

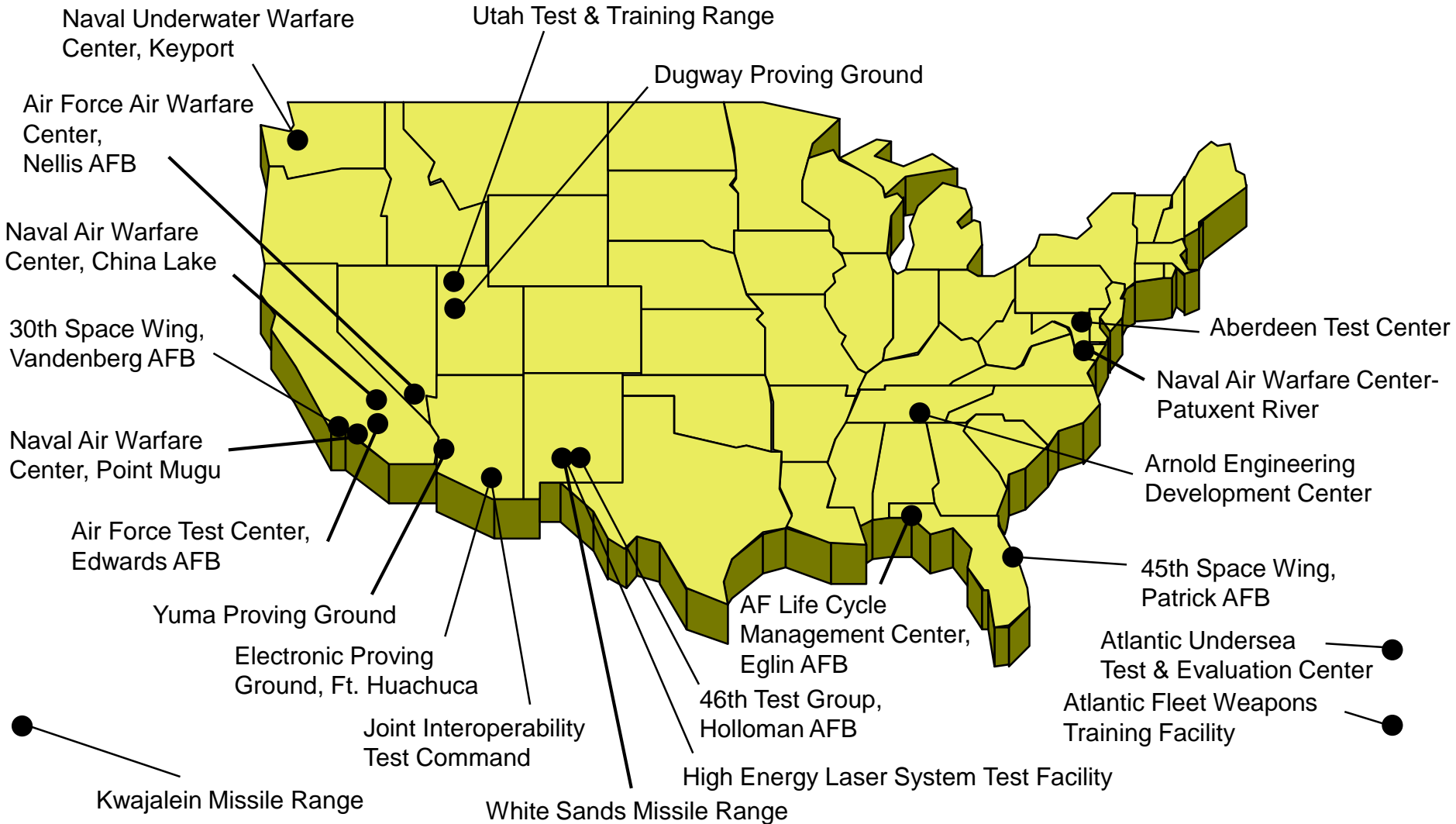


The State of Multi-Range Test and Training Technology

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Major Ranges & Test Facilities



DoD Test and Training Ranges

- **Historic operation as independent units**
 - e.g., NTTR, UTTR, AFTC (AFFTC), NAWC-WD
- **Test and training missions increasingly require concurrent access and support across multiple ranges**
- **Increasing trend...**
 - from simple accommodation between ranges
 - to seamless integration of the multi-range complex to act as a single larger range

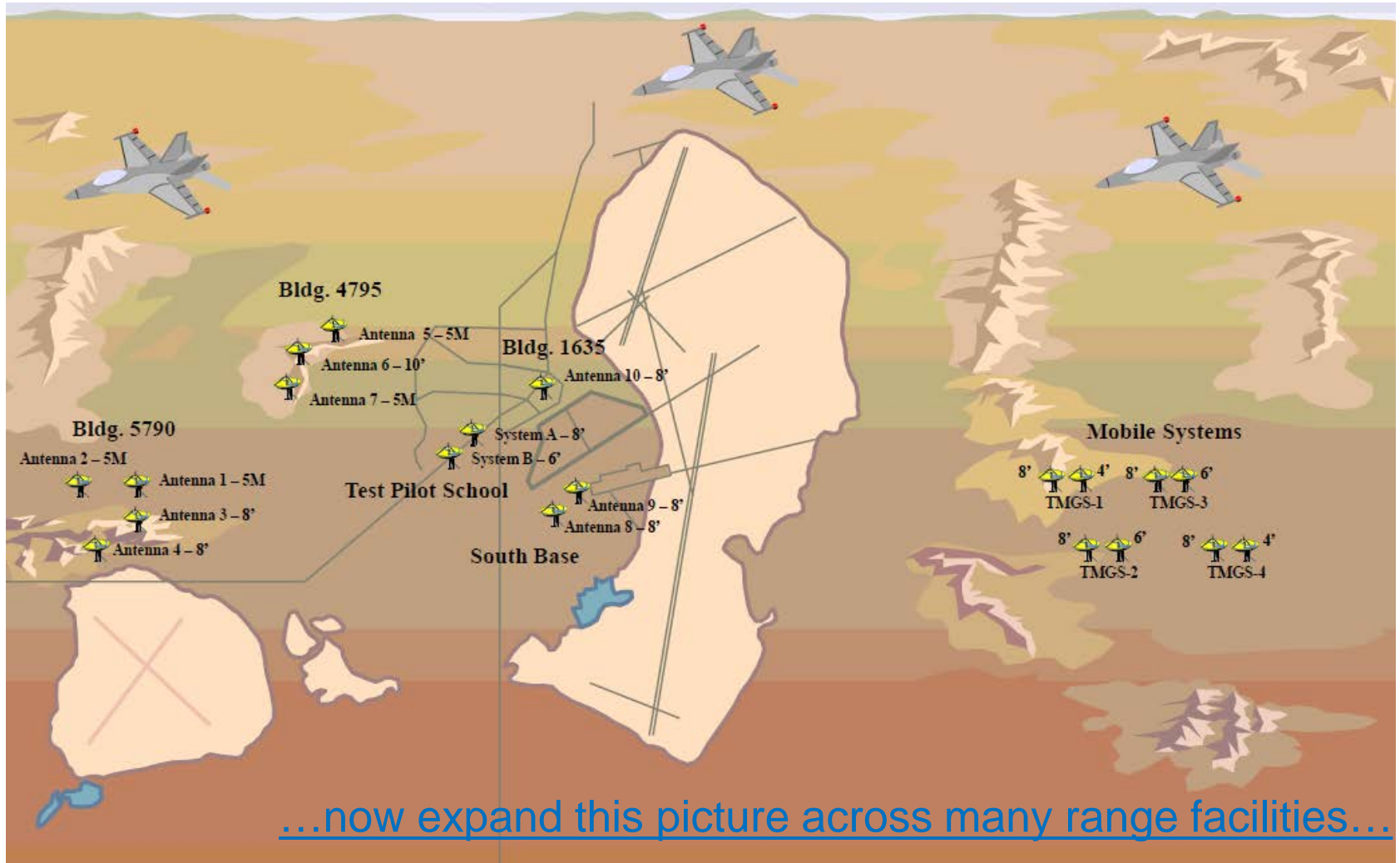
Test Infrastructure Paradigm

- Tests are not simply initiated at one range and executed at another
- Tests involve assets from multiple ranges
- Simultaneous test execution
- Distributed command and control
- Resulting test infrastructure requirements for cross-range and inter-range:
 - Interoperability ...always
 - Compatibility ...often
 - Commonality ...sometimes

Technology Arenas (example)

- **Telemetry**
 - **Test Article Equipment**
 - Data Acquisition, Encryption, Recording, Transmission
 - Antenna Type, Location, Configuration
 - **Frequency and Modulation**
 - **Ground Stations**
 - **Signal Tracking and Analysis**
 - **Data Transport**
 - **Mission Control**

EAFB TM Ground Stations...



Technology Arenas

- **Telemetry**
- **Test Article Tracking Systems**
- **RF Monitoring**
- **Flight Termination**
- **Communications**
- **Time-Space Position Information**
- **and more**

Non-technology Issues

- **Close cooperation in:**
 - Test Management (multi-range ConOps)
 - Cybersecurity
 - Frequency Management
 - Scheduling, Prioritization, and De-confliction
 - Funding and Billing
 - Security and Safety
- **Varying enterprise perspectives & working groups**
 - AFTC Enterprise
 - J-Tech Enterprise
 - Southwest Range Alliance
 - Range Commanders Council

Some Key Technology Enablers

- **Spectrum Relocation Fund projects**
 - expanding airborne telemetry capabilities while ensuring increased compatibility and commonality
- **Inter-range communications projects**
 - faster, higher-throughput data pipes
- **Test and Training Enabling Architecture (TENA) and Joint Mission Environment Test Capability (JMETC)**
 - interoperability of range systems and facilities

Conclusion

- **Technological and organizational infrastructure elements**
 - Key organizational enablers?
- **Current state must be well understood**
- **Identify technical gaps in multi-range test and training capabilities**
- **Identify institutional impediments to multi-range test and training objective**
- **Chart a course that will ensure optimal support of future warfighter needs**