

PURPOSE

Eglin Air Force Base (AFB), Florida, uses a large portion of the eastern Gulf of Mexico for military missions. This overwater range – known as the Eglin Gulf Test and Training Range (EGTTR) – is vital for testing the next generation of air armaments. Historically, missions in the EGTTR have been concentrated in areas closest to Eglin AFB. However, missions are being pushed farther from land into the southwestern portions of the EGTTR due to congestion, longer flight paths, and larger safety footprints.

The EGTTR must be configured to provide a fully instrumented capability for future test missions, which will expand the Air Force's ability to test large-footprint munitions, reduce the likelihood of encroachment, and increase mission throughput.

The 96th Test Wing Plans and Programs office (96 TW/XP) has been tasked to explore the full range of options for instrumenting the entire EGTTR. The *EGTTR Maximization Study* documents future mission requirements, discusses possible solution sets for range instrumentation, and recommends investments that will maximize the utilization of the EGTTR.

SCOPE

The weapons that drive the need to expand EGTTR instrumentation coverage are grouped into three categories: air-to-surface, air-to-air, and surface-launched. Their requirements were consolidated to determine the overall requirement drivers for operations in the EGTTR.

WEAPONS

Air-to-Surface

- JDAM/JDAM-ER
- Quickstrike-J/-ER
- MALD
- JASSM/JASSM-ER
- HCSW
- ARRW
- HPM
- SiAW
- Golden Horde
- HSSW
- LRSO

Air-to-Air

- JATM
- Directed Energy
- SHIELD
- Air-to-Air OT&E
- Air-to-Air DT&E

Surface-Launched

- AEGIS/SM-2
- SM-6
- Tomahawk
- Naval Railgun

KEY REQUIREMENT DRIVERS

- Altitude of the Test Item
- Footprint Size
- Quantity/Swarm
- Security
- Flight Termination System
- Telemetry
- Time-Space-Position Information
- Spectrum
- Item Recovery
- Targets
- Boat Traffic/Air Traffic
- Terminal Parameters
- Communications Support
- Air Support

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An F-16C fires an AIM-120 Missile in the EGTTR



B-52 Carrying a Prototype of the AGM-183A ARRW Hypersonic Weapon



Eglin AFB's Gulf Range Armament Test Vessel (GRATV) deployed in the EGTTR



JDAM released from an F-35 during Combat Hammer

EGTTR Max

Eglin Gulf Test & Training Range Maximization Study

Eglin Air Force Base, Florida

July 2020

A study of future mission requirements for the EGTTR, and recommended solutions for maximizing the use of the range.



SOLUTION SETS

Various courses of action were studied to determine if they could achieve the key requirement drivers. The 96 TW/XP team explored the full range of possible solutions, even those that included high costs or incorporated technology that was not yet mature. The following methods could be implemented to maximize instrumentation coverage in the EGTR:

Manned Aircraft: Range support aircraft (RSAs) would provide an agile method for extending instrumentation coverage over-the-horizon and deep into the EGTR.

Unmanned Aerial Vehicle (UAV): A swarm of networked medium-sized UAVs or a single large UAV could function similarly to a RSA.

Lighter-than-Air: Instrumentation coverage could be extended through the use of aerostats, airships, blimps, or stratospheric balloons.

Maritime Solutions: Test data could be captured by a vessel in the Gulf of Mexico. Examples include specialized DoD ships with range instrumentation, or static assets like a platform, buoy, or oil rig. Data would be relayed back to Eglin AFB via underwater fiber optic lines.

Satellite Communications: In this course of action, only satellites would be used for relaying data during a test event. A transceiver would need to be installed on each munition under test, and that would be the sole method of sending data between the test item and the mission controllers at Eglin AFB.

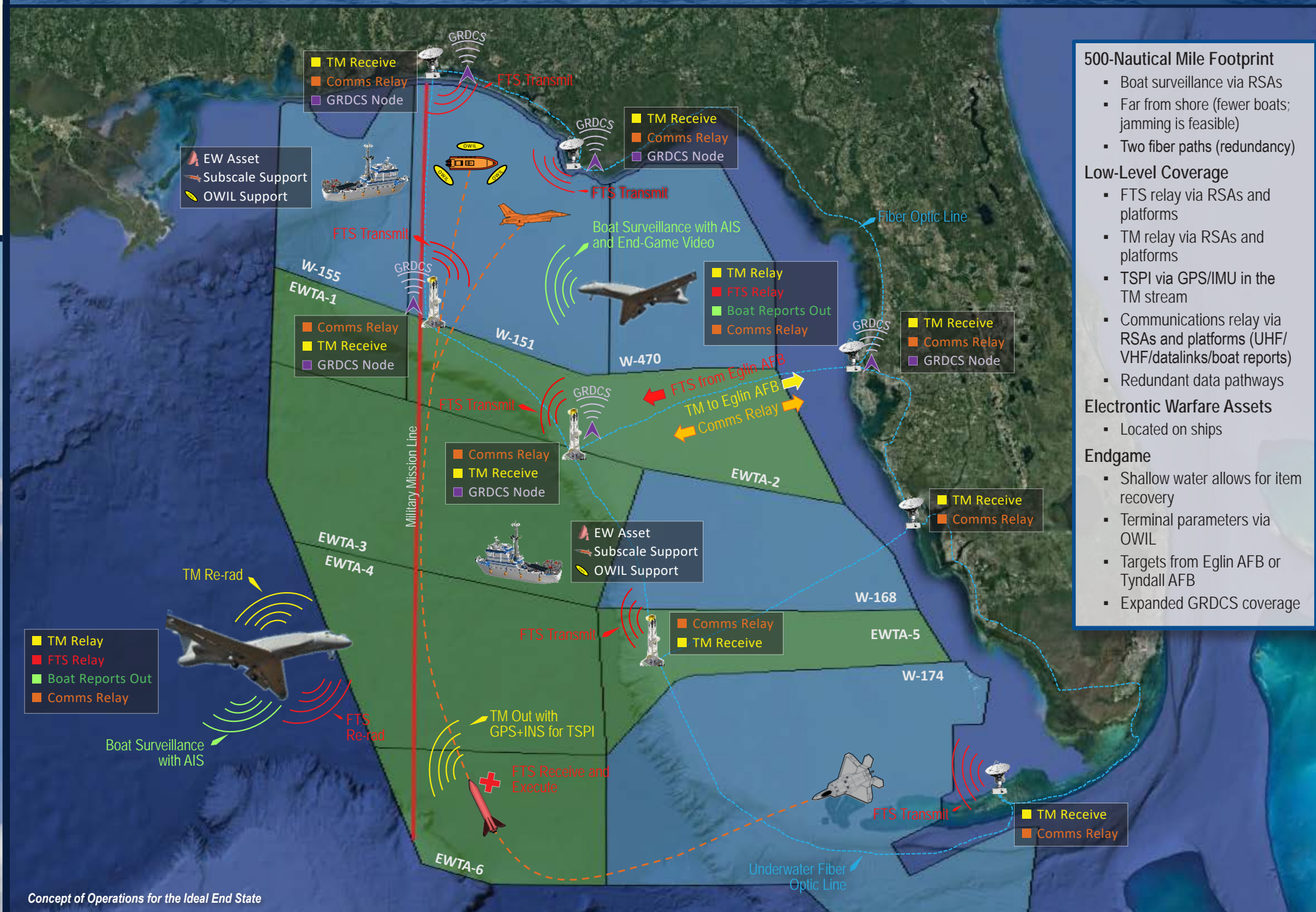
IDEAL END STATE

After evaluating the courses of action, it was determined that no single solution meets all of the requirements (i.e., there is no "silver bullet"). Maximizing the utilization of the EGTR for testing next-generation munitions will require a system-of-systems:

- Two RSAs: The use of RSAs is the solution set with the highest flexibility, technological readiness, and mission throughput. Replacing the two legacy E-9s with improved RSAs would address the 96th Test Wing's and the 53d Weapon Evaluation Group's need for over-the-horizon instrumentation coverage.
- Unmanned platforms connected to underwater fiber:** The platforms would be an additional method of data capture and relay. They would extend the coverage area for aerial targets, and the platforms could also host electronic warfare assets.
- Boats for range support tasks:** Manned support boats will be required to recover subscale drones, accompany unmanned target boats, refuel generators on the remote platforms, complete marine mammal surveys, etc.
- Procedural changes:** The *EGTR Maximization Study* also describes procedural changes that should be enacted to improve Eglin AFB's capability to test weapons in the farthest areas of the EGTR.

SUMMARY OF FUTURE MISSION REQUIREMENTS

Footprint size	Flight paths of 500+ nautical miles.	Spectrum	Need to test in GPS-jammed environment. Need to be able to do wide-band jamming. Want threat emitters and electronic warfare assets.
Flight Altitude	Down to 50 feet. Above 50,000 feet. Above the National Airspace System if hypersonic.	Recovery of Test Item	Ability to endgame in shallow water.
Quantity	Multi-object tracking and TM streams for a swarm.	Safety	Need to be able to locate non-participating boats, or go far offshore where no boats are present.
FTS Coverage	To bottom of EWTA-4 within the latency limits.	Deployability	Maritime and/or air support assets need to be able to reach test areas and operate in typical EGTR weather conditions (e.g. winds, currents, sea states).
TM Coverage	Over full flight-path; 30 Mb/s; multiple streams; to the surface at endgame.	Communications Support	Relay of UHF/VHF for voice communications and datalinks.
TSPI	Desire for TSPI from GPS/IMU via the TM stream in lieu of radar track.		
Targets	Launch and C2 for subscale and full-scale aerial targets. Launch and C2 of maritime targets.		



Concept of Operations for the Ideal End State

500-Nautical Mile Footprint

- Boat surveillance via RSAs
- Far from shore (fewer boats; jamming is feasible)
- Two fiber paths (redundancy)

Low-Level Coverage

- FTS relay via RSAs and platforms
- TM relay via RSAs and platforms
- TSPI via GPS/IMU in the TM stream
- Communications relay via RSAs and platforms (UHF/VHF/datalinks/boat reports)
- Redundant data pathways

Electronic Warfare Assets

- Located on ships

Endgame

- Shallow water allows for item recovery
- Terminal parameters via OWIL
- Targets from Eglin AFB or Tyndall AFB
- Expanded GRDCS coverage