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Lasers For Force Protection

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for
Full Dimensional Protection

REPORT DOCUMENTATION PAGE

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The Big Protection Issues

- **Countering Weapons of Mass Destruction**
- **Countering Air and Missile Threats**
- **Countering Terrorism**
- **Combat Identification**



Elements Of Full Dimensional Protection

Ref: Concept for Future Joint Operations May 1997

1. Control of the battlespace
 - 3.2 **Full range of offensive and defensive actions**
 - 3.2.1 Joint counter air & missile
 - 3.2.2 Information Operations
 - 3.2.3 Manned and Unmanned Platforms
 - 3.2.4 Sensor grid
 - 3.3 **Passive protection**
 - 3.3.1 Awareness of threat
 - 3.3.2 Enhance Deception and Camouflage
 - 3.3.3 Increased personal protection
 - 3.3.4 Dispersed operations
 - 3.3.5 Improved electronic countermeasures
 - 3.3.6 Joint restoration from WMD
 - 3.3.7 New sensors to detect WMD
- 1.1 **Protect from a full range of threats**
 - 1.1.1 Attacks where we are vulnerable
 - 1.1.2 Attacks in our rear areas
 - 1.1.3 Disruption of strategic Comm
 - 1.1.4 Attacks on Host Nation Support
 - 1.1.5 Coercion of partners
 - 1.1.6 Terrorist attacks
2. Information Superiority
 - 2.1 **See the battlespace**
 - 2.2 **Discriminate friend and foe**
 - 2.3 **Anticipate and control enemy action**
 - 2.4 **Disseminate threat Information**
 - 2.5 **Protect Information systems**
 - 2.6 **Deny adversary information systems**
 - 3.4.1 Active and passive protection
 - 3.4.2 ID and track friendly vulnerabilities
 - 3.4.3 Discriminate friend and foe
 - 3.4.4 Safety and health initiatives
3. Multilayered Protection
 - 3.1 **Broad range of threats**



Advantages of LASERS

- **Power**
- **Speed of Light**
- **Coherence**
- **Short Wavelength**
 - LWIR to X-RAY
- **Wavelength Selectability**
- **Modulation Options**
 - Time Domain, Frequency Domain, Phase, Polarization
 - High Bandwidth
- **Detector Options**
 - Imaging, Modulation Specific
- **Compact**



Example Applications Weapons

- Theater High Energy Laser (THEL)
- Airborne Laser

X Power	
X Speed of Light	
Coherence	
Short Wavelength	
Wavelength Selectability	
Modulation Options	
High Bandwidth	
Detector Options	
Compact	



Example Applications Sensors for Counter WMD

- **Detect Gas, Aerosol or Particulate Clouds**
- **Identify Chemicals or Biologicals**

Power	
Speed of Light	
Coherence	
X Short Wavelength	
X Wavelength Selectability	
X Modulation Options	
X High Bandwidth	
X Detector Options	
X Compact	



Example Applications Combat ID

•Precision Targeting Identification (PTI)

	Power
	Speed of Light
X	Coherence
	Short Wavelength
	Wavelength Selectability
X	Modulation Options
X	High Bandwidth
X	Detector Options
X	Compact



Lasers In ACTDs

(ACTD Web Site www.acq.osd.mil/at)

- **Theater High Energy LASER (THEL ACTD)**
 - Destroy Katyusha Style Rockets
- **Precision Targeting Identification (PTI ACTD)**
 - Micro Doppler Signatures
 - Precision Track
- **Unattended Ground Sensors (UGS ACTD)**
 - Ceilometer to Measure Cloud Height
- **Rapid Force Protection Initiative (RFPI ACTD)**
 - Forward Observer/Forward Air Control (FO/FAC)
 - Hunter Sensor Suite (Range Measurement)
 - Remote Sentry (Range Measurement)
- **Military Operations in Urban Terrain (MOUT ACTD)**
 - Forward Observer/Forward Air Control (FO/FAC)



Precision Targeting Identification (PTI)

FY98 ACTD

MISSION:

- Detect, Track, Identify Non-Cooperative Air, Land and Sea Targets
- Demonstrate Capability Aboard JIATFE Counter Drug P-3 aircraft

PERFORMANCE Requirement:

- Detect, Track, and ID
 - Aircraft to 35 NM, Ships to 30 NM, Ground Targets to 12 NM Passively
- Day/night Operations Vs. Small, Fast, Non-Metallic Hulled Vessels

TECHNOLOGIES:

- 3RD Gen MWIR Staring FLIR with a 4X Increase in Range
- Navy Developed Stand Off Electro-optical System
- Infrared LADAR system
 - Precise 3D Track
- Non-Cooperative Target Identification (Vibration Signature Analysis)
- Developed under Navy Combat ID Sponsored 6.3 Program
- Shipboard and Airborne Sensor Packages Developed Under
 - USN Radiant Mist and Outlaw Programs



Unattended Ground Sensor

FY 98 ACTD

- **Unattended MASINT Sensors**
 - Find and Identify Time Critical Targets
- **Remote Miniature Weather Station (RMWS)**
 - USSOCOM Requirement
 - Local “NOW” Weather (Temperature, Wind, Visibility, etc)
 - Ceiling Height Requirements
 - » +/- 10 ft below 1500 ft and +/-100 ft above to 12000ft
 - » Air Deployable (3000Gs impact)
 - » All Weather operation
 - » Satellite Readout
 - Ceilometer Design
 - » LASER Trans: 16mm Aperture, 20mJ-5ns Pulses, 1.06 μ m Freq
 - » Laser Receiver: 50 mm Aperture
 - » Total System weight 14 lb.



Some Needs

- **See Through Obscurants: Fog, Smoke**
 - Range Gating
- **Recognize Man Made Objects**
 - Polarization
- **Identify Objects**
 - Range Profiles, Other
- **Auto Land in Category 3 Weather and Obscurants**
 - Forward Scatter
- **Penetrate Foliage and Camouflage**
 - Exploit Multiple Small Openings
- **See and Communicate Inside of Buildings**
 - ?
- **Sterilize Chemicals or Biologicals**
 - Speculative !



Some Requirements

- **Cost Effective**
 - 80% solutions
- **Safe**
- **Rugged**
- **Minimal Skills Required for Operation**
- **Maintainable**
- **If Man Portable**
 - Small
 - Simple
 - Light Weight
 - Low Power Needs
 - Low Signature