

# *Headquarters Air Combat Command*

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## *ACC Directed Energy Activities*



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**ACC/A5/8ZW**

**This Briefing is:**  
**UNCLASSIFIED**

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# USAF Strategic Master Plan

## Priorities

- Develop capabilities to ensure freedom of action for the joint force
- Leverage and integrate new approaches, technologies and capabilities
- Deliver more effects at range
- Increase resiliency when presence within the battlespace is required
- Retain the ability to operate across the full spectrum of operations



***Directed Energy (DE) is a “game-changing” technology***

***Joint collaboration in technology development and maturation is necessary to move Directed Energy out of the Labs into Operations***



# Why is DE important to ACC?

Directed Energy Weapons (DEW) have the potential to enable our Airmen to effectively, affordably, and rapidly defeat massed attacks from an adversary and to precisely strike critical targets with little/no collateral impacts or detectable disturbance and provide protection to assets that must operate in harm's way.



- Lethality: Defeat enemy's ability to F2T2EA & use offensively against adversary threats
- Persistence: Rechargeable weapons allow greater station time & magazine depth
- Asymmetric weapons with low/no collateral damage
- Defensive Capability: Keep threats outside of damage zone

Though there are no formal ACC requirements for DEW, we continue to support efforts to develop/mature technologies that address capability gaps and solve warfighting problems



# ACC Support to DEW Flight Plan

ACC supports efforts to operationalize DEW across the enterprise in order to complement kinetic weapons and deliver key battlefield, and other operational environments, effects against adversary forces and technologies



United States Air Force  
Directed Energy Weapons  
Flight Plan  
April 2017

Signed by SECAF and CSAF  
22 May 2017

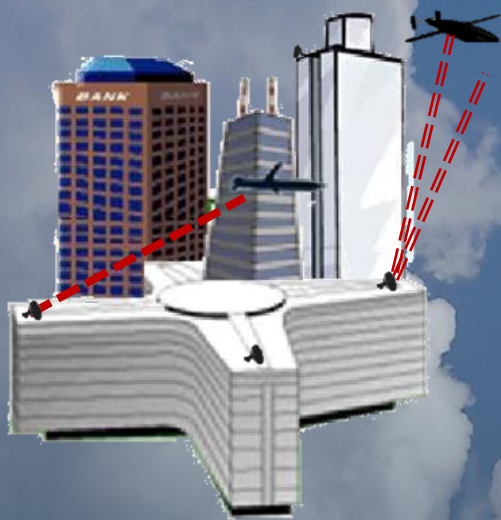
## 3 Operational Use Cases

- Forward Airbase Defense
- Precision Strike
- Aircraft Self Protect



# Forward Airbase Defense

Forward bases and operating locations for the USAF can no longer be considered sanctuaries. From an AF doctrinal perspective, protection of these locations from attack through the air is included under Defensive Counter Air.



## Key Threats

- UASs
- RAMs (Rockets, Artillery, and Mortars)
- Cruise Missiles
- Ballistic Missiles

## Key Enabling Technologies

- High Energy Lasers (HELs)
- High Powered Microwaves (HPMs)



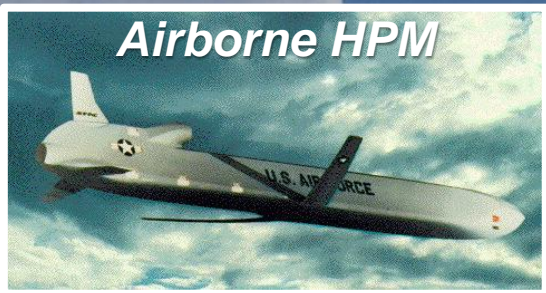
The 2016 Hybrid Defense of Restricted Airspace (HyDRA) study enabled scenario and CONOPs development to inform military utility assessments of both systems for area and point defense.



# Precision Strike

The ability to hold targets at risk while limiting collateral damage and/or impacts to the civilian populace, as well as mitigating reconstruction costs once hostilities cease, is a capability that affords our leaders greater flexibility

*Airborne HPM*



*Gunship HEL*



## HPM

- Mission Evaluation of Next Airborne Counter Electronics (MENACE)
  - Military Utility study to assess kinetic vs. non-kinetic tradespace
- High Power Joint Electromagnetic Non-Kinetic Strike (HIJENKS)
  - Joint AF-Navy prgm to develop a multi-mission, multi-tgt weapon; aiming f/ flight test in FY22

## HEL

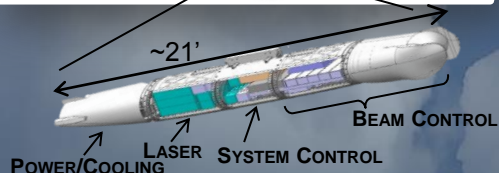
- Assessing limitations against target sets
- CONOPs for kinetic/HEL employment balance



# Aircraft Self Protect

Environments within which we operate are becoming increasingly contested and our ability to protect our platforms and Airmen operating there is vitally important.

ACC supports efforts to advance DE solutions with the potential to provide rechargeable, deep-magazine protection capabilities against advanced threats.



## Self Protect High Energy Laser Demonstrator (SHIELD) ATD

- Demos a rechargeable HEL in a relevant fighter environment to defeat relevant missile threats
- Reduce/retire risk, meet/resolve tech challenges of power-scaling, beam qual, thermal mgmt, and packaging
- Feeds parallel efforts to improve LWS capes f/ future fighter/bomber & HVAA protect
- Provides off-ramp capabilities as LWS matures

## Laser Subsystem Development (LSD)

- AFRL/DARPA funded effort to dev 150kW laser
- Compact subsystem form fit to SHIELD pod
- Advances fiber laser tech to support ruggedized laser
- Enables off-ramps for ftr, tanker, HVAA, gunship prototypes
- Compliments AMC's Laser Weapon System (LWS) effort



# A history of successful DE weapons systems demonstrations



1984: Airborne Laser Lab



1990 – Present:  
laser system research



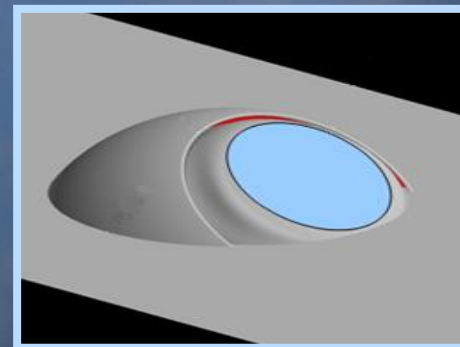
Fiber lasers



Active Denial System



MAX POWER IED Defeat System



Advanced Beam  
Control Turret



# ***DE Challenges (Opportunities)***

- Technology challenges
  - SWaP-C
  - Integrated power & thermal management
  - Beam control advances to enable precise aiming/tracking/pointing amidst aero-mechanical jitter induced by vibrations during flight
  - High-speed aerodynamic flow mitigation to avoid aero-optical disturbances
- DEWs will not replace kinetic systems
  - LWS are not all-Wx; predictability of HPM effects TBD
  - Should be used to compliment Kinetic systems
  - Joint Munitions Effectiveness Manual (JMEM)
- Training/Testing
- DoD Roadmap
- Counter-DEW
  - Adversary investments to counter



# Final Thoughts

*“To ensure our nation continues to have the ability to strike anytime and anywhere, we must continue to blend stealth technologies and new technologies like...directed-energy weapons that can operate across domains.” - Gen Welsh*

*“Our sensor and C2 packages are getting better. We just need to enhance the technology which provides us with the low-cost, high-magazine and high-accuracy systems to go along with the sensor grid...Directed Energy Weapons are clearly part of the transition.” - Gen Carlisle*

*“The battlefield is changing, the character of war is changing. We need to be able to think about how we will use these systems on new battlefield and new paradigms. And we need help with industry to be able to move forward and take the ideas that make all these things possible and find ways to do them faster and sooner.” - Gen Holmes*

- DE has significant senior leader attention
- Now is the time to move out on DEW initiatives
- Warfighter input throughout the process is critical

# *Headquarters Air Combat Command*

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## *Questions?*



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## INTERESTED IN ATTENDING?

Future weapons, including directed energy weapons have been in the Research & Development phase for the past several years. As the US armed forces, continue to develop and innovate in order to achieve battlefield overmatch and superiority, the Directed Energy weapon systems are making their way from the R&D phase to DoD and Military programs as the next step before acquisition and force integration.

Over the three-day summit we will examine the latest DE advancements, initiatives and plans regarding technology, acquisition and service roadmaps. This event will bring together thought leaders, acquisition executives, industry solution providers, and academia in order to tackle some of the challenges that face this community in the near, mid, and far term fight. We will look to gain insight and lessons learned from warfighter perspectives on the operational challenges and requirements of DES that will influence the capabilities of this game-changing technology.

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