (blue) as depicted in Figure 14 and 15. The ATCAA/ALTRV areas (green) is airspace being coordinated with military units and the FAA to allow aircraft to transition from overwater airspace to land impact ranges. The specifics of the airspace proposal will be detailed in the Deliverable C section of this report.

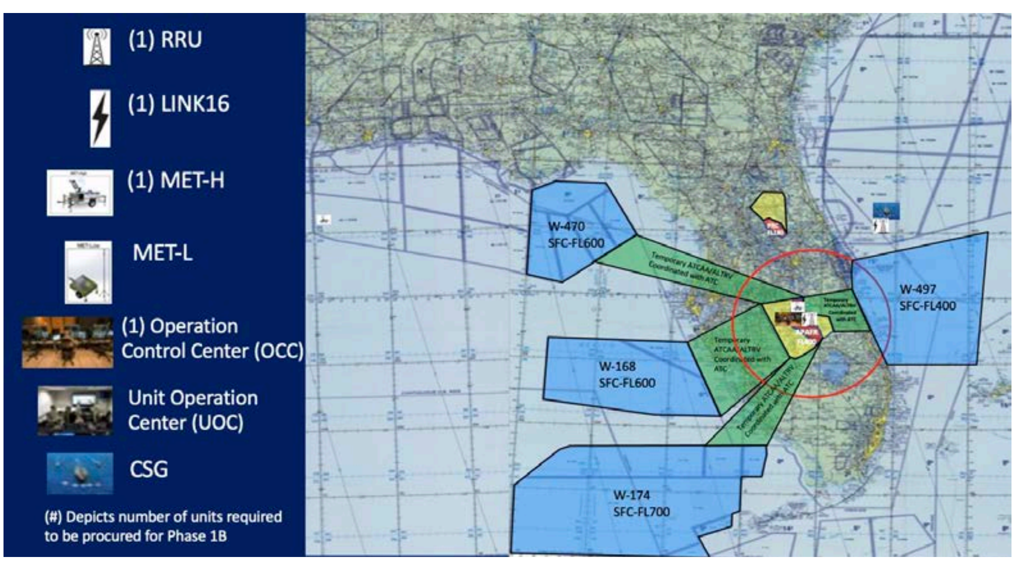


Figure 14: OMOS for Phase 1B Prototype Demonstration

In Phase 1B, a single OCC will be located at APAFR. The OCC will coordinate with participating units and the APAFR Range Operation Control Center (ROCC) to schedule, develop scenarios, support execution of the demonstration and collect feedback from the military units. A MET/ALVC prototype system will also be located at APAFR combined with a Link 16 datalink network and an RRU communication architecture. Technicians from Scientific Research Corporation will be on location remotely operating the MET/ALVC system in conjunction with the US government-owned Digital Integrated Air Defense System (DIADS) application. The 3-week prototype demonstration is scheduled for May 2024. Results and lessons learned from the demonstration will be utilized to improve the OMOS and develop the technology demonstration plan for Phase 2. Figure 15 depicts the OMOS plan for Phase 2. The organizational structure includes locating an OCC at MacDill DUC and FACSFAC JAX with UOCs at as many participating units as funding allows. The OCC located at APAFR during Phase 1B will be converted to a UOC to be utilized for deployed unit operations at the airfield. As mentioned earlier, the goal will be to have at least one Air Force, Navy and Army unit with a UOC located at their base, station or post.

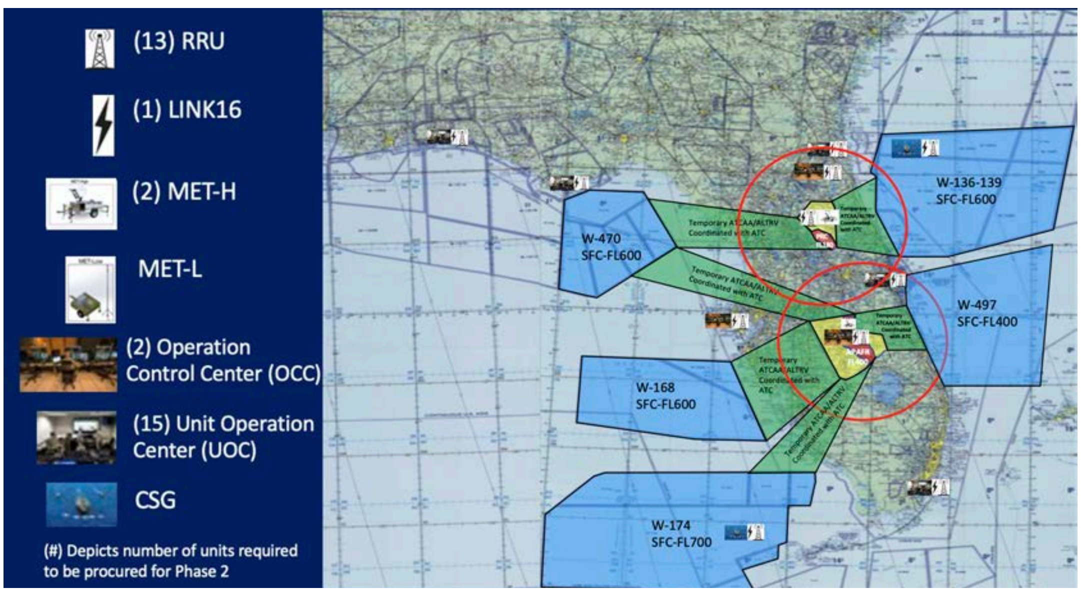


Figure 15: OMOS for Phase 2 Technology Demonstration

The MacDill OCC will primarily coordinate technology demonstration events for APAFR and FACSFAC OCC will coordinate for events at PRC.

Management

The management of FATR will include the procurement of equipment, facility setup and contracting personnel to operate and maintain the OCC/UOCs and blended ALVC environment, to include the communication network across the peninsula. This effort will include extensive coordination with installation and unit facility managers; development of information technology (IT) architecture; communication network setup; scheduling of training events;

coordination of training scenarios; maintenance, repair and operation (MRO) of the FATR environment; compilation of data and feedback processes; and contract compliance and reports. In Phase 1B, the FATR team and Scientific Research Corporation, in coordination with supporting commands, installations and military units, will manage the 3-week prototype demonstration scheduled for May 2024.

The management of the FATR after Phase 1 will ultimately be determined by the DoD in conjunction with the funding source(s). The most likely management option for the Phase 2 technology demonstration will be a contract agreement between a private company and the funding source(s). Task 4/Deliverable D for Phase 1B (depicted in the Recommendations for Phase 1B Execution section at the end of the report) specifies the team's effort to coordinate the OMOS transition from Phase 1 to Phase 2.

The vision for Phase 3 assumes the DoD finds merit in the blended ALVC environment and programs funding for the build out and operation of the FATR in the future. The management of Phase 3 will likely have three options for DoD to develop: (1) DoD contractor agreement with a private company; (2) DoD programmed and operated; or (3) a combination of contractor and DoD operated. The future management portion of FATR will become clearer during Phase 1B when a company is selected to lead the project and funding source(s) are acquired for Phase 2.

<u>Operation</u>

Since FATR is a blended ALVC environment overlaying the Florida airspace and ranges, the operation of FATR will run in concert with all current military operations on the peninsula. The controlling agencies for all SUA and the ROA for the land impact ranges remains the same. All scheduling, operations and instructions will be IAW the SUA operation manual. Utilization of the FATR ALVC environment will include coordination with the appropriate OCC depending on the required training scenario. During Phase 1B, an OCC will be located at APAFR to coordinate all technology demonstration events with the ROCC during the 3-week period in May 2024. The coordination will include scheduling events; development of profiles; creating the live, virtual and constructive environment; execution, data capturing and recording unit feedback for the demonstrations.

In Phase 2, the OCC at APAFR will be converted to a UOC for use by units deploying to the airfield for agile combat employment (ACE) training. Two new OCCs will be located at MacDill DUC and FACSFAC JAX for the one-year technology demonstration. These OCCs will have the same responsibilities as previously described above. However, key functions including updating application software, communication architecture, MRO of the FATR environment and updating all the UOCs will become a focal point of the OCCs support role. Each OCC will have the specific support priorities listed in Table 7. UOCs will coordinate with the appropriate OCC depending on the location for the training event. When multiple locations will be used during a training event, the land impact range will set the priority of which OCC to coordinate FATR support requests. OCCs will primarily be utilized for joint/large force exercises (LFE) and can be used as a white force for the execution of any unit training event if requested. In many cases, each UOC will be able to plan, coordinate, execute and debrief daily training events utilizing the ALVC environment of the FATR with minimal coordination with the OCC or ROCC. Figure 16 depicts an example of a training coordination worksheet that will be transmitted from a UOC to an OCC/ROCC.

Table 7: OCC Support Priorities

OCC Support Priorities	MacDill DUC	FACSFAC JAX
1. Land Impact Range	APAFR (R-2901)	PRC (R2906/7/10)
2. Overwater Airspace	W-470/168/174	W-136-140/497
3. Service Branch	USAF, USA, USSF	USN, USMC, USCG

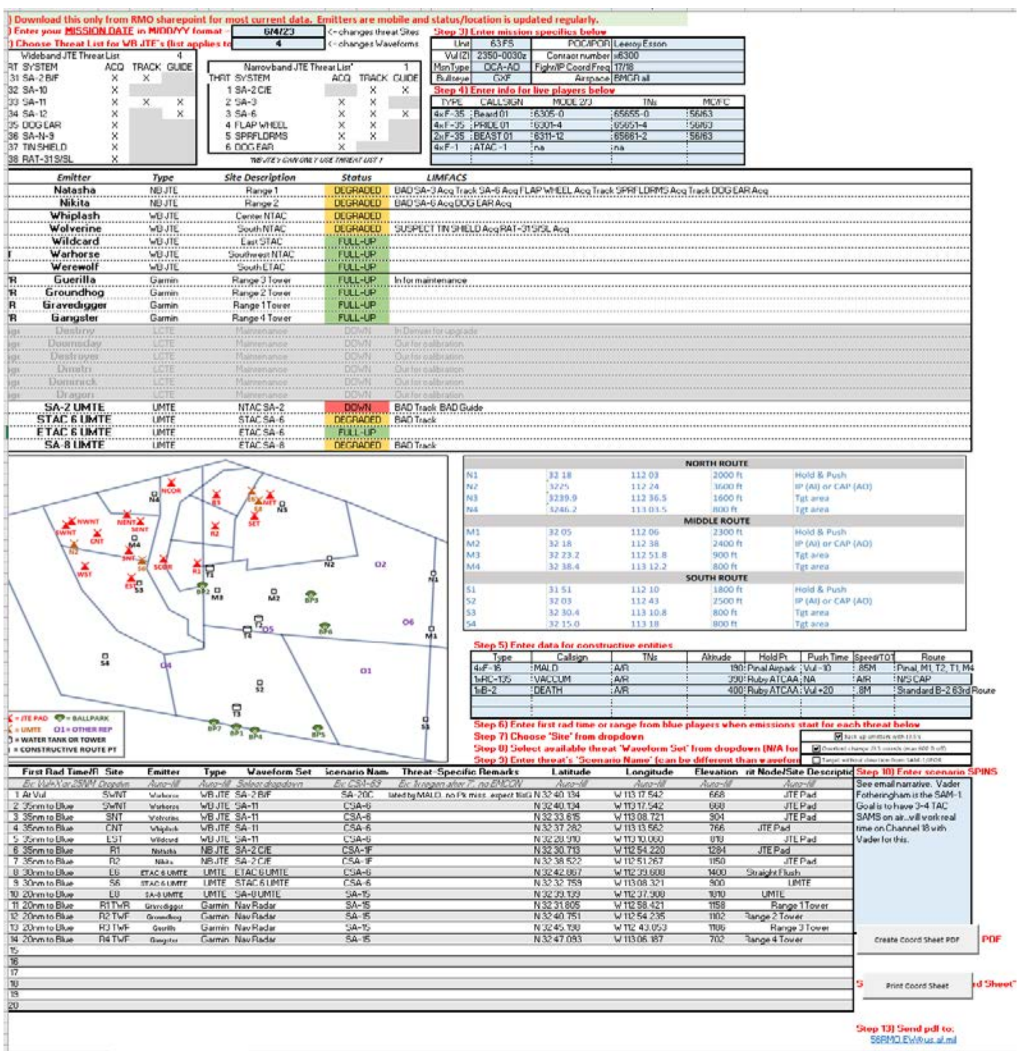


Figure 16: Training Coordination Worksheet Example

In order to integrate the FATR environment into the current Florida military training areas, a draft operation manual was created and coordinated for inclusion in the APAFR and PRC range operation manuals depicted in Figure 12 and 13. The FATR operational manual draft (see Appendix A.2), when completed and approved by the ROAs in Phase 1B, will be included as a supplement to AFM13-212 (see Reference 2) and PRC Handbook (see Reference 2). The manual will include instructions to schedule, develop training scenarios, operate live emitters, include virtual and constructive entities, operate in the LVC environment and allow detailed debrief of training events. The FATR operation manual draft has been submitted to the 598 RANS and PRC for coordination with USAF and USN headquarters for inclusion as a supplement in the respective range operation manuals. Further coordination and final approval for the supplement will be expected during Phase 1B and included in the final report.

<u>Summary</u>

Task 1.1 and 1.2 have been completed with the primary focus of developing a concept to improve Florida training areas and increase the joint force's combat capability. The team believes the completion of Deliverable A has built a solid foundation for successful transition to the operational demonstration in Phase 1B. Defining and resourcing requirements, developing technology and processes and operating the FATR will be work in progress through Phase 2.

Deliverable B: PATS/ALVC Prototype System Demonstrated in a Controlled Environment

Task 1.3-Development and demonstration of PATS/ALVC prototype system (TRL 6)

Overview

Defining the term LVC is mandatory for bounding and shaping the discussion of the PATS/ALVC prototype. For the FATR, LVC represents all aspects of live, virtual, and constructive training systems. LVC is the injection or supplementation of synthetic (e.g., simulators) and constructive systems/effects into live platforms and their onboard system controllers, regardless of warfighting domain (e.g., air, land, sea, space, and cyber). The constructive injection includes scenario generation, threat emulation, physics and effects-based modeling and simulation (M&S). Collectively, the injection of synthetic and constructive effects into live platforms is best termed synthetic-inject-to-live (SITL) LVC and is the basis for creating a blended LVC environment.

Another key aspect of the instantiation of SITL LVC is encryption. Because of the proximity of threat nations to and persistence of overhead systems around the FATR, an encrypted environment is mandatory. Where synthetic and constructive entities are “hidden” from plain sight, air and surface-based platforms are not. However, the effects from both Red (threat) and Blue (friendly) systems, in the training environment, are likely not hidden from enemy detection. This is where virtual (synthetic) and constructive training characteristics are maximized. Encrypting the training architecture is mandatory to mitigate risk of operation security (OPSEC) and information security (INFOSEC) concerns and release of classified tactics, techniques, and procedures (TTP). The FATR will operate in an encrypted training environment.

The FATR will leverage previous LVC advanced technology demonstrations and maturation projects from across the Department of Defense (DoD) to develop the final deliverable – an advanced training range combining all aspects of LVC technology to create a blended LVC training environment taking advantage of the air, land, and sea space that is in and around the Florida peninsula.

Objective

Due to the abundance of 5th generation platforms in and around the state of Florida, the FATR will provide an operationally representative training environment that will allow soldiers, sailors, airmen, marines, and guardians the ability to train in an operationally representative environment emphasizing INFOSEC/OPSEC and minimizing the collection of TTP by our enemies. The blended LVC training environment will primarily focus on 5th generation systems and platforms (e.g., F-35 and Next Generation Jammer/NG), while providing a challenging training environment for ground forces at the squad, company and battalion levels. It will also allow for 4th generation platform and systems (e.g., EA-18G/F-15E and Next Generation Electronic Warfare Planning and Management – EWPMT) to train as a joint force against pacing threats in a contested and operationally representative environment.

<u>Development</u>

The FATR will be based on a combination of live and constructive threats systems that will create the blended LVC training environment. At the heart of the live threat systems is the MET family of systems which will have (4) variants: Low, Medium, High, and a scalable AESA Multi-function array (AXEE). Each of the systems will be mobile and transportable, deployable by land and potentially by sea. They will operate stand alone or as a network connected system replicating an advanced Integrated Air Defensive System (IADS). All the MET systems will have the ability to provide multiple threat emulations within the frequency spectrum as depicted in Figure 17. Although each system is only capable of emitting one threat frequency at a time, the system will be capable of remotely reprogramming via a wireless network through a SDR to emit another threat frequency in less than 60 seconds. MET will have "receive" capabilities as a spectrum monitoring/surveillance system and replicate threat waveforms as follows: electronic attack (EA), early warning radar, target engagement radar, and missile uplink/command link signals. Figures 4 and 5 in the executive summary section display the four MET systems and detail capabilities of each (AXEE capabilities are still in the development phase but will reflect the MET-H system with significantly more power and an AESA antenna).

System	Frequency	IBW	Power	Antenna
Low	70 MHz – 6 GHz	50 MHz	~20 W	Omni
Medium	70 MHz – 6 GHz	50 MHz	~200 W	Directional with manual AZ/EL
High	70 MHz – 18 GHz	200 MHz	≥ 200 W	Directional with electronic AZ/EL

Figure 17: MET Frequency, Bandwidth, Power and Antenna Specifications

Constructive threats and the Common Operating Picture (COP) for Phase 1A of the technology demonstration will be provided by the DIADS, which is a US government-owned, open-source software application. DIADS has been a part of electronic warfare (EW) analysis for many years, dating back to its origins from the Real-Time Electromagnetic Defense Capability (REDCAP). DIADS was a centralized rehost of the REDCAP distributed Integrated Air Defense System (IADS). Given the DIADS legacy, it has been used for EW analysis since its development from the REDCAP hardware-in-the-loop (HITL)/man-in-the-loop (MITL) software. DIADS has increased its role in the integrated EW test process providing stimulation capability as a stand-alone, and more frequently, as a player in a distributed set of models and simulations. Because of its REDCAP lineage, it was initially only a real-time model and was used mainly in live and virtual test capabilities. What provides DIADS uniqueness is its current use at the Air Force Flight Test Center, Edwards AFB, California, in the complete EW test process from analysis to installed system test. This is essential in developing an integrated EW test process. It is used today in LVC modes for both the test and training communities. DIADS has been and will be a key player in several distributed virtual simulations and installed test facilities. In the test domain, DIADS was the key opposing forces player in the F-22 Air Combat Simulator (ACS) program. In the training domain, DIADS is integrated with the Red Forces Command and Control (RFCC) system at Nellis AFB, NV, as well as the Fallon Range Training Complex (FRTC) at Naval Air Station Fallon, NV. DIADS was able to participate efficiently in these distributed simulations via continuous support of standard High-Level Architecture (HLA) and Distributed Interactive Simulation (DIS), as well as several specialized interfaces. Other models and simulations typically use DIADS to represent a test capability that best meets the requirements of a specific test. DIADS does not provide a full mission simulation, but instead focuses on air picture generation and command and control processes inside a typical IADS. Within this context, DIADS provides a timing and spatial synchronization of the sensor, weapons and command and control (C2) elements that allows it to be used in any level of simulation and the informational content to allow for evaluation of hardware, techniques and tactics, as well as stimulation of virtual and live hardware. DIADS works with other models to provide that capability, and in the end, evaluate future weapon system capabilities while providing the COP for integrated and advanced training events.

To provide a full SITL LVC training capability, synthetic injects (effects produced in synthetic training devices or simulators) are required. Due to the time and funding required to create a complex training architecture of this nature, synthetic injects from distributed simulators will not be included until Phase 2 of the FATR technology demonstration. However, synthetic injects from DIADS to actual aircraft will be attempted in Phase 1B, time and funding permitting. Amplifying information will be provided in the Phase 1B final report.

Architecture of the Phase 1A PATS/ALVC Demonstration

The architecture for Phase 1A of the PATS/ALVC demonstration consisted of a MET-L being controlled remotely (wirelessly) by DIADS via an SDR. The message protocol used is the legacy DIS message format. DIS is an Institute of Electrical and Electronics Engineers (IEEE) standard protocol used primarily in modeling and simulation (M&S) and has proven applicability to the LVC training environment. The framework of the architecture starts with DIADS providing C2 to the MET system and injects a constructive threat indication into the training environment. Once commanded by DIADS, the SDR remotely sends a signal to the MET-L to initiate a low power threat emission that attempts to stimulate a rotary wing aircraft's radar warning receiver (RWR) flying in close proximity (1.65 nm) to the MET-L system. This demonstration architecture was developed over the course of Phase 1A and was setup for a demonstration in a controlled environment. Figure 18 illustrates the demonstration schematic.

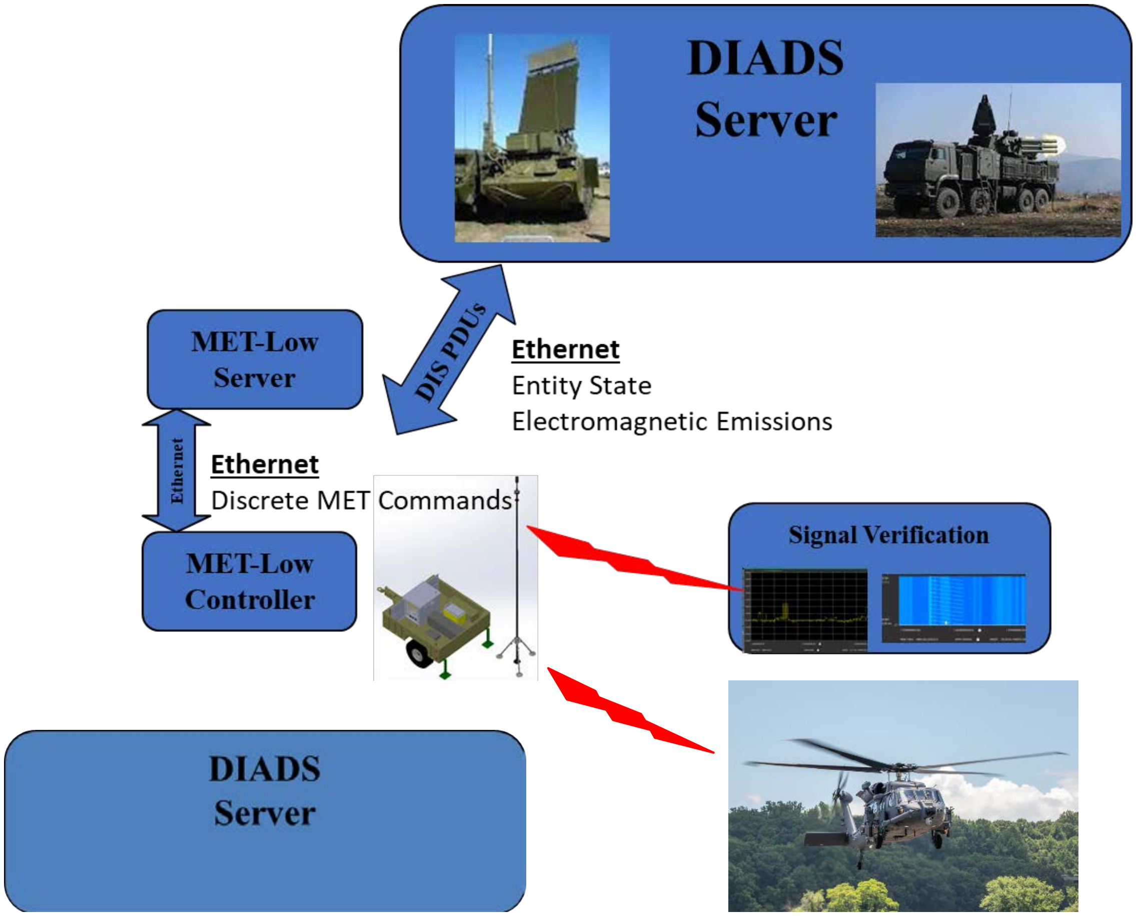


Figure 18: Phase 1A Demonstration Schematic

Demonstration Summary

The Phase 1A demonstration (Part 1) was completed at the SRC facility in Huntsville, AL on Wed, 7 June 2023. Participants included the Threat Systems Management Office (TSMO) from Redstone Arsenal, SRC MET engineering team, FATR Program Manager and Technical Lead and members of the 41st Rescue Squadron from Moody AFB, GA. A mission briefing was held on Tue, 6 June 2023 to ensure all participants were familiar with the PATS/ALVC architecture, scope of the demonstration and all critical demonstration parameters and profiles. The briefing also allowed the technical team to better understand the combat systems onboard the HH-60W helicopter. The 41st Rescue Squadron flies the HH-60W Combat Search and Rescue (CSAR) helicopter with the APR-52(V)1 RWR, Common Missile Warning System and ALE-47 Countermeasures Dispenser. The threat warning and indications system is integrated on both the pilot and co-pilots' digital multi-function display (MFD). The threat display is appropriately called the "Ring of Fire" because the display takes highest priority when threat indications are received and is located on the highest level of the MFD. Figure 19 shows the APR-52(V)1 digital electronic support measures (ESM) equipment and the pilot's MFD.

Figure 19: HH-60W ESM Equipment and MFD

The MET-L system was programmed to be able to emit multiple waveforms (one at a time) representing different surface-to-air threat systems. As depicted in Figure 20, the HH-60W flight profile included a holding point approximately 1.65 NM southeast of the SRC facility and a northwest to southeast racetrack pattern, exposing all four quadrants of the RWR to the MET-L emissions.

Figure 20: HH-60W Flight Profile for PATS/ALVC Demonstration

Sixteen passes were performed using seven different profiles and four distinct threat waveforms. The profiles consisted of a combination of racetrack patterns, hovering at altitudes ranging from 1000-1500 feet above ground level and performing multiple 360 degree turns to expose all quadrants to the threat indications at close range. The HH-60W was only able to accurately identify and display one of the four threat waveforms under the high-power MET setting. This was anticipated due to the preset Mission Data File (MDF) loaded in the ESM system. The 40-minute flight event was accomplished in the presence of two persistent RF signals; one of the signals was emanating from the Restricted Area south of the Redstone Arsenal Airfield and the other was emanating from the vicinity of the Huntsville International Airport. By conducting passes without the MET emitting, the crew identified the two persistent signals and their azimuth in the operating area which allowed them to confidently discern the accuracy of the MET emission and azimuth. Waveform D was correctly indicated and displayed in the pilot's MFD as an advanced surface-to-air threat system that was confirmed to be in the MDF of the aircraft.

A flight debrief was conducted with the crew of the HH-60W. All the passes were reviewed and discussed. The crew confirmed the aircraft's successful reception, identification and displaying of the appropriate indication on the RWR for Waveform D. The aircraft commander summarized the successful demonstration with the following statement: "This was value added because we only get to see this (current threats) in the simulator." These are compelling words from the warfighter and motivation for the team to continue forward on developing the FATR.

Due to software updates, the DIADS portion (Part 2) of the architecture was completed successfully in a separate demonstration on 28 Jun. **Overall, the entire architecture, as depicted in the Figure 18 schematic, functioned completely as designed and met the requirements of TRL 6**. Reference Appendix B.1 and B.2 for a complete synopsis of the Phase 1A demonstration overview, architecture, profiles and execution. The team is now ready to develop the PATS/ALVC prototype system to show proof of concept in an operational environment (TRL 7) in Phase 1B.

<u>Architecture of the Phase 1B Demonstration</u>

The PATS/ALVC technology demonstration in Phase 1B will be similar in scope but will be conducted on an operational training range in central Florida using a MET-H system. The range to be used is the APAFR and live participants will again consist of rotary wing platform(s) from Air Force and Army units, as well as potential support from the Helicopter Maritime Strike Wing Atlantic (HSMWL) and the Maritime Patrol Wing ELEVEN, both based in Jacksonville, FL. HSMWL flies the MH-60R multi-purpose helicopter with an ALQ-210 ESM suite and various other digital ESM capabilities on their experimentation aircraft. Wing ELEVEN flies the P-8A and is equipped with the ALQ-240 ESM system in conjunction with the ALE-55 Fiber Optic Towed Decoy (FOTD) to provide situational awareness and defensive self-protection capability, respectively, against RF threat systems.

Another platform of opportunity is the F/A-18E/F Super Hornet. The Super Hornets, from the Naval Air Forces Atlantic, are currently flying with an Operational Flight Program (OFP) that was modified to include SITL LVC training injects as part of the Secure LVC Advanced Training Environment (SLATE) Technology Maturation (Tech Mat) project. The SLATE Tech Mat project was conducted on behalf of Program Executive Officer Tactical Aircraft (PEO-TACAIR) in 2021. As part of Phase 1B, the technology demonstration will utilize an OCC setup in a hangar facility located at the APAFR. The OCC will consist of a server rack with processors that will include the software host system. The server rack will likely resemble a Live Mission Operations Center (LMOC located at Hill AFB in Ogden, UT) server called WarRoom. For this technology demonstration, there is an opportunity to install a WarRoom-In-A-Box (WIAB) that will act as an actual WarRoom server surrogate. The WIAB will have a host software package to include: DIADS and a data recording/debriefing capability; multiple monitors to display the COP, DIADS, and other pertinent data feeds; and switches and connectors to control an SDR. It is anticipated there will be a tactical datalink (Link-16) with the requisite NSA-certified encryption available at the APAFR complex. A graphical depiction of this schematic is shown below in Figure 21.

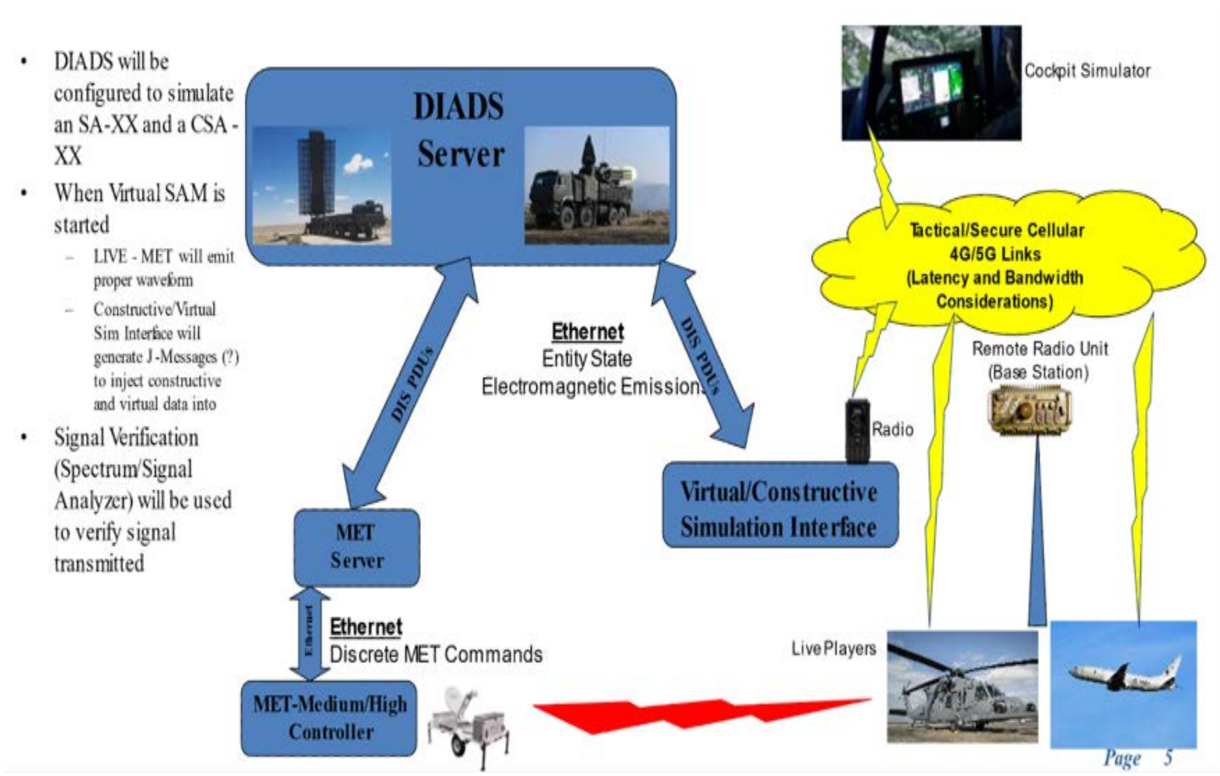


Figure 21: Phase 1B PATS/ALVC Technology Demonstration Schematic

Phase 1B will culminate in a three-week operational demonstration scheduled for May 2024. Due to the complexity and INFOSEC/OPSEC aspects of a multi-domain training range included in Phase 2, the FATR team will be required to interact and partner with U.S. Department of Defense organization(s), individual services and reserve components. Government-furnished equipment (GFE) will be required (e.g., MIDS-J terminals and Crypto Mod keys for Link-16) in order to create the fully functioning blended LVC training environment required to prepare the joint force for the peer fight. This is even more evident with recent open-source reporting that China is basing an electronic listening post in Cuba. A fully encrypted, multi-domain blended LVC training environment is the only way to overcome these enhanced security risks.

The FATR team would like to thank the 23 WG at Moody Air Force Base, GA for their participation in the demonstration and their continued support in Phase 1B. The following photos (Figure 22) are added to recognize the exceptional team effort of the event.

Figure 22: Photos of MET/ALVC Prototype Demonstration at SRC, 7 Jun 2023

Deliverable C: Coordinated and Approved Air Traffic Control Corridor Procedures to Link Regional Military Airspace to Utilize the FATR

Task 2.1: Coordinate and Seek Federal Aviation Administration and Air Traffic Control Approval for Airspace Framework and Processes

Overview

As part of the Phase 1A FATR project work, our team reviewed various operational concepts being utilized within the Department of Defense, interviewed various DoD aviation-centric commands located across the state of Florida, documented their high-level training requirements, and reviewed the current military use airspace construct over and around Florida as defined in the National Airspace System (NAS) documentation from the FAA. Considering all that information, a confluence of four unique factors makes a reevaluation of the military use of airspace over and around the Florida peninsula a strategic imperative. The four most significant factors are: (1) the Florida ranges and holistic complex of military-use airspace/sea-space; (2) the 2022 NDS identification of the Peoples Republic of China as a strategic competitor and pacing threat necessitating the requirement for our military to provide more joint force, all-domain test and training operations; (3) air, land, sea, space, cyber weapon systems capabilities and training requirements, and; (4) the planned 5th generation aircraft basing laydown for the southeastern United States.

This section will cover the background of each of these four topics, outline a concept of how best to connect existing portions of current military use airspace and optimize range capabilities to enhanced weapon systems training for the joint force. Our team's role is to coordinate a consolidated airspace proposal with the Florida units for submission to the FAA and ATC.

The goal of the consolidated airspace proposal is neither a complete redesign, baseline change, nor is it a significant revision. The plan would only add temporary use Air Traffic Control Assigned Airspace (ATCAA) and/or an Altitude Reservations (ALTRV) to connect existing SUA offshore Warning Areas to overland Restricted Areas and MOAs. By doing this at scale, and holistically across Florida, the airspace necessary to support realistic training for the joint force can be achieved in Florida with minimal impact and disruption to the NAS. Ultimately, this proposal will need to be fully coordinated by DoD with the FAA and its Air Route Traffic Control Centers (ARTCC) across the southeastern United States.

Objective

The objective of the task is to assist Florida-based military units and their headquarters in developing a consolidated airspace change proposal for FAA consideration that will address the issues identified in the overview. The team laid the framework for Task 2.1 in Phase 1A and will continue to assist the military commands in the FAA submission and final approval process. Ultimately, the decision to coordinate and submit the airspace change request will be made by each respective DoD stakeholder that chooses to utilize the FATR environment. Our team has no official standing to make an airspace change request. During the initial coordination in Phase 1A, our team encountered broad agreement from the Florida units on the proposed changes, but more importantly, the consensus that a consolidated DoD coordination effort would be more efficient than multiple individual FAA requests from various local units located around the state.

The Florida Ranges and Airspace Complex

With twenty-three major military and DHS installations in Florida, across four services and the USCG, military aviation has a long and storied history in Florida, not to mention major economic implications. Much of that history derives from the legacy of the build-up and early years of the United States' involvement in World War II when today's, modern military complex in Florida was born. Florida was a natural place in the 1930s-1940s for aviation training as it had abundant airspace over both land and water, land areas available for bombing practice and other aviation-related ordnance testing and training. Further enhancing this premier airspace in Florida were, and still are, the prevailing climate and weather conducive to reliable, year-round Visual Flight Rules (VFR) flying conditions. Additionally, Florida presented numerous ocean surface and subsurface areas for naval testing and training as well. All those factors still exist in Florida today. What has changed in the last 65+ years, in addition to reducing the WWII military base footprint, has been the addition of access to and from space surrounding the Florida peninsula, along with the tremendous growth of commercial aviation and development of the NAS to regulate it via the FAA. Florida's major range complexes today are depicted in Figure 23.[1] They include robust sea and airspace in offshore areas on either side of the peninsula.

[1] Figure source: *"From the sea floor to outer space: The value of Florida Ranges to existing and future military missions."* Spring 2022. Pg. 11. Enterprise Florida available at: https://www.enterpriseflorida.com/wp-content/uploads/Florida-Range-Report-Spring-2022.pdf.

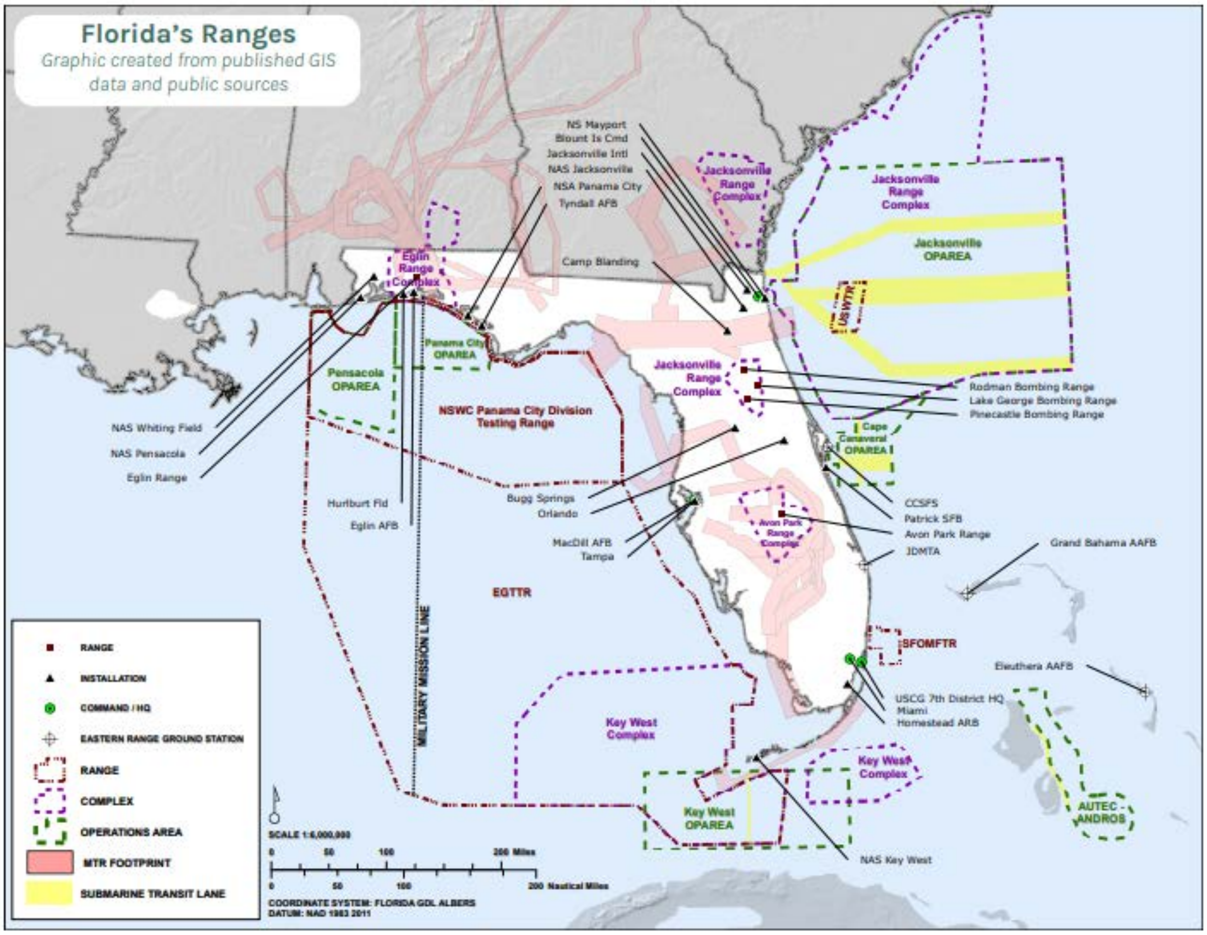


Figure 23: Overall Florida Military Range Complex Highlights

Offshore Airspace

To the west, the Eglin Gulf Test and Training Range (EGTTR) has been described by the Secretary of Defense as "…an irreplaceable national asset used by the Department of Defense (DoD) to develop and maintain the readiness of our combat forces and is critical to achieving the objectives contained in the National Defense Strategy. The unique capabilities present in the region have been developed over decades through the investment of billions of taxpayer dollars and countless hours of effort by federal, state, and private organizations and local citizens. No other area in the world provides the U.S. military with ready access to a highly instrumented, network-connected, surrogate environment for military operations in the Northern Arabian Gulf and Indo-Pacific Theater."[2] The totality of the EGTTR provides over 150,000 nm^2 of surface and airspace, making it the largest over-water DoD test and training area in the continental United States. "When coupled with approximately 465,000 acres of land managed by Eglin Air Force Base, and the surrounding installations of the Naval Surface

[2] Report to Congress, Preserving Military Readiness in the Eastern Gulf of Mexico, Office of the Secretary of Defense, May 2018. Document Number: 03012018T098

Warfare Center (NSWC) Panama City, Tyndall AFB, MacDill AFB, and Naval Air Station (NAS) Key West [and Navy controlled range space surrounding the lower Keys], this area cannot be replicated as it provides one of the DoD's most diverse, highly instrumented areas."[3]

To the east of Florida, the Jacksonville Range Complex and Operating Areas (JAXOPAREA) encompasses offshore, nearshore, and onshore OPAREAs, ranges, and Special Use Airspace (SUA). Components of the JAX Range Complex encompass 50,090 square nautical miles (nm2) of sea space and 62,596 nm2 of SUA off the coasts of North Carolina, South Carolina, Georgia, and Florida, as well as 20 square miles of inland range area in north-central Florida. This complex consists of targets and instrumented areas, airspace, surface OPAREAs, and inland range facilities. It also includes the Jacksonville Undersea Warfare Shallow Water Training Range (USWTR), the first underwater training range, designed and built for use by Air, Surface, and Undersea participants in the shallow-water area that is the most difficult real-world anti-submarine warfare environment.

Still to the east and south of the Jacksonville Complex is the Eastern Range, extending more than 10,000 miles from the Florida mainland through the South Atlantic and into the Indian Ocean. It includes the launch facilities at Cape Canaveral Space Force Station and a network of instrumentation stations, including Malabar and Jonathan Dickinson tracking annexes, and downrange sites. Space Launch Delta 45 and the Eastern Range assets continue to provide a vast network of radar, telemetry, and communications instrumentation support to facilitate the safe launch of all Department of Defense National Security Space, National Aeronautics Space Administration, National Oceanic and Atmospheric Administration, commercial and Naval Ordnance Test Unit's support to the Navy's Strategic Systems Programs missions.

Overland Airspace and Associated Ranges

The on-land ranges and associated airspace for the FATR technology demonstration includes a MET/ALVC system positioned at APAFR and possibly a second MET/ALVC system positioned at the Navy's PRC. More details regarding the MET/ALVC prototype systems, their laydown and phasing in FATR through Phase 2 are provided in the Deliverable A section of this report.

APAFR provides a sustainable, world-class training complex focused on advanced, realistic, and relevant training for joint, interagency, and multinational partners, excelling in air-ground integration and ACE operations (Figure 24). The facility is commanded by the 598th Range Squadron whose mission is to deliver mission-ready support facilities, infrastructure, base operations support services, logistics, fire services, environmental services, and communications support assuring success in training for their customers. The range provides 106,000 acres of day/night training space, has an 8,000-foot uncontrolled runway, and 13 different Military Training Routes (MTRs) and 7 established air refueling tracks. It also includes 189 sq. miles of restricted airspace.

---

[3] Ibid.

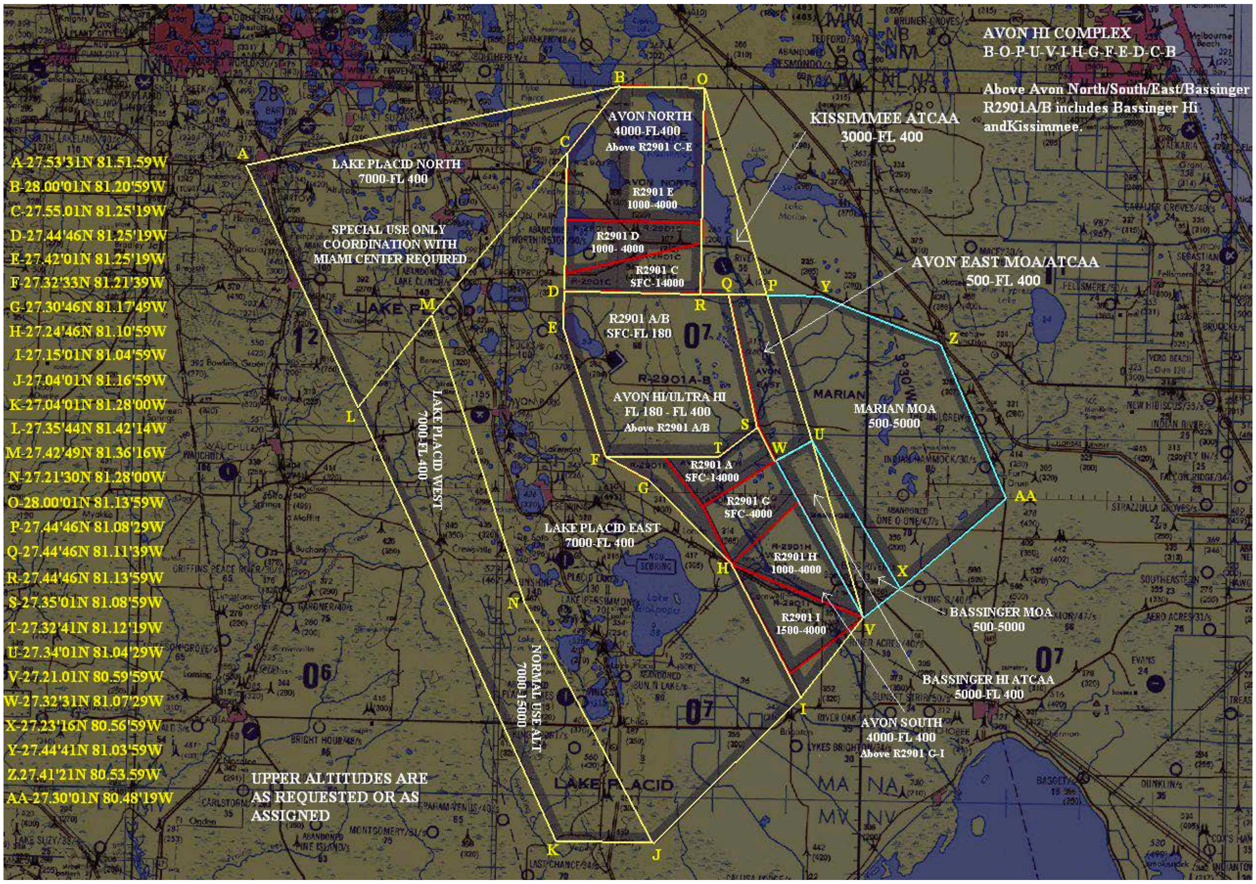


Figure 24: APAFR Restricted Areas and MOAs

PRC is an unfenced area within the Ocala National Forest, with the eastern edge located approximately 2 miles west of Florida SR 19 and the Camp Ocala campgrounds, and 1/2 mile west of the Farles Lake campground Figure 25. Military aircraft fly at low altitude over the forest, and drop practice, inert or live bombs and/or shoot their cannons in the middle 450 acres of the range. Aircraft will also fly low over the forest, northwest of nearby Lake George on the St. Johns River, bisect the lake at low altitude on a southeasterly heading, and drop inert 500 lb., 1000 lb., or 2000 lb. bombs or mines in a Navy controlled impact area in the southeast quadrant of Lake George. Restricted Area airspace in the form of R-2906, R-2907A/B/C, and R-2910A/B/C/D/E overlies all range area, all bounded by the Palatka 1 and Palatka 2 Military Operating Areas (PALATKA ONE MOA; PALATKA TWO MOA), extending from just south of the city of Palatka to just north of the town of Paisley. Depending on potential wildfire conditions, aircraft can fire 20mm, 25mm and 30mm cannon rounds, drop Mk 76 and Mk 106 practice bombs and live Mk 82 series 500 lb. bombs (Mk 82/BLU-111/BLU-126 series, GBU-12 LGB, GBU-38 JDAM) bombs on the range. Inert Mk82 series, Mk83 series (1000 lb.) and Mk84 series (2000 lb.) bombs may be dropped at any time regardless of fire conditions. PRC is the only place on the East Coast where the Navy can do live impact training. The Navy drops nearly 20,000 bombs a year on the site.

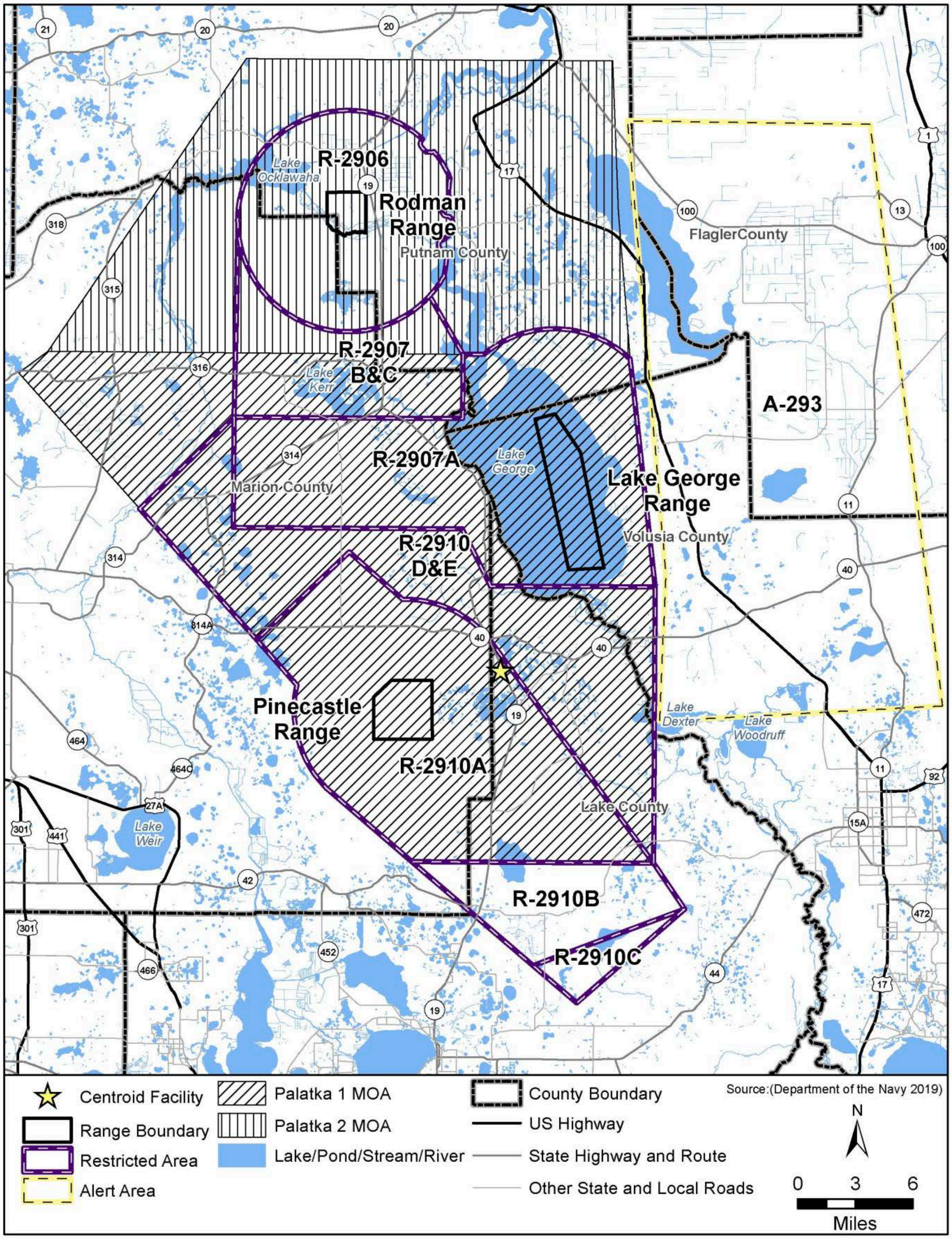


Figure 25: PRC Restricted Areas and MOAs

Existing Airspace Summary

The airspace associated with all these land impact ranges is highlighted in Figure 26 below.[4]

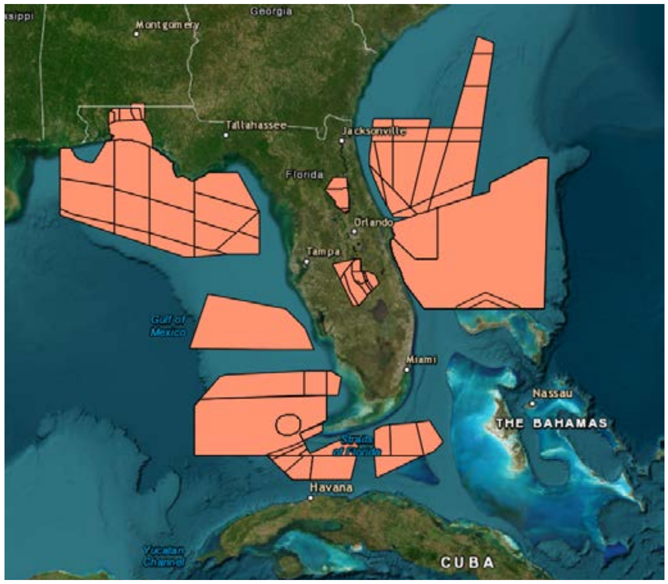


Figure 26: Key Special Use Airspace Over Florida and Surrounding Waters

It is this unique combination of not only the airspace and associated aviation ranges, but also the sea, subsea, space and cyber space ranges spanning the state that creates the unique value proposition for military training in Florida. It enables the potential training space encompassing 500 nm x 400 nm (200,000 sq/nm of air, land, sea, space, cyber potential) from the EGTTR to the Atlantic. How to better link these existing airspace areas for temporary durations in support of joint force training is the focus of the airspace change proposal in this narrative along with the accompanying draft of an airspace change request developed for use by joint military units in requesting tactically significant training space.

This combination of ranges and infrastructure is also coupled with distinctive geography that can provide a bespoke solution to training for the National Defense Strategy's identified "pacing challenge."

National Defense Strategy Focus and the "Florida Fit"

What has also changed more recently has been the identification of the People's Republic of China in the 2022 National Defense Strategy as the most significant threat and a "pacing challenge" for U.S. forces. This recognition of the decades-long rise of Chinese power to rival U.S. forces in the Indo-Pacific theater brings new value to the combined air-land-sea test and

[4] Created from Florida 3D Military Range tool available at: http://florida3d.demo.s3-website.eu-west-2.amazonaws.com

training range complexes across Florida. As previously depicted in Figure 3 , Florida and its holistic complex of ranges, sea space and airspace present a unique ability to connect multiple air, land and sea areas due to lack of bordering states or other countries. The geographic circumstance is also unique in that it reasonably represents and fits the configuration of the area in the South China Sea; a recognized area where increased friction and interactions could lead to the outbreak of hostilities in the Western Pacific.

Florida's unique military range complex presents a robust, joint warfighting, all-domain opportunity for the military to practice with the forces required, and at the scale needed in a combined arms manner. It is perhaps the only place in the world where the anticipated anti-access, area denial strategy anticipated from China inside the Western Pacific's first island chain could be replicated at scale for testing, training, and exercises. In their 2022 analysis of the Florida Range Complex, The Roosevelt Group noted that, "the concept of Joint All-Domain Operations (JADO) is not new but has emerged in recent years as the one true competitive advantage of the United States and its allies and partners."[5] Consistent with JADO, is the evolving concept of Joint, All-Domain Command and Control (JADC2) to provide the network, data storage and analysis, data transmission, and ultimately decision superiority that comes from connecting massive amounts of data. The 5th Gen F-35 is a key capability node given its enhanced networking and data link capabilities. As such, the ability to better leverage the existing Florida airspace and range complex is a strategic imperative.

The Roosevelt Group also highlighted a conclusion in their report regarding the unique Florida geographic "fit" to the strategic inflection point facing the United States that summed it up best:

> "As the United States and its allies bring Joint All-Domain Operations to maturity, the integrated Florida range-of-the-future will take on new significance. Its most important use could well extend beyond the development of new all-domain architectures and employment doctrine, to the campaign-level rehearsal of a full-scale conflict between the United States and its pacing adversary."

Bottomline: the Florida ranges and linkages through the FATR concept are the only place in CONUS where the joint force can operationally train with live forces for our most difficult potential fight.

<u>Operational/Tactical Local Training Requirements</u>

To effectively train joint forces in integrated employment of capabilities against adaptive and determined threats, military forces must practice, rehearse, and adapt their TTPs in both building-block, unit-level training as well as when integrated together into larger joint force packages. The complex of ranges in Florida affords the joint force the potential to do this in ways that are either very difficult, or even impossible in other locations. The robust air, sea surface, subsurface, land, space and cyber ranges in Florida enable this combination of live

[5] *"From the sea floor to outer space,"* Pg. 6.

forces like no other. Particularly in preparation for a potential conflict in the South China Sea region which is heavily dependent on the maritime and air domains, Florida ranges provide this unique ability to combine these force types at the scale required to simulate both long-range fires and stand-off outside of long-range threats. Properly connected, the airspace over and around the Florida peninsula, coupled with the enhanced threat emitters provided in the FATR concept, enables the networking a sensor data from 5th Gen aircraft in training in tactical and operational relevant ways better replicating the way they will have to fight in support of the joint force. These 5th Gen air domain requirements are further amplified below.

F-35 pilots are required to perform the full spectrum of air-to-air and air-to-ground missions at all altitudes from surface to 50,000 feet. The F-35 Ready Aircrew Program (RAP) tasking requires pilots to maintain proficiency in the following primary mission sets:

- Offensive Counter Air (OCA)
- Defensive Counter Air (DCA)
- Tactical Intercepts (TI)
- Air Combat Maneuvering (ACM)
- Suppression of Enemy Air Defense (SEAD)
- Strike Coordination and Reconnaissance (SCAR)
- Close Air Support (CAS)
- Basic Fighter Maneuvers (BFM)
- Basic Surface Attack (BSA)
- Instrument Proficiency

In accomplishing this training, F-35 pilots require predictable and stable access to suitable low and high-altitude airspace. The RAP requirements of the F-35 dictate what events pilots must complete within a given year to build the essential skills necessary to be Combat Mission Ready (CMR). The ability for F-35 pilots to execute training events at high altitudes is required for many of the primary mission sets listed above. Failure to meet RAP requirements during a given cycle may result in additional training requirements and loss of CMR status.

A critical capability enhancement of the 5th Gen F-35 is its ability to network information to not only other F-35s flying in formation, but also with other ground, sea, and air assets. This provides enhanced ability for F-35 formations to work multiple missions sets in real-time; for example: a formation may be performing SCAR and SEAD functions while at the same time maneuvering towards a target area to conduct BSA or CAS missions as well. The entire time, the aircraft are linking and sharing information about the battlespace they are sensing. To do this effectively, tactical requirements may dictate a multi-aircraft formation. Figure 27 is an example of such a F-35, 8-ship formation supported by an airborne command and control aircraft with enemy fighters and enemy surface-to-air missile threats. The desired tactical formation and threat profile requires a 3-dimensional space of approximately 160 miles long by 100 miles wide and from the surface to 50,000 feet high to effectively train pilots to employ the F-35's capabilities as identified through various F-35 unit interviews and tactical discussions.

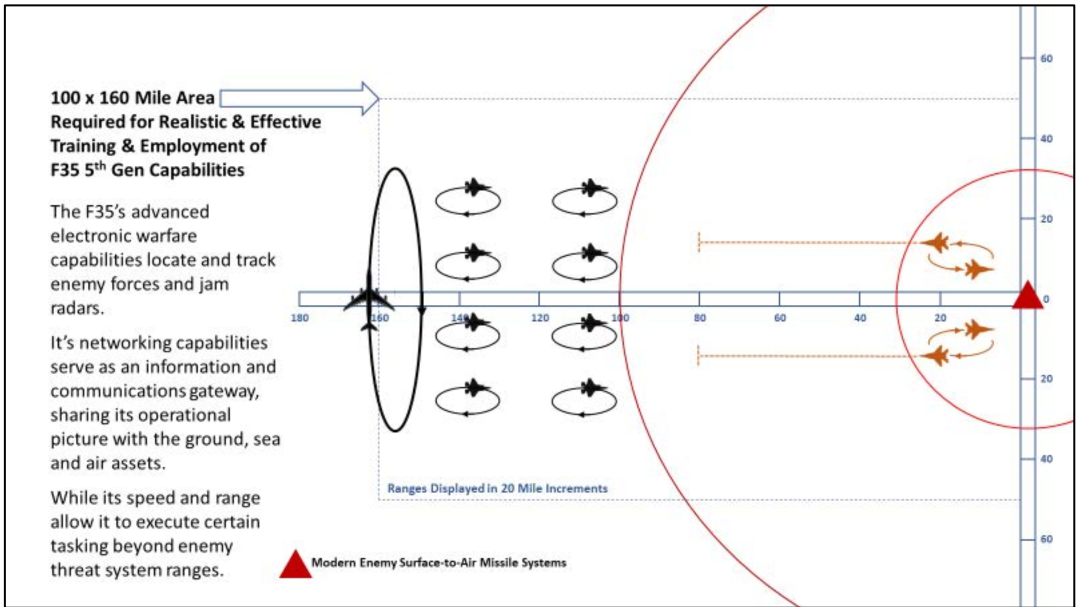


Figure 27: An 8-Ship F-35 Tactical Formation

The challenge the FATR Team identified, and depicted in Figure 28 below, is the lack of these larger airspace connections between the plentiful airspace available over the offshore Warning and training areas, and the Restricted Areas and MOAs that exist over the land ranges such as at Eglin AFB, PRC, and APAFR. While multiple MTRs exist (samples displayed in yellow) that do provide physical airspace connectivity, these MTRs tend to be rather narrow and would limit the ability of 5th Gen fighters to fly in tactical maneuver formations while transitioning from over water to over land operations as they approach the ranges/targets.

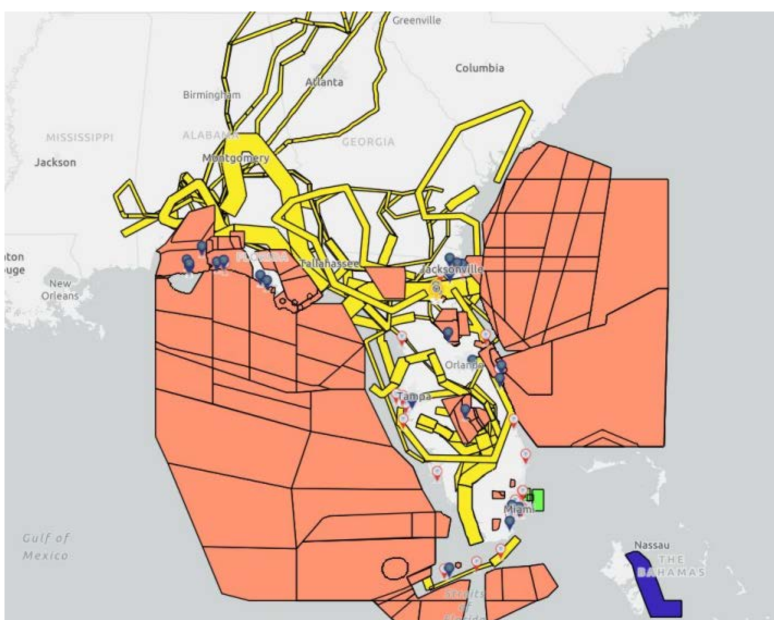


Figure 28 : Current Overwater and MTR Transitions to Over Land Range Complexes

Planned F-35 Basing Laydown for the Southeastern United States

Furthermore, as Figure 2 previously highlighted in the executive summary of this report, within the next several years, there is a planned basing laydown of 300-400 F-35, 5th Generation fighter aircraft across the Southeastern United States all within a 500-mile flying radius of Florida and its range complex. These aircraft and aircrew will require "backyard" ranges readily available to maintain their CMR ratings. While both the Air Force and Navy have other air training ranges in the western United States and Alaska that east-coast based aircraft will occasionally travel to for training and exercise events, it is not possible based on time, cost, and airframe life, for east coast-based aircrew and aircraft to continually travel that distance for routine training requirements. "Backyard" ranges must be configured in such a manner to enable 5th Gen capable tactics, techniques, and procedures to be practiced for proficiency. With the potential airspace and threat emitter changes proposed within the FATR plan, this capability, and more, are possible across Florida's range complex. Without these changes, pilots from the various fighter wings operating F-35 and future advanced fighters will be unable to accomplish various required flying events in the manner called for by their tactics, techniques, and procedures (TTPs) and will be unable to effectively "train as they will fight," particularly in air-to-ground missions sets.

Proposed Airspace Changes: ATCAAs & ALTRVs to Support Enhanced Training Requirements

Taking into consideration all the facts and information discovered throughout the preceding sections, and multiple fact-finding discussions with representatives of military aviation units based across Florida, the airspace challenge identified by the FATR Team was how to better leverage the existing NAS structure and range complexes, with minimal disruptions, to support holistic joint force training.

For the planned initial Phase 2 technology demonstrations utilizing the new MET threat systems at APAFR and PRC, existing MTRs and ALTRVs can support single aircraft or small formations performing limited operations. However, for larger force exercises, including 5th Gen aircraft, to fully benefit from the MET placement at ranges like APAFR and PRC for Phase 2 and beyond, a connective ATCAA "shelf" will be required to bridge between an existing Warning Area and a Restricted Area/MOA.

It is important to note that these ATCAAs do not necessarily represent simultaneous, nor continuous use. It is envisioned that each would be established for intermittent, short time periods when training or exercise evolutions are planned. They would still be subject to FAA approval/authorization in-situ and could be modified and/or canceled for use depending on prevailing conditions of weather, air traffic, and other issues that impact on the NAS.

Figures 32-37, at the end of this section, summarize the proposal of these "shelves" to connect the offshore and onshore airspace. Starting in the northeast and moving clockwise around the peninsula, this plan utilizes the following offshore warning areas to create new connections into both APAFR and PRC:

- W-136 – W-139
- W-497
- W-174
- W-168
- W-470

The ATCAAs from the Atlantic Ocean Warning Areas are appreciably shorter as the ranges from the western edges of the Warning Areas to the eastern edges of the Restricted Areas/MOAs tend to be in the 40–50-mile range distance. Ideally, these short distance ATCAAs would be available for discreet time durations from 18,000 – 35,000-foot altitudes (FL 180 – FL 350) to enable full tactical employment of a F-35 tactical formation as it moves inland to ingress the range Restricted Area.

Alternatively, when airspace constraints limit the altitude block, the ATCAA could be established in a 10K foot increment, selected by ATC, that affords the least impact to other commercial and general aviation operations. While the reduced altitude block does limit some tactical maneuvering flexibility, a 10K foot block still allows multi-aircraft formations maneuvering in their tactical configurations, as well as the opportunity to employ opposition "red" aircraft for an improved tactical training benefit.

Each ATCAA could be established for any discrete training event in any one of the following two altitude block options if the entire FL 180 – FL 350 is not available:

- FL 250 – FL 350
- FL 180 – FL 280

For training events that will include air-to-ground weapons employment into a range complex, the lower altitude block can be established as a step-down into the appropriate MOA and Restricted Area associated with that range.

On the other coast, the Gulf of Mexico Warning Areas have longer approach distances of 100–170-miles in length. As such, to minimize the volume of airspace activated by use of these ATCAAs, the longer routes could also be established in a continuous 10K foot altitude block utilizing one of the two identified above. This will afford greater flexibility for ATC to enable commercial and general aviation to continue to operate both above and below any ATCAA shelf activated for the limited duration the ATCAA activation is in effect. Figures 29 and 30 below highlight these two options.

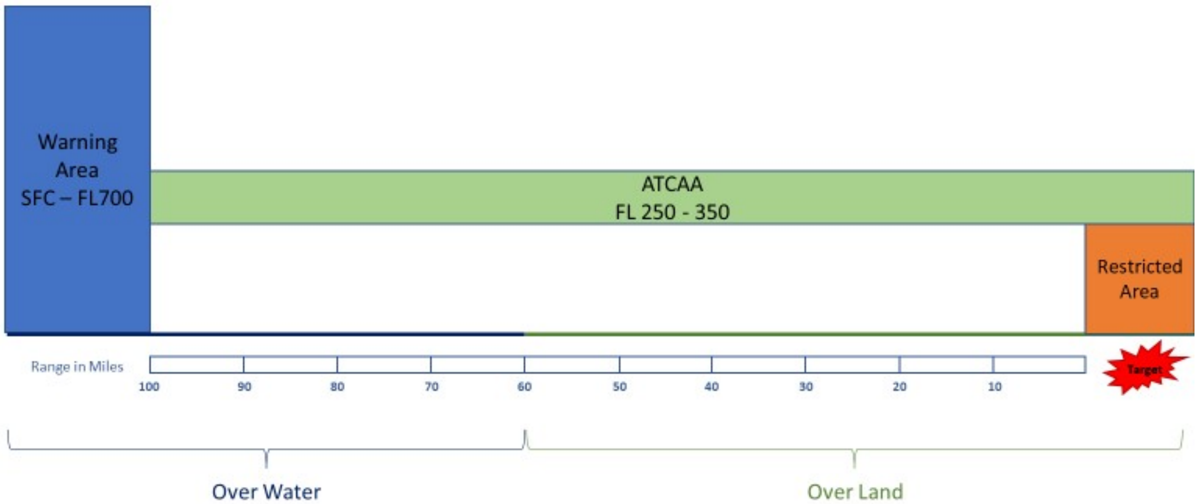


Figure 29: Side Profile View of ATCAA Reduced Altitude Block Concept (FL 250 - 350) from Over Water Warning Area to Over Land Restricted Area/Range

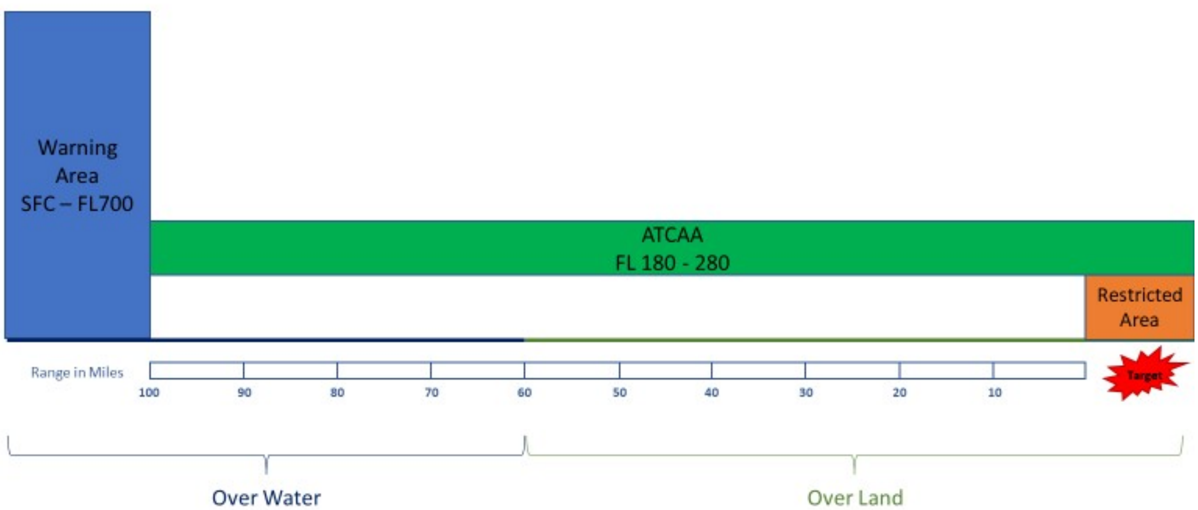


Figure 30: Side Profile View of ATCAA Reduced Altitude Block Concept (FL 180 - 280) from Over Water Warning Area to Over Land Restricted Area/Range

As further flexibility in these longer ATCAAs from the western side of the peninsula, a stepdown in altitude from one altitude block to another could be accommodated. While altitude block changes are not desirable as they create another artificial limitation imposed during live training, if it means the difference between completing the training event or cancellation due to ATC concerns, a stepdown could likely be accommodated on a shelf with over 100 miles in distance between Warning Area and the connected range. If this altitude block change were required, it would best be accommodated prior to the 50NM distance from the range as depicted in Figure 31 below. This step down would create further flexibility for brief periods of military use during the training event while still allowing for the flow of commercial and general aviation aircraft both above and below these corridors.

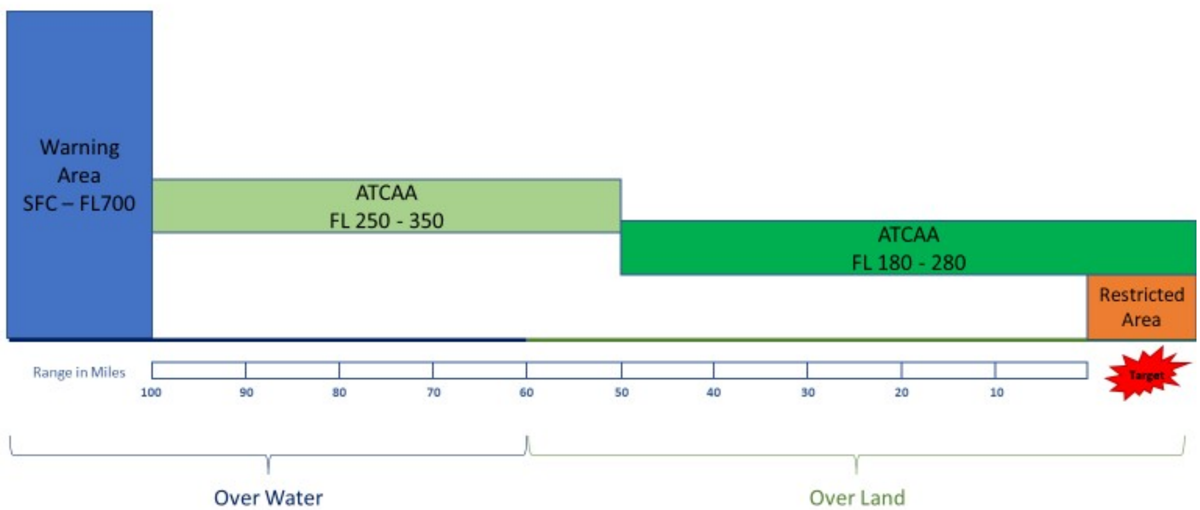


Figure 31: Side Profile View of ATCAA Tiered Step-Down Concept from Over Water Warning Area to Over Land Restricted Area/Range

Additionally, the time of ATCAA activation can be utilized during both day and night which may afford greater deconfliction options with commercial and general aviation operations.

The list of coordinates and figures on the following pages provide proposed boundary information and controlling authority for the initial concept proposal of the six ATCAAs. Altitude options for each are as described above.

- W-136 – W-139 to PRC (The Daytona Shelf)
    - Boundaries: Beginning at lat. 30°19’00”N., long. 80°59’47”W.; to lat. 29°51’15”N., long. 81°02’02”W.; thence southeast along a line parallel with and 12 NM from the shoreline to lat. 29°03’16”N., long. 80°38’35”W.; to lat. 28°50’00”N., long. 80°29’00”W.; to lat. 28°57'56''N., long. 81°28'24''W.; to lat. 29°36’21”N., long. 81°32’19”W.; to the point of beginning
    - Time of Designation: Intermittent by NOTAM
    - Controlling agency: FAA, Jacksonville ARTCC

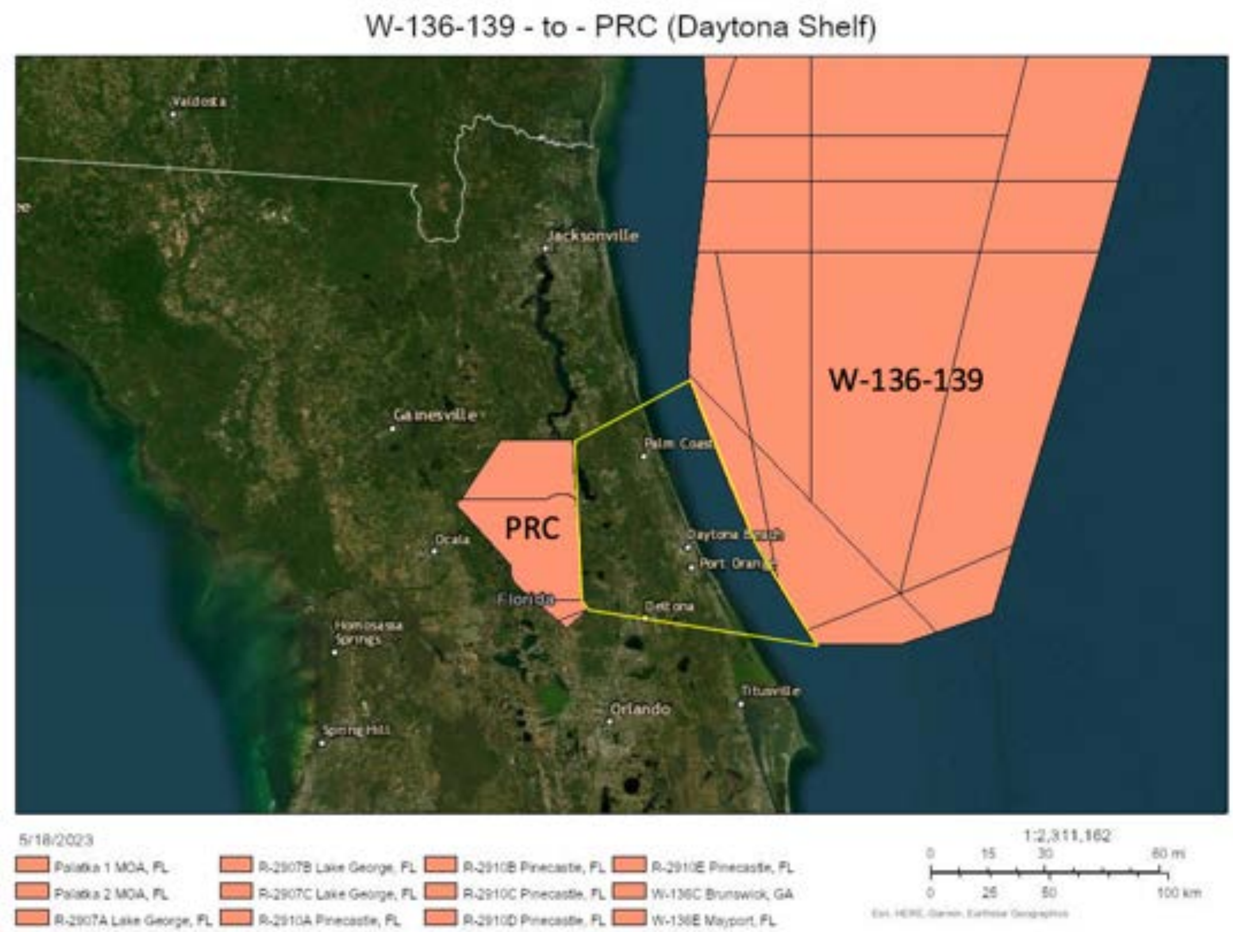


Figure 32: The Daytona Shelf

- W-497 to APAFR (The Melbourne Shelf)
    - Boundaries: Beginning at lat. 28°24’31”N., long. 80°29’52”W.; thence south along a line 3 NM from and parallel to the shoreline to lat. 27°31’14”N., long. 80°14’58”W.; to lat. 27°30'01"N., long. 80°48'19"W.; to lat. 27°41'21"N., long. 80°53'59"W.; to lat. 27°44'41"N., long. 81°03'59"W.; to lat. 27°44'46''N., long. 81°13'59''W.; to lat. 28°00'01''N., long. 81°13'59''W.; to the point of beginning
    - Time of Designation: Intermittent by NOTAM
    - Controlling agency: FAA, Miami ARTCC

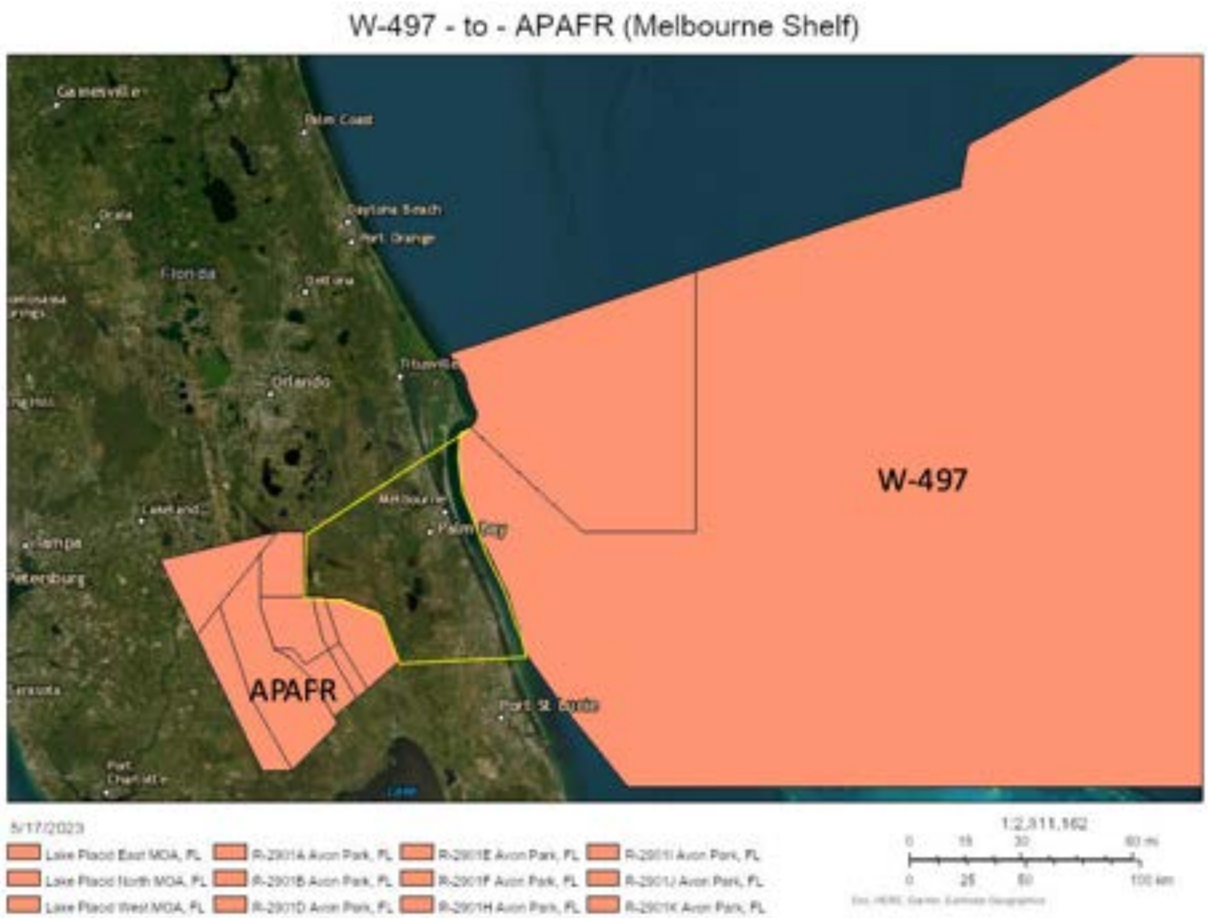


Figure 33: The Melbourne Shelf

- W-174 to APAFR (The Naples Shelf)
    - Boundaries: Beginning at lat. 25°44'01"N., long. 82°29'59"W.; to lat. 25°45'01"N., long. 81°53'00"W.; thence counterclockwise along a line 12 NM from and parallel to the shoreline; to lat. 25°37'00"N., long. 81°40'10"W.; to lat. 25°36'01"N., long. 81°39'59"W.; to lat. 27°32'31''N., long. 81°07'23''W.; to lat. 27°04’01”N., long. 81°16’59”W.; to lat. 27°04’01”N., long. 81°24’59”W.; to lat. 27°35’44”N., long. 81°42’14”W.; to the point of beginning
    - Time of Designation: Intermittent by NOTAM
    - Controlling agency: FAA, Miami ARTCC

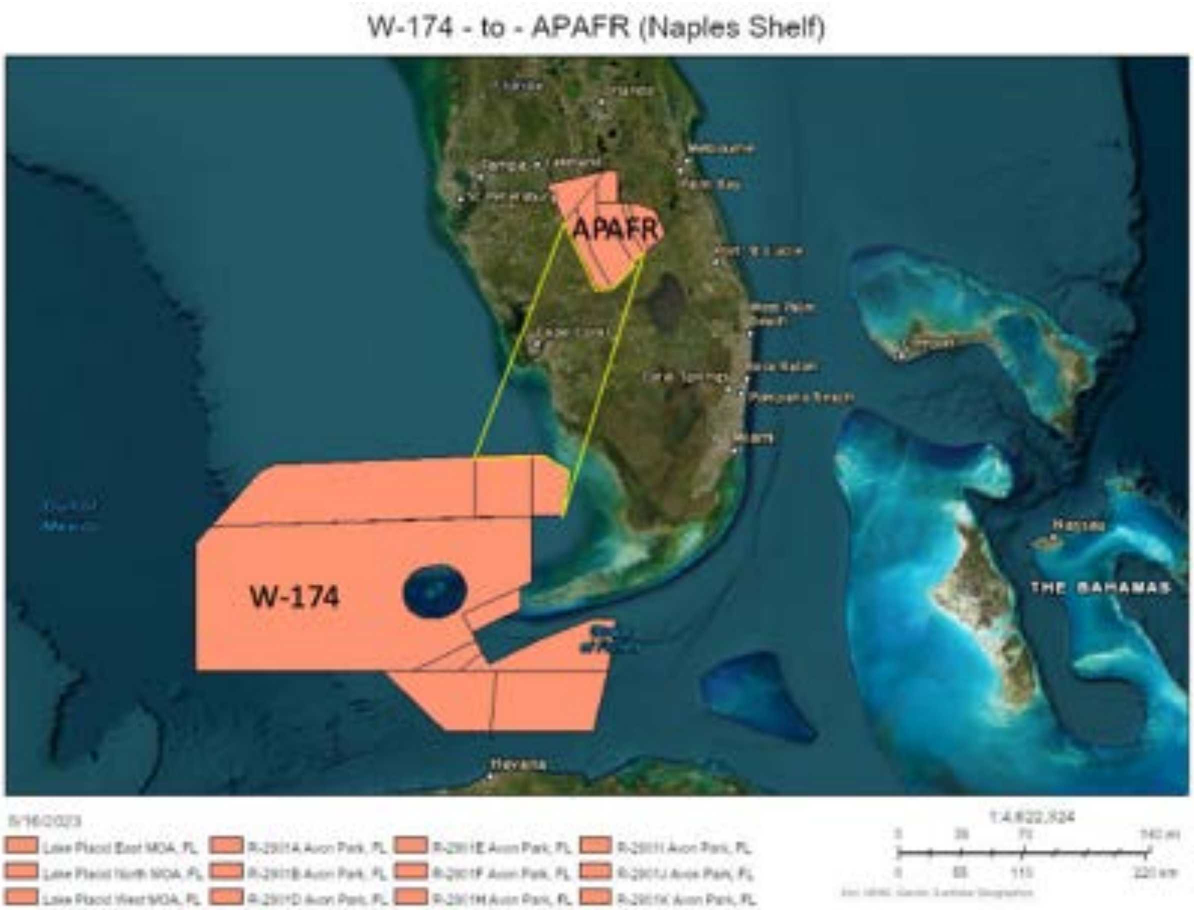


Figure 34: The Naples Shelf

- W-168 to APAFR (The Sarasota Shelf)
    - Boundaries: Beginning at lat. 27°00'31"N., long. 82°55'10"W.; to lat. 26°36'42"N., long. 82°29'40"W.; to lat. 26°10'01"N., long. 82°16'59"W.; to lat. 27°04’01”N., long. 81°24’59”W.; to lat. 27o53’31”N., long. 81o51’59”W.; to the point of beginning
    - Time of Designation: Intermittent by NOTAM
    - Controlling agency: FAA, Miami ARTCC

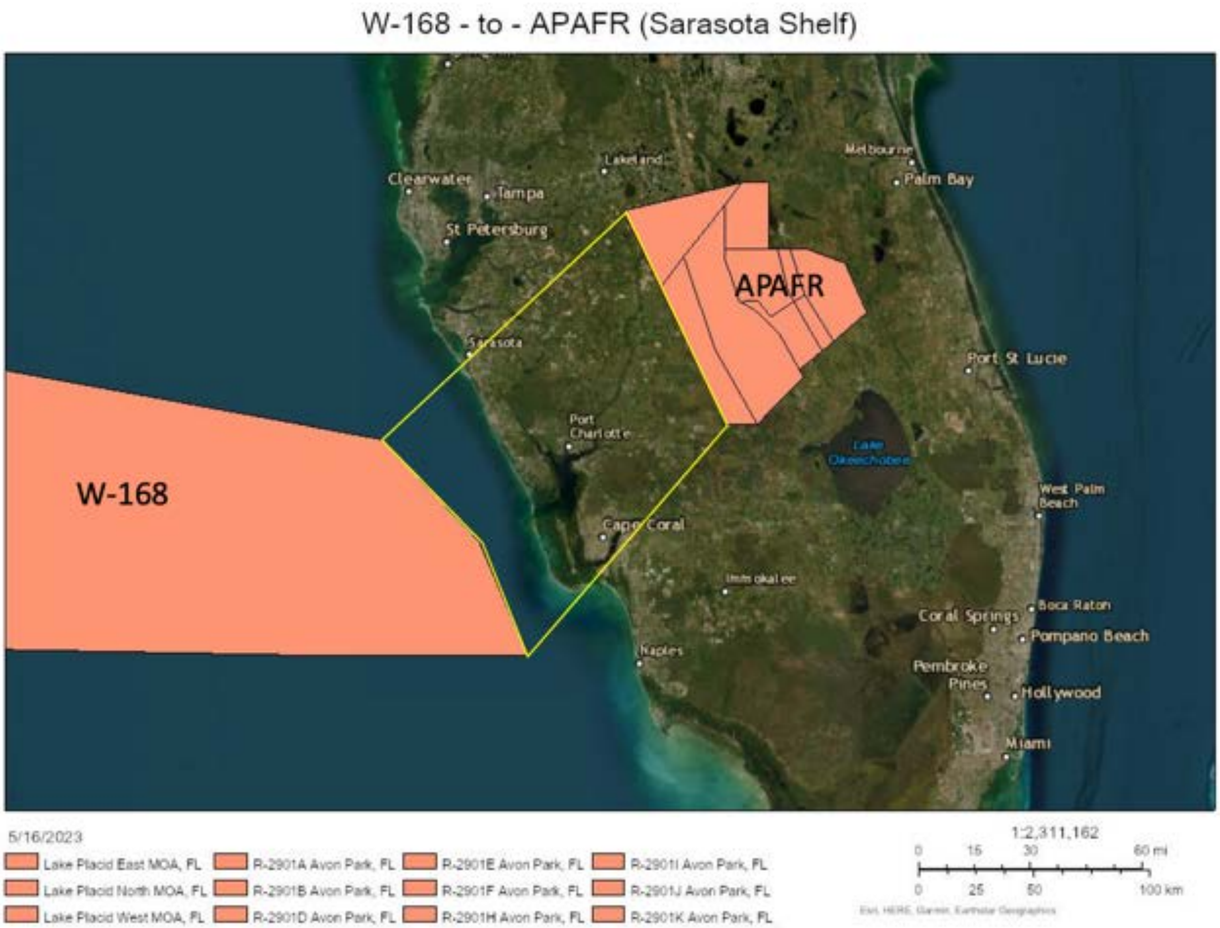


Figure 35: The Sarasota Shelf

- W-470 to APAFR (The Lakeland Shelf)
    - Boundaries: Beginning at lat. 29°42'30"N., long. 84°00'00"W.; to lat. 28°56'00"N., long. 83°31'00"W.; to lat. 28°05’00”N., long. 83°31’00”W.; to lat. 27°04’01”N., long. 81°24’59”W.; to lat. 27°53’31”N., long. 81°51’59”W.; to lat. 28°00’01”N., long. 81°20’59”W.; to lat. 28°00'01''N., long. 81°13'59''W.; to the point of beginning
    - Intermittent by NOTAM
    - Controlling agency: FAA, Jacksonville ARTCC

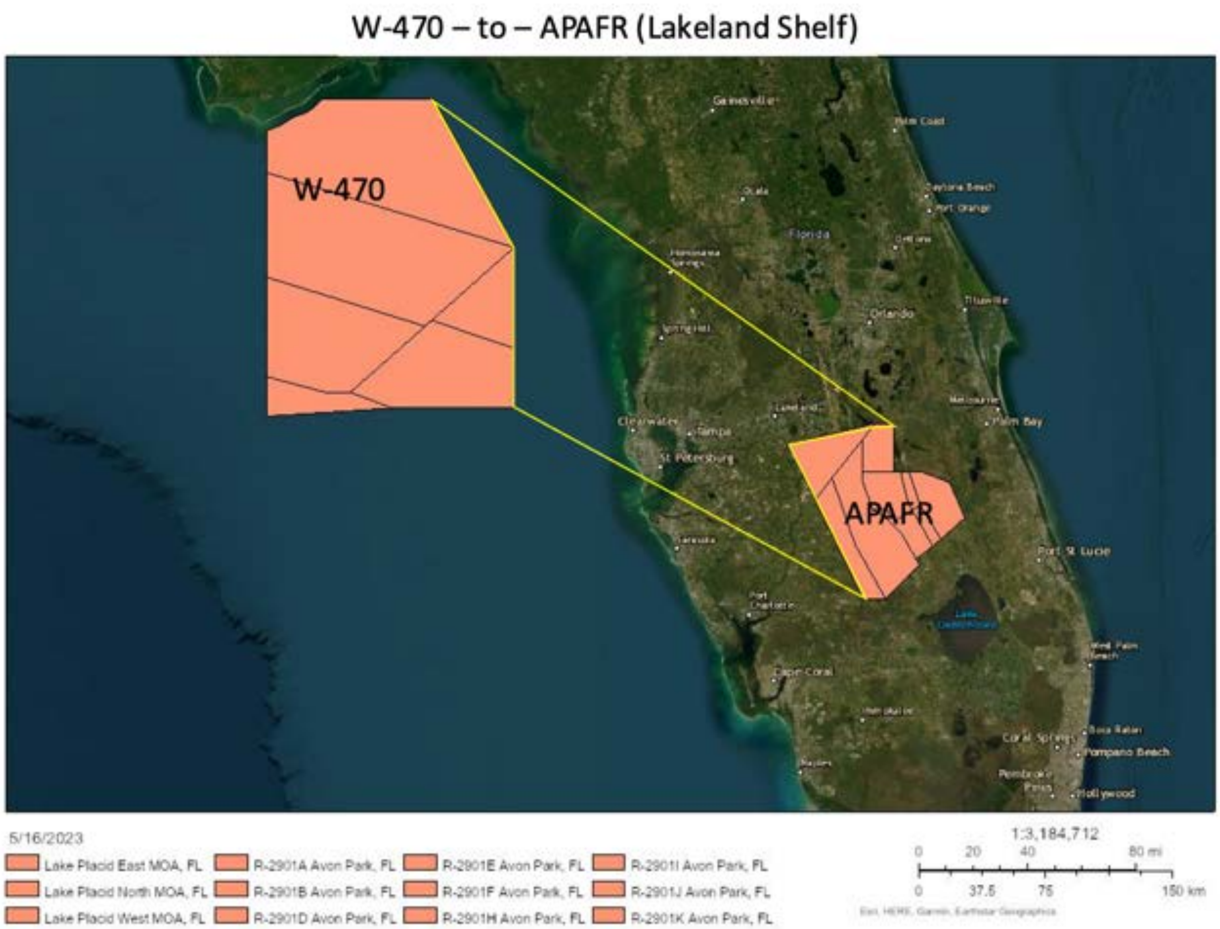


Figure 36: The Lakeland Shelf

- W-470 to PRC (The Ocala Shelf)
    - Boundaries: Beginning at lat. 29°42'30"N., long. 84°00'00"W.; to lat. 28°56'00"N., long. 83°31'00"W.; to lat. 28°24’00”N., long. 83°31’00”W.; to lat. 28°53'39''N., long. 81°33'56''W.; to lat. 29°36’21”N., long. 81°51’19”W.; to the point of beginning
    - Intermittent by NOTAM
    - Controlling agency: FAA, Jacksonville ARTCC

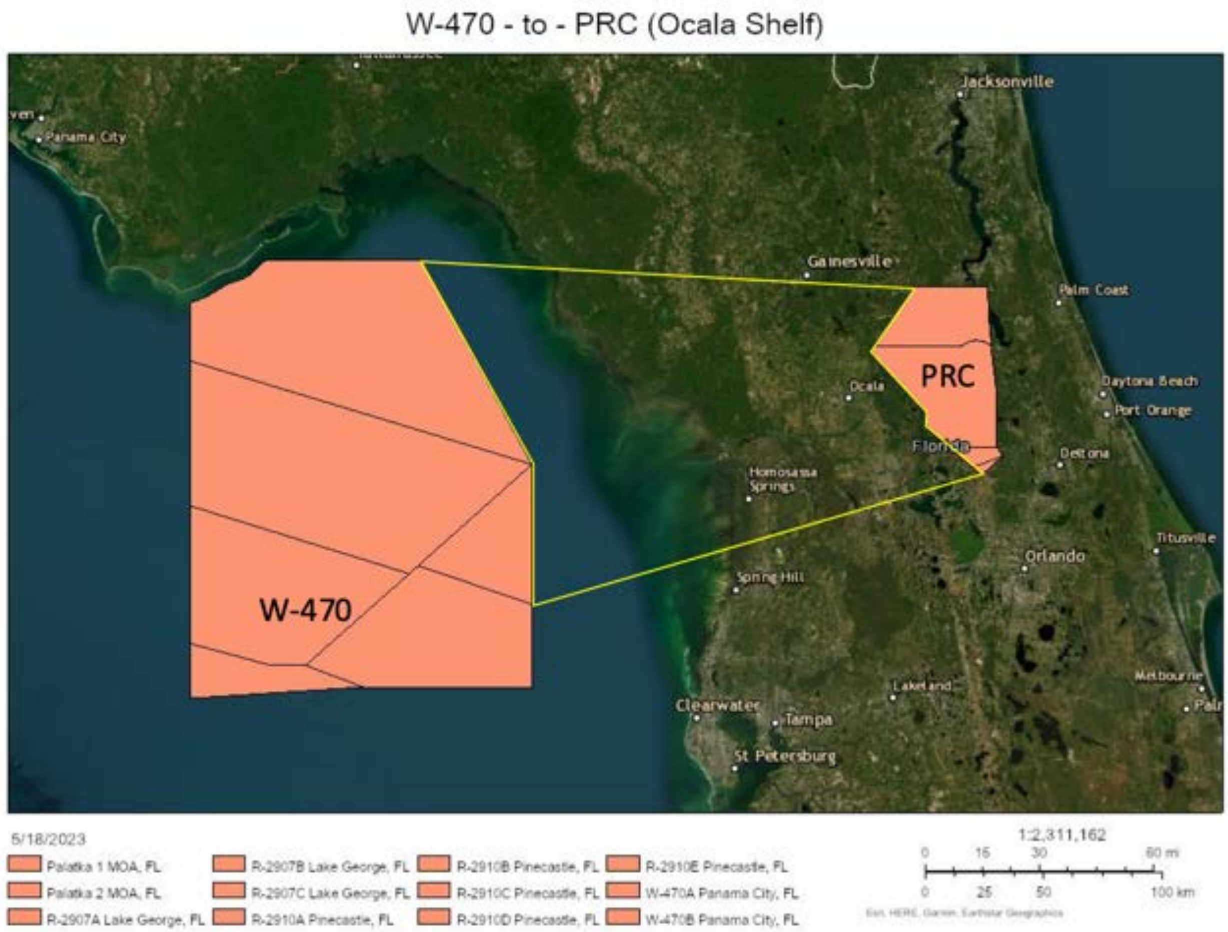


Figure 37: The Ocala Shelf

The ATCAAs outlined above, coupled with the offshore Warning Areas, approximate the required 160 x 100-mile airspace for effective F35 tactical employment and operational joint training. All six potential ATCAAs narrow in width as the distance to either the APAFR or PRC decreases recognizing the outer limits of the Restricted Airspace and MOAs supporting those range operations. The utilization of the larger offshore Warning Areas enables the initial tactical set-ups to approximate the 160 x 100-mile configuration prior to closing the width approaching over land airspace.

Summary

Throughout Phase 1A of the FATR concept development, the focus on regional airspace has been to primarily understand the training needs of military units across Florida and document their requirements. The team then designed an initial architecture to better connect existing SUA providing a reasonable balance between military test/training requirements, commercial/general aviation routes and defense/commercial space launch access. Balancing those competing demands has led to the development of a draft, consolidated Test and Training Space Needs Statement (T/TSNS) prepared for use by Florida-based military units and their higher headquarters to start coordination with the FAA for approval of these newly proposed ATCAA shelves. The draft T/TSNS proposal has been submitted to the stakeholders for coordination and can be reviewed at Appendix C.

Phase 1B will involve the finalization of the T/TSNS by the military units and their engagement with FAA to pursue approval. While technology demonstrations in Phase 1B and 2 can be conducted using existing, smaller MTRs and ALTRVs, eventual approval of the proposed ATCAA shelves will enable tactical and operational training for the joint force in a realistic, all-domain battlespace replicating the threat environment of a pacing threat. Once proven, the flexibility of Florida's geography and ranges can enable configurations that are operationally relevant to almost any scenario involving joint, air, land, sea, space and cyber scenarios.

Deliverable D: Coordinated and Approved Frequency Spectrum Management Procedures

Task 2.2-Coordinate and Seek Spectrum Certification for Threat Emitters and Communication Networks

Overview

As part of the Phase 1 FATR project work, our team identified a new family of threat emitter systems along with the various equipment required to establish a data-link network and the connectivity between nodes in the FATR to enhance training on the Florida ranges. Part of enabling this capability is ensuring the spectrum certifications required to transmit on the various systems. Since the FATR project has no official standing with various federal agencies to request spectrum authorization, the team's role in this process is to assist in identification of requirements and ensure ranges, other participating organizations and military units have the appropriate information to submit the formal spectrum requests. In preparation for Phase 2 and beyond, our team also prepared requirements for the creation of increasingly congested and contested electromagnetic spectrum (ESM) environments with enhanced threat networks and ensure the participating organizations and military units have the information necessary to request spectrum authorization. Finally, we provide support through key leader engagements with various service headquarters to facilitate the processes described below.

Objective

The main objective of Task 2.2 is to deliver pacing threat emitters and a communication network for use on the Florida peninsula to enhance the value of military training on Florida ranges. The following is a list of anticipated equipment requiring spectrum certification for Phase 1 and 2: PATS, Link 16 datalink network and software defined radios (SDR), to include the associated radio relay unit (RRU), propagating network waveforms. To utilize these emitters and networks, appropriate spectrum authority for use must be obtained. This deliverable section addresses the standard processes by which that authority will be obtained. The Phase 1 and 2 operational schematics described in Deliverable A depict the current network concept and location for equipment requiring local spectrum certifications.

Background

The complexity of the larger spectrum management processes throughout the DoD and the U.S. federal government interagency, particularly as they relate to finding viable spectrum allocations, allotments and assignments for new systems and global operations, is partially overcome in the FATR project due to the simple fact that the FATR requirement is to replicate advanced threat waveforms operated by potential adversaries. Representative of these systems are surface-to-air (SAM) systems with NATO designations such as the SA-17 (Figure 38), SA-20, and SA-22 for example. As a result, FATR's spectrum approval coordination must focus on the process to certify viable PATS and obtain operating authority within the frequency ranges and with waveforms those threat emitters transmit, commonly within the 70 MHz – 18 GHz range.

Figure 38: Typical Road-Mobile SA-17 Launcher System

Currently, the FATR project is collaborating with the Scientific Research Corporation (SRC) who has created a family of PATS called Multi-Domain Emitter Threat systems (MET). These mobile systems are a new generation of affordable threat emitters that are being contracted and tested by the U.S. Army, Threat System Management Office (TSMO). The initial DoD certification process for these systems supporting Phase 1 and eventually Phase 2 will be initiated by SRC and processed by TSMO. This deliverable narrative describes the process in more generic terms such that any other future threat emitters and communication equipment, potentially developed by another enterprise, will follow the same approach via different requesting organizations.

Spectrum Certification

All spectrum dependent equipment/systems owned and operated by the DoD require spectrum certification. Spectrum certification is a mandated process to ensure: (1) the operational frequency band(s) and type of services are in conformance with respective national and international tables of frequency allocations; (2) the equipment conforms to applicable standards, specifications, regulations, directives, and statutes, and (3) approval is provided to authorize expenditure of funds for the procurement/development of RF dependent equipment.

The majority of DoD operational spectrum issues are processed through the Frequency Panel (FP) structure of the Military Communications-Electronics Board (MCEB). The MCEB is a DoD organization that is composed of communications and information systems directors from the Joint Staff, the Services, and selected DoD agencies, together with invited non-voting members from other DoD components and other government departments. Its mission is to obtain coordination on military communications-electronics matters among DoD components, between the DoD and other governmental departments and agencies, and between the DoD and representatives of foreign nations; to coordinate operational guidance and direction to DoD components; to furnish advice and assistance to the DoD and its Components on military communications-electronics matters; and to inform the DoD Chief Information Officer Council of communications-electronics matters that require high-level attention.

The MCEB FP is a panel of technical experts, drawn from the components that are represented on the MCEB, that reviews, develops, and coordinates studies, reports, and DoD positions for consideration by the MCEB in the areas of radio frequency engineering and spectrum management. Specific issues concerning the use of spectrum are divided among permanent working groups.

Equipment spectrum certification is supported by the MCEB FP Equipment Spectrum Guidance Permanent Working Group (ESGPWG) and the National Telecommunications and Information Administration (NTIA)[6] Spectrum Planning Subcommittee (SPS) and Frequency Assignment Subcommittee (FAS). Figure 39 illustrates the spectrum certification process.

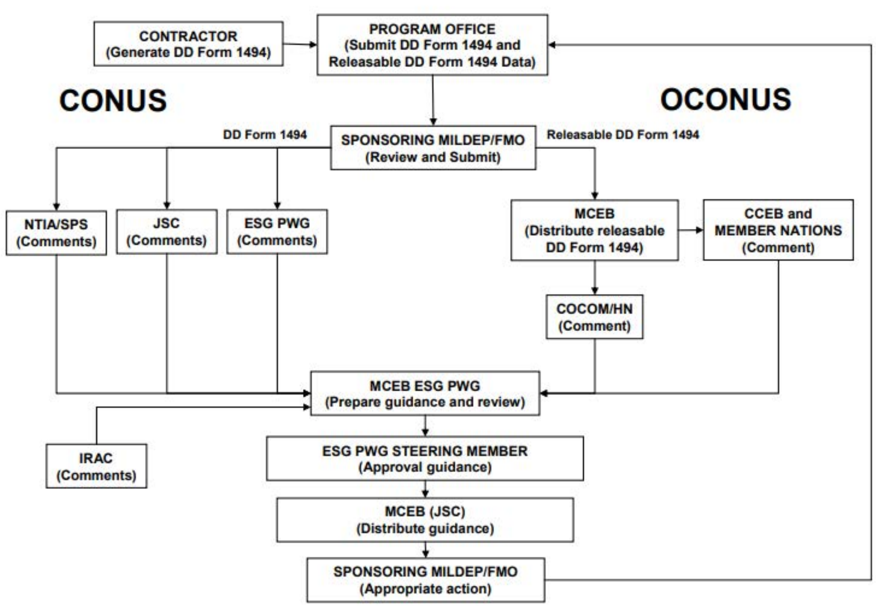


Figure 39: The Spectrum Certification Process

[6] As defined in Chapter 10 of the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management.

Application for Equipment Frequency Allocation, DD Form 1494 Process

The spectrum certification process begins when a program manager submits a DD Form 1494, Application for Equipment Frequency Allocation, to the frequency management office of the pertinent military service:

- Army, the Army Spectrum Management Office (AMSO)
- Air Force and Space Force, the Air Force Frequency Management Agency, (AFFMA)
- Navy and Marine Corp, the Navy Marine Corp Spectrum Center (NMSC)

This application must be coordinated through the FP of the MCEB before funds are authorized for the development of any new equipment that will radiate electromagnetic energy. An application is also required for equipment receiving RF, if protection is desired. This review process is called the Joint Frequency Allocation-to-Equipment Process, or as it is commonly known, the J-12 Process.

An approved DD Form 1494 establishes that a particular system has a valid spectrum requirement. The approved DD Form 1494 is later used for frequency assignment. In parallel with the J12 process, the Frequency Assignment Subcommittee (FAS) of the Interdepartmental Radio Advisory Committee (IRAC) must assign a frequency for any transmitting equipment prior to its operation. Additionally, the applicant must coordinate with the local frequency manager in the proposed area of deployment.

The DD Form 1494 is submitted at four different stages of an acquisition program and the process repeats itself for each. The purposes of these submissions follow:

- Stage 1. Planning or Conceptual: Advises on feasibility of getting spectrum support and recommends modifications or changes in frequency bands needed to get spectrum support.
- Stage 2. Experimental: Provides guidance for assuring spectrum support in later stages and is needed before obtaining frequency assignments for experimental testing.
- Stage 3. Developmental: Provides guidelines for assuring operational spectrum support needed before obtaining frequency assignments for developmental testing.
- Stage 4. Operational: Certifies availability of spectrum support needed before making operational frequency assignments.

Figure 40, on the following page, provides an example of the DD Form 1494 and its required information.

OMB No. 0704-0188

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION	DATE	J/F 12 No. Page No.

The public reporting burden for this collection of information is estimated to average 24 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Services Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION. RETURN COMPLETED FORM TO THE USING AGENCY OR CONTRACTING AGENCY, AS APPROPRIATE.**

DOD GENERAL INFORMATION

TO	FROM

1. APPLICATION TITLE

2. SYSTEM NOMENCLATURE

3. STAGE OF ALLOCATION *(X one)*

☐ a. STAGE 1 - CONCEPTUAL ☐ b. STAGE 2 - EXPERIMENTAL ☐ c. STAGE 3 - DEVELOPMENTAL ☐ d. STAGE 4 - OPERATIONAL

4. FREQUENCY REQUIREMENTS

a. FREQUENCY(IES):			
b. EMISSION DESIGNATOR(S):			

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2:	b. STAGE 3:	c. STAGE 4:

6. EXTENT OF USE

7. GEOGRAPHICAL AREA FOR

a. STAGE 2:

b. STAGE 3:

c. STAGE 4:

8. NUMBER OF UNITS

a. STAGE 2	b. STAGE 3	c. STAGE 4

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT

10. OTHER J/F 12 APPLICATION NUMBER(S) TO BE	**11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11?**
a. SUPERSEDED J/F 12/ b. RELATED J/F 12/	☐ a. YES ☐ b. NO ☐ c. NAvail

12. NAMES AND TELEPHONE NUMBERS

a. PROGRAM MANAGER	(1) COMMERCIAL PHONE	(2) DSN
b. PROJECT ENGINEER	(1) COMMERCIAL PHONE	(2) DSN

13. REMARKS

DOWNGRADING INSTRUCTIONS	CLASSIFICATION	J/F 12 No. Reset Page

DD FORM 1494, APR 2015 — DoD General Information Page 1

Figure 40: Example of a DD Form 1494

DD 1494 Submissions for MET Family-of-Systems

The DD 1494 process has been initiated for the SRC family of MET systems. TSMO served as the "Program Office" for the SRC DD1494 submissions. TSMO currently has Stage 2-Experimental certifications, and the following submissions were accomplished or scheduled for submission:

- MET-Low and MET-M (MET-L with directional antenna): Stage 3-Developmental DD1494 updated to include additional Florida-based locations and will be submitted by TSMO to the Army Spectrum Management Office (ASMO) in July 2023 (See Appendix D.1)
- MET-High Stage 3-Developmental DD1494, with additional Florida-based locations, will be submitted by TSMO to ASMO following a critical design review

Stage 3 certifications will be sufficient for the duration of Phase 1 and Phase 2 follow-on technology demonstration. If DoD accepts the MET family of systems for broader employment across the FATR complex, or for use in other locations post-demonstration phase, a Stage 4-operational certification request will be required.

Local Frequency Managers

For Phase 1, and follow-on Phase 2 technology demonstration, the planned MET-High locations are APAFR and PRC.

The local frequency manager for APAFR is located at the 23rd Mission Support Group, based at Moody AFB in Georgia. (229-257-9793 // https://usaf.dps.mil/teams/23CSPWCS).

The local frequency manager for the PRC is coordinated through FACSFAC JAX to the NMSC Office Southeast, SOPWG NAVY PRI, based at NAS Jacksonville in Florida. (904-542-5843 // https://usff.navy.deps.mil/sites/NAVIFOR/NMSC/SitePages/Home.aspx)

Operationalizing Spectrum for Phase 3 and Beyond

Assuming successful Phase 2 technology demonstrations and Phase 3 implementation by DoD, it is envisioned that multiple PATS will be available for deployment around the Florida peninsula and not just within the boundaries of dedicated military installations, facilities and ranges. Florida's unique geography affords an ability to "reconfigure" the state with different PATS laydown footprints enabling rapid configuration of different IADS networks to match required contested and congested training scenarios.

To support this, five distinct types of PATS siting locations are envisioned:

- Utilization on established DoD military ranges (consistent with Phases 1 & 2)[7]
- Utilization on other, non-range DoD facilities and installations[8]

[7] Anticipate first post-Phase 2 range for addition into FATR would be Eglin AFB.
[8] Tyndall AFB or other coastal positioned DoD facilities would be priorities.

- Utilization on other federal facilities (ex: USCG stations around the state of Florida)[9]
- Utilization on other state or local government-controlled facilities (ex: Forestry Service fire watch towers)
- Utilization on private property

Additionally, multiple ranges could be simultaneously involved in larger training scenarios or joint force exercises, each equipped with one of more PATS in a variety of the locations indicated above. As a result, future spectrum authorizations may require additional procedures and processes to support this.

Spectrum Management Off-Installation

When military organizations plan to operate equipment outside the installation property but operating in association with that range or installation, the unit must coordinate the use of frequencies with the Area Frequency Coordinator (AFC). There are eight AFCs, each manned by one of the Services, and each responsible for a geographic area. The AFCs are responsible to their military department for administrative purposes and to the MCEB for policy guidance. The AFC's role is to ensure spectrum use will not interfere with any installation's spectrum-dependent systems.

AFCs maintain close liaison and coordination on matters of mutual interest with other military and civil frequency coordination activities in, among and within line-of-sight to their areas of operation. They minimize electromagnetic interference at, among, and within line-of-sight of national and military test and training ranges and with all civil and non-military federal activities within their electromagnetic environment. Much of the Florida panhandle falls within the Gulf AFC (GAFC) and the remainder of the peninsula is under the Eastern AFC (EAFC).

Gulf Area Frequency Coordinator
Eglin AFB
Florida west of 83°W

Eastern Area Frequency Coordinator
Patrick SFB
Florida east of 83°W

Three designated Major Range and Test Facility Bases (MRTFB) are in or adjacent to Florida. These are significant test installations, facilities and ranges which are regarded as "national

[9] NOTE: Initial discussion with USCG District 7 Commander was favorable towards pursuing a future MOU/MOA to potentially position PATS units on Coast Guard facilities pending legal and spectrum management reviews. United States Coast Guard Spectrum Management Office (CG-672) is anticipated to be the lead on spectrum management review for the Coast Guard.

assets" and spectrum deconfliction is particularly acute with the AFCs around these facilities. MRTFBs around Florida include:

- Naval Undersea Warfare Center, Atlantic Undersea Test and Evaluation Center (AUTEC), Andros Island, Bahamas
- Eastern Test Range (SLD 45), Patrick SFB, FL
- Eglin Gulf Test and Training Range (96th Test Wing), Eglin AFB, FL

Since multiple PATS configured into an IADS network will likely be associated with one of Florida's ranges serving as the primary target, all remotely located, off-site PATS associated with the core range will be managed and have coordination done by the "parent" range and Service that is managing/running the training and/or exercise. If multiple ranges controlled by different Services are involved, the Service who is establishing the overall training requirement shall lead the coordination of spectrum authorizations with all stakeholders across the FATR elements being utilized. Two Operational Control Centers (OCC) will be resourced and located at MacDill AFB, FL and FACSFAC in Jacksonville, FL prior to Phase 2 (reference Deliverable A section on operational command and control of each OCC). In addition, Unit Operation Centers (UOC) will be located at each participating military unit with the ability to develop electronic warfare scenarios utilizing the live emitter systems as well as real-time, remote operation of the systems during actual training events.

<u>Electromagnetic Interference (EMI)</u>

EMI may be caused by friendly, enemy, neutral, or natural sources. Interference must be solved on a case-by-case basis with resolution by the lowest level capable within the spectrum management structure. Interference not able to be resolved at the lowest level must be reported and elevated to the next responsible agency. The Joint Spectrum Center's (JSC) Joint Spectrum Interference Resolution (JSIR) team is on call 24 hours a day and is capable of global deployment with its equipment.[10]

The following minimum information is required in a JSIR report:

- Affected System Frequency
- Network Control Station & Principal User
- Other Stations/Units Experiencing Interference
- Location of Affected System
- Operating Mode of the Affected System: Frequency Agile, Pulse Doppler, Search, Upper/Lower Sideband, etc.
- GPS Affected
- Interference Frequency, Bandwidth, and Signal Strength
- Interference Characteristics: Continuous, Intermittent, Random, or Characteristic Pattern; Varied or Constant Amplitude; Noise and/or Pulsed

[10] CJCSM 3320.02E; JOINT SPECTRUM INTERFERENCE RESOLUTION (JSIR) PROCEDURES, dated 20 May 2022.

- System Impact and Circuit Reliability

- Interference Cause(s) and Source(s):
    - Dates and Times
    - Resolution: Specific Actions Taken to Mitigate, Nullify, Identify
    - Source(s) of & Resolve Interference
    - Resolution Status
    - Request for Resolution Assistance

JSC can be reached at:
JSC Help Desk, JSIR Team and Duty Officer
Phone number: (410) 293-HELP (4357)/9850/9819
DSN 281
NIPRNET: disa.annapolis.dso.list.jsc-j3-vault-ops@mail.mil
SIPRNET: jscoperations@disa.smil.mil
JWICS: operations@jsc.ic.gov
NIPRNET: http://www.disa.mil/Services/Spectrum/Occupational-Support
SIPRNET: http://intelshare.intelink.sgov.gov/sites/jsir
JWICS: http://intelshare.intelink.ic.gov/sites/jsir/default.aspx

Summary

At the conclusion of Phase 1A, we ensured the DD1494 process has been initiated for the MET-L and MET-H systems anticipated for further development in Phase 1B and beyond into Phase 2. Coordination with the Air Force is ongoing for the placement of a MET-H system at APAFR for the technology demonstration. Additionally, although not formally in the scope of Phase 1B, there is a possibility of MET-L systems on loan from TSMO for placement at PRC and Tyndall AFB to enhance the demonstration capability and span of participants utilizing the larger range footprint.

Supporting the preparation for demonstration of advanced emitter(s), included in Phase 1B will also be the completion of the design of a datalink network across the peninsula to support operations and communications. These early demonstration phases will leverage the Link-16 network, a current datalink network owned and operated by the DoD. In addition to the MET emitters at ranges, the Phase 1B effort will also include the analysis, design and recommended placement of data/radio relay units in appropriate locations as well as connecting an operation control center with unit operation centers at participating military units. This will ensure connectivity between designated sites in the FATR demonstration for Phase 2 and beyond. Spectrum requests will be developed in Phase 1B to support this communication architecture.

Additional Supporting Activity

Task 3.1-Coordinate Support and Utilization of DoD Resources and Installations

<u>Overview</u>

The FATR team determined early in the project that concept development would require significant key leader engagements (KLE) at all levels of the Federal government, Department of Defense (DoD), and State of Florida stakeholders. The engagements were primarily focused on leadership at key installations and the principal training units located in Florida that would benefit from advanced training range opportunities across the peninsula. Lastly, cross-tell with managers of numerous training ranges located in other regions across the military enterprise proved valuable in the concept development of a prototype range in Florida.

<u>Objective</u>

The objective of Task 3.1 was to gain support across the joint force to enable utilization of existing DoD infrastructure. The team used the following summary (Figure 41) from the 2022 National Defense Strategy plus a map of the FATR concept overlaying the South China Sea area of operations as our main attention step for engagements with decision makers to set the stage for answering the questions: “why does the state/region/nation need FATR?” Additional emphasis was placed on the requirement for a new 5th generation training construct outlined by the units interviewed during the engagements. The most significant training requirements mentioned consistently by the units the upgrade to programmable, affordable threat systems (PATS) to replace obsolete emitters currently in use on Florida’s ranges; significantly larger training areas up to 160nm long and 100nm wide; and the ability to conduct joint force training while practicing long range kill chain targeting techniques against a pacing threat array.

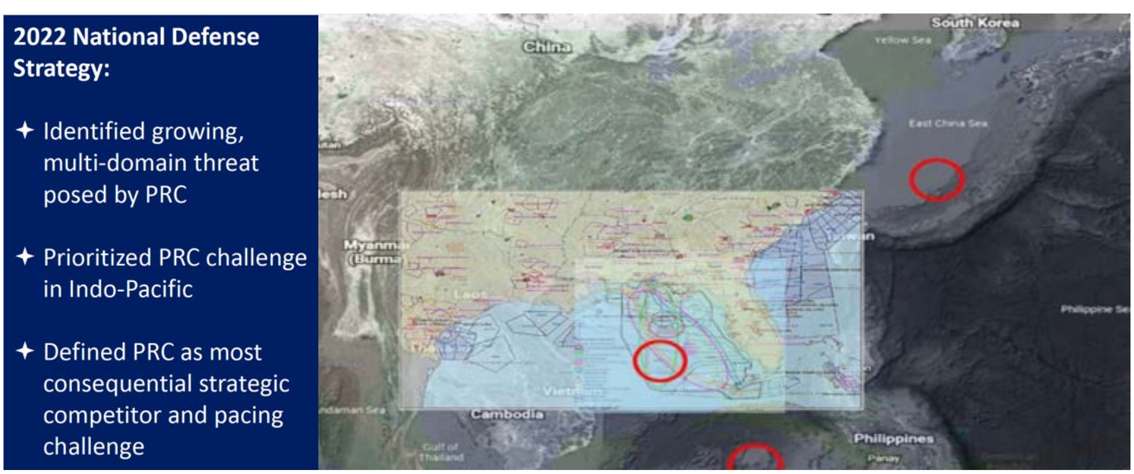


Figure 41: National Defense Strategy and FATR Overlay

Key Leader Engagements

The team engaged with leaders from Headquarters Air Force, Air Combat Command (ACC), Air Mobility Command (AMC), Air Force Material Command (AFMC), Air Force Special Operations Command, Air Education and Training Command (AETC), Air and Army National Guard units (ANG/ARNG), Air Force Reserve Command (AFRC), Naval Air Forces Atlantic (AIRLANT), US Space Force (USSF) and Space Systems Command (SSC).

The primary focus of Phase 1A was to develop 'proof of concept' for combining live threat emitters with a blended LVC training environment to offer Florida units the capability to conduct realistic, local training without having to deploy regularly to western US ranges. The team talked directly with commanders of Florida units to learn about their unique training requirements for a high-end fight against a peer competitor.

Using this process for gathering unit training requirements, our team divided engagements and discussions during Phase 1A into the following three categories of key leaders:

- Department of Defense (DOD) offices associated with Operational Training and Readiness including Office of the Secretary of Defense (OSD) directorates, National Guard Bureau (NGB) and all military services including the Air Force, Space Force, Navy, Marine Corps, Army, and Coast Guard including major commands, fleet commands and their subordinate units.

- State entities and offices in the southeast region of the US including Governors' national security teams, defense alliances, legislative staffs, adjutant generals, and economic development teams associated with military installations.

- Federal government entities, including US congressmen, the Federal Communications Commission (FCC) and the Federal Aviation Administration (FAA)

The engagements covered the entire spectrum of discussions from simple courtesy calls to in-depth, in-person office calls and virtual meetings covering the concept development of an advanced training range spanning the Florida peninsula from the Gulf of Mexico to the Atlantic Ocean. Figure 42 depicts the KLE conducted during Phase 1A and includes engagements already scheduled for Phase 1B. Appendix E provides a complete list of key leader engagements with the date of the meeting, their title/office location and the highlights of the discussion.

It is notable that during most of these calls and meetings spanning six-months of Phase 1A, each of the key leaders expressed some level of support for FATR and requested to be updated. Some of the leaders we engaged have budgetary control over key aspects of military training in the Southeast region and offered their direct support for the development of an advanced training range spanning the peninsula of Florida. It was obvious to the team that the advanced training 'opportunities' outlined in the FATR concept were of major interest to all military leaders interviewed. KLE will continue to be an important task during every phase of this project.

Key Leader Engagements

Federal

- Congress
  - Rep Scott Franklin FL District 18
  - Rep Jake Ellzey TX District 6
  - Rep Carlos Gimenez FL District 28
  - Rep Mario Diaz-Balart FL District 26
  - Rep Gus Bilirakis FL District 12
  - Mach 1 Caucus
  - Rep Mike Waltz FL District 6 (Jul)
  - Rep Matt Gaetz FL District 1 (Jul)
  - Sen Rick Scott FL (Jul)
  - Rep Kathy Castor FL District 14 (Jul)
- FAA
  - FATR airspace proposal presented at Eastern Airspace/Range Conference
- NGB
  - Lt Gen Marc Sasseville, NGB/CV

State

- Legislature
  - Rep Paul Renner, SoH, District 19 (Jul)
  - Sen Jay Collins, District 14 (Jul)
- FLANG/FLARNG
  - MG John Haas, TAG

DoD

- OSD
  - Mr. Greg Knapp, Force Education/Training
  - EW/LVC Joint Study Group
- Navy
  - RADM John Meier, COMNAVAIRLANT
  - CDR Mary Robinson, FACSFAC JAX/CO
- Space Force
  - Col Mark Shoemaker, SLD45/CV
- Air Force
  - PACAF
    - Gen Ken Wilsbach, Commander
  - ACC
    - Lt Gen Russ Mack, DCOM
    - Maj Gen Dave Lyons, A3
    - Maj Gen Mike Koscheski, 15AF/CC
  - AETC
    - Maj Gen Phil Stewart, 19AF/CC
  - AFMC
    - Maj Gen Evan Dertien, AFTC/CC
  - AMC
    - Col Adam Bingham, 6ARW/CC
  - AFRC
    - Maj Gen Bryan Radliff, 10AF/CC
  - AFSOC
    - Brig Gen Jocelyn Schermerhorn, A3

Figure 42: Key Leaders Engaged During Phase 1A

Installation Support Plan

The team conducted multiple site surveys during Phase 1A to compile data on the current resources and equipment already resident on key military installations and ranges across the state of Florida. These surveys were designed to start with the installation commander to determine the availability and viability of the facility to support Phase 1 and 2 FATR project development and demonstrations. Our team visited APAFR, PRC, MacDill DUC and FACSFAC Jacksonville during Phase 1A. A summary of key data and discoveries can be found in Table 6, in Deliverable A section of the report. The following narratives provide relevant information on each facility visit.

Summary of Visits

1. Avon Park Air Force Range, 10 Feb 2023

Rob Polumbo and Jake Polumbo

The team conducted multiple site visits to the Avon Park bombing range and concluded each time, if properly modernized and updated, the facility could offer and provide control of advanced training scenarios in all military domains for units located in the Southeast US. APAFR could also host a functional OCC for demonstrating the PATS/ALVC prototype system in Phase 1B.

Notes from visit:

- The airport tower is the highest elevation on APAFR approximately 150 feet. Tower and hangar roof are possible locations for a Radio Relay Unit (RRU) and other communication equipment
- An ROCC is located in the tower including the primary Range Safety function; there are no ATC controllers or published instrument approaches for the airfield.
- Office space is available in several facilities on the installation. Hangar offices are in the same area as deployed unit workspace and could work for a FATR OCC or UOC. NIPR, internet, phone, furniture is all available but there are currently no SIPR terminals/secure area for classified operations; APAFR leadership is in the process of furnishing these offices; Classified storage is possible in the deployed unit office
- Comm, antenna locations compatible for MET/ALVC prototype function (DIADS, ALVC architecture for unclassified use only until SIPR and secure storage areas are installed; 5G-ATW waveform for SADL/Link16 datalink is also planned/funded for APAFR operations but not yet in-place; 23WG plans on installing Link 16 capability at APAFR
- FATR operation manual will be required to provide units with instruction on all aspects of utilizing the blended LVC range, scheduling, mission planning, operations, including debriefing and safety issues. The operation manual will be formatted similarly with the AFM 13-212 APAFR Supplement and coordinated with 598 RANS as a supplement to the existing range manual
- Discussion on the organizational structure of FATR operational plan including possible OCC location at MacDill DUC and the UOCs located at APAFR and each participating Florida unit during Phase 2 technology demonstration (no decisions made at this point). NIPR/SIPR/RRU/network connectivity TBD. Estimated cost for personnel, equipment, setup, training TBD
- Discussed possible MET location: for prototype Phase 2 testing we agreed to have it close to the ramp area for quick reaction to logistical, operational, troubleshooting, fueling, maintenance issues and inclement weather storage. The location should be optimized for reducing main lobe clutter for aircraft range entry (ATCAA or ALTRV W-497/174/168). The two locations depicted in Figures 43 and 44 minimize conflict with airfield operations and reduce RF clutter on a clockwise heading from 020-220.
- Other MET information: MET-L gas powered generator 6-8 hours of operation; shore power 110V Classified/Unclassified signals MET-M/H diesel powered generator 6-8 hours of operation; shore power 110V/30A Classified/Unclassified signals

A few concerns were identified during multiple site surveys at Avon Park including MET locations, spectrum certification, environmental impact study and safety impact of MET emissions, security requirements, personnel, funding for classified operations at MacDill DUC and APAFR, funding for additional personnel to oversee the FATR operation (contractor) and incorporation of FATR operation manual as a supplement to AFM 13-212.

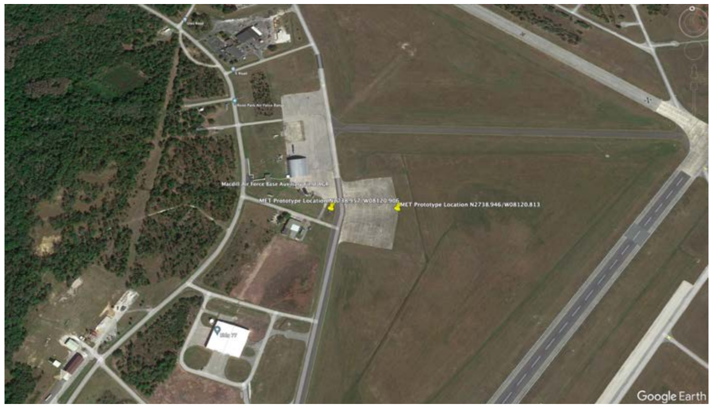


Figure 43: Possible MET-H location at APAFR

Figure 44: Expanded view of MET-H locations at APAFR

2. MacDill AFB Deployed Unit Complex Site Visit, 3 April 2023
Rob Polumbo and Jake Polumbo

<u>Notes from visit</u>:

Our team met with Lt Col Ryan and Buck McLaughlin regarding existing capabilities in the Deployed Unit Complex. Discussion centered around these topics:

- Phase 2 office space for OCC for APAFR operations
- Currently no SIPR/Link 16/SADL/ACMI/classified briefing or debriefing capabilities
- No classified storage/SCIF available
- Possible location for MET system for Phase 3
- Spectrum certification/deconfliction with other MacDill units

- Alert facility Mole-Hole
- Issues with the installation of 6ARW Link 16
- 290 JCSS/comm architecture
- Link 16 kits from ACC

The team also discussed on-site options for an OCC at either APAFR or the DUC:

- Phase 1B office space for operation center
- SIPR terminals
- Currently no Link 16/SADL/ACMI capability at either location
- Location for MET-H during Phase 1B setup and Phase 2 testing
- Draft FATR operation manual to include as a Supplement to AFM13-212

3. Pinecastle Range Complex Site Visit, 18 Apr 2023
Rob Polumbo and Rick Miller

<u>Notes from visit</u>:

The team visited both Pinecastle Range Complex and FACSFAC Jacksonville over a two-day period. Key data and discoveries include:

- PRC exercise schedule for Aug 2023 - Aug 2024
- RRU at PRC on a tower primarily oriented towards the east to support afloat assets offshore in the OPAREAs, approximately 125 feet height (Figures 45-47)
- Older, single-digit SAM simulators/emitters are still on site but mainly deployed for COMPTUEX events (Figure 48)
- Confirmed the need to emphasize upcoming FATR “demonstrations”
- PRCs 2020 EA encompassed F-35s and expanded parameters for new aircraft
- Navy Black network available to transmit data "up the coast" via fiber lines to FACSFAC VACAPES; USN and USMC units should be able to see and monitor as well

Figure 45: RRU Tower at Pinecastle Range

Figure 46: Equipment on RRU Tower

Figure 47: RRU Power and Control Unit

Figure 48: Single-digit SAMs on Pinecastle

3. FACSFAC Jacksonville Site Visit, 19 April 2023
Rob Polumbo and Rick Miller

Notes from visit:

The team discussed the following information during the Jacksonville FACSFAC site visit:

- Commander drafted "support" letter for Phase 1B being reviewed by FACSFAC JAG.
- Agreed to coordinate FATR operation manual as a supplement to FACSFAC and PRC range manual

- Advised they have a contracted relay aircraft to link their shallow water ASW range data from offshore back to shore; FATR team can possibly leverage this architecture as airborne relay for L16 architecture
- Facilities have space for classified operations within ops center to support OCC/UOC
- Equipment/range systems are provided/serviced under contract NSWC Corona

Summary

In summary, our engagements, site visits and meetings with key leaders and stakeholders resulted in broad support for the FATR concept. We received positive feedback and useful inputs for the framework needed to move forward on a technology demonstration over the next 12-18 months. Our list of potential Florida installations for MET system locations, OCCs and UOCs have been identified in the Deliverable A section of the report. In Phase 1B, additional support activity will again focus on KLE and DoD installation visits to gain support and funding for the technology demonstration in Phase 2.

Tasks and Deliverables for Phase 1B

After six months of developing the concept for the FATR, the team has a much clearer picture of the way ahead to make the project successful. Phase 1B must not only develop an operational PATS/ALVC prototype and an operational network but also provide a pathway to advancement into Phase 2. For this reason, a separate task and deliverable has been added to coordinate the transition from a state-funded concept development project to a federally resourced program of record. The following depicts the tasks and deliverables for Phase 1B:

PHASE 1B

Tasks

1. Develop, field and install Operation Control Center (OCC) at APAFR with completed FATR operation manual
2. Develop, field and install PATS/ALVC prototype system on APAFR for demonstration in an operational environment (TRL 7)
3. Coordinate with Service branches to submit airspace proposal, spectrum authorizations and demonstrate processes when approved by the FAA and SMO
4. Coordinate Phase 2 support plan including engagement, resourcing, company partnership and funding sources

Deliverables

A. Functional OCC at APAFR with completed FATR operation manual submitted for incorporation in APAFR/PRC range manuals
B. Functional PATS/ALVC prototype system demonstrated at APAFR///3-week demonstration tentatively scheduled for May 2024
C. Airspace proposal and spectrum authorizations submitted for APAFR/PRC and demonstrated when approved by FAA and SMO
D. Phase 2 support plan coordinated

The challenges to completing the tasks and deliverables on time will be the delivery date and testing of the MET-H system, spectrum certification at APAFR, completion of the Link 16 network at APAFR and coordination of weapon system support with the services. The FATR team is confident these challenges will be overcome, and a successful demonstration will occur on time and on budget.

List of Appendices

Appendix A.1: Unit Requirements Worksheet_____

UNIT REQUIREMENTS WORKSHEET
Version: 13 Apr 2023

UNIT: ______________ LOCATION: __________________________________ DATE: ________________

POC: _______________________ PHONE: ______________ EMAIL: ______________________________

#/MODEL OF AIRCRAFT (WEAPON SYSTEM)/BLOCK/OFP/ALQ-213/P-5/P-6 CAPABLE/EW TRAINING/MODES/LINK 16 (Include capability of the weapon system and installation the unit is located):____

____

UNIT MISSION STATEMENT: ____

____

____

SPECIFIC MISSION DESCRIPTIONS: ____

____

____

CURRENT EW/EA/DEAD/SEAD TRAINING REQUIREMENTS: ___________________________________

____

CURRENT FLORIDA RANGE UTILIZATION: ____

____

CURRENT WARNING AREA AND MOA UTILIZATION: ____

____

CURRENT ACMI SYSTEM/CAPABILITIES (P5/P6 pod and number at the installation):

____

CURRENT SIMULATOR CAPABILITIES/#/LOCATION/DMON: ___________________________________

____

ALTRV PROCESS WITH ATC: ____

IF SO, CURRENT PROFILES: ____

________________________ ATC POC: _________________________ PHONE: ____________________

UNIT SCHEDULING OFFICE/POC: _____________________________ PHONE: ____________________

EMAIL: _________________________

RECURRING EXERCISES/DATES (FLORIDA RANGES): ____

____

PARTICIPATING UNITS/SUPPORTING UNITS: ____

____

STANDARD TRAINING MISSION SCENARIOS: ____

REQUESTED LIVE THREAT EMITTERS (IE EW/VORONEZH SAM/SA-20 FROM 70MHZ-18GHZ): _______

REQUESTED VIRTUAL (SIMULATOR) ENTITIES: ____________________

REQUESTED CONSTRUCTIVE ENTITIES: ____________________

REQUESTED LVC SCENARIOS: ____________________

WEAPONS/TACTICS/INTEL POC: ____________________ PHONE: ____________________

EMAIL: ____________________ SIPR: ____________________

ADDITIONAL REMARKS/REQUIREMENTS: ____________________

INTERVIEWER: ____________________

Appendix A.2: FATR Operation Manual___________

Florida Advanced Training Range
Operation Manual
(Draft Jun 2023)

SUMMARY OF REVISIONS:

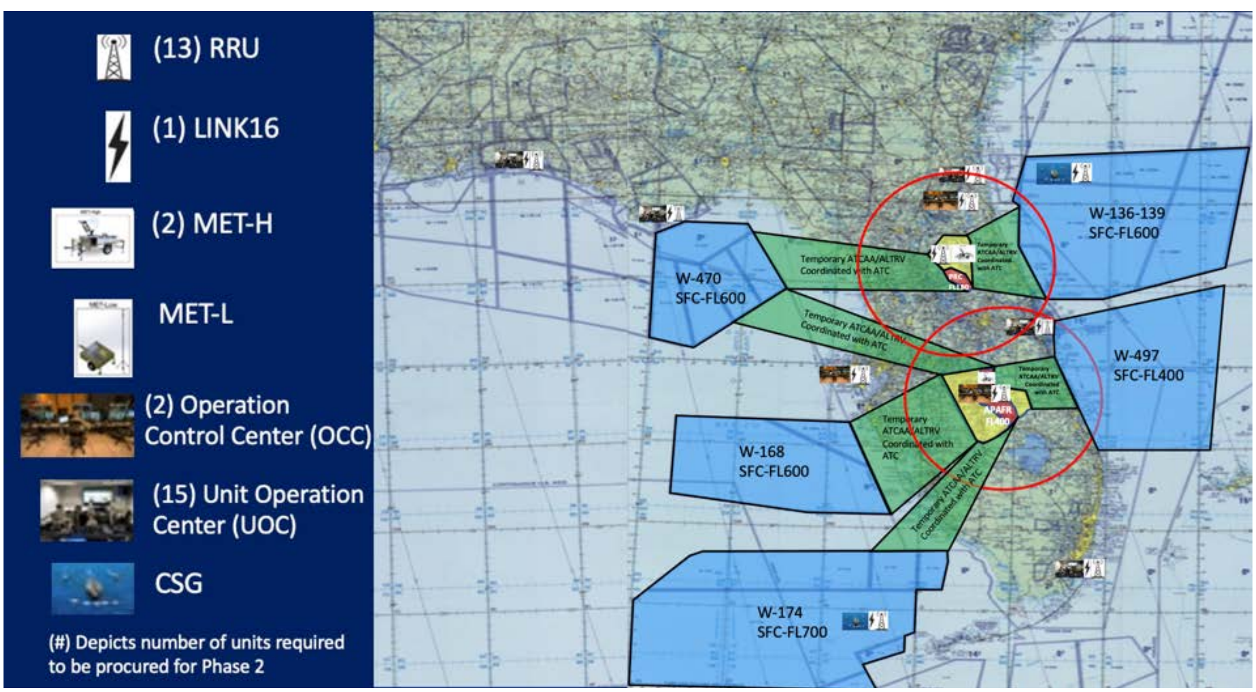
AREAS IN YELLOW WILL BE COMPLETED IN PHASE 1B PRIOR TO SUBMISSION FOR APPROVAL

Chapter 1

RESPONSIBILITIES

1.1. General Information. The Florida Advanced Training Range (FATR) is a blended live, virtual, constructive (LVC) environment extending from the Gulf of Mexico to the Atlantic Ocean overlaying the peninsula of Florida (Figure 1). The development of the FATR has been funded by grants through the Florida Defense Support Task Force and federal entities, including congressional delegations and the Department of Defense (DoD). The primary objective of the FATR is to provide a realistic, LVC environment for joint force training. The operation of the FATR is managed at two Operations Control Centers (OCC) located at the Deployed Unit Complex (DUC) at MacDill AFB, Tampa FL and Fleet Area Control and Surveillance Facilities (FACSFAC) at NAS Jacksonville FL. The OCC at the MacDill DUC and FACSFAC JAX will coordinate unit and large force training exercises with Avon Park Air Force Range (APAFR) and Pinecastle Range Complex (PRC), respectively, to include Restricted Areas, Military Operations Areas (MOA), Air Traffic Control Assigned Airspace (ATCAA) and Altitude Reservations (ALTRV). Each participating military unit will maintain a Unit Operation Center (UOC) to coordinate training events with the OCC supporting each range. The OCCs and UOC will be networked through information technology applications located at each operation center to schedule, develop scenarios and interact real-time during training events. This operation manual is the primary source document providing guidance for scheduling, planning, coordinating, executing and debriefing training events on the FATR. The Office of Primary Responsibility (OPR) for this manual is TBD in Phase 1B. This manual will be incorporated in all participating Florida land ranges and airspace operation manuals TBD.

Figure 1: Operational Schematic of FATR (Phase 2)



1.1.1. The FATR operation manual has been reviewed and approved by applicable service departments' OPR for specific range operations. Units utilizing the FATR environment will comply with all guidance, procedures and manuals of the Federal Aviation Administration (FAA), Air Traffic Control (ATC), Range Operating Authority (ROA) and service Spectrum Management Offices (SMO). The Range Operation Control Center (ROCC) will be the on-scene authority for all range operations IAW the applicable range operation manual. Any deviations from the procedures in this supplement require coordination and approval by the offices listed above.

1.2. Organizational Structure. The organizational structure of each participating range is determined by the ROA and service branch chain of command listed in the range operation manual. A FATR OCC will be assigned to each participating range to coordinate scheduling, mission scenarios and real-time interaction of the blended LVC network with the ROCC and UOCs. The development of the processes, applications, communication and personnel for each OCC will be determined in Phase 1B.

1.2.1. OCC Organization at MacDill DUC (Phase 2)
1.2.2. OCC Organization at FACSFAC (Phase 2)
1.2.3. OCC Organization at Eglin (Phase 3)
Reference range manuals for personnel, operations and sustainment, contact info email/phone

1.3. Other Agencies. FAA/Air Route Traffic Control Centers; Spectrum Management Offices

1.3.1. Special Use Airspace (SUA): Restricted Areas; Warning Areas; Military Operations Airspace (MOA); Air Traffic Control Assigned Airspace (ATCAA) and Altitude Reservation (ALTRV). Units will be responsible for scheduling all SUA through the appropriate controlling agency. Reference the following site developed by Enterprise Florida and the Florida Defense Alliance for information on all Florida SUA (controlling and using agency). http://florida3d.demo.s3-website.eu-west-2.amazonaws.com

1.3.2. Spectrum Management Offices

1.3.2.1. USAF

1.3.2.2. USN/USMC

1.3.2.3. USA

1.3.2.4. USSF

1.3.2.5. USCG

1.4. Weather. The FATR LVC training environment is very dependent on stable electrical and communication network operations to generate live, virtual and constructive entities during a training event. Users must be aware that inclement weather in and around the peninsula, not only in the area of intended training, may impact the fidelity of the training environment. The ROA is the OPR on decisions to cancel the FATR operation when system degradation is deemed unsatisfactory or unsafe for the user(s).

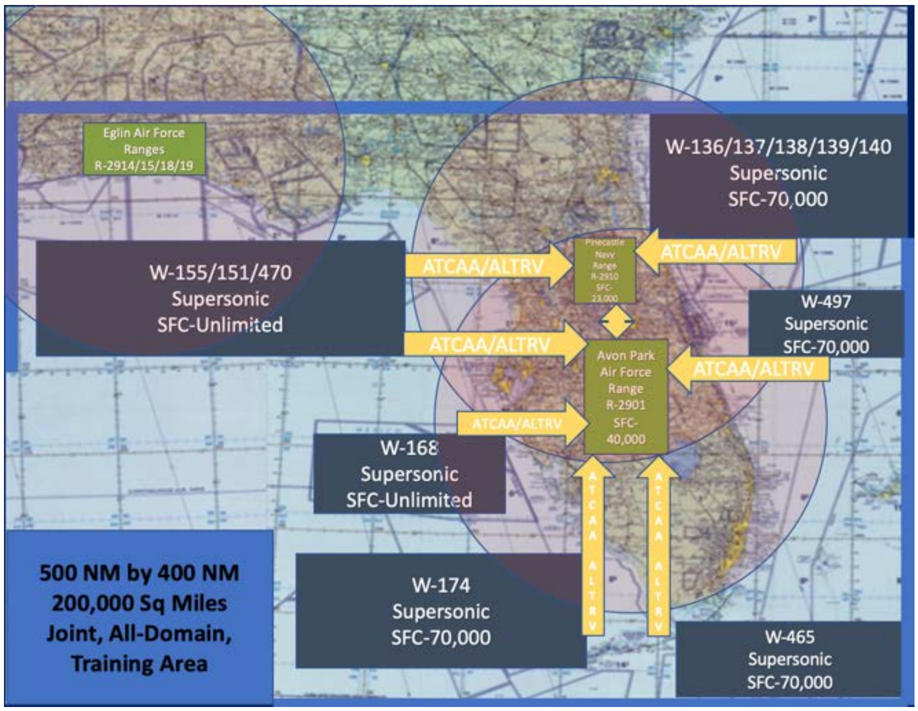
1.5 Range User. Reference specific range operation manual

1.6 Unit Feedback. All units and personnel utilizing the FATR training environment are encouraged to provide feedback to the OCC assigned to each range. A feedback form is attached (hyperlink file) at the end of this supplement (Attachment 3) TBD in Phase 1B.

Chapter 2

DESCRIPTION OF FATR LVC ENVIRONMENT

Figure 2.1. Depiction of Airspace Used in FATR Environment (Phase 2)



2.1. General Information. FATR is an LVC environment that overlays approximately a 500 by 400 nautical mile area extending from the eastern Gulf of Mexico to the Atlantic Ocean over the entire peninsula of Florida (Figure 2.1). The FATR includes all air, land and sea airspace/ranges within the 200,000 sq/mile of area. All military services, to include the US Coast Guard, are approved to utilize the range for test and training.

2.1.1. Capabilities. FATR offers all missions, weapon systems, weapons employment, electronic warfare and counter measures to be used for test or training IAW each airspace/range list of approved use.

2.1.2. Communications (Comm Card). Reference the communication data listed for each airspace/range utilized for a test or training mission. Table 2.1 depicts the communication data for FATR OCC and UOC locations TBD.

Table 2.1. Communications for FATR OCC and UOC Facilities
Include Communications/Contacts Table TBD

2.1.3. Hours of Operation. The FATR will be available at all times the intended airspace/range is available for use.

2.1.4. Scheduling Procedures. Reference the scheduling process for the airspace/range of intended use. Once the airspace/range is appropriately scheduled, utilize the FATR coordination process in Attachment 2 to schedule and develop test or training scenario TBD.

2.2. Restrictions.

2.2.1. Reference and adhere to all restrictions listed for the airspace/range of intended use.

2.2.2. No weapons employment, kinetic effect or lasing are authorized on any live, virtual or constructive entity included in the FATR blended LVC environment. Electronic warfare and countermeasures against any entity must comply with the restrictions for the airspace/range of intended use.

2.3. Ranges and Military Operations Areas (MOAs).

2.3.1. Reference and comply with all airspace/range instructions for the intended range of intended use.

2.3.2. The FATR will include the following special use airspace (SUA): over water Warning Areas, over land Restricted Areas/Military Operations Areas (MOA), Altitude Reservations (ALTRV) and ATC Assigned Airspace (ATCAA). All these SUAs will be scheduled by each unit through the appropriate Air Route Traffic Control Center (ARTCC) controlling the airspace/range of intended use. All clearances to enter/exit SUAs must be requested by the controlling ARTCC. The FATR OCC and UOCs have no Air Traffic Control (ATC) authority and should never be utilized to request airspace/range clearances.

2.3.3. The live emitters utilized on the ranges are mobile (self-propelled or towed) and can be operated at location or remotely via wireless radio communication. The detailed capabilities of the emitters are listed in Chapter 4. The following figures depict the approved locations and coordinates for the live emitters on each participating range. Alternate locations or mobile scenarios can be requested through the scheduling process for the airspace/range of intended use.

Figure 2.2 APAFR FATR Live Emitter Locations

Figure 2.3 PRC FATR Live Emitter Locations

Figure 2.4 Eglin FATR Live Emitter Locations (TBD Phase 3)

Chapter 3

OPERATIONS/WEAPONS DELIVERY PROCEDURES

3.1. Overview. Reference and adhere to all procedures listed for the airspace/range of intended use.

3.2. Authorized Ordnance. No weapons employment, kinetic effect or lasing are authorized on any live, virtual or constructive entity included in the FATR blended LVC environment. Electronic warfare and countermeasures against any entity must comply with the restrictions for the airspace/range of intended use.

Chapter 4

ELECTRONIC COMBAT RANGES

4.1. Threat Emitters.

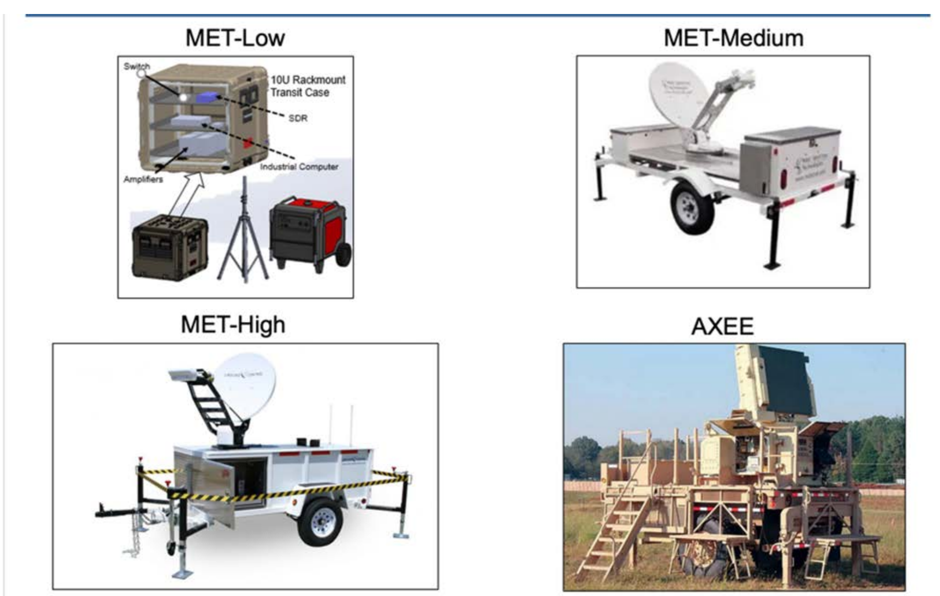
4.1.1. Airspace Restrictions. FATR live emitters will be located and operated IAW the requirements of the airspace/range of intended use.

4.1.2. Scheduling. FATR live emitters will be scheduled and coordinated by assigned OCC and/or participating UOC through the normal airspace/range processes listed in Chapter 2 of this supplement. The authority for emitter transmissions rests solely with the ROCC of the airspace/range being utilized. The ROCC may grant authority for the OCC and/or UOC to “control” live emitters during a unit’s scheduled training period (control means-turn emitter on/off, reprogram emitter waveform, move emitter).

4.1.3. EC Range Operations. Flights performing weapons deliveries in conjunction with EC training will conform to the weapons delivery procedures described in the operation manual of the range being utilized. No weapons employment, kinetic effect or lasing are authorized on any live, virtual or constructive entity included in the FATR blended LVC environment.

4.1.4. In addition to current EC assets listed in the range operation manuals, the multi-domain emitter threat systems depicted in figure 4.1 will be utilized as live emitters in the FATR environment. These emitters are produced by Scientific Research Corporation (SRC) and are mobile, reprogrammable and can be operated manually at location or remotely utilizing radio relay.

Figure 4.1. Multi-Domain Emitter Threat (MET) family of systems



Figures 4.2 and 4.3 provide the MET capabilities for the Low, Medium and High systems. The emitters are programmed to provide a wide array of current threat waveforms and can be reprogrammed at the site or remotely within minutes. An unclassified catalog with a classified annex of available threat waveforms is available at each OCC/UOC facility TBD.

Figure 4.2, and 4.3. MET Capabilities

Capabilities		Low	Medium	High
Frequency Range		70 MHz - 6 GHz	70 MHz - 6 GHz	70 MHz - 18 GHz
Waveform Types	Electronic Warfare	CW, AM, FM, FSK, BPSK, QPSK, OOK, Narrow and Broadband Noise	CW, AM, FM, FSK, BPSK, QPSK, OOK, Narrow and Broadband Noise	CW, AM, FM, FSK, BPSK, QPSK, OOK, Narrow and Broadband Noise
	Radar	Acq Radar, BPSK Pulsed	Acq Radar, BPSK Pulsed, FM/Swept FM, Chirp	Acq Radar, BPSK Pulsed, FM/Swept FM, Chirp
	Communications	AM, FM, FSK, BPSK, QPSK	AM, FM, FSK, BPSK, QPSK	AM, FM, FSK, BPSK, QPSK
Instantaneous Bandwidth		50 MHz	50 / 120 MHz	200+ MHz
RF Transmitter Power		~20 Watts	~200 Watts	> 200 Watts
Antenna Type		Dipole / Fixed	Directional (Horn / Dish) Manuual Az / El	Directional (Horn / Dish) Automatic Az / El
Receiver Capabilities		Basic Electornic Warfare (Basic) Spec Monitoring (amp/Freq & Waterfall)	Basic Electronic Warfare (Basic, Look through, Auto/Preset) Spec Monitoring (amp/Freq & Waterfall)	Basic Electronic Warfare (Basic, Look through, Auto/Preset) Spec Monitoring (amp/Freq & Waterfall)
Size		Single Case / Enclosure, Mast	Multiple Case / Enclosure, Mast	Multiple Case / Enclosure, Mast
Power		Low Cost Generator	Moderate Cost Generator	Moderate Cost Generator
Operational Temp Range		-20° to +50° C	-20° to +50° C	-20° to +50° C
Portability		Trailer / Transportable	Trailer / Transportable	Trailer / Transportable

	EHF	Extremely high frequency	1 cm	30 GHz	124 µeV
Micro-waves	SHF	Super high frequency	1 dm	3 GHz	12.4 µeV
	UHF	Ultra high frequency	1 m	300 MHz	1.24 µeV
radio waves	VHF	Very high frequency	10 m	30 MHz	124 neV
	HF	High frequency	100 m	3 MHz	12.4 neV
	MF	Medium frequency	1 km	300 kHz	1.24 neV
	LF	Low frequency	10 km	30 kHz	124 peV
	VLF	Very low frequency	100 km	3 kHz	12.4 peV
	ULF	Ultra low frequency	1 Mm	300 Hz	1.24 peV
	SLF	Super low frequency	10 Mm	30 Hz	124 feV
	ELF	Extremely low frequency	100 Mm	3 Hz	12.4 feV
Sources: File:Light spectrum.svg[1][2][3]					

4.2. Virtual Entities. Virtual entities from man-in-the-loop (MITL) ground simulators can be included in training scenarios. Instructions on coordination and development of scenarios with virtual entities will be determined in Phase 1B.

4.3 Constructive Entities. Constructive entities from computer generated applications can be included in training scenarios. Digital Integrated Air Defense System (DIADS) will be utilized to inject threat entities in training scenarios. An unclassified catalog of available threats is available at OCC/UOC facilities. Instructions on coordination and development of scenarios with constructive entities will be determined in Phase 1B.

Chapter 5

RANGE OPERATIONS CONTROL CENTER AND FATR OCC/UOC COORDINATION

5.1. Responsibilities and coordination between ROCC/OCC/UOC TBD during Phase 1B

5.1.1. OCC/MacDill Deployed Unit Complex (DUC)

5.1.1.1. Avon Park Air Force Range (APAFR)

5.1.2. OCC/Fleet Area Control and Surveillance Facilities Jacksonville (FACSFAC JAX)

5.1.2.1. Pinecastle Range Complex (PRC)

5.1.3. OCC/Panhandle operation center TBD in Phase 3

5.1.3.1. Eglin Range

5.1.4. UOC/Participating units

Chapter 6

AIR COMBAT MANEUVERING INSTRUMENTATION (ACMI), DATALINK AND NETWORKS

TBD during Phase 1B

Chapter 7

UNMANNED AERIAL SYSTEMS (UAS) PROCEDURES

7.1. General. Reference and adhere to all procedures listed for the airspace/range of intended use.

7.2. UAS Operations. No weapons employment, kinetic effect or lasing are authorized on any live, virtual or constructive entity included in the FATR blended LVC environment. Electronic warfare and countermeasures against any entity must comply with the restrictions for the airspace/range of intended use.

Chapter 8

GROUND LIVE-FIRE PROCEDURES

TBD during Phase 1B

Chapter 9

RANGE CLEARANCE AND RANGE MAINTENANCE PROCEDURES

9.1. General. Reference and adhere to all procedures listed for the airspace/range of intended use. FATR personnel will adhere to all ground safety instructions during operation and maintenance of the ALVC system, communication network and components on the installation.

Chapter 10

GROUND TRAINING PROCEDURES

10.1. General. Reference and adhere to all procedures listed for the airspace/range of intended use. FATR personnel will adhere to all ground training instructions during operation and maintenance of the ALVC system, communication network and components on the installation.

Attachment 1

FATR ACRONYMS AND ABBREVIATIONS
Complete list TBD in Phase 1B

Advanced Battle Management System…………………………………………………………………………ABMS
Air Combat Command……………………………………………………………………………………………ACC
Agile Combat Employment………………………………………………………………………………………ACE
Air Combat Maneuvering…………………………………………………………………………………………ACM
Air Combat Simulator………………………………………………………………………………………………ACS
Adaptive Electronic Steerable Array……………………………………………………………………………AESA
Air Education and Training Command…………………………………………………………………………AETC
Area Frequency Coordinator………………………………………………………………………………………AFC
Air Force Frequency Management Agency……………………………………………………………………AFFMA
Air Force Materiel Command……………………………………………………………………………………AFMC
Air Force Reserve Command……………………………………………………………………………………AFRC
Air Force Research Laboratory…………………………………………………………………………………AFRL
Air Force Special Operations Command………………………………………………………………………AFSOC
Air Interdiction……AI
Altitude Reservation………………………………………………………………………………………………ALTRV
Advanced Live, Virtual, Constructive……………………………………………………………………………ALVC
Air Mobility Command………………………………………………………………………………………………AMC
Army Spectrum Management Office……………………………………………………………………………AMSO
Avon Park Air Force Range………………………………………………………………………………………APAFR
Air Refueling………AR
Air Route Traffic Control Center…………………………………………………………………………………ARTCC
Anti-Submarine Warfare……………………………………………………………………………………………ASW
Air Traffic Control……………………………………………………………………………………………………ATC
Air Traffic Control Assigned Airspace…………………………………………………………………………ATCAA
Atlantic Undersea Test and Evaluation Center………………………………………………………………AUTEC
AESA Extensible Emitter Emulator………………………………………………………………………………AXEE
Basic Fighter Maneuvers……………………………………………………………………………………………BFM
Basic Surface Attack…………………………………………………………………………………………………BSA
Chinese Aerospace Science…………………………………………………………………………………………CSA
Close Air Support………………………………………………………………………………………………………CAS
Command and Control…………………………………………………………………………………………………C2
Combat Mission Ready………………………………………………………………………………………………CMR
Common Operating Picture…………………………………………………………………………………………COP
Composite Training Unit Exercise………………………………………………………………COMPTUEX/C2EX
Contiguous United States…………………………………………………………………………………………CONUS
Combat Search and Rescue…………………………………………………………………………………………CSAR
Deputy Assistant Secretary of Defense…………………………………………………………………………DASD
Defensive Counter Air…………………………………………………………………………………………………DCA
Destruction of Enemy Air Defense………………………………………………………………………………DEAD
Department of Defense………………………………………………………………………………………………DoD
Digital Integrated Air Defense System…………………………………………………………………………DIADS

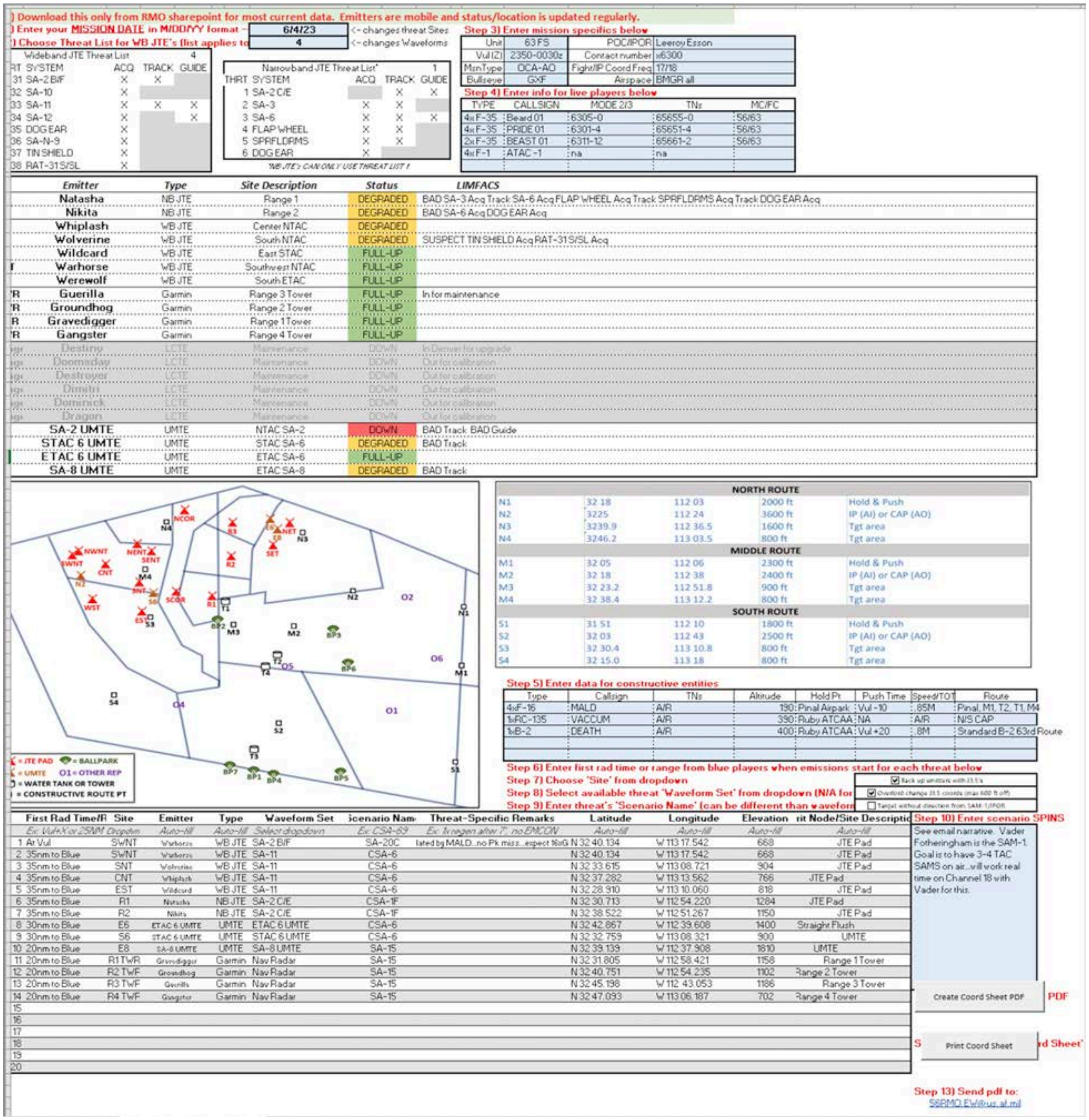
Distributed Interactive Simulation…………………………………………………………………………………………DIS
Digital Radar Warning Receiver……………………………………………………………………………………DRWR
Deployed Unit Complex……………………………………………………………………………………………………DUC
Electronic Attack………EA
Environmental Assessment…………………………………………………………………………………………………EA
East Area Frequency Coordinator……………………………………………………………………………………EAFC
Eglin Gulf Test and Training Range………………………………………………………………………………EGTTR
Electromagnetic Interference………………………………………………………………………………………………EMI
Environmental Impact Study………………………………………………………………………………………………EIS
Enterprise Range Plan……ERP
Equipment Spectrum Guidance Permanent Working Group…………………………………………ESGPWG
Electronic Support Measures……………………………………………………………………………………………ESM
Electronic Warfare……EW
Federal Aviation Administration……………………………………………………………………………………FAA
Fleet Area Control and Surveillance Facility Jacksonville…………………………………………FACSFAC JAX
Frequency Assignment Subcommittee…………………………………………………………………………………FAS
Fifth Generation Advanced Training Waveform…………………………………………………………5G-ATW
Florida Air National Guard……………………………………………………………………………………………FLANG
Florida Army National Guard…………………………………………………………………………………………FLARNG
Florida Advanced Training Range………………………………………………………………………………………FATR
Florida Defense Support Task Force…………………………………………………………………………………FDSTF
Fiber Optic Towed Decoy…………………………………………………………………………………………………FOTD
Frequency Panel……FP
Fallon Range Training Complex………………………………………………………………………………………FRTC
Gulf Area Frequency Coordinator……………………………………………………………………………………GAFC
Gulf of Mexico Water/Airspace……………………………………………………………………………………GOMEX
Government Reference Architecture……………………………………………………………………………………GRA
Hardware-In-The-Loop……HITL
High-Level Architecture……………………………………………………………………………………………………HLA
Helicopter Maritime Strike Wing Atlantic…………………………………………………………………HSMWLANT
In Accordance With………IAW
Integrated Air Defense System…………………………………………………………………………………………IADS
Infantry Brigade Combat Team…………………………………………………………………………………………IBCT
Institute of Electrical and Electronics Engineers……………………………………………………………IEEE
Interdepartmental Radio Advisory Committee……………………………………………………………………IRAC
Information Security…………………………………………………………………………………………………INFOSEC
Information, Surveillance and Reconnaissance………………………………………………………………………ISR
Information Technology……IT
Joint, All-Domain Command and Control…………………………………………………………………………JADC2
Joint, All-Domain Operations……………………………………………………………………………………………JADO
Jacksonville Range Complex and Operation Area…………………………………………………JAXOPAREA
Joint Frequency Allocation-to-Equipment Process…………………………………………………………JFAEP
Joint Spectrum Center……JSC
Joint Spectrum Interference Resolution………………………………………………………………………………JSIR
Key Leader Engagement………………………………………………………………………………………………………KLE
Logistic, Equipment and Training…………………………………………………………………………………………LET

Large Force Exercise……………………………………………………………………………………………………LFE
Live Mission Operations Center……………………………………………………………………………LMOC
Large Scale Combat Operations……………………………………………………………………………LSCO
Military Communications-Electronics Board……………………………………………………………MCEB
Mission Data File………………………………………………………………………………………………MDF
Medical Evacuation…………………………………………………………………………………………MEDEVAC
Multi-Domain Emitter Threat………………………………………………………………………………MET
Multi-Function Display………………………………………………………………………………………MFD
Multifunction Information Distribution System-Joint Tactical Radio System……………………MIDS-J
Man-In-The-Loop………………………………………………………………………………………………MITL
Military Operations Area……………………………………………………………………………………MOA
Maintenance, Repair and Operation………………………………………………………………………MRO
Major Range and Test Facility Bases……………………………………………………………………MRTFB
Modeling & Simulation………………………………………………………………………………………M&S
Military Training Routes……………………………………………………………………………………MTR
Naval Air Forces Atlantic……………………………………………………………………………………AIRLANT
National Airspace System……………………………………………………………………………………NAS
National Defense Strategy……………………………………………………………………………………NDS
National Guard Bureau…………………………………………………………………………………………NGB
National Guard and Reserve Equipment Account……………………………………………………NGREA
Next Generation Jammer………………………………………………………………………………………NGJ
Non-classified Internet Protocol Router……………………………………………………………………NIPR
Navy, Marine Corps Spectrum Center………………………………………………………………………NMSC
National Telecommunications and Information Administration……………………………………NTIA
Naval Surface Warfare Center………………………………………………………………………………NSWC
Operating Area……………………………………………………………………………………………………OPAREA
Offensive Counter Air…………………………………………………………………………………………OCA
Operation Control Center………………………………………………………………………………………OCC
Outside Continental United States……………………………………………………………………………OCONUS
Operational Flight Program……………………………………………………………………………………OFP
Operations and Maintenance…………………………………………………………………………………O&M
Organization, Management and Operational Structure……………………………………………………OMOS
Operational Security……………………………………………………………………………………………OPSEC
Open System Enclave……………………………………………………………………………………………OCE
Office of Primary Responsibility………………………………………………………………………………OPR
Office of the Secretary of Defense……………………………………………………………………………OSD
Operational Test and Evaluation………………………………………………………………………………OT&E
Off-The-Shelf……………………………………………………………………………………………………OTS
Operation Test and Training Infrastructure…………………………………………………………………OTTI
Programmable, Affordable Threat System……………………………………………………………………PATS
Program Executive Officer Tactical Aircraft…………………………………………………………………PEO-TACAIR
Pinecastle Range Complex………………………………………………………………………………………PRC
Ready Aircrew Program…………………………………………………………………………………………RAP
Real-Time Electromagnetic Defense Capability……………………………………………………………REDCAP
Red Force Command and Control………………………………………………………………………………RFCC
Range Operating Authority………………………………………………………………………………………ROA

Range Operation Control Center………………………………………………………………………………………ROCC
Radio Relay Unit………RRU
Radar Warning Receiver…………………………………………………………………………………………………RWR
Software Defined Radio…………………………………………………………………………………………………SDR
Suppression of Enemy Air Defense……………………………………………………………………………SEAD
Secret Internet Protocol Router…………………………………………………………………………………SIPR
Synthetic-Inject-To-Live………………………………………………………………………………………………SITL
Spectrum Analyzer………SA
Surface-to-Air Missile……………………………………………………………………………………………………SAM
Strike Coordination and Reconnaissance……………………………………………………………………SCAR
Secure LVC Advanced Training Environment…………………………………………………………………SLATE
Spectrum Management Office………………………………………………………………………………………SMO
Spectrum Planning Subcommittee………………………………………………………………………………SPS
Scientific Research Corporation…………………………………………………………………………………SRC
Space Systems Command………………………………………………………………………………………………SSC
Special Use Airspace………………………………………………………………………………………………………SUA
Surface Warfare……SUW
The Adjutant General………………………………………………………………………………………………………TAG
Tactical Datalink………LINK16
Tactical Intercepts……TI
Technology Maturation…………………………………………………………………………………………………Tech Mat
The Roosevelt Group………………………………………………………………………………………………………TRG
Technology Readiness Level…………………………………………………………………………………………TRL
Threat System Management Office……………………………………………………………………………TSMO
Tactics, Techniques and Procedures…………………………………………………………………………TTP
Test and Training Space Needs Statement………………………………………………………………T/TSNS
Unit Operation Center……………………………………………………………………………………………………UOC
United States Air Force…………………………………………………………………………………………………USAF
United States Army……USA
United States Coast Guard……………………………………………………………………………………………USCG
United States Marine Corps…………………………………………………………………………………………USMC
United States Navy……USN
United States Space Force……………………………………………………………………………………………USSF
University of West Florida……………………………………………………………………………………………UWF
Undersea Warfare Shallow Water Training Range………………………………………………………USWTR
Virginia Capes………VACAPES
WarRoom-In-A-Box………WIAB

Attachment 2

FATR TRAINING/SCENARIO REQUEST FORM
TBD in Phase 1B
Example Below



) Download this only from RMO sharepoint for most current data. Emitters are mobile and status/location is updated regularly.
) Enter your MISSION DATE in M/DD/YY format – 6/4/23 <- changes threat Sites
) Choose Threat List for WB JTE's (list applies to 4 <- changes Waveforms

Wideband JTE Threat List	4		
RT SYSTEM	ACQ	TRACK	GUIDE
31 SA-2 B/F	X	X	
32 SA-10	X		
33 SA-11	X	X	X
34 SA-12	X		X
35 DOG EAR	X		
36 SA-N-9	X		
37 TIN SHIELD	X		
38 RAT-31 S/SL	X		

Narrowband JTE Threat List* 1			
THRT SYSTEM	ACQ	TRACK	GUIDE
1 SA-2 C/E		X	X
2 SA-3	X	X	
3 SA-6	X	X	X
4 FLAP WHEEL	X	X	
5 SPRFLDRMS	X	X	
6 DOG EAR	X		

*NB JTE's CAN ONLY USE THREAT LIST 1

Step 3) Enter mission specifics below

Unit	63 FS	POC/IPOR	Leeroy Esson
Vul (Z)	2350-0030z	Contact number	x6300
MsnType	OCA-AO	Fight/IP Coord Freq	17/18
Bullseye	GXF	Airspace	BMGR all

Step 4) Enter info for live players below

TYPE	CALLSIGN	MODE 2/3	TNs	MC/FC
4x F-35	Beard 01	6305-0	65655-0	56/63
4x F-35	PRIDE 01	6301-4	65651-4	56/63
2x F-35	BEAST 01	6311-12	65661-2	56/63
4x F-1	ATAC -1	na	na	

Emitter	Type	Site Description	Status	LIMFACS
Natasha	NB JTE	Range 1	DEGRADED	BAD SA-3 Acq Track SA-6 Acq FLAP WHEEL Acq Track SPRFLDRMS Acq Track DOG EAR Acq
Nikita	NB JTE	Range 2	DEGRADED	BAD SA-6 Acq DOG EAR Acq
Whiplash	WB JTE	Center NTAC	DEGRADED	
Wolverine	WB JTE	South NTAC	DEGRADED	SUSPECT TIN SHIELD Acq RAT-31 S/SL Acq
Wildcard	WB JTE	East STAC	FULL-UP	
Warhorse	WB JTE	Southwest NTAC	FULL-UP	
Werewolf	WB JTE	South ETAC	FULL-UP	
Guerilla	Garmin	Range 3 Tower	FULL-UP	In for maintenance
Groundhog	Garmin	Range 2 Tower	FULL-UP	
Gravedigger	Garmin	Range 1 Tower	FULL-UP	
Gangster	Garmin	Range 4 Tower	FULL-UP	
Destiny	LCTE	Maintenance	DOWN	In Denver for upgrade
Doomsday	LCTE	Maintenance	DOWN	Out for calibration
Destroyer	LCTE	Maintenance	DOWN	Out for calibration
Dimitri	LCTE	Maintenance	DOWN	Out for calibration
[illegible]	LCTE	Maintenance	DOWN	Out for calibration
Dragon	LCTE	Maintenance	DOWN	Out for calibration
SA-2 UMTE	UMTE	NTAC SA-2	DOWN	BAD Track BAD Guide
STAC 6 UMTE	UMTE	STAC SA-6	DEGRADED	BAD Track
ETAC 6 UMTE	UMTE	ETAC SA-6	FULL-UP	
SA-8 UMTE	UMTE	ETAC SA-8	DEGRADED	BAD Track

		NORTH ROUTE		
N1	32 18	112 03	2000 ft	Hold & Push
N2	3225	112 24	3600 ft	IP (AI) or CAP (AO)
N3	3239.9	112 36.5	1600 ft	Tgt area
N4	3246.2	113 03.5	800 ft	Tgt area
		MIDDLE ROUTE		
M1	32 05	112 06	2300 ft	Hold & Push
M2	32 18	112 38	2400 ft	IP (AI) or CAP (AO)
M3	32 23.2	112 51.8	900 ft	Tgt area
M4	32 38.4	113 12.2	800 ft	Tgt area
		SOUTH ROUTE		
S1	31 51	112 10	1800 ft	Hold & Push
S2	32 03	112 43	2500 ft	IP (AI) or CAP (AO)
S3	32 30.4	113 10.8	800 ft	Tgt area
S4	32 15.0	113 18	800 ft	Tgt area

Step 5) Enter data for constructive entities

Type	Callsign	TNs	Altitude	Hold Pt	Push Time	Speed/TOT	Route
4xF-16	MALD	A/R	190	Pinal Airpark	Vul -10	.85M	Pinal, M1, T2, T1, M4
1xRC-135	VACCUM	A/R	390	Ruby ATCAA	NA	A/R	N/S CAP
1xB-2	DEATH	A/R	400	Ruby ATCAA	Vul +20	.8M	Standard B-2 63rd Route

Step 6) Enter first rad time or range from blue players when emissions start for each threat below
Step 7) Choose 'Site' from dropdown
Step 8) Select available threat 'Waveform Set' from dropdown (N/A for
Step 9) Enter threat's 'Scenario Name' (can be different than waveform

First Rad Time/R	Site	Emitter	Type	Waveform Set	Scenario Nam	Threat-Specific Remarks	Latitude	Longitude	Elevation	rit Node/Site Descriptic
Ex: Vul+X or 25NM	Dropdwn	Auto-fill	Auto-fill	Select dropdown	Ex: CSA-69	Ex: Is regen after 7', no EMCON	Auto-fill	Auto-fill	Auto-fill	Auto-fill
1 At Vul	SWNT	Warhorse	WB JTE	SA-2 B/F	SA-20C	lated by MALD...no Pk miss...expect 16xG	N 32 40.134	W 113 17.542	668	JTE Pad
2 35nm to Blue	SWNT	Warhorse	WB JTE	SA-11	CSA-6		N 32 40.134	W 113 17.542	668	JTE Pad
3 35nm to Blue	SNT	Wolverine	WB JTE	SA-11	CSA-6		N 32 33.615	W 113 08.721	904	JTE Pad
4 35nm to Blue	CNT	Whiplash	WB JTE	SA-11	CSA-6		N 32 37.282	W 113 13.562	766	JTE Pad
5 35nm to Blue	EST	Wildcard	WB JTE	SA-11	CSA-6		N 32 28.910	W 113 10.060	818	JTE Pad
6 35nm to Blue	R1	Natasha	NB JTE	SA-2 C/E	CSA-1F		N 32 30.713	W 112 54.220	1284	JTE Pad
7 35nm to Blue	R2	Nikita	NB JTE	SA-2 C/E	CSA-1F		N 32 38.522	W 112 51.267	1150	JTE Pad
8 30nm to Blue	E6	ETAC 6 UMTE	UMTE	ETAC 6 UMTE	CSA-6		N 32 42.867	W 112 39.608	1400	Straight Flush
9 30nm to Blue	S6	STAC 6 UMTE	UMTE	STAC 6 UMTE	CSA-6		N 32 32.759	W 113 08.321	900	UMTE
10 20nm to Blue	E8	SA-8 UMTE	UMTE	SA-8 UMTE	SA-15		N 32 39.139	W 112 37.908	1810	UMTE
11 20nm to Blue	R1 TWR	Gravedigger	Garmin	Nav Radar	SA-15		N 32 31.805	W 112 58.421	1158	Range 1 Tower
12 20nm to Blue	R2 TWF	Groundhog	Garmin	Nav Radar	SA-15		N 32 40.751	W 112 54.235	1102	Range 2 Tower
13 20nm to Blue	R3 TWF	Guerilla	Garmin	Nav Radar	SA-15		N 32 45.198	W 112 43.053	1186	Range 3 Tower
14 20nm to Blue	R4 TWF	Gangster	Garmin	Nav Radar	SA-15		N 32 47.093	W 113 06.187	702	Range 4 Tower
15										
16										
17										
18										
19										
20										

Step 10) Enter scenario SPINS

See email narrative. Vader Fotheringham is the SAM-1. Goal is to have 3-4 TAC SAMS on air...will work real time on Channel 18 with Vader for this.

Create Coord Sheet PDF PDF

S Print Coord Sheet d Sheet'

Step 13) Send pdf to:
56RMO.EW@us.af.mil

Attachment 3

FATR TRAINING FEEDBACK FORM TBD in Phase 1B

Appendix B.1: MET/ALVC Demonstration (Part 1)

Florida Advanced Training Range (FATR) Phase 1A Technology Demonstration

Purpose: To demonstrate the Multi-Domain Emitter Threat (MET) system can be remotely controlled in a Live/Virtual/Constructive (LVC) training architecture to provide representative threat indications to live aircraft

Participants:
Threat Systems Management Office (Redstone Arsenal, AL)
41st Rescue Squadron (Moody AFB, GA)
Scientific Research Corporation (Huntsville, AL)
Redstone Army Airfield Base Operations (Huntsville, AL)
FATR Technical Team (Various locations in FL)

Agenda

- Demonstration Concept, Flight Path/Points
- MET Overview, Waveforms to Radiate
- Data Collection and Observations
- DIADS Overview
- MET Hardware and Local Demonstration

Florida Advanced Training Range (FATR) Phase 1A Technology Demonstration

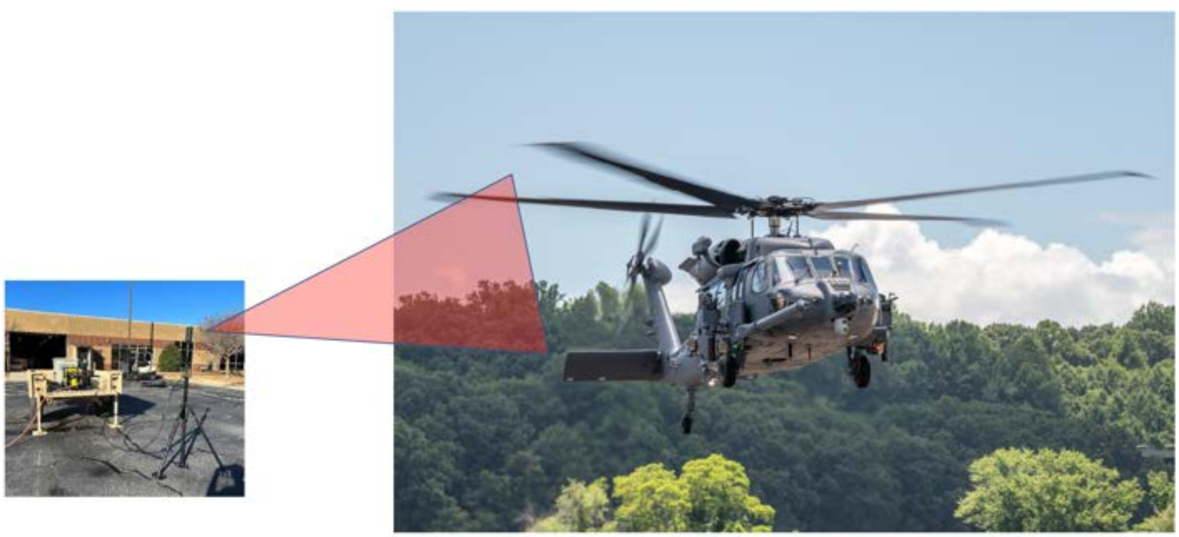
Location: Redstone Army Airfield Class D airspace (4.4 NM radius from Redstone AAF up to 2400' MSL) maintaining communications at all times with Redstone tower for deconfliction with arrival and departure traffic, both IFR and VFR

Date(s) and Time(s): Primary vul window – Weds, 7 Jun 2023 from 11:00 – 11:30 CDT
AAR at 103 Quality Circle NW, Suie 220, Wed, 7 June, 1400 CDT?
Secondary vul window – Thurs, 8 Jun 2023 from 08:00 – 08:30 CDT

Operating Area: Airspace between SRC facility (N 34 42.633/W 86 41.024) and the Army Medical Facility east of Redstone AAF (N 34 41.779/W 86 39.616) flying at 1500' AGL and below

Flight Parameters: Establish a 1.65 NM racetrack pattern between the SRC facility and the Army Medical Facility; expecting 4 – 5 laps around the racetrack pattern to test multiple waveforms emitting from the MET

Overview of Demonstration

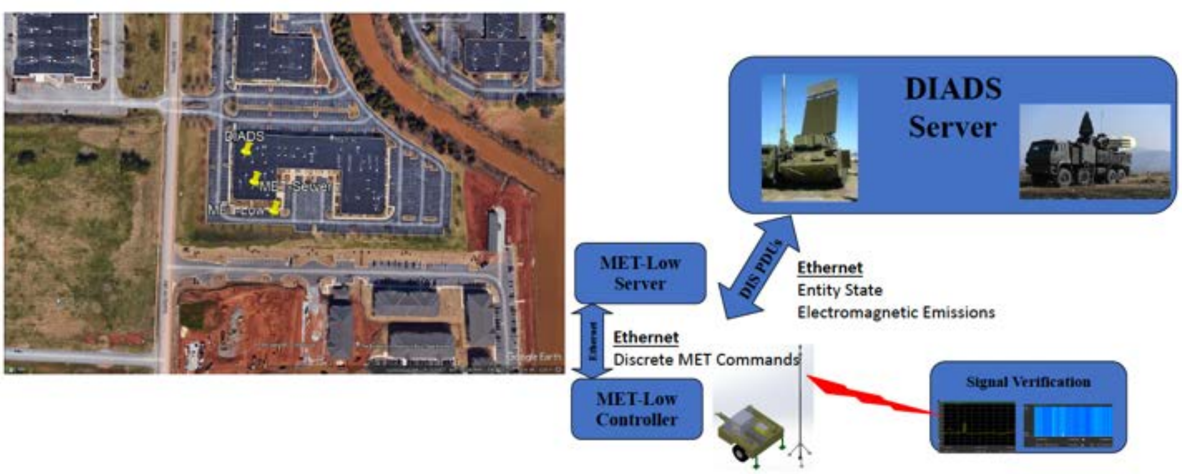


Overview of Operating Area

FATR Phase 1A Technology Demonstration Operating Area

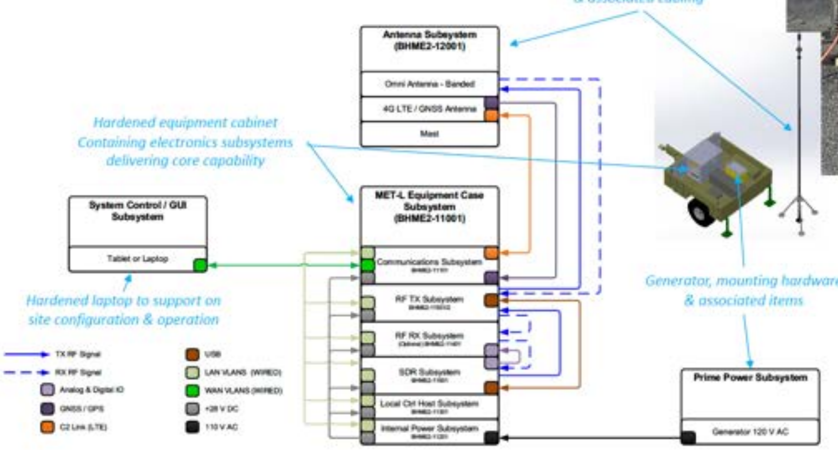
Close-up View of SRC Facility (Target)

OV1, FATR Phase 1A



MET-L System

- Divided into Four Core Subsystems
  - Equipment Case, Prime Power, Antenna, System Control/GUI
  - Drawing # BHME2-10001



4 Primary Waveforms Created for Demonstration

- CW – Unmodulated, Calibration Signal (Not used During Demonstration)
- Waveform “A”
- Waveform “C”
- Waveform “B”
- Waveform “D”

These are a Representative Sample of S Band Waveforms

Flight Profile Plan

1. Waveform OFF, 2 Racetrack loops
2. Waveform A, 4 Racetrack loops
3. Waveform A, Hover (2*360°)
4. Waveform OFF, 2 Racetrack loops
5. Waveform C/B, 4 Racetrack loops
6. Waveform C/B, Hover (2*360°)
7. Waveform D, 2 Racetrack loops and Hover (2*360°)

Data Collection/Data Capture Discussion Points

- MET/FATR Team is Looking for Feedback on Signal Received on Board Aircraft
  - Assume any Countermeasures are Disabled
  - What are Data Collection Capabilities on Board Aircraft?
  - When Radiated, we would like any Available Parameters
    - Notification (GPS time and location) the crew receives
    - Frequency
    - PRI/PRF
    - Automatic or Manual Signal Classification
    - Quadrant or Az Location?
  - Time and Position of Aircraft when Events Occur
    - Determine if Aircraft Leaving/Approaching, Approximate Range, etc.
  - Any other information available to share?

Points of Contact for the FATR Team

FATR Team Lead: Robert 'Mumbles' Polumbo
(305) 803-4594
fatrteam@gmail.com

FATR Tech Lead: David 'Streaker' Lowe
(404) 394-7897
dlowe@2circleinc.com

SRC Tech Lead: Jeremy Jetton
(931) 227-7353
jjetton@scires.com

Appendix B.2: MET/ALVC Demonstration (Part 2)_

OVERVIEW:

1) Test setup, picture of DIADS, Network switch, MET Server/controller, MET hardware, Pulse capture.
2) Pictures of DIADS (Map View, MET Control Interface, Activate and stop buttons)
3) Picture of no waveform from Pulse analysis Instrument
4) Activation of MET Waveform from DIADS
5) Picture of Waveform D from Pulse analysis instrument
6) DIADS turns off waveform D, picture of no waveforms from instrument
7) DIADS activates Waveform B
8) Picture of waveform B from instrument
9) DIADS de-activates Waveform B
10) Picture of no waveform from instrument

TEST SETUP: To demonstrate the Digital Integrated Air Defense Simulation (DIADS) was modified to support virtually controlling a MET-L emitter, the lab setup in **Figure 1** was created. The key components in this setup are labeled in **Figure 2**, and are described below:

1) DIADS Server – this is DIADS, v10.4.7, received from AVARINT on 8 May 2023.
2) Network Switch – this is an Ethernet switch and provides connectivity between the DIADS Server and the MET Server/Client.
3) MET Controller – this is the embedded controller that provides the external interface to command and control and other services.
4) MET Local Interface – this is the local operator display and was used to show commands and assist in troubleshooting. It is not needed when the software is released.
5) MET SDR – this chassis is controlled and configured by the MET Controller and creates the low power signals to be radiated.
6) MET HPA – this is the high-powered amplifier for the MET and provides the final stage of RF amplification prior to the transmit antenna.
7) MET RF Load – this is an RF dummy load, used to attenuate the signal in a lab environment. Since the MET-L was not connected to an antenna, this allows the RF amplifier to be connected and used in a lab environment. When used in open air, this device is replaced by the transmit antenna.
8) RF Pulse Analyzer – this is a piece of specialized test equipment used to verify the output waveform and its parameters.

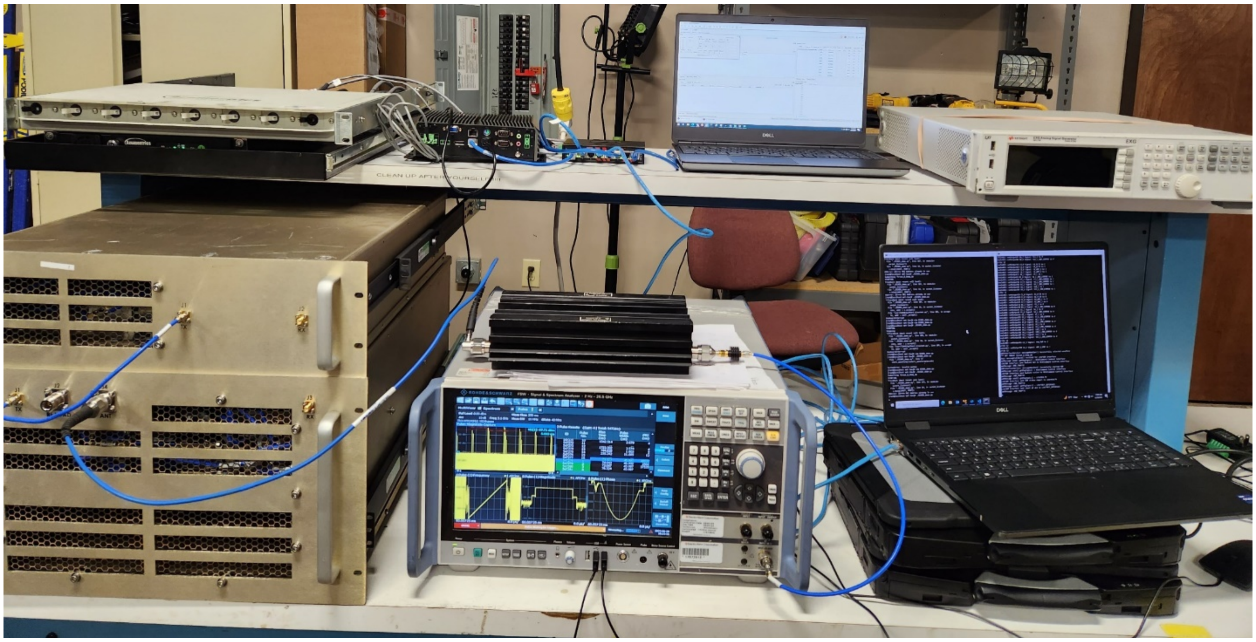


Figure 1: DIADS MET-L Lab Setup

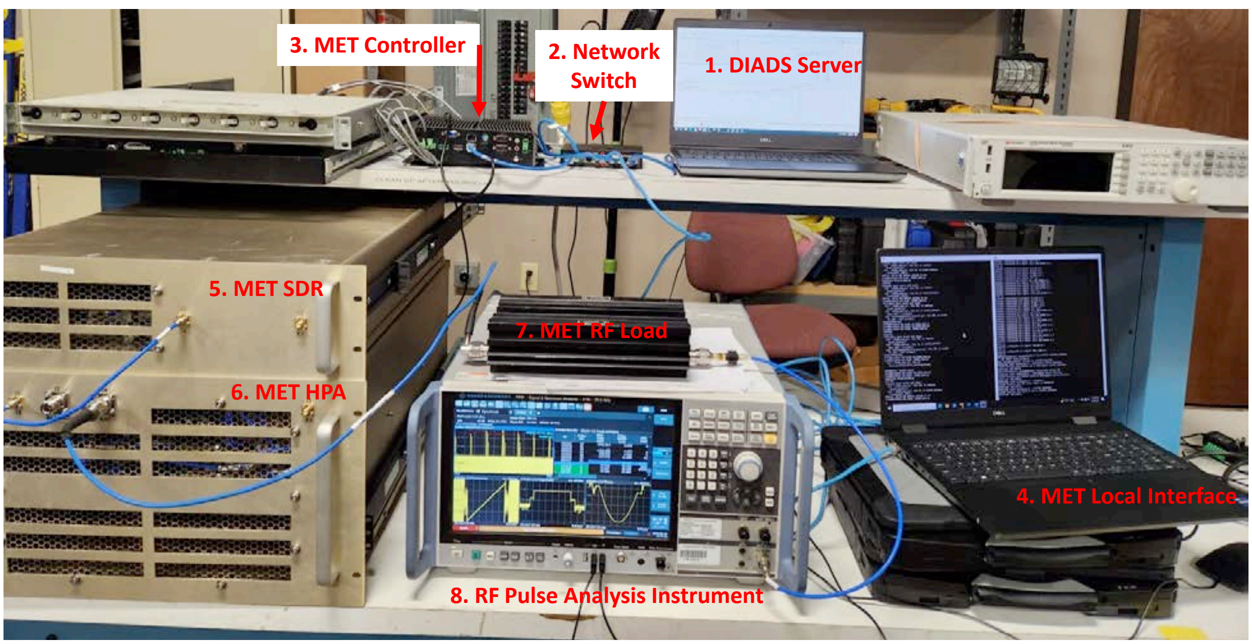


Figure 2: DIADS MET-L Lab Setup

DIADS SETUP: Once DIADS is started, the first step is to pair the MET-L controller with a system in the DIADS environment. For our purposes, we selected M96 (**Figure 3**), which is how it is referred to in the virtual environment. The block of commands in the lower left of **Figure 3** show the paring sequence and allow the DIADS operator to verify the MET-L controller is present and associated. On the local MET User Interface (from **Figure 1)**, the MET operator can also verify that a virtual entity is now in control of the MET-L hardware.

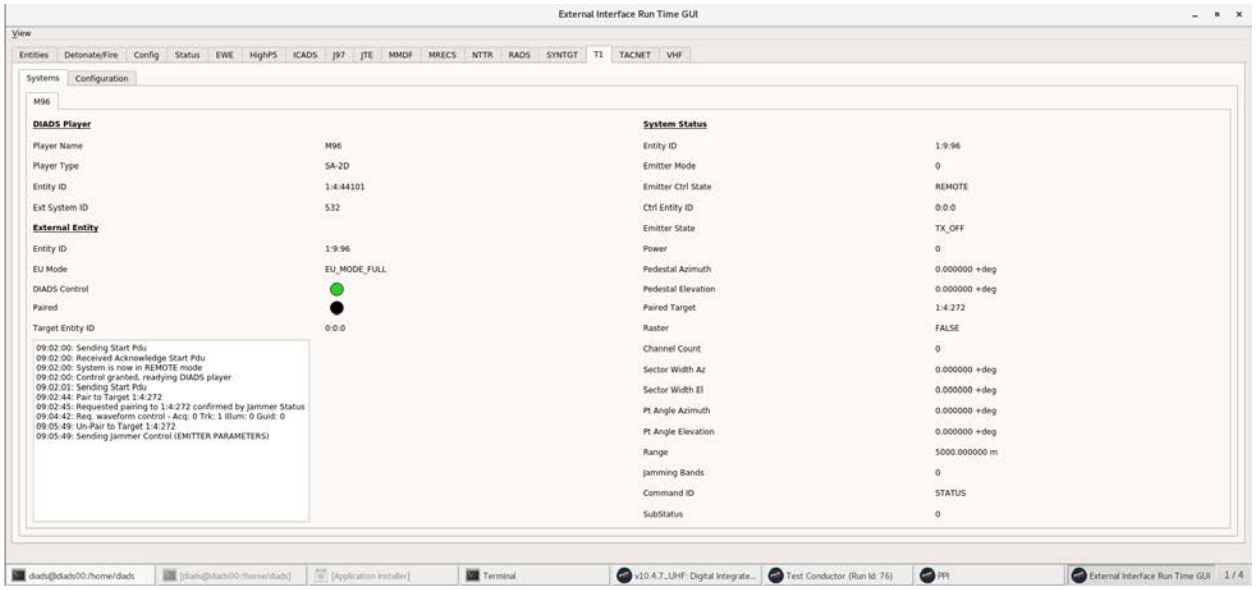


Figure 3: External Interface Pairing

Once the entity is associated, it is populated on an air picture view, as shown in **Figure 4**. This view shows an Exercise Controller (EXCON), and includes virtual, live and constructive entities. When available, this view can also show truth data (location of aircraft taken from P5, P4, or ADSB-Out), and engagements. This version of DIADS supports DIS (Distributed Interactive Simulation), and the MET-L was configured to accept Protocol Data Units (PDU's) that provided information as to status (radiate or off) and waveform type. In support of future activities, the MET Server will also provide information back to DIADS over the DIS PDU's, to include information about health, status, location, etc.

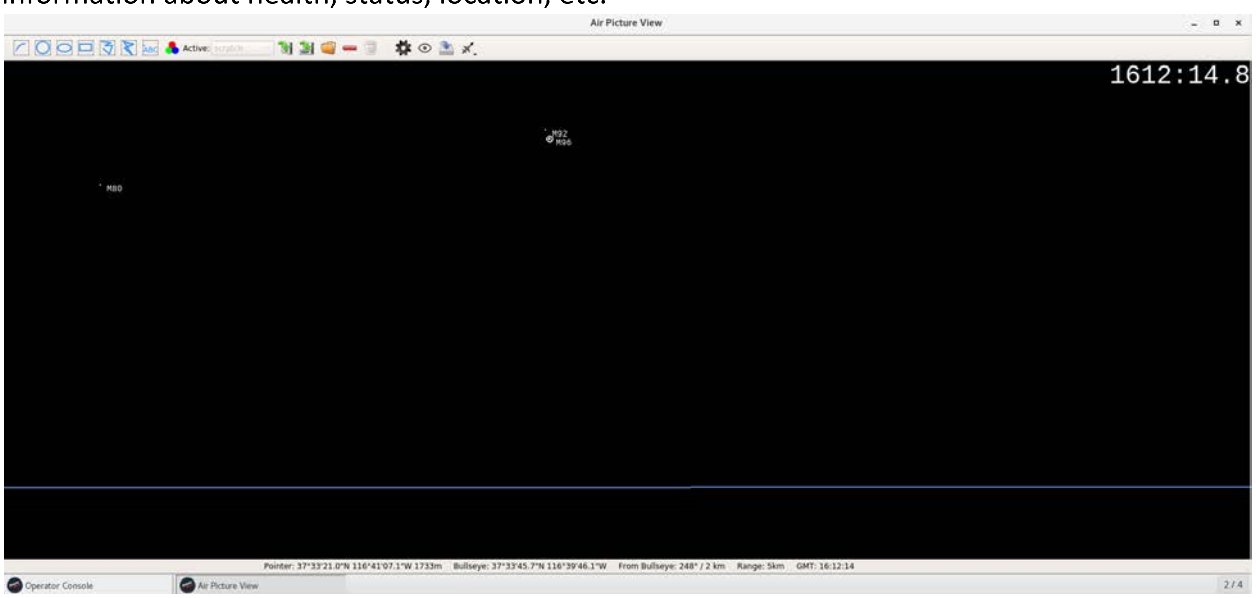


Figure 4: DIADS Air Picture View

Once the entity is populated in DIADS and registered as a system, the operator has access to the screen in **Figure 5**. The controls are shown in the upper left-hand corner of Figure 5, and include the ability to select a waveform, and to turn the system on or off. You can also remove the system from the simulation in the boxes in the lower right-hand windows, and general status information is on the right side of **Figure 5**.

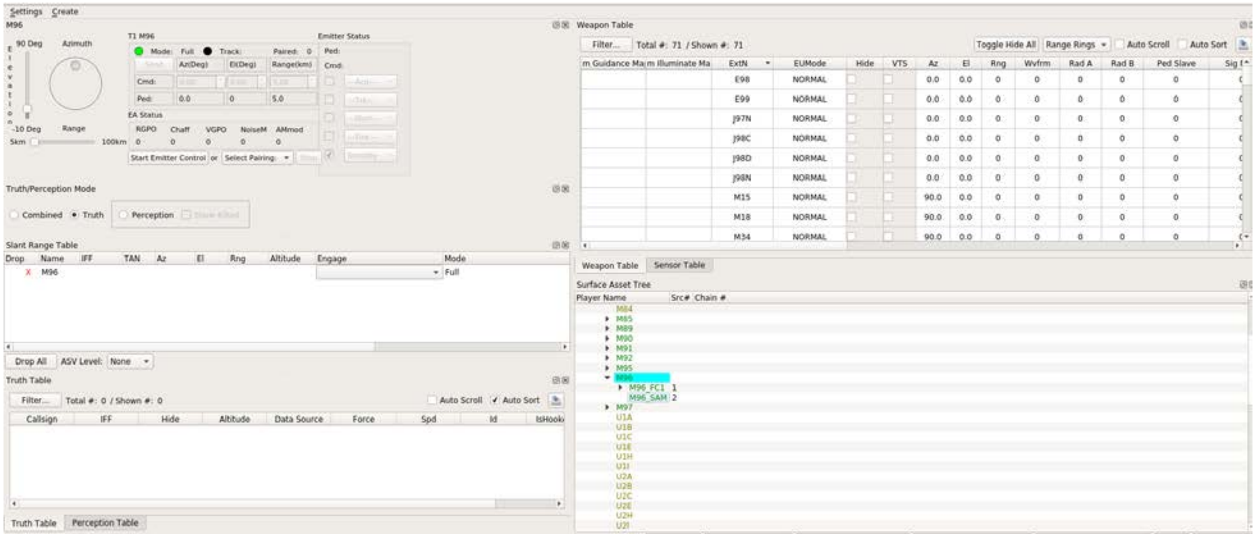


Figure 5: Initial MET-L (M98) Interface Screen

As shown in **Figure 6**, to select and radiate a waveform, the operator will select a Waveform (Ack is Waveform D, Track is Waveform B), and the MET will respond to the Activation signal over DIS.

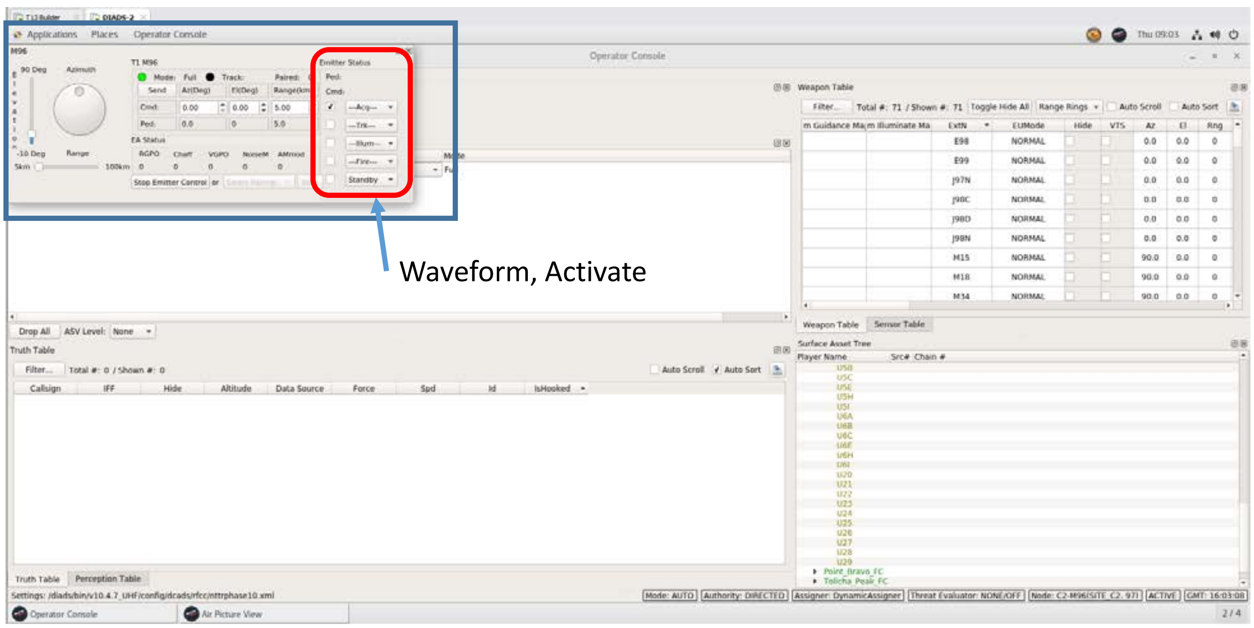


Figure 6: User Control Interface and Waveform Activation

Waveform Verification: In order to verify that the DIADS PDU was received and properly decoded, we used a Rohde and Schwarz FSW Signal and Spectrum Analyzer, shown in **Figure 7**. This unit displays both time domain (pulse characters) and spectrum information (frequencies). When it is blank (as shown in **Figure 7**), no pulse is detected.

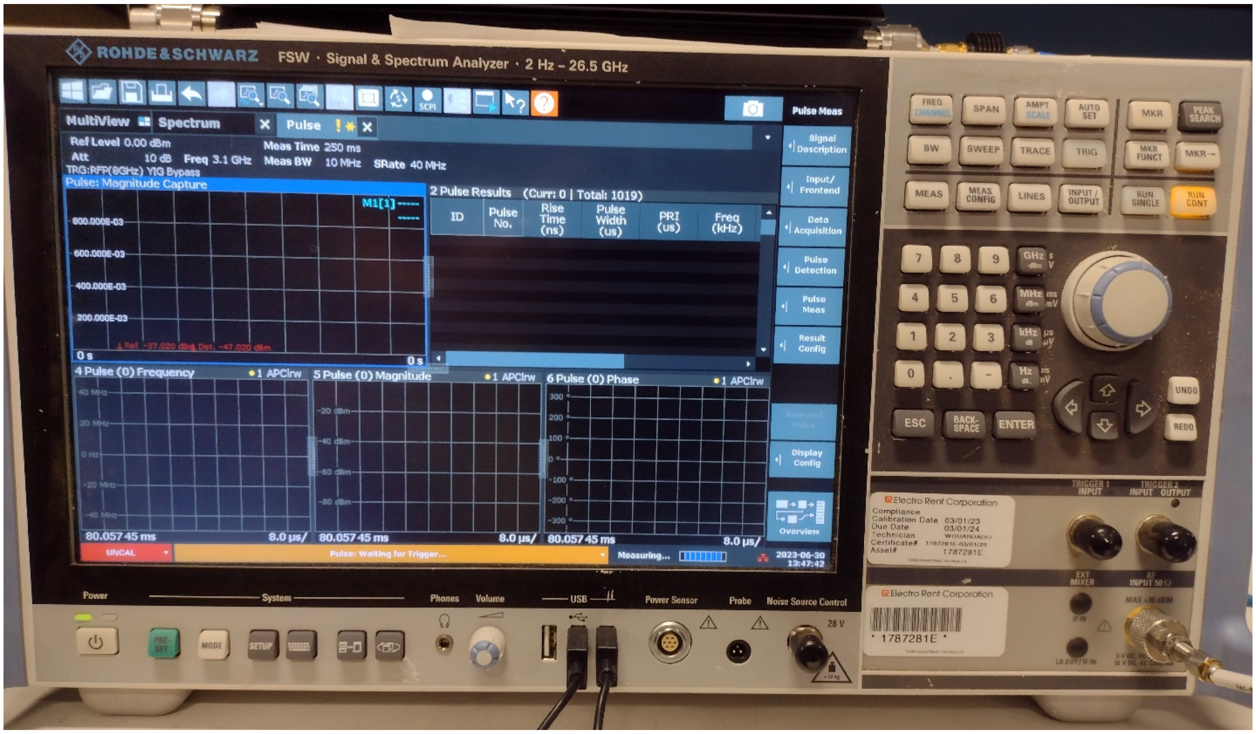


Figure 7: Rhode and Schwarz FSW Signal and Spectrum Analyzer

Demonstration Results: Using DIADS, the team activated an ACK waveform (Waveform D) in DIADS, which is shown in **Figure 8**. Figure 9 shows the captured waveform and its associated parameters. Following this, the waveform was deactivated from DIADS, and the pulse train ceased.

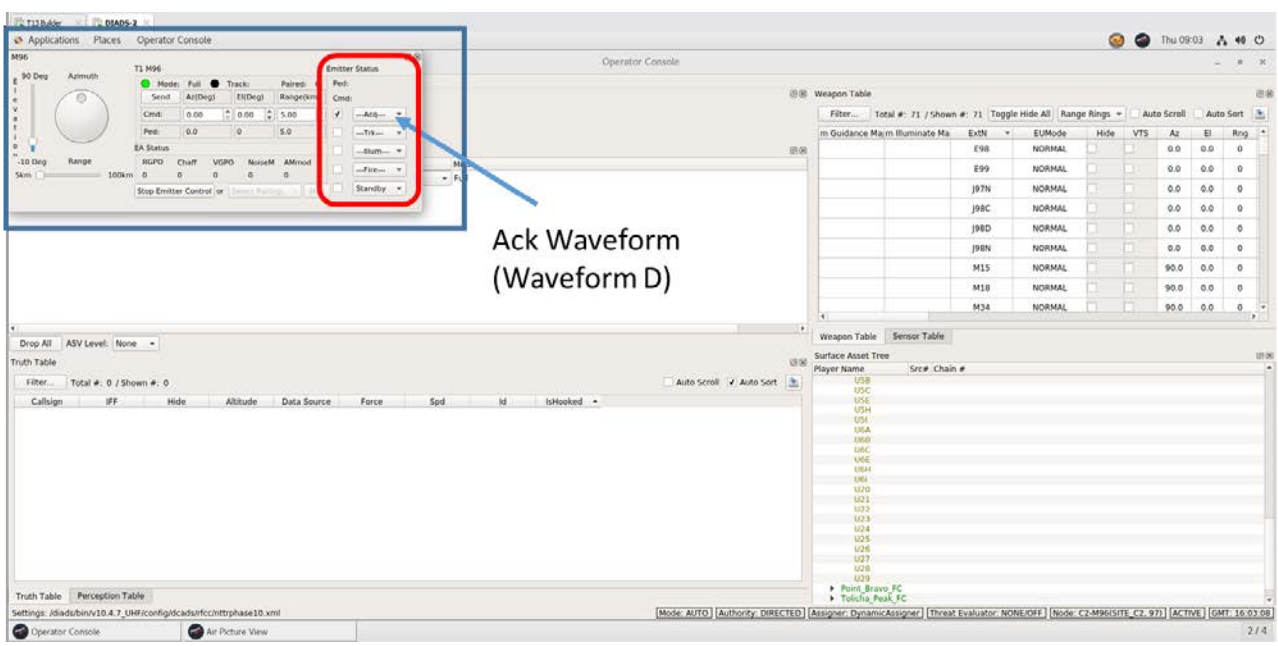


Figure 8: DIADS Activation of Waveform D

Figure 9: Measurement of Waveform D

To complete the demonstration, Waveform B (using DIADS) was activated as a Trk1 waveform as shown in **Figure 10**. **Figure 11** shows the captured waveform and its associated parameters. Following this, the waveform was deactivated from DIADS, and the pulse train ceased.

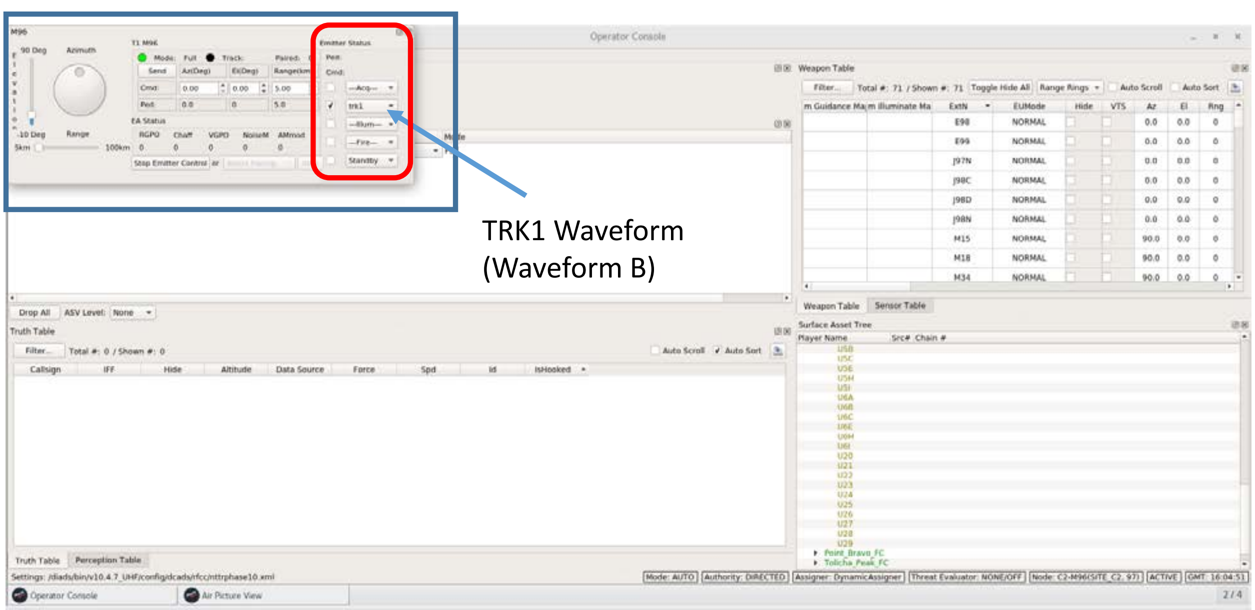


Figure 10: DIADS Activation of Waveform B

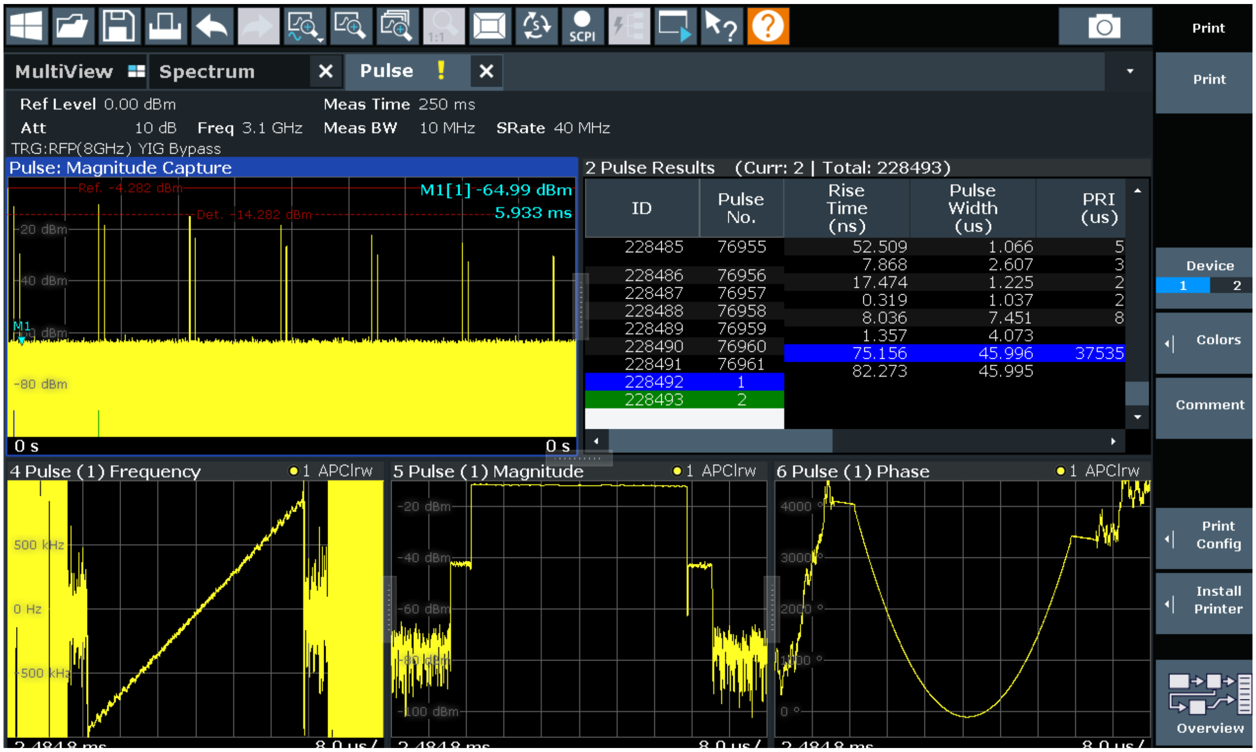


Figure 11: Measurement of Waveform B

Demonstration Conclusion and Summary: This demonstration successfully illustrated the concept of using a virtual simulation to activate an open-air transmitter. The waveforms used in this demonstration were the same as those successfully received by the Radar Warning Receiver in the open-air test in Part 1. These demonstrations proved that the use of a virtual simulation to control and activate Radar Warning receivers on live training units is feasible and is a viable, cost-effective approach to using low-cost emitters to train US Air Force pilots and their crews.

Appendix C: Consolidated Airspace Proposal (Test/ Training Space Needs Statement--T/TSNA)

TEST/TRAINING SPACE NEEDS STATEMENT (T/TSNS)

FLORIDA ADVANCED TRAINING RANGE
MODIFICATION OF FLORIDA SPECIAL USE AIRSPACE
CONNECTING OFFSHORE WARNING AREAS TO
ONSHORE RANGE-RELATED RESTRICTED AIRSPACE AND MILITARY OPEATIONS AREAS

Proponent Names:
_____, Air Combat Command
_____, Air Education and Training Command
_____, Air Force Material Command
_____, Air Force Reserve Command
_____, Commander, Naval Air Force Atlantic
_____, National Guard Bureau
_____, Space Systems Command

_____, 325th Fighter Wing/USAF/ACC
_____, 53rd Wing/USAF/ACC
_____, 33rd Fighter Wing/USAF/AETC
_____, 96th Test Wing/USAF/AFMC
_____, 482nd Fighter Wing/USAF/AFRC
___, Carrier Strike Group FOUR/USN
_____, Fleet Area Control and Surveillance Facility (FACSFAC) Jacksonville
_____, 125th Fighter Wing/USAF/FLANG
_____, SLD 45/USSF

TABLE OF CONTENTS

1. Executive Summary.

1.1. Concept/purpose.

A confluence of four unique factors makes a reevaluation of the military use of airspace over and around the Florida peninsula a strategic imperative. Those four significant factors are: (1) the Florida ranges and holistic complex of military-use airspace/sea-space; (2) the 2022 National Defense Strategy (NDS) identification of the People's Republic of China as a strategic competitor and pacing threat necessitating the requirement for our military to provide more joint force, all-domain test and training operations; (3) air, land, sea, space, cyber weapon systems capabilities and training requirements, and; (4) the planned 5th generation aircraft basing laydown for the southeastern United States.

The goal of the consolidated airspace proposal is neither a complete redesign, baseline change, nor is it a significant revision. The plan would only add temporary use Air Traffic Control Assigned Airspace (ATCAA) and/or an Altitude Reservations (ALTRV) to connect existing Special Use Airspace (SUA), offshore Warning Areas to overland Restricted Areas and Military Operations Areas (MOAs). By doing this at scale, and holistically across Florida, the airspace necessary to support realistic training for the joint force can be achieved in Florida with minimal impact and disruption to the National Airspace System (NAS).

1.1.1 Florida Range Complex.

Florida's major range complexes today are depicted in Figure 1.[11] They include robust sea and airspace in offshore areas on either side of the peninsula. These test and training range areas are supported by dozens of installations and commands based in Florida to leverage the abundant airspace over both land and water, land areas available for bombing practice and other aviation-related ordnance testing and training. This is complemented in a joint warfighting context by significant range space at sea, both surface and subsurface, as well as access to space and cyber space from Florida.

[11] Figure source: *"From the sea floor to outer space: The value of Florida Ranges to existing and future military missions."* Spring 2022. Pg. 11. Enterprise Florida available at: https://www.enterpriseflorida.com/wp-content/uploads/Florida-Range-Report-Spring-2022.pdf.

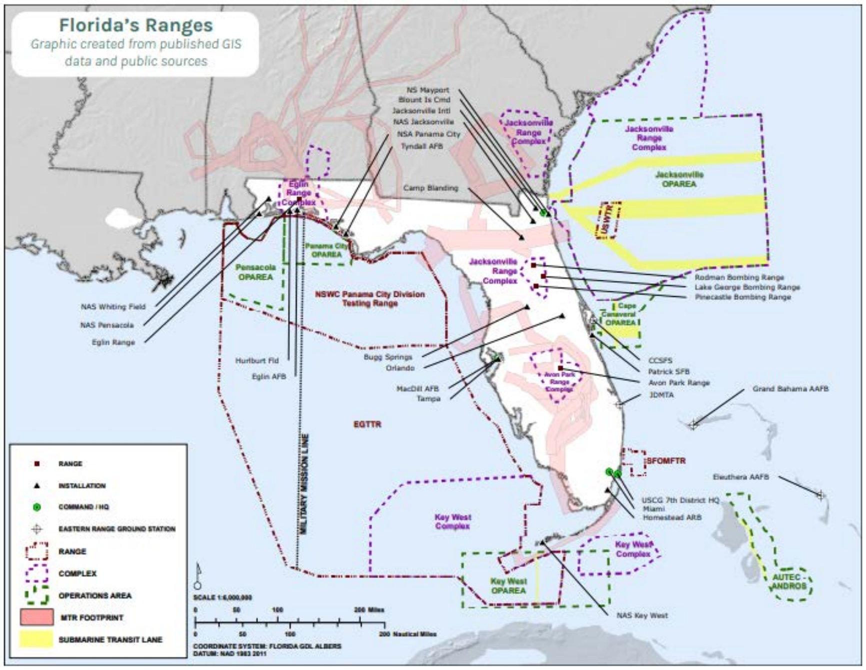


FIGURE 1: Overall Florida Military Range Complex Highlights

In total, the SUA over and around Florida is depicted in Figure 2.

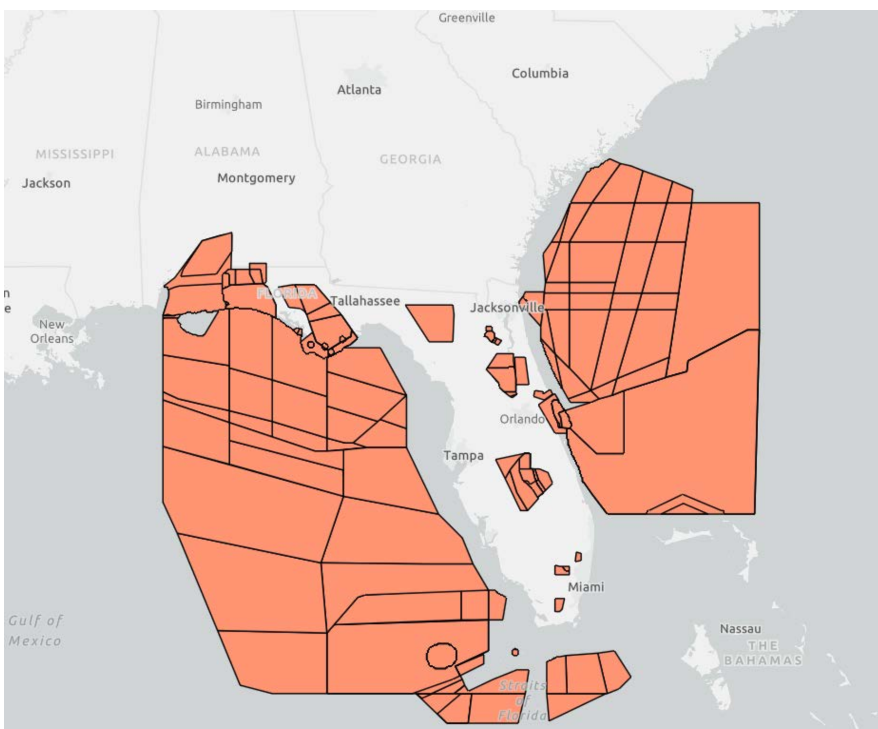


FIGURE 2: Special Use Airspace Over and Around Florida

However, a challenge identified, and depicted in Figure 3., is the lack of larger airspace connections between the plentiful airspace available over the offshore Warning and training areas, and the Restricted Areas and MOAs that exist over the land ranges. While multiple Military Training Routes (MTRs) exist (samples displayed in yellow) that do provide physical airspace connectivity, these MTRs tend to be rather narrow and would limit the ability of 5th Gen fighters to fly in tactical maneuver formations while transitioning from over water to over land operations as they approach the ranges/targets.

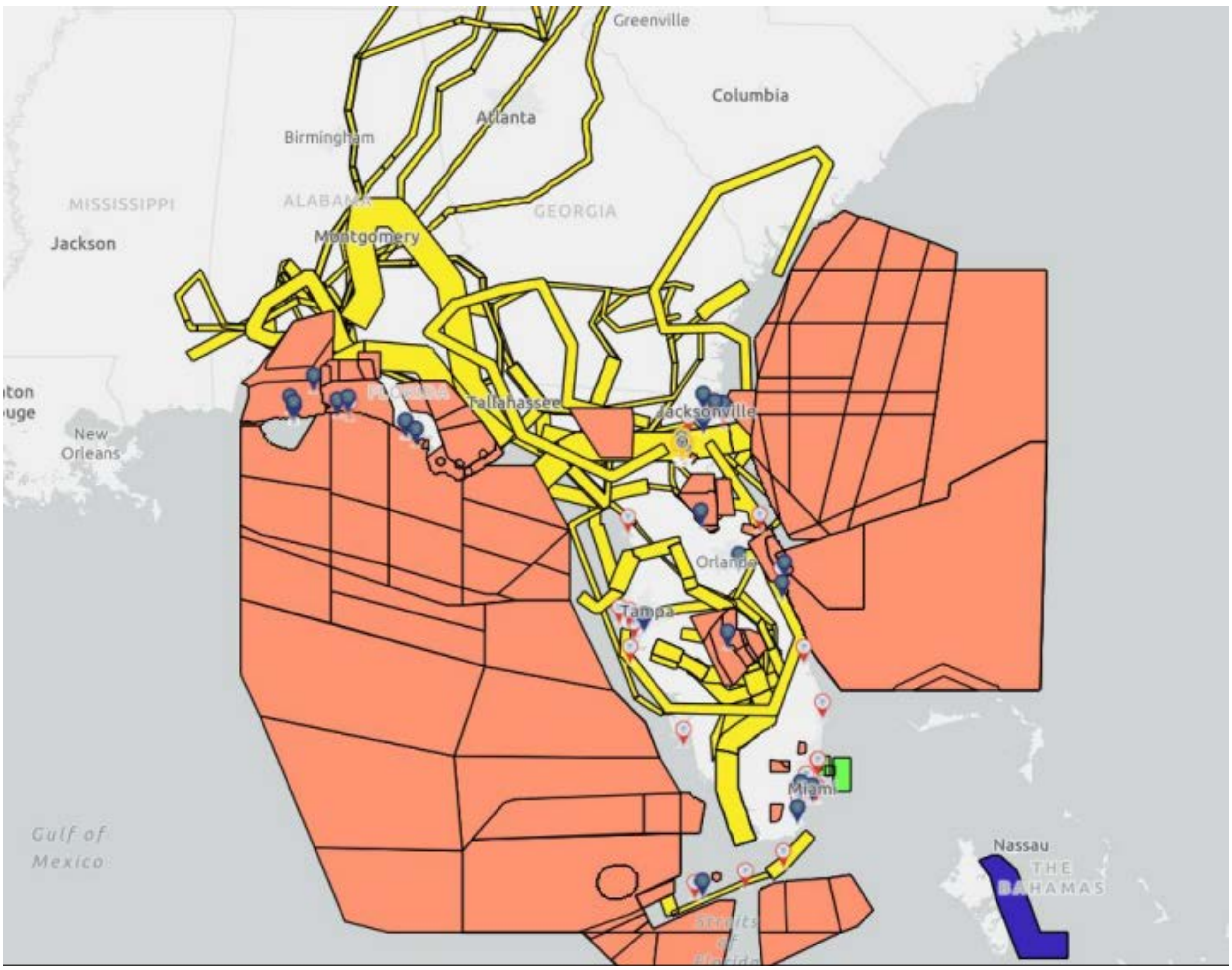


FIGURE 3: Current Military Training Routes Have Limited Utility for F-35 / 5th Gen Aircraft Tactically Approaching Over Land Range Complexes

1.1.2 Strategic Imperative: China.

The People's Republic of China was identified in the 2022 National Defense Strategy as the most significant threat and a "pacing challenge" for U.S. forces including advanced air and surface-based defense capabilities. This recognition of the decades-long rise of Chinese power to now be able to rival U.S. forces in the Indo-Pacific theater brings new value to the combined sea-air-land test and training range complexes across Florida. As shown in Figure 4., Florida and its holistic complex of ranges, sea space and airspace present a unique ability to connect multiple land, sea, and air areas due to lack of bordering states or other countries. The geographic circumstance is also unique in that it reasonably represents and fits the configuration of the area in the South China Sea; a recognized area where increased friction and interactions could lead to the outbreak of hostilities in the Western Pacific.

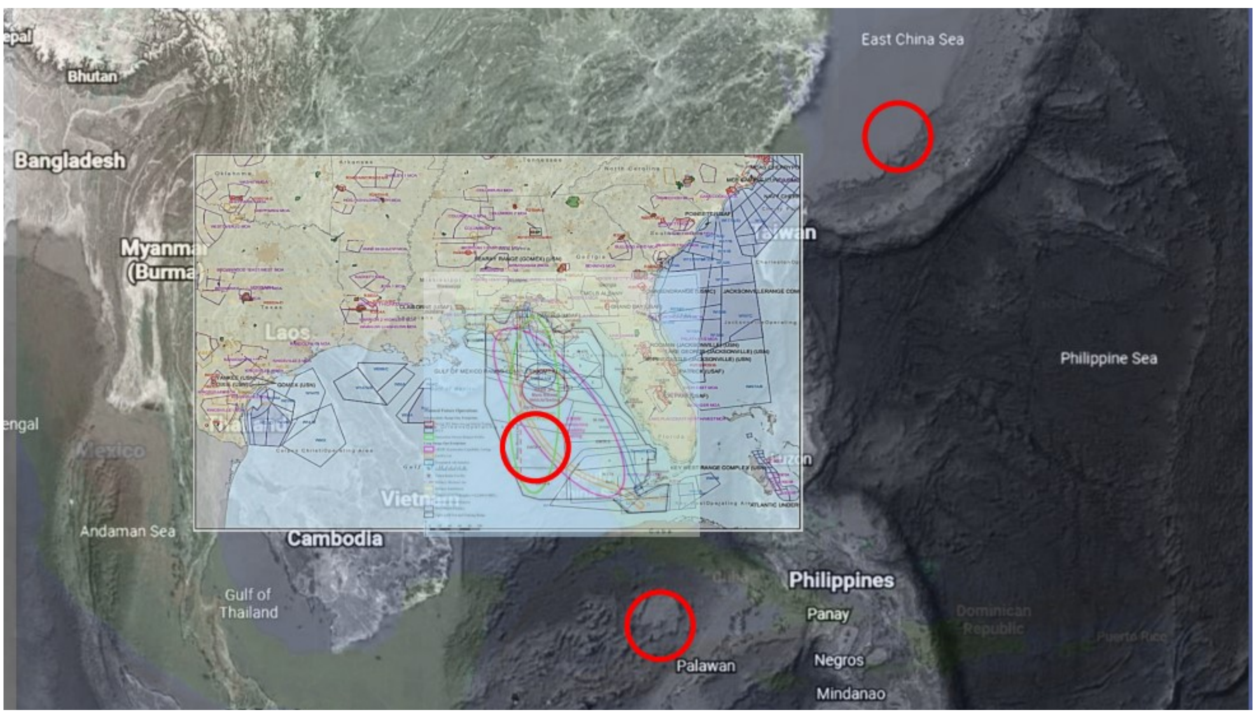


FIGURE 4: Scaled Overlay of the Southeastern United States, Southeast Asia, and Portions of the Florida Range Complex in a Scripted Geography Configuration

The Florida complex of military ranges in their totality represents the only place in the CONUS where our operational Joint Force training can occur in an all-domain manner replicating the geography, conditions, and scale for our most difficult potential fight. Florida SUA takes on an increased value as it can be coupled with adjacent sea/undersea and space ranges not found anywhere else in this configuration.

1.1.3 Advanced Generation Weapon Systems.

As an illustrative example of the expanding training space requirements of newer generation weapon systems, the emerging and evolving capabilities and tactics of the F-35 are increasing the requirement for improved airspace complexes with increased volume to meet training needs. These evolving tactics manuals, USAF Weapons School and Navy Fighter Weapons School guidance, fighter integration standards, and modern threat replications, all point to the need for greater scale of ranges and connecting airspace to support training operations. Further discussion is provided in Section 2 of this document.

1.1.4 Basing.

As Figure 5. highlights, within the next several years, there is a planned basing laydown of 300-400 F-35, 5th Generation fighter aircraft across the Southeastern United States all within a 500-mile flying radius of Florida and its range complexes. These aircraft and aircrew will require "backyard" ranges readily available to maintain their CMR ratings. "Backyard" ranges must be configured in such a manner to enable 5th Gen capable tactics, techniques, and procedures to be practiced for proficiency. Without these changes, pilots from the various fighter wings, carrier air wings, and Marine aircraft groups operating F-35 and future advanced fighters will be unable to accomplish various required flying events in the manner called for by their tactics, techniques, and procedures (TTPs) and will be unable to effectively "train as they will fight," particularly in air-to-ground missions sets.

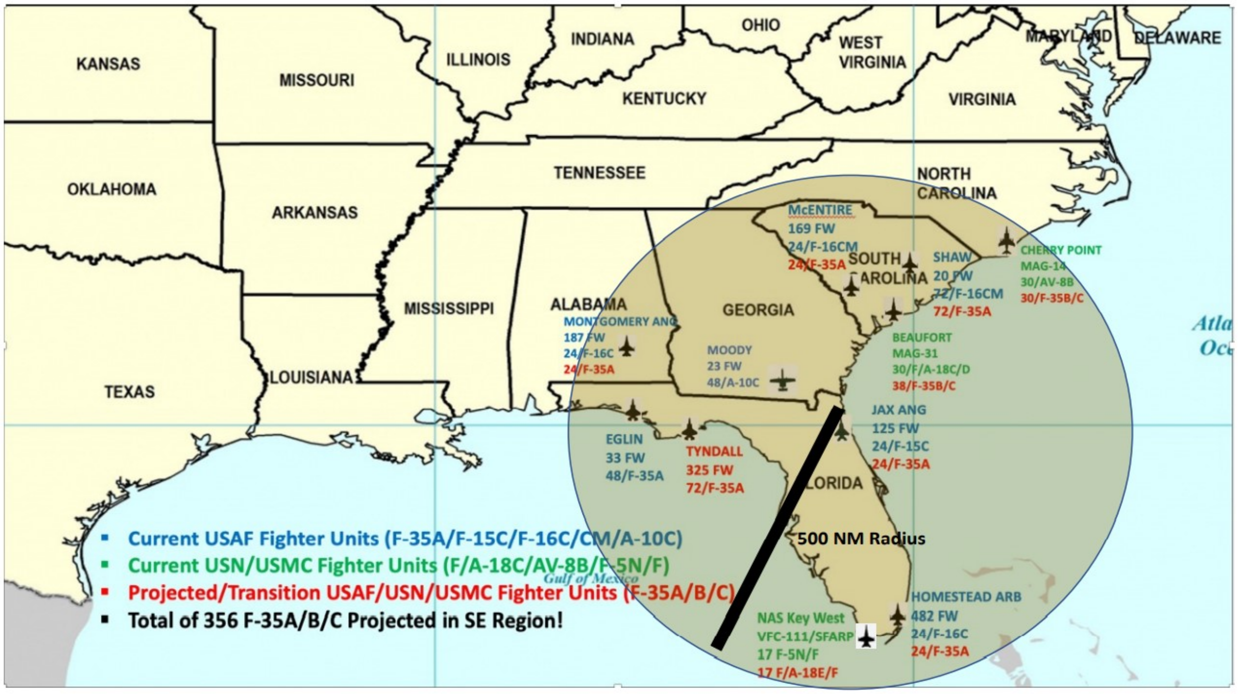


FIGURE 5: Planned F-35 Basing Laydown Posture in the Southeastern United States

1.2. Summary of Requested Changes / Proposed Structure.

Taking into consideration all the information highlighted in Section 1.1, the airspace challenge identified is how to better leverage the existing NAS structure and range complexes, with minimal disruptions, to support joint force training. In a nutshell, the proposal is to create a temporary connecting airspace shelf in the form of an ATCAA for each of five offshore Warning Areas to link airspace in tactically relevant ways to onshore ranges such as Avon Park Air Force Range (APAFR) and Pinecastle Range Complex (PRC). Further details and discussion are provided in Section 3 of this document regarding the proposed airspace changes.

2. Operational Requirements / Justification.

2.1 Overview of 5th Gen F-35 Ready Aircrew Program Requirements.

F-35 pilots are required to perform the full spectrum of air-to-air and air-to-ground missions at all altitudes from surface to 50,000 feet. The USAF F-35A Ready Aircrew Program (RAP) tasking requires pilots to maintain proficiency in the following primary mission sets:

- Offensive Counter Air (OCA)
- Defensive Counter Air (DCA)
- Tactical Intercepts (TI)
- Air Combat Maneuvering (ACM)
- Suppression of Enemy Air Defense (SEAD)
- Strike Coordination and Reconnaissance (SCAR)
- Close Air Support (CAS)
- Basic Fighter Maneuvers (BFM)
- Basic Surface Attack (BSA)
- Instrument Proficiency

The F-35B Training and Readiness Manual (NAVMC 3500.111A) for the USMC F-35B and the VFA F-35 matrix of the COMNAVAIRPAC/COMNAVAIRLANT Squadron Training and Readiness instruction (COMNAVAIRPAC/COMNAVAIRLANTINST 3500.1B) for the Navy and Marine Corps F-35C outline nearly identical mission sets.

In accomplishing this training, F-35 pilots require predictable and stable access to suitable low and high-altitude airspace. The RAP requirements of the F-35 dictate what events pilots must complete within a given year to build the essential skills necessary to be Combat Mission Ready (CMR). The ability for F-35 pilots to execute training events at high altitudes is required for many of the primary mission sets listed above. Failure to meet RAP requirements during a given cycle may result in additional training requirements and loss of CMR status.

A critical capability enhancement of the 5th Gen F-35 is its ability to network information to not only other F-35s flying in formation, but also with other ground, sea, and air assets. This provides enhanced ability for F-35 formations to work multiple missions sets in real-time; for example: a formation may be performing SCAR and SEAD functions while at the same time maneuvering towards a target area to conduct BSA or CAS missions as well. The entire time, the aircraft are linking and sharing information about the battlespace they are sensing. To do this effectively, tactical requirements may dictate a multi-aircraft formation. Figure 6. is an example of such a F-35, 8-ship formation supported by an airborne command and control aircraft with enemy fighters and enemy surface-to-air missile threats. This typical tactical formation and threat profile requires approximately 100 x 160 miles of airspace to effectively train the employment of the F-35's capabilities as identified through various F-35 unit interviews and tactical discussions.

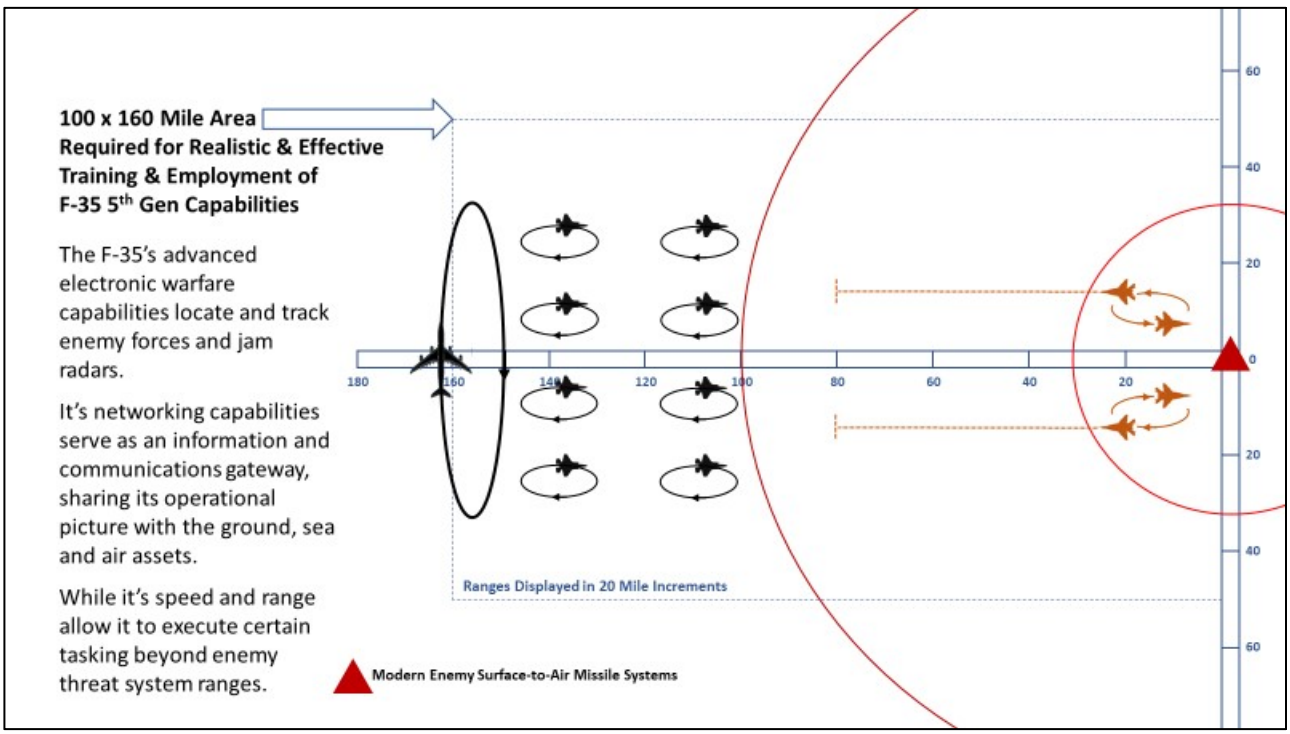


FIGURE 6: Example of an 8-Ship F-35 Tactical Formation

2.2 Anticipated Utilization.

2.2.1 Florida-based F-35s.

While precise certainty on the total number, basing locations and timing of F-35 force structure in Florida is still open to change, it is anticipated the state will shift from currently basing approximately 50 F-35s in Fiscal Year 2023 (FY23) to likely supporting over 200 by FY29. During this same timeframe, as the number of aircraft increases, the anticipated collective utilization of these six new ATCAAs proposed would increase from an estimated 16 hours per month in FY24 to approximately 68 hours per month in FY29. This would support a notional 34 training events with a temporary ATCAA activation in one of the six designated ATCAAs for approximately one-hour during aircraft ingress to the range and then again for approximately one-hour during aircraft egress from the range for each event.

2.2.2 Navy Composite Training Unit Exercise (COMPTUEX).

East coast-based Navy Carrier Strike Groups routinely conduct 2-3 COMPTUEX events in the Jacksonville Operating Areas each calendar year. In the execution of those exercises, Navy aircraft routinely access the PRC and occasionally APAFR. As the Navy carrier air wings further transition to F-35 squadrons, it is anticipated that COMPTUEX events will also utilize the Atlantic-based ATCAAs depicted herein consistent with the current pace of COMPTUEX events.

2.2.3 Other F-35/5th Gen Aircraft.

As indicated in Section 1.1.4, an additional 100-150 F-35s are anticipated to be based within a 500-mile distance of Florida and may also occasionally utilize the ranges and request temporary ATCAA activations consistent with the procedures and training events that Florida-based F-35s conduct. These would be intermittent in nature due to their more distant basing and for short periods of time if/when they temporarily reposition to Florida bases for training.

2.3 Operational Command Specific Requirements/Justifications by Unit.

2.3.1 325th Fighter Wing *(Placeholder for 325FW specific insert)*

2.3.2 53rd Wing *(Placeholder for 53WG specific insert)*

2.3.3 33rd Fighter Wing *(Placeholder for 33FW specific insert)*

2.3.4 482nd Fighter Wing *(Placeholder for 482FW specific insert)*

2.3.5 125th Fighter Wing *(Placeholder for 125FW specific insert)*

2.3.6 Fleet Area Control and Surveillance Facility (FACSFAC) Jacksonville *(Placeholder for FACSFAC JAX specific insert)*

2.3.7 Carrier Strike Group FOUR *(Placeholder for CSG4/COMPTUEX specific insert)*

2.3.8 TBD: 96th Test Wing *(Placeholder for 96TW specific insert)*

3. Concept / Proposed Actions.

3.1. Creation of New ATCAAs.

To better leverage the existing NAS structure both offshore and onshore with the range complexes to support holistic joint force training while minimizing disruptions, this proposal creates a connective ATCAA “shelf” to bridge between an existing Warning Area and a Restricted Area/MOA. Six different ATCAAs are outlined in the following subsections. It is important to note that these ATCAAs do not necessarily represent simultaneous, nor continuous use. It is envisioned that each would be established for intermittent, short time periods when training or exercise evolutions are planned. They would still be subject to FAA approval/authorization in-situ and could be modified and/or canceled for use depending on prevailing conditions of weather, air traffic, and other issues that impact on the NAS.

Starting in the northeast and moving clockwise around the peninsula, this plan utilizes the following offshore warning areas:

- W-136 – W-139
- W-497
- W-174
- W-168
- W-470

to create new connections into both APAFR and PRC.

3.1.1 The Daytona Shelf ATCAA.

The proposed ATCAA connecting the W-136 – 139 complex to PRC is reflected in Figure 7. and includes the coordinates and information as outlined.

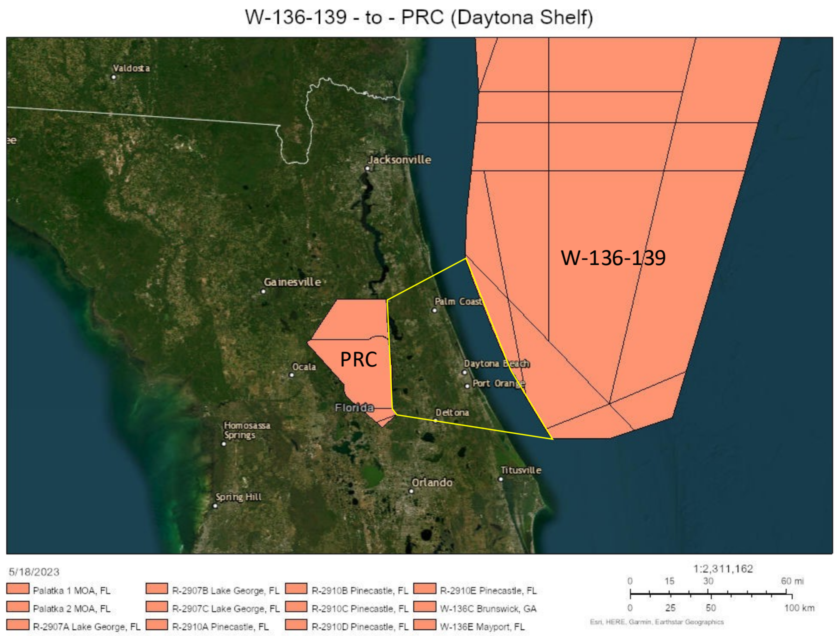


FIGURE 7: The Daytona Shelf

- W-136 – W-139 to PRC (The Daytona Shelf)
  - Boundaries: Beginning at lat. 30°19’00”N., long. 80°59’47”W.; to lat. 29°51’15”N., long. 81°02’02”W.; thence southeast along a line parallel with and 12 NM from the shoreline to lat. 29°03’16”N., long. 80°38’35”W.; to lat. 28°50’00”N., long. 80°29’00”W.; to lat. 28°57'56''N., long. 81°28'24''W.; to lat. 29°36’21”N., long. 81°32’19”W.; to the point of beginning
  - Time of Designation: Intermittent by NOTAM
  - Controlling agency: FAA, Jacksonville ARTCC

3.1.2 <u>The Melbourne Shelf ATCAA</u>.

The proposed ATCAA connecting W-497 to APAFR is reflected in Figure 8. and includes the coordinates and information as outlined.

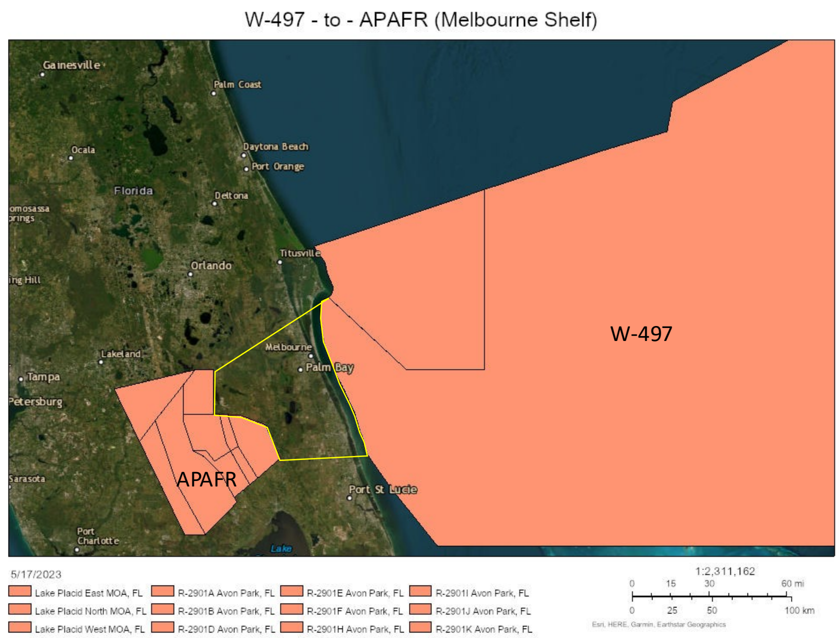


FIGURE 8: The Melbourne Shelf

- W-497 to APAFR (The Melbourne Shelf)
  - Boundaries: Beginning at lat. 28°24’31”N., long. 80°29’52”W.; thence south along a line 3 NM from and parallel to the shoreline to lat. 27°31’14”N., long. 80°14’58”W.; to lat. 27°30'01"N., long. 80°48'19"W.; to lat. 27°41'21"N., long. 80°53'59"W.; to lat. 27°44'41"N., long. 81°03'59"W.; to lat. 27°44'46''N., long. 81°13'59''W.; to lat. 28°00'01''N., long. 81°13'59''W.; to the point of beginning
  - Time of Designation: Intermittent by NOTAM
  - Controlling agency: FAA, Miami ARTCC

3.1.3 <u>The Naples Shelf ATCAA</u>.

The proposed ATCAA connecting W-174 to APAFR is reflected in Figure 9. and includes the coordinates and information as outlined.

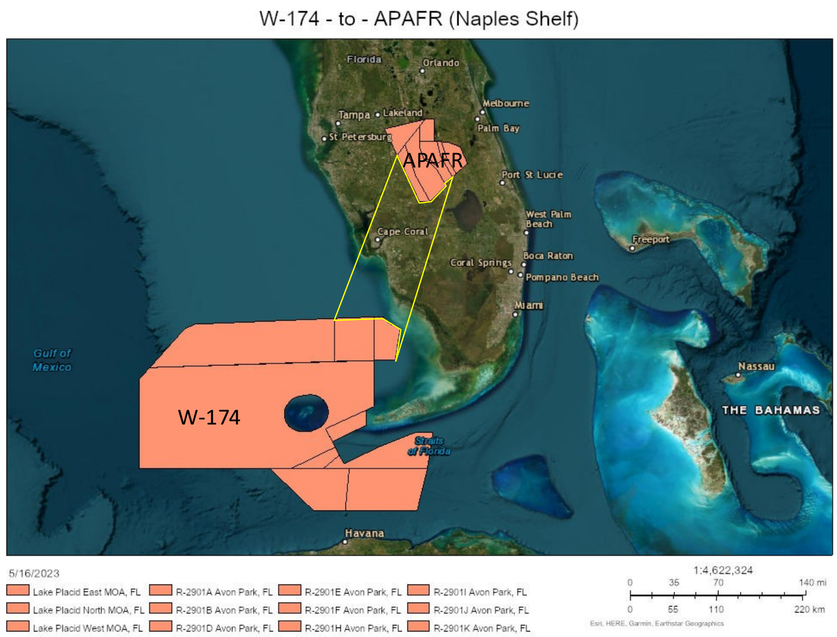


FIGURE 9: The Naples Shelf

- W-174 to APAFR (The Naples Shelf)
  - o Boundaries: Beginning at lat. 25°44'01"N., long. 82°29'59"W.; to lat. 25°45'01"N., long. 81°53'00"W.; thence counterclockwise along a line 12 NM from and parallel to the shoreline; to lat. 25°37'00"N., long. 81°40'10"W.; to lat. 25°36'01"N., long. 81°39'59"W.; to lat. 27°32'31''N., long. 81°07'23''W.; to lat. 27°04’01”N., long. 81°16’59”W.; to lat. 27°04’01”N., long. 81°24’59”W.; to lat. 27°35’44”N., long. 81°42’14”W.; to the point of beginning
  - o Time of Designation: Intermittent by NOTAM
  - o Controlling agency: FAA, Miami ARTCC

3.1.4 The Sarasota Shelf ATCAA.

The proposed ATCAA connecting W-168 to APAFR is reflected in Figure 10. and includes the coordinates and information as outlined.

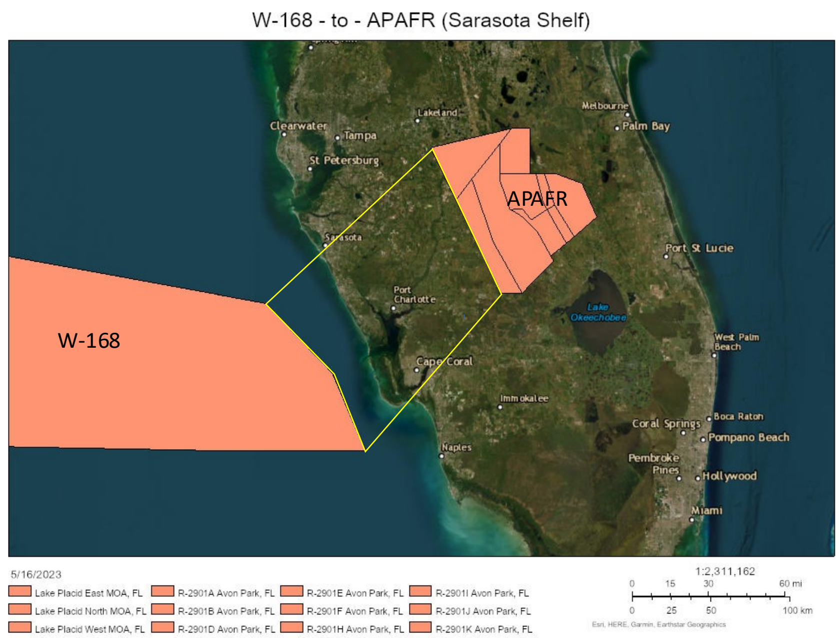


FIGURE 10: The Sarasota Shelf

- W-168 to APAFR (The Sarasota Shelf)
  - Boundaries: Beginning at lat. 27°00'31"N., long. 82°55'10"W.; to lat. 26°36'42"N., long. 82°29'40"W.; to lat. 26°10'01"N., long. 82°16'59"W.; to lat. 27°04’01”N., long. 81°24’59”W.; to lat. 27o53’31”N., long. 81o51’59”W.; to the point of beginning
  - Time of Designation: Intermittent by NOTAM
  - Controlling agency: FAA, Miami ARTCC

3.1.5 <u>The Lakeland Shelf ATCAA</u>.

The proposed ATCAA connecting W-470 to APAFR is reflected in Figure 11. and includes the coordinates and information as outlined.

W-470 – to – APAFR (Lakeland Shelf)

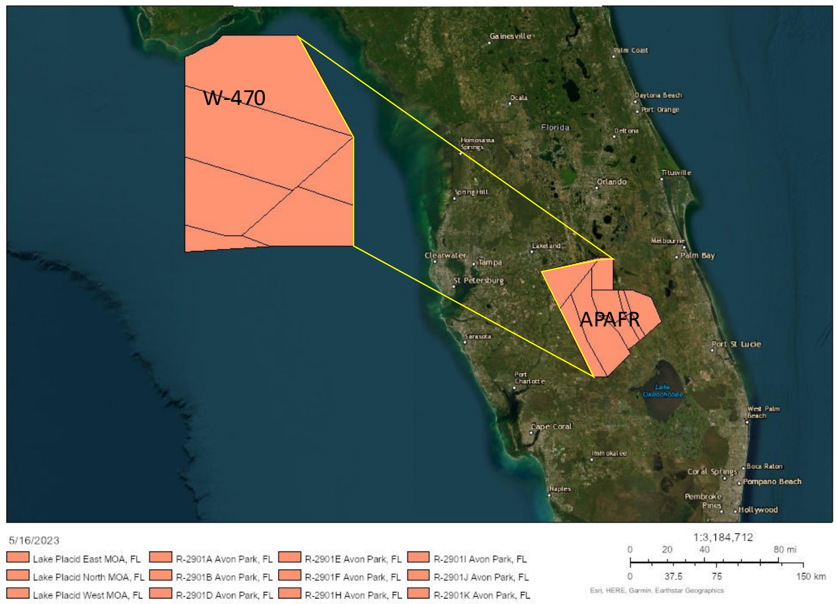


FIGURE 11: The Lakeland Shelf

- W-470 to APAFR (The Lakeland Shelf)
  - Boundaries: Beginning at lat. 29°42'30"N., long. 84°00'00"W.; to lat. 28°56'00"N., long. 83°31'00"W.; to lat. 28°05’00”N., long. 83°31’00”W.; to lat. 27°04’01”N., long. 81°24’59”W.; to lat. 27°53’31”N., long. 81°51’59”W.; to lat. 28°00’01”N., long. 81°20’59”W.; to lat. 28°00'01''N., long. 81°13'59''W.; to the point of beginning
  - Intermittent by NOTAM
  - Controlling agency: FAA, Jacksonville ARTCC

3.1.6 <u>The Ocala Shelf ATCAA</u>.

The proposed ATCAA connecting W-470 to PRC is reflected in Figure 12. and includes the coordinates and information as outlined.

W-470 - to - PRC (Ocala Shelf)

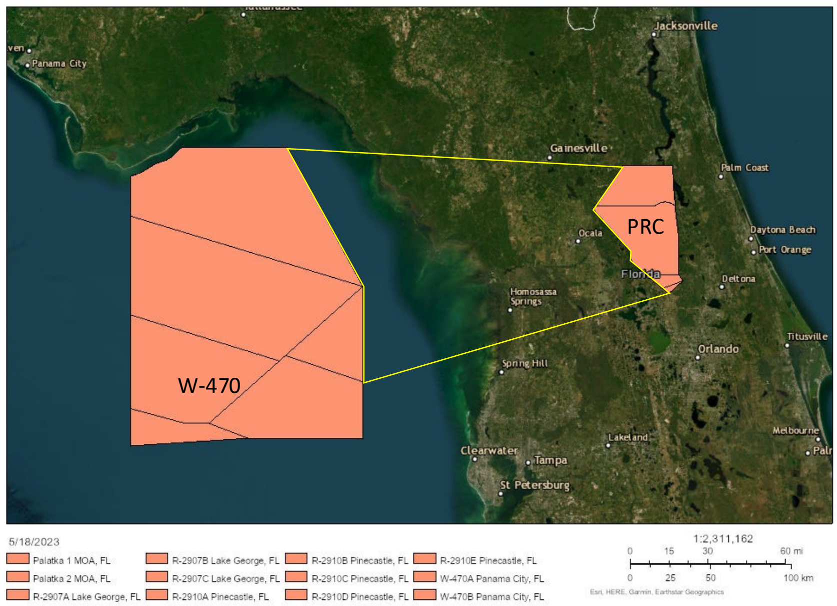


FIGURE 12: The Ocala Shelf

- W-470 to PRC (The Ocala Shelf)
  - Boundaries: Beginning at lat. 29°42'30"N., long. 84°00'00"W.; to lat. 28°56'00"N., long. 83°31'00"W.; to lat. 28°24’00”N., long. 83°31’00”W.; to lat. 28°53'39''N., long. 81°33'56''W.; to lat. 29°36’21”N., long. 81°51’19”W.; to the point of beginning
  - Intermittent by NOTAM
  - Controlling agency: FAA, Jacksonville ARTCC

3.2 Altitude Considerations.

3.2.1 Atlantic Coast ATCAAs.

The ATCAAs from the Atlantic Ocean Warning Areas are appreciably shorter as the ranges from the western edges of the Warning Areas to the eastern edges of the Restricted Areas/MOAs tend to be in the 40–50-mile range distance. Ideally, these short distance ATCAAs would be available for discreet time durations from 18,000 – 35,000-foot altitudes (FL 180 – FL 350) to enable full tactical employment of a F-35 tactical formation as it moves inland to ingress the range Restricted Area. Alternatively, when airspace constraints limit the altitude block, the ATCAA could be established in a 10K foot increment, selected by ATC, that affords the least impact to other commercial and general aviation operations. While the reduced altitude block does limit some tactical maneuvering flexibility, a 10K foot block still allows multi-aircraft formations maneuvering in their tactical configurations, as well as the opportunity to employ opposition “red” aircraft for an improved tactical training benefit.

Each ATCAA could be established for any discrete training event in any one of the following two altitude block options if the entire FL 180 – FL 350 is not available:

- FL 250 – FL 350
- FL 180 – FL 280

For training events that will include air-to-ground weapons employment into a range complex, the lower altitude block can be established as a step-down into the appropriate MOA and Restricted Airspace associated with that range.

3.2.2 Gulf Coast ATCAAs.

On the other coast, the Gulf of Mexico Warning Areas have longer approach distances in the 100–170-mile range. As such, to minimize the volume of airspace activated by use of these ATCAAs, the longer routes could also be established in a continuous 10K foot altitude block utilizing one of the two identified above. This will afford greater flexibility for ATC to enable commercial and general aviation to continue to operate both above and below any ATCAA shelf activated for the limited duration the ATCAA activation is in effect.

As further flexibility in these longer ATCAAs from the western side of the peninsula, a stepdown in altitude from one altitude block to another could be accommodated. While altitude block changes are not desirable as they create another artificial limitation imposed during live training, if it means the difference between completing the training event or cancellation due to ATC concerns, a stepdown could likely be accommodated on a shelf with over 100 miles in distance between Warning Area and the connected range. If this altitude block change were required, it would best be accommodated prior to the 50 miles distance from the range. This step down would create further flexibility for brief periods of military use during the training event while still allowing for the flow of commercial and general aviation aircraft both above and below these corridors.

The concept of different altitude block options and a tiered approach are outlined in examples shown in Figures 13-16 below. These depict profile views of the airspace altitudes as aircraft transition from a Warning Area offshore to a Restricted Area onshore. The goal of providing different altitude block options within each ATCAA is to afford the corresponding ATC the greatest flexibility in accommodating requirements of all airspace users.

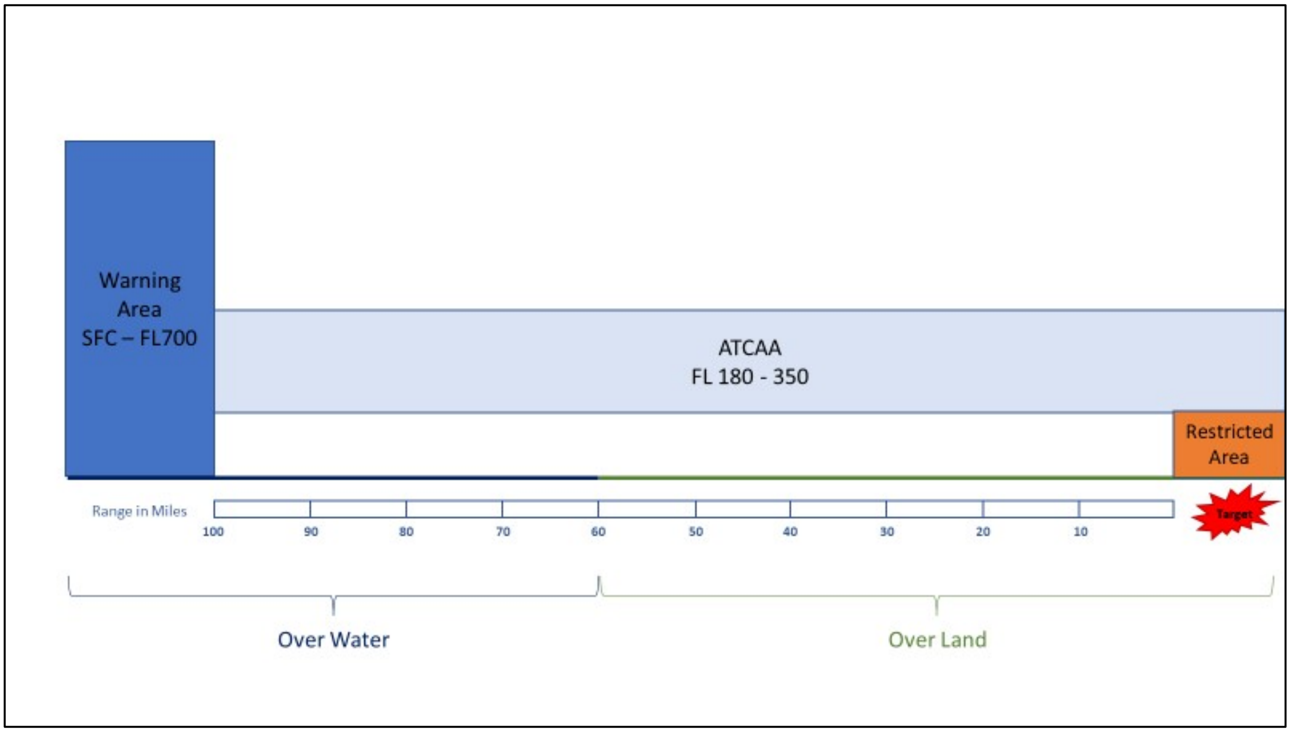


FIGURE 13. Side Profile View of ATCAA Full Altitude Block Concept from Over Water Warning Area to Over Land Restricted Area/Range

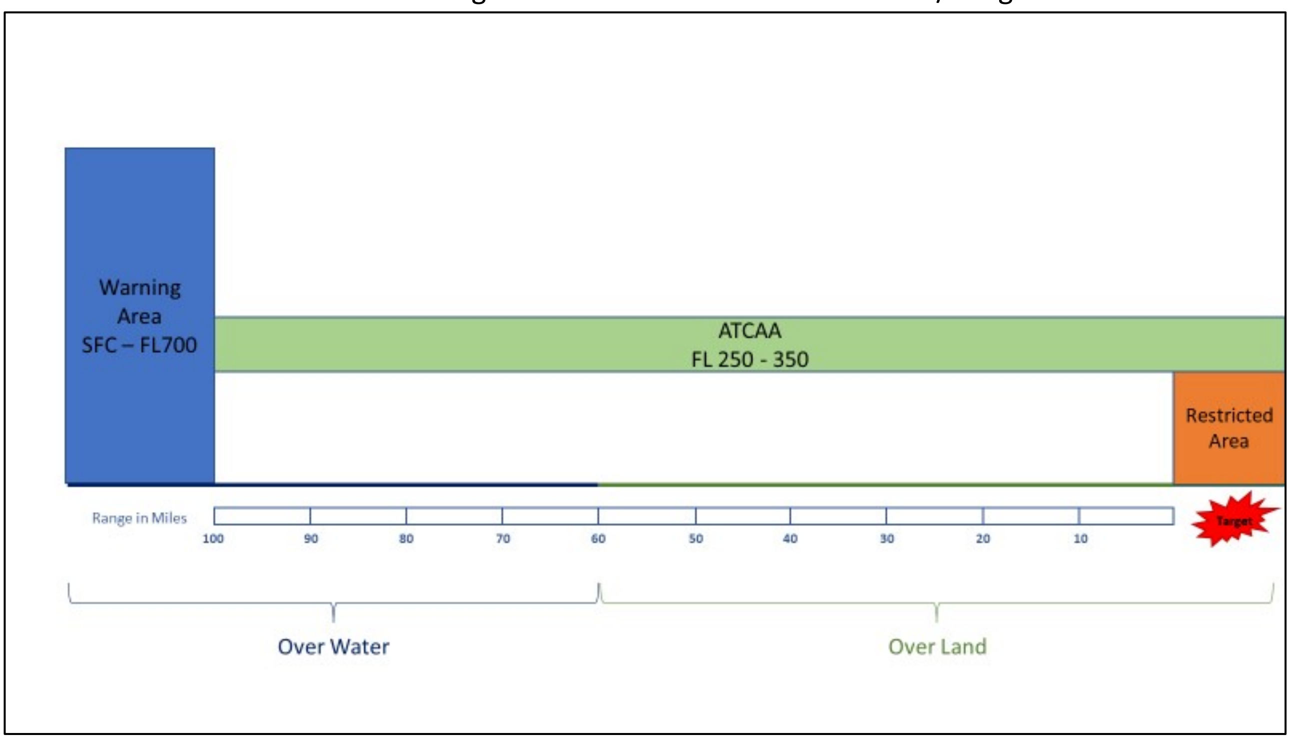


FIGURE 14. Side Profile View of ATCAA Reduced Altitude Block Concept (FL 250 - 350) from Over Water Warning Area to Over Land Restricted Area/Range

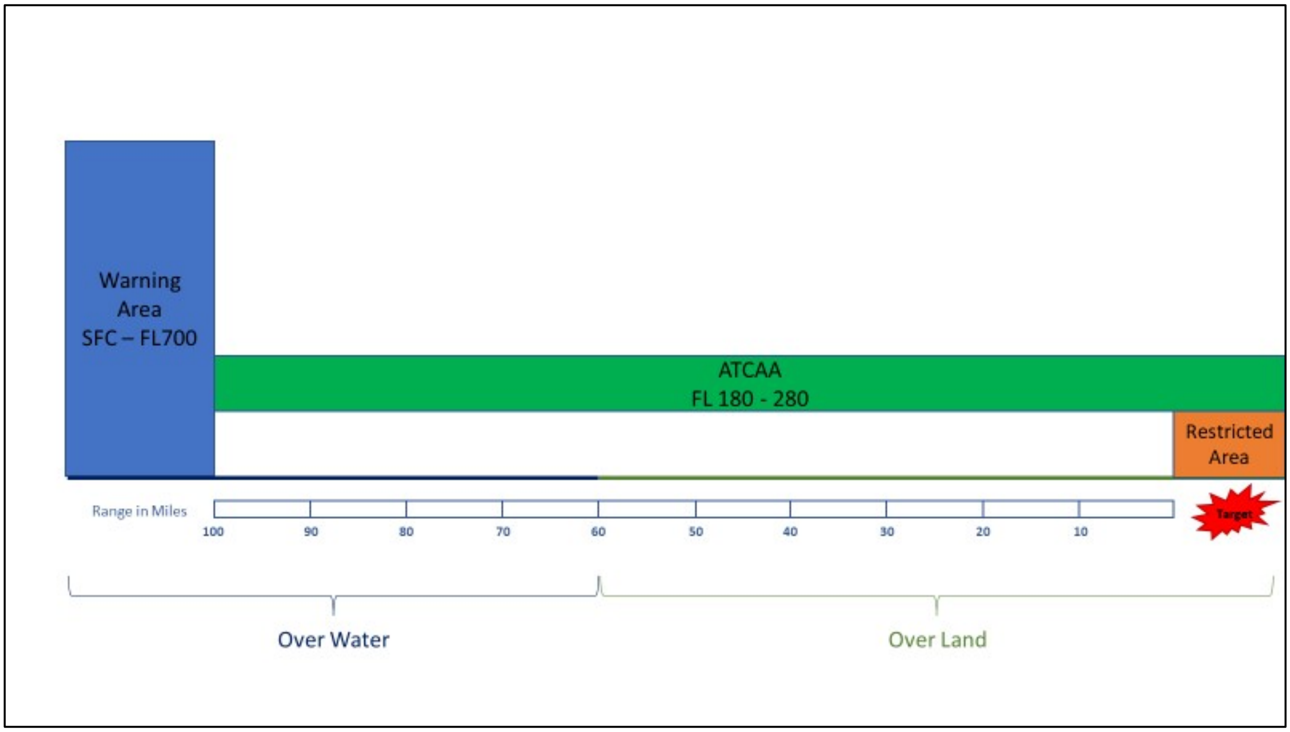


FIGURE 15. Side Profile View of ATCAA Reduced Altitude Block Concept (FL 180 - 280) from Over Water Warning Area to Over Land Restricted Area/Range

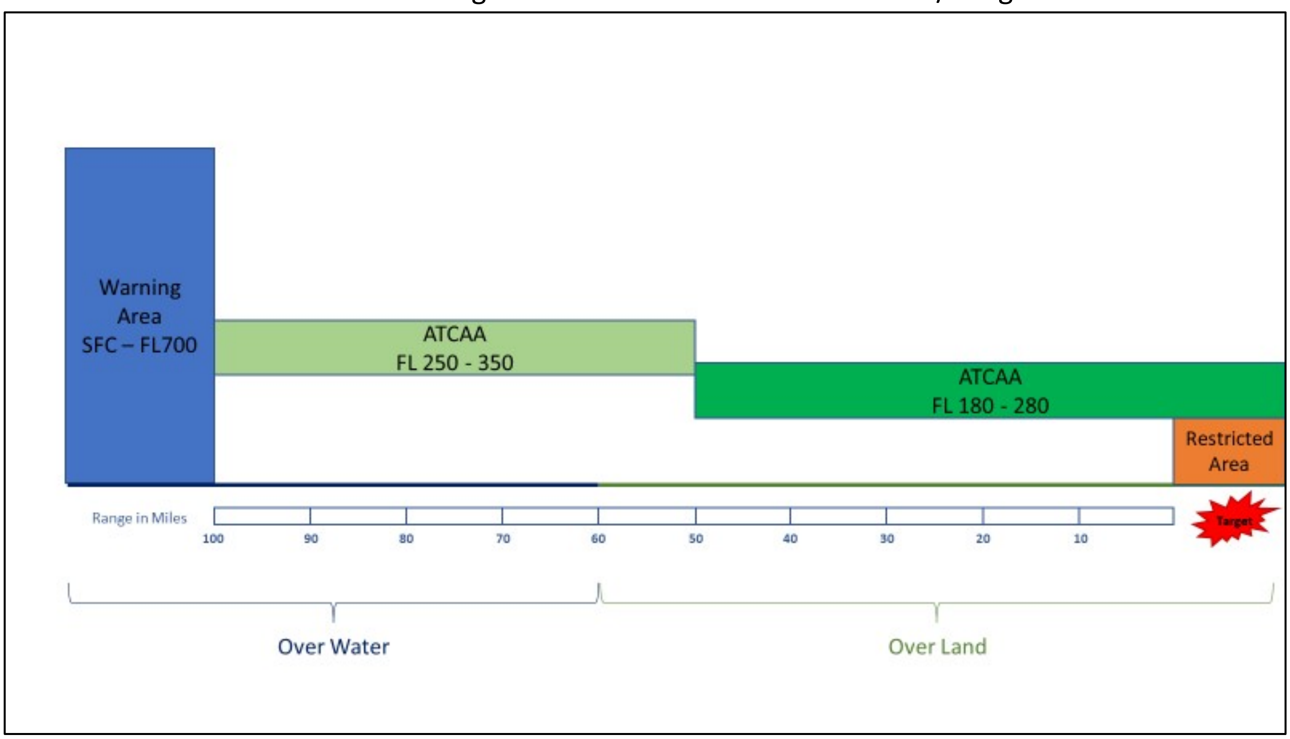


FIGURE 16. Side Profile View of ATCAA Tiered Step-Down Concept from Over Water Warning Area to Over Land Restricted Area/Range

3.3 Timing Considerations.

Additionally, the time of ATCAA activation can be utilized during both day and night which may afford greater deconfliction options with commercial and general aviation operations.

3.4 Electronic Countermeasures.

Advanced threats and evolution of current tactics requires the use of electronic countermeasures (jamming pods). This request includes the use of ALQ-188, ALQ-184, ALQ-131, and any future developed jamming pods to be used in the new ATCAAs.

3.5 Chaff and Flare Restrictions.

Chaff and flare expendable countermeasures will not be used in the ATCAAs.

3.6 Supersonic Restrictions.

No changes to existing supersonic restrictions are requested as part of this proposal.

4. Alternative Courses of Action.

4.1. No actions alternative.

Without changes to the Florida Complex ATCAAs as proposed, joint force training utilizing 5th Gen fighter aircraft will be precluded from conducting USAF RAP or USN/USMC equivalent required flying events in accordance with established longer range TTPs for multiple missions including missions such as SEAD, SCAR, CAS, and BSA. In addition, integration with other joint forces for realistic training will be restricted.

4.2. Use of alternate airspace.

Given the common commercial air routes into the peninsula, the growing demand for space launch activities on the Eastern Range at Cape Canaveral SFS and NASA/John F. Kennedy Space Center, and the military testing requirements over the Gulf range and into

Eglin AFB, the use of alternative airspace was deemed to be more disruptive to the NAS than leveraging the existing proposal designated SUA around Florida and creating short term, temporary connectors via ATCAAs as the most viable option for flexible access in ingress and egress to APAFR and PRC at the tactical ranges required, formation maneuvering room, station keeping and safety buffers required.

4.3. Actions considered but not advanced.

4.3.1. Entire redesign/baselining of Florida airspace.

Due to the impending arrival of the F-35 at various Florida-based units, this option would be prohibitive due to the time required for a total airspace redesign or baselining to include existing Restricted Areas and MOAs.

4.3.2. Deploying for all unit level training.

This option would be excessively expensive to implement requiring multiple deployments by the various Florida-based units to fulfill AP requirements for each assigned pilot. This option would incur significant additional costs in moving hundreds of support personnel and flying operations to alternative locations. Scheduling availability in other CONUS airspace complexes combined with the amount of RAP events make this option ineffective for future F-35 training requirements. Furthermore, most alternative locations lack the airspace required to effectively train at the distances and scale required by F-35 TTPs and also have very limited-to-no opportunities for joint force integration with live forces.

5. Air Traffic Control Coordination.

[SECTION PENDING ADDITIONAL ENGAGEMENT WITH ATREPs and ARTCCs]

6. Other Interest Potential.

The anticipated impacts of proposed actions on each of the potentially affected areas are listed below.

6.1. Recreational areas: (Parks – Federal, state, local).

There are several national wildlife refuges, national and state forest lands located across Florida the ATCAAs will pass over or adjacent to. However, due to the high altitudes of the ATCAAs proposed, there are no anticipated negative effects.

6.2. Native American Reservations, Lands, or areas of special interest.

The ATCAAs proposed do not pass over any known reservation lands.

6.3. Grazing and/or farming.

Due to the high altitudes of the ATCAAs proposed, there are no anticipated effects to any grazing or farming assets.

6.4. Endangered species.

Due to the high altitudes of the ATCAAs proposed, there are no anticipated effects to any endangered species.

6.5. Wildlife sites.

Due to the high altitudes of the ATCAAs proposed, there are no anticipated effects to hunting or fishing.

6.6. Hunting and fishing.

Due to the high altitudes of the ATCAAs proposed, there are no anticipated effects to hunting or fishing locations.

6.7. Archaeological sites.

There are no known archaeological sites involved in the ATCAAs proposed.

6.8. Population centers, communities, previously identified or potential noise sensitive areas.

Due to the high altitudes of the ATCAAs proposed, there are no anticipated effects on any population centers or noise sensitive areas.

6.9. Ongoing litigation that may be impacted.

There is no known ongoing or pending litigation involving the areas of the ATCAAs proposed.

6.10. Other training airspace actions that may be impacted by this initiative.

Unknown.

6.11. Regional actions by other MAJCOM or military services.

This proposal is a regionally coordinated effort across the joint force based across Florida. There are no other known regional actions that would be impacted.

6.12. Consultation with other state/federal agencies.

This concept and proposal have been coordinated and supported at the state level with the Florida Defense Support Task Force (FDSTF) which is established pursuant to Florida Statute §288.987 and the Florida Defense Alliance which is established pursuant to Florida Statute §288.980(1)(b). The Adjutant General of the Florida National Guard has coordinated on the development of this proposal and is in concurrence with the approach. Representatives of the State of Florida Department of Transportation have also received briefings on the concept. Several members of the Florida state legislature have also been briefed on the concept. At the federal level, outside of various DoD entities that have been briefed, the U.S. Coast Guard has been coordinated with for potential future employment of advanced threat emitters at their facilities to compliment this concept of using Florida ranges by being able to create more complex congested and contested integrated air defense networks for training. Additionally, several members of the Florida federal congressional delegation and members of the congressional Mach 1 Caucus have been briefed and are supportive of the concept.

6.13. Other aviation interest groups and agencies.

Consultation with the Aircraft Owners and Pilots Association (AOPA), the National Business Aircraft Association (NBAA), Air Transport Association (ATA), Florida's Department of Transportation (FDOT) and local airport commissions and/or Fixed Base Operators (FBOs) will be conducted to minimize impacts to all agencies and stakeholders.

6.14. Other interested or affected parties.

None known.

7.0 Engagement planning.

Due to the high-altitude nature of this airspace request, no negative effects are anticipated to the surrounding communities that will require engagement. If there are concerns raised, the nearest proponent military command based in Florida will ensure that the intent for users of the FATR to remain at higher altitudes above a level that would impact the local community is clearly communicated.

FLORIDA ADVANCED TRAINING RANGE
MODIFICATION OF FLORIDA SPECIAL USE AIRSPACE
CONNECTING OFFSHORE WARNING AREAS TO
ONSHORE RANGE-RELATED RESTRICTED AIRSPACE AND MILITARY OPEATIONS AREAS

Proponent Signatures

____

NAME, RANK, SVC

TITLE, COMMAND

____

NAME, RANK, SVC

TITLE, COMMAND

____

NAME, RANK, SVC

TITLE, COMMAND

____

NAME, RANK, SVC

TITLE, COMMAND

____

NAME, RANK, SVC

TITLE, COMMAND

____

NAME, RANK, SVC

TITLE, COMMAND

Appendix D.1: DD1494 MET-L

View Pages 1 To 6 | OMB No. 0704-0188

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION	DATE	J/F 12 No.
		09 Dec 2022	Page No.

The public reporting burden for this collection of information is estimated to average 24 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Services Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION. RETURN COMPLETED FORM TO THE USING AGENCY OR CONTRACTING AGENCY, AS APPROPRIATE.**

DOD GENERAL INFORMATION

TO	FROM
Army Spectrum Management Office	Threat Systems Management Office Building 4497 Redstone Arsenal, Huntsville, AL

1. APPLICATION TITLE
(U) MET-L

2. SYSTEM NOMENCLATURE
(U) Multi-Domain Threat Emitter - Low

3. STAGE OF ALLOCATION *(X one)*

☐ a. STAGE 1 - CONCEPTUAL ☐ b. STAGE 2 - EXPERIMENTAL ☒ c. STAGE 3 - DEVELOPMENTAL ☐ d. STAGE 4 - OPERATIONAL

4. FREQUENCY REQUIREMENTS

Add Another Frequency

a. FREQUENCY(IES):	(U) 70 MHz - 6.0 GHz		
b. EMISSION DESIGNATOR(S):	(U) 4M50Q1N	(U) 5M06Q3N	

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2:	b. STAGE 3:	c. STAGE 4:
	01 Apr 2023	

6. EXTENT OF USE
(U) This is programmable training asset to provide the war-fighter the ability to test identification, evasive maneuvers, and tactical responses in the presence of threat representative RF signatures in this frequency range.

7. GEOGRAPHICAL AREA FOR

a. STAGE 2:

b. STAGE 3: (U) China Lake, CA; (U) National Test Center, CA; (U) Redstone Arsenal, (U) Fort Huachuca, see remarks

c. STAGE 4:

8. NUMBER OF UNITS

a. STAGE 2	b. STAGE 3	c. STAGE 4
	(U) 4	

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT 4

10. OTHER J/F 12 APPLICATION NUMBER(S) TO BE

a. SUPERSEDED J/F 12/

b. RELATED J/F 12/

11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11?

☐ a. YES ☒ b. NO ☐ c. NAvail

12. NAMES AND TELEPHONE NUMBERS

a. PROGRAM MANAGER	(1) COMMERCIAL PHONE	(2) DSN
(U) Teddy Wong	256-783-1365	
b. PROJECT ENGINEER	**(1) COMMERCIAL PHONE**	**(2) DSN**
(U) Brett Holland	256-428-9245	

13. REMARKS
(U) The MET-L system is designed to support war-fighter test and training missions. Its purpose is to simulate open air threat system RF signatures to generate a realistic contested electromagnetic environment that will enable trainees to properly identify and react to these systems. The system is programmable and the Emission Designators included are representative of system capability.
(U) 7(b) Additional Locations include Pinecastle Range, FL; Avon Park Air Force Range, FL; Eglin AFB, FL; Tyndall AFB, FL;McDill AFB, FL; Patrick Space Force Base, FL; Camp Blanding, FL; Jacksonville Naval Air Station, FL; Moody AFB, GA

DD FORM 1494, APR 2015 | DoD General Information Page 1-1

View Pages 1 To 6 — OMB No. 0704-0188

CLASSIFICATION	PAGE

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) MET-L

2. MANUFACTURER'S NAME
(U) Scientific Research Corporation

3. TRANSMITTER INSTALLATION
(U) Land - Trailer M1102

4. TRANSMITTER TYPE
(U) Track While Scan, Pulse Radar

5. TUNING RANGE
(U) 70 MHz - 6.0 GHz

6. METHOD OF TUNING
(U) Synthesizer Direct Digital

7. RF CHANNELING CAPABILITY:

a. Lowest channel/frequency	(U) 70 MHz
b. Tuning increments	(U) 100 kHz
c. Number of channels	(U) 35,000
d. Number of frequencies required for operation	(U) 100
e. Minimum Frequency Separation	(U) 100 kHz

8. EMISSION DESIGNATOR(S) Add Another Emission

4M50Q1N	(U) 5M06Q3N	

9. FREQUENCY TOLERANCE
(U) 1 ppm

10. FILTER EMPLOYED *(X one)*
☒ a. Yes ☐ b. No

11. SPREAD SPECTRUM *(X one)*
☐ a. Yes ☒ b. No

12. EMISSION BANDWIDTH *(x and complete as applicable)*
☒ CALCULATED ☐ MEASURED

a. -3 dB	(U) 1.00 MHz	(U) 4.84 MHz	
b. -20 dB	(U) 4.50 MHz	(U) 5.06 MHz	
c. -40 dB	(U) 5.37 MHz	(U) 5.92 MHz	
d. -60 dB	(U) 53.74 MHz	(U) 59.20 MHz	
e. OC-BW	(U) 4.50 MHz	(U) 5.06 MHz	

13. MAXIMUM BIT RATE
(U) NA

14. MODULATION TECHNIQUES AND CODING
(U) 4M50Q1N - BPSK Barker
(U) 5M06Q3N - LFMOP / 4.8 MHz Excursion

15. MODULATION FREQUENCY
☒ a. Maximum ☐ b. Minimum

16. PRE-EMPHASIS *(X one)*
☐ a. Yes ☒ b. No

17. DEVIATION RATIO
(U) NA

18. PULSE CHARACTERISTICS

a. RATE	(U) 3700 /s	(U) 800 / s	
b. WIDTH	(U) 26 uS	(U) 23 uS	
c. RISE TIME	(U) 2 uS	(U) 2 uS	
d. FALL TIME	(U) 2 uS	(U) 2 uS	
e. COMP RATIO	(U) NA	(U) NA	

19. POWER *(X one)* ☐ a. MEAN ☒ b. PEP

(U) 20 W	(U) 20 W	

20. OUTPUT DEVICE
(U) Solid State (GaN Transistors)

21. HARMONIC LEVEL
a. 2ND
(U) -40 dB
b. 3RD
(U) -60 dB
c. OTHER

22. SPURIOUS LEVEL
(U) -60 dB

23. FCC TYPE ACCEPTANCE NO.
(U) NA

24. NAVSTAR GPS BAND MEASUREMENT

a. GPS WIDEBAND EMISSION LEVEL (1164-1240 MHz): dBw/MHz	(U) NA
b. GPS WIDBAND EMISSION LEVEL (1559-1610 MHz0: dBw/MHz	(U) NA
c. GPS NARROWBAND EMISSION LEVEL (1164-1240 MHz): dBw	(U) NA
d. GPS NARROWBAND EMISSION LEVEL (1559-1610 MHz) : dBw	(U) NA
e. PULSE SYSTEMS	(U) NA

25. REMARKS
(U) Remark 1
The system employs a bank of harmonic filtering with the following cutoffs:
Fc = 115 MHz: 7L110-115/QX333-O/O
Fc = 160 MHz: 7L110-160/QX463-O/O
Fc = 240 MHz: 7L110-240/QX690-O/O
Fc = 380 MHz: 7L110-380/QX1093-O/O
Fc = 630 MHz: 7L110-630/QX1813-O/O

DD FORM 1494, APR 2015 — Transmitter Equipment Characteristics Page 2-1

View Pages 1 To 6 OMB No. 0704-0188

CLASSIFICATION	PAGE

Fc = 1,075 MHz: 7L340-1075/QX3093-O/O
Fc = 1,865 MHz: 7L340-1865/QX5363-O/O
Fc = 3,275 MHz: 7L120-3275/QX7000-O/O

(U) Remark 2

All BW parameters are calculated instead of measured because the system is still under development.

(U) Remark 3

A) The identified emission designators incorporate multiple pulse types and worst case has been selected for each.

B) -3 dB Emission Bandwidth is based upon computed sin(x)/x and minimum pulse width.

C) -20 dB Emission Bandwidth is based upon computed pulse widths and rise time from Table A in Annex J of the document MANUAL OF REGULATIONS AND PROCEDURES FOR FEDERAL RADIO FREQUENCY MANAGEMENT.

D) -40 dB Emission Bandwidth is based upon formula from paragraph 3.1 of document MANUAL OF REGULATIONS AND PROCEDURES FOR FEDERAL RADIO FREQUENCY MANAGEMENT.

E) -60 dB Emission Bandwidth is based upon 20 dB/decade from B(-40) per Criteria B radar from paragraph 4.1 of document MANUAL OF REGULATIONS AND PROCEDURES FOR FEDERAL RADIO FREQUENCY MANAGEMENT.

CLASSIFICATION		J/F 12 No.		Reset Page

Add a new Transmitter Page | Remove a Transmitter Page

View Pages 1 To 6 OMB No. 0704-0188

CLASSIFICATION	PAGE

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO. (U) MET-L	**2. MANUFACTURER'S NAME** (U) Scientific Research Corporation
3. RECEIVER INSTALLATION (U) Land - Trailer M1102	**4. RECEIVER TYPE** (U) NA
5. TUNING RANGE (U) NA	**6. METHOD OF TUNING** (U) NA

7. RF CHANNELING CAPABILITY:

a. Lowest channel/frequency	(U) NA
b. Tuning increments	(U) NA
c. Number of channels	(U) NA
d. Number of frequencies required for operation	(U) NA
e. Minimum Frequency Separation	(U) NA

8. EMISSION DESIGNATOR(S)

(U) NA

9. FREQUENCY TOLERANCE

(U) NA

10. IF SELECTIVITY	1ST	2ND	3RD
a. -3 dB	(U) NA		
b. -20 dB	(U) NA		
c. -60 dB	(U) NA		

11. RF SELECTIVITY *(X and complete as applicable)*

CALCULATED MEASURED

a. -3 dB	(U) NA
b. -20 dB	(U) NA
c. -60 dB	(U) NA
d. PRESELECTION TYPE	(U) NA

12. IF FREQUENCY

a. 1ST	(U) NA
b. 2ND	(U) NA
c. 3RD	(U) NA

13. MAXIMUM POST DETECTION FREQUENCY

(U) NA

14. MINIMUM POST DETECTION FREQUENCY

(U) NA

15. OSCILLATOR TUNED	1ST	2ND	3RD
a. ABOVE TUNED FREQUENCY	(U) NA	(U) NA	(U) NA
b. BELOW TUNED FREQUENCY	(U) NA	(U) NA	(U) NA
c. EITHER ABOVE OR RELOW TUNED FREQUENCY	(U) NA	(U) NA	(U) NA

16. MAXIMUM BIT RATE

(U) NA

17. SENSITIVITY

a. SENSITIVITY	(U) NA	dBm
b. CRITERIA	(U) NA	
c. NOISE FIG	(U) NA	dB
d. NOISE TEMP	(U) NA	Kelvin

18. DE-EMPHASIS *(X one)*

☐ a. Yes ☒ b. No

19. IMAGE REJECTION

(U) NA

20. SPURIOUS REJECTION

(U) NA

21. ADJACENT CHANNEL SELECTIVITY (dB)	22. INTERMODULATION REJECTION LEVEL (dB)	23. CONDUCTED UNDESIRED EMISSIONS (dBm)
(U) NA	(U) NA	(U) NA

24. REMARKS

(U) A receiver is not included with this system.

CLASSIFICATION	J/F 12 No.	Reset Page

Add a new Receiver Page Remove a Receiver Page

DD FORM 1494, APR 2015 Receiver Equipment Characteristics Page 3

View Pages 1 To 6 OMB No. 0704-0188

CLASSIFICATION	PAGE

ANTENNA EQUIPMENT CHARACTERISTICS

1. ☒ a. TRANSMITTING ☐ b. RECEIVING ☐ c. TRANSMITTING AND RECEIVING

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.	3. MANUFACTURER'S NAME
(U) AD-18/CF-2512-M-N	(U) Cyntony
4. FREQUENCY RANGE	**5. TYPE**
(U) 70 MHz - 500 MHz	(U) Omni-directional
6. POLARIZATION	**7. SCAN CHARACTERISTICS**
(U) Vertical	a. TYPE (U) NA
8. GAIN	b. VERTICAL SCAN (U) NA
a. MAIN BEAM (U) - 5 dBi to 2.0 dBi / -3 dBi typical	(1) MAX ELEV (U) NA (2) MIN ELEV (U) NA
b. 1ST MAJOR SIDE LOBE AND ANGULAR DISPLACEMENT (U) NA	(3) SCAN RATE (U) NA
9. BEAMWIDTH	c. HORIZONTAL SCAN (U) NA
a. HORIZONTAL (U) Omni / 360 deg	(1) SECTOR SCANNED (U) NA (2) SCAN RATE (U) NA
b. VERTICAL (U) 60 +/- 10 deg	d. SECTOR BLANKING *(x one)* ☐ a. Yes ☒ b. No

10. REMARKS

(U) 1. This is an omni directional antenna with varying vertical performance across the operational band of 70 MHz to 500 MHz.

CLASSIFICATION	J/F 12 No.	Reset Page

Add a new Antenna Page | Remove a Antenna Page

View Pages 1 To 6 | OMB No. 0704-0188

CLASSIFICATION	PAGE

ANTENNA EQUIPMENT CHARACTERISTICS

1.	☒ a. TRANSMITTING	☐ b. RECEIVING	☐ c. TRANSMITTING AND RECEIVING

2. NOMENCLATURE, MANUFACTURER'S MODEL NO. U) OMNI-A0266	**3. MANUFACTURER'S NAME** (U) Cyntony
4. FREQUENCY RANGE (U) 500 MHz - 6 GHz	**5. TYPE** (U) Omni-directional
6. POLARIZATION (U) Vertical	**7. SCAN CHARACTERISTICS** a. TYPE (U) NA
8. GAIN	b. VERTICAL SCAN (U) NA
a. MAIN BEAM (U) - 3 dBi to 1.5 dBi / 0 dBi typical	(1) MAX ELEV (U) NA
b. 1ST MAJOR SIDE LOBE AND ANGULAR DISPLACEMENT (U) NA	(2) MIN ELEV (U) NA (3) SCAN RATE (U) NA
9. BEAMWIDTH	c. HORIZONTAL SCAN (U) NA
a. HORIZONTAL (U) Omni / 360 deg	(1) SECTOR SCANNED (U) NA (2) SCAN RATE (U) NA
b. VERTICAL (U) 60 +/- 10 deg	d. SECTOR BLANKING *(x one)* ☐ a. Yes ☒ b. No

10. REMARKS

(U) 1. This is an omni directional antenna with varying vertical performance across the operational band of 500 MHz to 6.0 GHz. With the main beam typically 30 deg above horizon.

CLASSIFICATION		J/F 12 No.		Reset Page

Add a new Antenna Page | Remove a Antenna Page

View Pages 1 To 6

OMB No. 0704-0188

APPLICATION FOR SPECTRUM REVIEW	CLASSIFICATION	DATE	PAGE

NTIA GENERAL INFORMATION

1. APPLICATION TITLE
(U) MET-L

2. SYSTEM NOMENCLATURE
(U) Multi-Domain Emitter Threat - Low

3. STAGE OF ALLOCATION *(X one)*

☐ a. STAGE 1 - CONCEPTUAL ☐ b. STAGE 2 - EXPERIMENTAL ☒ c. STAGE 3 - DEVELOPMENTAL ☐ d. STAGE 4 - OPERATIONAL

4. FREQUENCY REQUIREMENTS Add Another Frequency

a. FREQUENCY(IES):	(U) 2.5 GHz - 6.0 GHz		
b. EMISSION DESIGNATOR(S):	(U) 4M50Q1N	(U) 5M06Q3N	

5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS **(NSEP USE)** *(X one)* ☐ a. YES ☐ b. NO

(U) This is programmable training asset to provide the war-fighter the ability to test identification, evasive maneuvers, and tactical responses in the presence of threat representative RF signatures in this frequency range.

6. INFORMATION TRANSFER REQUIREMENTS
(U) NA

7. ESTIMATED INITIAL COST OF THE SYSTEM
(U) $100k

8. TARGET DATE FOR

a. APPLICATION APPROVAL	b. SYSTEM ACTIVATION	c. SYSTEM TERMINATION
01 Dec 2022	02 Jan 2023	

9. SYSTEM RELATIONSHIP AND ESSENTIALITY
(U) This is programmable training asset to provide the war-fighter the ability to test identification, evasive maneuvers, and tactical responses in the presence of threat representative RF signatures in this frequency range.

10. REPLACEMENT INFORMATION
(U) None

11. RELATED ANALYSIS AND TEST DATA
(U) None

12. NUMBER OF MOBILE UNITS
(U) 4

13. GEOGRAPHICAL AREA FOR

a. STAGE 2:

b. STAGE 3: (U) China Lake, CA; (U) National Test Center, CA; (U) Redstone Arsenal, (U) Fort Huachuca, see remarks

c. STAGE 4:

14. LINE DIAGRAM *(See Page(s))* Attach Diagram

15. SPACE SYSTEMS *(X and complete SPACE SYSTEMS DATA field if applicable)* ☐ Yes ☒ No

16. TYPE OF SERVICE(S) FOR STAGE 4
(U) No Specific Service

17. STATION CLASS(ES) FOR STAGE 4
(U) NA

18. REMARKS
(U) This system is a test asset necessary to support war-fighter test and training activities at the ranges specified herein.
(U) 13(b) Additional Locations include Pinecastle Range, FL; Avon Park Air Force Range, FL; Eglin AFB, FL; Tyndall AFB, FL;McDill AFB, FL; Patrick Space Force Base, FL; Camp Blanding, FL; Jacksonville Naval Air Station, FL; Moody AFB, GA

DOWNGRADING INSTRUCTIONS	CLASSIFICATION	J/F 12 No.
		Reset Page

DD FORM 1494, APR 2015

View Pages 1 To 6 OMB No. 0704-0188

APPLICATION FOR FOREIGN SPECTRUM SUPPORT	CLASSIFICATION	DATE	PAGE

FOREIGN COORDINATION GENERAL INFORMATION

1. APPLICATION TITLE
(U) MET-L

2. SYSTEM NOMENCLATURE
(U) Multi-Domain Threat Emitter - Low

3. STAGE OF ALLOCATION *(X one)*

☐ a. STAGE 1 - CONCEPTUAL ☐ b. STAGE 2 - EXPERIMENTAL ☒ c. STAGE 3 - DEVELOPMENTAL ☐ d. STAGE 4 - OPERATIONAL

4. FREQUENCY REQUIREMENTS Add Another Frequency

a. FREQUENCY(IES):	(U) NA		
b. EMISSION DESIGNATOR(S):	(U) NA	(U) NA	(U) NA

5. PROPOSED OPERATING LOCATIONS OUTSIDE US&P
(U) NA - Not intended for OCONUS Operation

6. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS
(U) NA - Not intended for OCONUS Operation

7. INFORMATION TRANSFER REQUIREMENTS
(U) NA - Not intended for OCONUS Operation

8. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT
(U) NA

9. REPLACEMENT INFORMATION
(U) NA

10. LINE DIAGRAM *(See Page(s))* Attach Diagram

11. SPACE SYSTEMS *(X and complete SPACE SYSTEMS DATA field if applicable)* ☐ Yes ☒ No

12. PROJECTED OPERATIONAL DEPLOYMENT DATE
(U) NA

13. REMARKS
(U) This system is not intended to be operated OCONUS.

DOWNGRADING INSTRUCTIONS	CLASSIFICATION	J/F 12 No.
		Reset Page

Appendix E: KLE and Installation Support Report Log

Federal government (Congress, FCC, FAA)

Date/Location	Key Leader/ Title	Results/ Key Takeaways
4 Feb 2023 Phone call	Rep Jake Ellzey US Congressman (Appropriations Committee) Texas District 6	Rep Ellzey is a founding member of the Mach 1 Caucus and a retired USN aviator. The FATR team had discussions regarding a blended LVC training range across the Gulf of Mexico (GOM). Ellzey said when the time is right, he would like the FATR team to brief the Mach 1 Caucus including the technology needed to build out the training range. He would like to see FATR extended to the west side of the Gulf of Mexico and incorporate coastal TX bases.
8 Feb 23 Washington DC Virtual	Rep Scott Franklin US Congressman (Appropriations Committee) Florida District 18	The Congressman expressed support for FATR but was concerned that FAA support might be challenging. He offered to arrange another meeting with key members of the Florida delegation - plus the other three members of the Mach 1 Caucus (including Republican Reps. Mike Garcia of California, Scott Franklin of Florida, and Jake Ellzey and August Pfluger of Texas).
22 Feb 2023 Virtual	Ms. Kathy Ferguson Senior Advisor, The Roosevelt Group	FATR team met with Kathy to discuss congressional assistance via defense budget inserts and language. Kathy agreed to let us review the final language proposal given our inputs from FATR Concept development.
17 Mar 2023 Virtual	Rep Scott Franklin	Follow-up meeting with the Congressman to answer questions and discuss FATR concept in more detail. Agreed to arrange future meetings with congressman in Appropriations including Rep Rob Wittman. Advised we

		should get started now with info briefs that lead to Congressional language and inserts for FY25 Budget.
22 Mar 2023 Phone call	Rep Jake Ellzey Follow-up	Touched base with Rep Ellzey and gave him an update on the progress we are making on the FATR. FATR team will continue informing him on progress.
3 Apr 2023 Washington DC Phone call	Sen Rick Scott's Staff FL US Senator (SASC)	Contacted his Chief of Staff and Mil Liaison; continuing to update.
7 Apr 2023 Email	Dr. Paul Bonicelli Sen Scott's National Security Advisor	Via a connection from Jerry Lavely, reached out to Dr. Bonicelli to set up a formal discussion on FATR.

State Entities (Governors, Legislators, TAGs, Defense Alliances)

Date/Location	Key Leader/ Title	Results/ Key Takeaways
12 Mar 2021 27 Jun 2022 APAFR On-site	Maj Gen Jim Eifert, The Adjutant General Florida National Guard	During multiple briefings and discussions with FL TAG starting in 2021, Gen Eifert expressed support for the FATR concept and helped at any level including Florida Air Guard and Florida Army National Guard.
29 Dec 2022 Virtual	Dr. Lucy Greene, Consultant for MOODY SUPPORT Team Defense Alliance	Virtual meeting with Dr. Lucy Greene. She feels our FATR vision for upgrading of the ranges is the first concrete proposal she's heard along those lines. Moody's Avon Park is a primary focus for Moody AFB. She asked for assurances that the range will not be removed from 23d Wing responsibility as this new concept develops. She's interested in F-35 training and wants to remain in the fighter business in addition to their Rescue Mission and the Air Ground Operations Wing. Moody is perfect for training and has had many training missions in the past. Dr. Greene feels there should be state of Georgia involvement in FATR as Moody is important to South Georgia.

US Department of Defense (OSD, Joint Staff, NGB, ANG/ARNG and Military Services)

Date/Location	Key Leader/ Title	Results/ Key Takeaways
11 Dec 2022 NAS JRB Ft Worth TX Virtual	Maj Gen Bryan Radliff Commander, 10 AF	Gen Radliff supported our efforts on FATR and approved our interviews with the 482 FW and 920 RQW regarding their unit training requirements.
20 Dec 2022 Arlington VA Email	Lt Gen Marc Sasseville Vice Chief, NGB	Gen Sasseville supported our efforts on FATR and asked us to continue to remain synced up with Maj Gen Eifert, TAG of Florida.
20 Dec 2022 Virtual	MG John D. Haas FLARG leadership	MGEN Haas supported our FATR Concept and put us in touch with COL Felix Rodriguez
22 Dec 2022 Langley AFB VA Virtual	Lt Gen Russ Mack, Deputy Commander ACC	Gen Mack expressed support for the FATR concept and asked us to keep him apprised of our progress. He understands our desire to enhance training for 4th and 5th Gen Units in the SE region of the US - all Services - and ultimately in all Domains. He also supports our efforts to focus initially on RC units to ensure they can train for pacing-threat mission scenarios without constant deployments out west. Finally, he emphasized Emitter development and deployment more so than LVC enhancements.
22 Dec 2022 Moody AFB GA Virtual	Col Russell Cook Commander, 23 WG	Col Cook expressed support for our FATR efforts and made two SMEs available to FATR for FL range planning: Maj Harrold for Attack and Maj' Combs for Rescue (Cc’d). Both are senior weapons officers at Moody for their respective missions and can provide some background for the FATR concept within constraints for classification/releasability. He offered to keep us posted on Agile Flag planning and wants to have a Wing level tactics

		discussion on improved training options via APAFR range improvements.
26 Dec 2022 Randolph AFB TX Virtual	Maj Gen Phil Stewart, 19th AF Commander	19 AF/CC expressed support for our FATR concept and approved coordination w/33FW
5 Jan 2023 Virtual	COL Rodriguez, LTC Mike Adler FLARNG	The FATR team provided COL Felix Rodriguez and LTC Mike Adler a briefing on the concept including ideas on how their soldiers might benefit from our efforts. They appreciated information on the MET threat emitter options but feel the systems would likely benefit only their future training requirements, but not their current training in older equipment. The US Army is centrally managing the APR-39 Treat Warning Receivers and FLARNG has zero in stock for any of their helicopters. There is no live training going on in that regard. Their crews go to Hunter AAS and train in simulators when it comes to threat reactions and avoidance. COL Rodriguez agreed to fill out our Unit Training Worksheet. He expressed support for our FATR concept.
17 Jan 2023 Shaw AFB SC Virtual	Maj Gen Mike Koscheski Commander, 15 AF	Gen Koscheski expressed support for our efforts in Florida and suggested we interview the 325 FW Commander at Tyndall AFB FL to ensure we are aware of upgrades to over-land and over-water training ranges and airspace near Tyndall. He emphasized the importance of our emitter development over the LVC enhancements just like Lt Gen Mack did.
17 Jan 2023 Virtual	Maj Gen Thomas Grabowski, Commander Georgia Air Guard	Maj Gen Grabowski expressed support for our FATR concept and feels this concept is necessary due to limited local training capabilities for his current and future units. He's well versed in the Marine Corps attempts to upgrade Townsend Range and

		his efforts to connect the range to the over-water Atlantic Warning Area airspaces. He does not think the Marine Corps will make much training time available on Townsend since they use it all the time. He feels Georgia Tech Research Institute has a similar effort underway and recommends we get with them to understand what they're trying to do. He asked who our engineering expertise was, and I explained SRC's capabilities and current efforts with the US Army and TSMO. He has a POC working at Savannah named Lt Col 'Tracker" Thomas who's trying to connect the dots on all of this regarding emitters. He feels it's connected to ABMS Family of Systems and recommended we check into that too. He recommended we consider briefing the Georgia Military Defense Commission and a former Secretary of the Navy who is currently the Chairman of the Commission: William Ball. He also recommends we brief Congressman Austin Scott at some point who's on the HASC.
23 Jan 2023 Virtual	Mike Dolby Chief, Joint Airspace Management & Bilateral Operations (J32) US Forces Japan	Mike was willing to discuss USFJ efforts on range modernizations
23 Jan 2023 Virtual	Lt Col Stephen Thomas Commander, Air Dominance Center	Lt Col Thomas invited the FATR team to visit the CRTC to see how they train for Large Force Employment, 5th and 4th Generation assets.
23 Jan 2023 Huntsville AL Virtual	Regina 'Gina' Tyrrell TSMO Liaison to OSD R&E	FATR team briefed her about the concept using TSMO products (MET systems) to provide live threat emitters on training ranges. She is now working directly for TSMO. Linked Gina up with SRC reps. Will coordinate a trip to SRC for a hands-on demonstration/petting zoo visit to see the MET system and provide a more in-depth

		overview of the FATR concept.
26 Jan 2023 Eglin AFB FL Virtual	Col Jack Arthaud Commander, 33 FW	Col Arthaud expressed support for our efforts on FATR and recommended connecting with his Wing Weapons officer and the 96 Range Group to discuss unit training requirements.
27 Jan 2023 Virtual	Col Jesse Hamilton, Commander 920th Rescue Wing	Col Hamilton is supportive of FATR concept including providing enhanced emitters to train against. He is supportive of airspace changes as well, albeit ceilings and floors for many of his assets will be significantly different than those required for fighters. Mentioned that the eastern ATCAA the 125th is considering from W497 over to APAFR goes across the Patrick-area and it would be ideal from a lat/long perspective for 920th-based assets. POCs: 39 RQS LtCol Paul Golando; 321-494-1172; paul.golando.2@us.af.mil 301RQS: Lt Col Mel Bonifacio; 321-494-8111; melvin.bonifacio.1@us.af.mil
27 Jan 2023 Eglin AFB FL Virtual	Maj Kevin Hand Director, F-15C CTF (AATC)	Discussed the lines of effort to network F-15C/E/EX aircraft into the prototype PATS/ALVC architecture. Said they were coordinating the system protocols used previously with AFRL to Maj Hand to determine the best way ahead.
30 Jan 2023 Hickam AFB HI Email	Gen Ken Wilsbach Commander, PACAF	Gen Wilsbach expressed support for our efforts; asked us to continue the discussion with Brig Gen Chris Niemi, PACAF A5/8
31 Jan 2023 Orlando, FL Virtual	Mr. Greg Knapp DASD, Personnel & Readiness/Force Education & Training	Reviewed FATR concept and discussed the MET system as part of other OSD projects supporting EW training. Greg requested we re-engage with BG John Nipp regarding another EW training project at OSD (Range Modernization Spectrum Tool) that could be complementary to FATR. Asked us to arrange for OSD P&R/FE&T Mil Deputy (Lt Col Aaron Cavazos) to see the MET system

		in Huntsville. Scheduled for Mar 2023.
1 Feb 2023 Tyndall AFB FL Virtual	Col George Watkins Commander, 325 FW	Col Watkins expressed support for our efforts on FATR and approved our interview of his units regarding their training requirements. He also asked for SRC to brief him on the PATS capabilities.
1 Feb 2023 Beale AFB CA On-site	Maj Ray Tierney Director, Fed Lab	Briefed the ACC Federal Lab Director, 9th Reconnaissance Wing, about the goals, objectives, and phases of the FATR proposal. Advised him of our interest in his lab and airborne experiments with open architecture communications and links for both 4th and 5th Gen aircraft. He appreciated the briefing.
2 Feb 2023 Univ of Maryland Virtual	Gil Martinez Director for OSD EW study ARLIS	Mr. Martinez and his team briefed their ongoing study on DoD EW training effort. The FATR concept will be mentioned in their report. Requested to be considered for the Phase 2 planning and exercise portion of their study.
6 Feb 2023 South Carolina Virtual	Erik Gardner PM at NIWDC Atlantic	Spoke with Erik and one of his IPT leads (Ryan Longshore) about FATR. The SC equivalent of the FL Defense Support Task Force is interested in collaborating on an extension of the FATR up the east coast of the US to accommodate the offshore ranges north into GA and SC. Erik and Ryan are working on an advanced EW training project for OSD. They would like to use FATR as a place to test their prototype(s) for advanced EW effects. Will coordinate a visit to FL to discuss Modeling, Simulation & Analysis (MS&A) for EW effects with the FATR team and members of the MS&A community.
6 Feb 2023 Eglin AFB FL Phone call	Lt Col Grant Hillman 33 OSS/OSK	Lt Col Hillman is the 33FW Weapons officer and offered his support for FATR coordinated efforts with the 125FW and 325FW for F-35 training requirements.

8 Feb 2023 Edwards AFB CA Phone call	Maj Gen Evan Dertien AFTC/CC	Maj Gen Dertien discussed the test upgrades to the GOMEX airspace and provided contact information for the 96 Test Wing at Eglin AFB FL to coordinate efforts.
9 Feb 2023 WPAFB OH Virtual	Winston Bennett 711/HPW/RHW	Mr. Bennett provided current information on AFRL's LVC connectivity R&D. There are still significant technology gaps, and these challenges may push the FATR timeline significantly to the right.
13 Feb Hickam AFB HI Virtual	Col James Roche PACAF, A8X	Col Roche was briefed on the FATR concept and discussed challenging issues facing INDOPACOM and the PMTEC initiative for their AOR. He recommended engagement with INDOPACOM/J7 and 350 SWW. He also will set up a meeting w/ACC/A5/8, Brig Gen Niemi
14 Feb 2023 Langley AFB VA Virtual	Maj Eric Wallace ACC/A8S	Maj Wallace provided information on the R&D conducted at the Fed Lab at Beale AFB CA. Significant technology gaps remain in producing a blended LVC environment. He estimated 2028 for F-35 inclusion into the ALVC network.
15 Feb 2023 Norfolk VA Virtual	RADM John F. Meier COMNAVAIRLANT	RADM Meier discussed his intent for training: maximize quality, repetition of training events; deny TTPs to adversaries; responsible use of flying hour program; no blue forces used as "Red Air;" the need for accelerated improvements outside of POM timelines; He expressed support for a PATS/ALVC prototype on Pinecastle Range Complex and provided contact information for FACSFAC commander - CDR Mary Robinson - to coordinate that effort.
15 Feb 2023 Camp Shelby, MS Virtual	BG John Nipp, 184th Sustainment Command, Commander	BG Nipp is participating in the OSD study on EW and LVC training improvements. He is working on improvements and upgrading Camp Shelby MS in the areas of Cyber and EW training. FATR team provided him a

		briefing on PATS capabilities, and he introduced us to the Gulfport CRTC commander Jeff Kirby for crosstalk on upgrading ranges. Connected BG Nipp to COL Felix Rodriguez FLARNG G-3 for crosstalk
16 Feb 2023 Eglin AFB FL Virtual	Dale Marks 96 TW/DV	Mr. Marks expressed support for our project and wants to make sure we sync efforts by coordinating range utilization, spectrum management to optimize OTTI vision. We set up a MET capes brief for their technology director.
17 Feb 2023 Langley AFB VA Virtual	Maj Gen Dave Lyons ACC/A3	Gen Lyons expressed support for the FATR concept and offered his staff's assistance on airspace and frequency spectrum management. FATR team will coordinate support through Col Brian Gebo, A3A and provide him a PATS briefing.
1 Mar 2023 Swedish Army Liaison (ODU) Phone call	Ulf Jinnestrand	Met with Ulf to discuss the Swedish Army COS (Major General Karl E. Engelbrektson) visit with FL TAG. They discussed a partnership between Sweden and the FL Army NG. FATR could be used as a ground maneuver force training range.
2 Mar 2023 NAS Jacksonville FL Virtual	CDR Mary Robinson, USN Commanding Officer Fleet Area Control and Surveillance Facility Jacksonville FACSFAC	Joined by XO, CDR Tyler Kendall, and assorted staff members. This was follow-up to the 15 Feb mtg with CNAL, RADM Meyer, and CDR Robinson was supportive of exploring further FATR emitter implementation at PRC. Also, indicated she would be the lead in the state of Florida for the Navy to coordinate any required airspace changes. Agreed to schedule a visit in April for FATR team, and working on emitter requirements, airspace, and spectrum management/permissions issues. Subsequently, connected us with Mr. Scott Collins, FACSFAC Spectrum Management Office to begin spectrum-related issue discussions and Pinecastle range director,

		Mr. Don Heaton.
3 Mar 2023 Virtual	Maj Alex Esson, Luke AFB wing weapons officer	FATR team interviewed F-35 Luke Weapons Officer about Ranges and Airspace: -He built a blended LVC environment on the BMG ranges using the AFRL concepts attached. -Luke architecture may be our initial approach to FATR (Phase 1/2) until the Fed Lab technology matures. -He said DIADS is unable to realistically provide RED threats/weapons employment due to classification level of F-35 RCS so a man-in-the-loop, with appropriate clearance, must be actively monitoring/manipulating the fight via the WarRoom server. -He also discussed types of live emitters used on the range (at least 6+ different ones). The LCTE version #2 is the only program of record and under contract with the AF. Its capes and costs are similar to the MET-H system. Leeroy said the total price for the modernization of the BMG Range including emitters, personnel, and sustainment is $150M since 2016. - Also mentioned an initial investment for FATR would probably run $25M — reminded us yet again that the real price tag for an Advanced (backyard) Range is driven by sustainment costs — said it takes one of the biggest Amplifiers (400W) on the market for a threat emitter to reach out to 150 miles ($200k) – he said his team was able to treat the emitters as UNCLAS out in the field by using ‘programming parameters’ that don’t connect to any specific real-world threat system — the wing’s Training Officer simply

		sends programming parameters to the field technician each day to load on to the emitters (which are then erased on power-down each day) -- the Luke array is only a 40x50 mile wide array/MEZ — includes 1 or 2 emitters that provide main beam capabilities — said the Luke array uses microwave transmitters — and a Raspberry Pie Interface — suggested FATR use Starlink — the range group field technicians put up a "Cluttered Site Design" using old crates, vehicles, boxes etc. that gives the F-35 pilot a difficult environment to SAR Map at 'long' range — said the WarRoom server sits inside LMOC -- said the Threat SPO does not openly support the Luke array/setup (they recommend real ARTS emitters) -- said ACC intends to fund each CAF base for up to 5 LCTEs Ver 2 NFI — 8-month lead time to order/receive LCTE Ver 2.
14 Mar 2023 Virtual	Gen (ret) Tod Wolters	Met with retired General Tod Wolters (SACEUR and EUCOM CC) on FATR. He expressed interest in the concept and supported our efforts. Agreed to discuss the concept with other Senior DOD officials. Highlighted the requirement for joint air, land, sea training opportunities.
15 Mar 2023 Naval Information Warfare Center Atlantic Charleston SC Virtual	Erik Gardner, NIWDC Atlantic Project lead, OSD EW/LVC Study	Spoke with Erik about efforts he is coordinating across the Southeastern US (refer to the previous discussion with MG Grabowski) and the Southwestern US training ranges. FATR could be an integral part in linking the two LVC training range complexes for multi-domain training.

		Erik mentioned he wants to see the MET family of systems.
17 Mar 2023 Eglin AFB FL Virtual	Dale Marks 96 TW/DV	Expressed support for the FATR Concept.
17 Mar 2023 Lakeland FL In-person	Rep Scott Franklin US Congressman Florida District 18	FATR Phase 1 Update and funding estimate discussion for Phase 2; Rep Franklin agreed to arrange meetings with w FL CODEL and Mach One Caucus to garner support on airspace proposal and set a timeline for FY2025 FATR funding
23 Mar 2023 OSD P&R OSD R&E TSMO NIWDC Atlantic In Person	Lt Col Aaron Cavazos, P&R Josh Weaver, OSD R&E Gina Tyrell, TSMO Erik Gardner, NIWDC Atlantic	Continued coordination with their team including a visit to SRC in Huntsville, AL to look at the MET family of systems. Will continue to engage with these individuals since they all occupy senior billets associated with EW training systems.
24 Mar 2023 St Augustine FL Virtual	Maj Gen Eifert, FL TAG, MG Haas, Commander, FLARG	Updated the TAG and his replacement, MG Haas on our progress. Expressed continued support for the FATR concept.
24 Mar 2023 Virtual	Col Gebo ACC/A3A	Briefed Col Gebo and his staff on MET capabilities and FATR airspace proposal; he expressed support for the FATR concept.
31 Mar 2023 Virtual	Lt Col Kyle Jansen Commander ACC TRSS Det 9	Briefed Lt Col Jansen and his staff on MET capabilities and FATR concept
3 Apr 2023 MacDill AFB FL In person	Col Adam Bingham, Commander 6th Air Refueling Wing	Col Bingham supports our FATR concept development and agreed to let his staff coordinate with us on Airspace and Spectrum support
3 Apr MacDill AFB FL On-site	Site survey Deployed Unit Complex, MacDill AFB	Met with Lt Col Ryan and Buck McLaughlin regarding existing capabilities in the Deployed Unit Complex. MacDill DUC visit discussions included: -Phase 2 office space for operation control center (OCC) for APAFR

		operations -Currently no SIPR/Link 16/SADL/ACMI/classified briefing or debriefing capes; no classified storage/SCIF -Possible location for MET system for Phase 3/spectrum cert/deconfliction with other MacDill units/Alert facility Mole/Hole -Installation Link 16 issues/6ARW -290 JCSS/comm architecture/Link 16 kit could come from ACC. Continued discussions on options for an Ops Center at Avon Park: -Phase 1B office space for operation center -SIPR - Currently no Link 16/SADL/ACMI capability -Location for MET-H during Phase 1B setup and Phase 2 testing -Draft FATR operations manual to include as a supplement to AFM13-212
3 Apr 2023 MacDill AFB FL In person	Maj Paul Martin, Commander 290th JCSS	Maj Martin agreed to assist the FATR Team with FATR Operational System Design and schematic if Florida Air National Guard provides MPA Days for the work.
3 Apr 2023 MacDill AFB FL In person	Lt Col Jerry Lavely (retired) Lobbyist for Sen Rick Scott	Agreed to facilitate KLE meetings with Sen Rick Scott and other key FL Political leaders.
5 Apr 2023 Patrick Space Wing Virtual	Col Paul Shoemaker Commander, SLD45	Col Shoemaker appreciated our briefing on FATR and directed his staff to review further correspondence from our team.
11 Apr 2023 Phone call	Michael Weglein Senior Policy Advisor to Congressman Mast FL 18th District	Good discussion on FATR with Michael from Congressman Mast's office in DC. He understands the concept and felt the Congressman would support if asked - but

		would not likely lead the effort to gain support since FATR "doesn't fall in his District". FATR team explained that the range was a state of Florida concept and he understood. He said he'd be willing to take a follow-on briefing as we approach Phase 2, and the Congressman would likely attend the next update.
11 Apr 2023 MacDill AFB FL Virtual	Maj Paul Martin Commander, 290 JCSS	Discussed FATR communication network and requested ideas on equipment, setup, and operations
14 Apr 2023 Eglin AFB FL Virtual	Col Matt Bradley, Commander, 53 WG and Kevin Burns, Chief Technology Officer	Col Bradley expressed support for concept development for the FATR and emphasized the different range requirements for Test versus Training; also pointed out the limiting factors on the NTTR and JPARC (too small). Recommended we get in touch with Devin Cate Executive Director Air National Guard, NGB and TRMC director George Rumford. Mr. Burns contacted his counterpart, Mike Contratto, in the 96th Test Wing. He confirmed the FATR team has presented sufficient details to him, Mr. Marks, and the 96th Range Group, to include XPO (airspace). Mr. Marks also related to Kevin Burns that he has a particular interest in staying current on MET threat emitter developments. 96th also understands all the airspace use challenges around GOMEX, including civil, which will probably not be trivial in this FATR endeavor.
17 Apr 2023 Virtual	Michael Corcoran, Congressman Gimenez's Military Legislative Assistant	Mike understands the concept and agrees the 'advanced training platform' here in Florida might benefit the joint force especially given the degree of difficulty associated with training against a pacing threat; he visualized potential benefits to the Congressman's home district (Homestead) while still viewing the FATR as a state of Florida concept.

19 Apr 2023 Jax FL On-site	Site Survey FACSFAC	Successful visit
27 Apr 2023 Virtual	VADM (ret) David C. Nichols Email	Corresponded via Email to brief the admiral on FATR. Offered an in-place briefing
28 Apr 2023 Phone call	Brig Gen J. Schermerhorn A3 at AFSOC	Initial contact with IMA Col Kevin Merrill USAF Mobilization Assistant to the AFSOC/A3 phone 850-884-2319/2211. Col Merrill said 'there are some compelling reasons this may be beneficial to AFSOC' as the command looks to train and integrate more in the high-end environment.
9 May 2023 Panama City FL In Person	MSG Andrew Hennessy Dept of the Army Regional Representative (DARR) FAA, Eastern Service Area, Southern Region Desk: 404 305-6918 Cell: 404 317-1045	Expressed interest in coordinating their joint, all-domain requirements and shared contact information; FATR updates to follow. CW3 Holly Denny is the Camp Landing Airspace Manager; SFC Mara Gordon works Range Operations and Airspace; CW4 Adam Denny is the Air Traffic and Airspace Manager for the Army National Guard.
11 May 2023 Virtual	Col Russ Cook, Commander 23d Wing, Moody AFB GA	Cleared the FATR team to initiate the FATR Ops Center plan at APAFR with Lt Col Ryan as the coordinating authority. His wing team is in the process of completing the gateway at Avon and purchasing the Link 16 radio needed asap. Timeline will depend on when they get the radio (typically backlogged), but the money was committed at $750k for network infrastructure this week. Col Cook passed these action items off to his replacement, Col Sheets. Lt Col Thad Ronnau is his POC for the HH-60W support to the emitter project test at Huntsville. Col Cook passed the 598 RANS Support request to Lt Col Ryan. Timing and priority will be important to their support for FATR during Phase 1B and will depend on support requirements.

24 May 2023 Virtual	Mach 1 Caucus: Congressmen Pfluger TX, Franklin FL, Garcia CA, and Stewart UT	All Members expressed support for the FATR concept, and each mentioned the need to accelerate our timeline. Pfluger and Franklin will mention FATR to Congressman Rob Wittman to get "Report Language'' drawn up for the HASC. Congressman Garcia mentioned we needed to get on at least one COCOM's Unfunded List.
24 May 2023 Phone call	Col M. Bradley, Commander 53rd Wing, Eglin AFB FL	Col Bradley offered insight into the Test Range upgrades needed in the Gulf of Mexico Ranges. Expressed continued support for FATR.
30 May 2023 Virtual	Col Tony Alexander IMA to AFSOC A-3	Discussed FATR with his EA and will schedule full discussion with the next A-3.
5 Jun 2023 Virtual	Lt Col Alex Esson, Luke AFB Weapons officer; follow-up discussions	Lt Col Esson offered a copy of their Range Coordination Sheet including these steps: 1. their IPs fill out to request for services they need on each mission. It is updated in real time by referencing links on the range SharePoint for which emitters are operational and their locations (they move often). There are different tabs at the bottom for various LFE missions. That generates a coord sheet and emails it to players in the range management office. If the planners have a SAM-1 then we pass directions to him at the brief, if we don't then we put Zulu start times or range based DLOs in the remarks of each emitter. 2. For operations, their emitter procedures are a little different than at other bases. We have our range contractors start the threats up and make sure they are functional, but then they hand over operational control of the emitters to SAM-1. SAM-1 is either a retired fighter pilot on a side contract, or if we don't have enough of them available then an IP at Luke. They use the AF Program of Record called War Room as their interface mechanism. It has

		a function in it called eSAM-1 where you select an emitter and activate, track, and guide beams as appropriate relative to a TSPI source provided by the aircraft. For the actual flight operation, they use wing classified standards. 3. For squadron scheduling, schedulers 'buy' the airspace 3 weeks out in a standard range war fashion. Then if you own the airspace, you get all the emitters and services in that airspace that are available on a given day.
9 Jun 2023 Clearwater FL Virtual	Rep Gus Bilirakis, FL District 12	FATR team briefed the congressman, and he expressed support for our concept and offered to connect us to Senators Rubio and Scott.
12 Jun 2023 Norfolk VA Virtual	RADM John Meier CNAL	Updated Phase 1A and requested support in Phase 1B from FACSFAC JAX, PRC and CSG4. He was pleased with our progress and offered his command's support for Phase 1B.
13 Jun 2023 Miami FL In person	Rep Carlos Gimenez, FL District 28	Provided the FATR concept briefing. He offered his full support for the project and asked for follow on meetings to discuss how he could provide specific support requirements in the next phases.
29 Jun 2023 Langley AFB VA Virtual	Lt Gen Russ Mack, Deputy Commander, ACC	Updated Phase 1A and requested support in Phase 1B from ACC. He was pleased with our progress and offered his command's full support for Phase 1B. He will arrange a meeting in mid to late August with him, his new A-3 and Deputy A-3, plus the new A-5/8/9 and ACC Chief Scientist. Suggested we also brief his replacement (current 15AF CC) and the deputy HAF/A-3 who is the Executive Agent for FAA coordination. Also suggested we brief USAF Air Warfare Center Commander when possible for synergies with current WSINT training done on the West Coast with US Navy.

List of References (references are included as separate documents)________________

Reference 1. The Roosevelt Group Report, *From the sea floor to outer space: The value of Florida Ranges to existing and future military missions,* Spring 2022

Florida Range Report Spring 2022.pdf

Reference 2. Avon Park Air Force Range AFM 13-212, August 2021

AFM13-212_APAFR Supp_13 Aug 21.pdf

Reference 3. Pinecastle Range Complex Handbook, 2/1/22 REV 8.0

PINECASTLE RANGE COMPLEX HANDBOOK REV 8.0.pdf