

UNCLASSIFIED

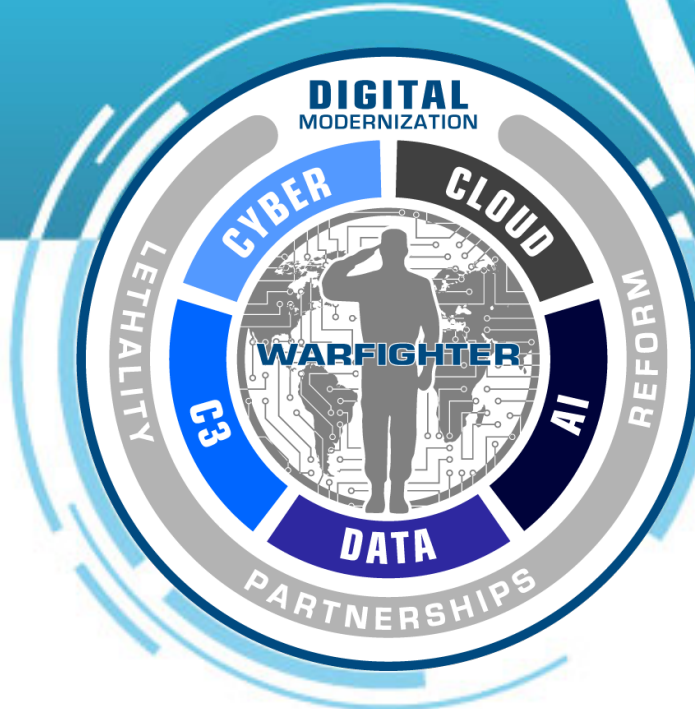


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For Open Publication

Jul 06, 2021

Department of Defense  
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

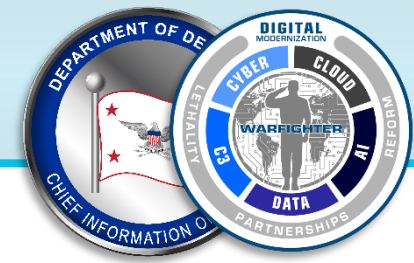
SLIDES ONLY  
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# 3.45 GHz Auction Workshop

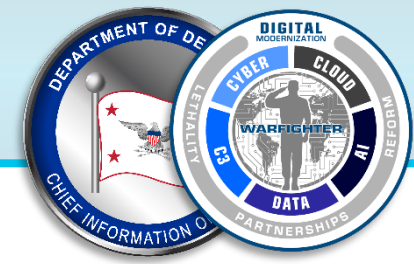
July 12, 2021

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# Agenda

- Welcome and Introductions
- Trusted Agent Process for Sharing Sensitive Information
- DoD Systems Overview
- Regulatory Overview
- Coordination Overview
- Analysis Methodology
- DoD Workbook Overview
- National Emergency
- Federally Authorized Contractor Test Sites

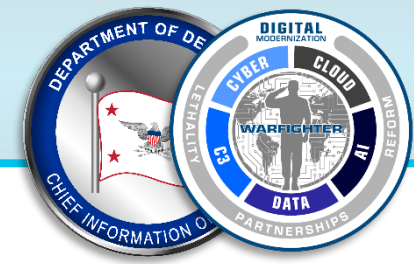


# Welcome

Ms. Vernita Harris

Department of Defense Office of the Chief Information Officer

Spectrum Policy and Programs, Director

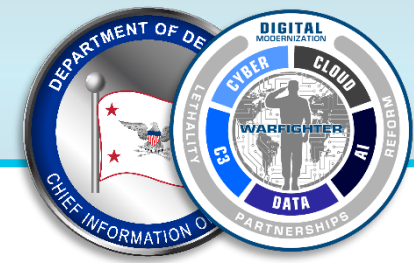


# Welcome

Mr. Charles Cooper

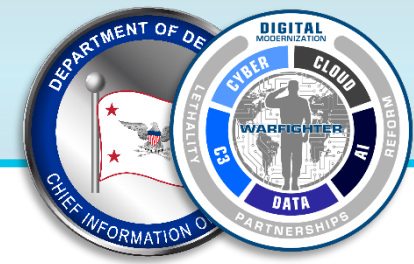
Department of Commerce, National Telecommunications and Information Administration

Office of Spectrum Management, Associate Administrator

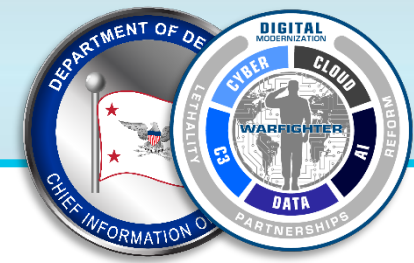


# Questions

- DoD will be providing written responses to all questions
- Responses will be posted on NTIA's website and available to all potential bidders
- At the conclusion of this briefing, DoD will lead a dialog to clarify and refine questions for future written response

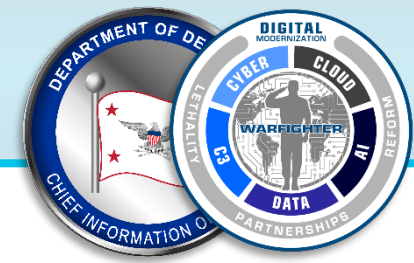


# Trusted Agent Process for Sharing Sensitive Information



# Trusted Agent

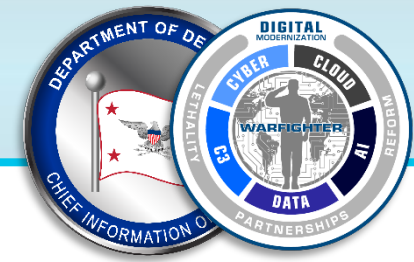
- Much of the information about DoD's systems and operations in the 3.45 GHz band is considered Controlled Unclassified Information (CUI) and cannot be publicly released for national security reasons
- DoD has partnered with the Department of Homeland Security's (DHS) Cybersecurity and Infrastructure Security Agency's (CISA) National Coordinating Center for Communications (NCC) to share sensitive information
- NCC has already distributed DoD's CUI information to its members
  - Un-redacted transition plans
  - Anticipated power level curves for high powered radar sites
- If not already a member, please contact NCC at [NCC@cisa.dhs.gov](mailto:NCC@cisa.dhs.gov) to join



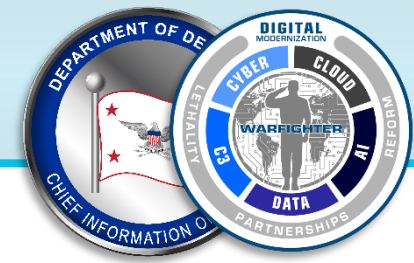
# CUI Handling Reminders

- Only authorized individuals are allowed to view CUI information
- During working hours, steps must be taken to minimize the risk of access by unauthorized personnel, such as not reading, discussing, or leaving CUI information unattended where unauthorized personnel are present
- After working hours, CUI information must be stored in locked desks, file cabinets, bookcases, locked rooms, or similarly secured areas
- CUI information may be transmitted electronically (e.g., data, website, or e-mail), via approved secure communications systems or systems utilizing other protective measures such as Public Key Infrastructure or transport layer security (e.g., https). Avoid wireless telephone transmission of CUI when other options are available
- Further details are included in DoD Instruction 5200.48 – Controlled Unclassified Information  
(<https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/520048p.PDF>)



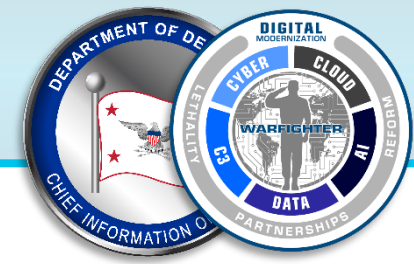


# DoD Systems Overview



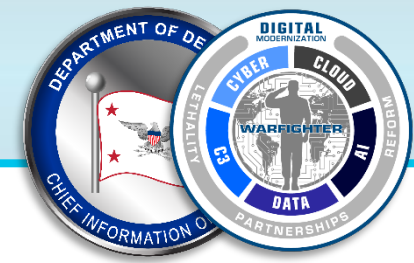
# DoD Operations Overview

- DoD utilizes the 3.45 GHz band for radar operations along with testing and training activities
- DoD operates five major types of systems in this band—
  - Army ground-based radar
  - U.S. Marine Corps (USMC) ground-based radar
  - Air Force airborne radar
  - Navy shipboard radar
  - Testing and training infrastructure and activities
- DoD CONUS radar operations include testing and training plus homeland defense operations



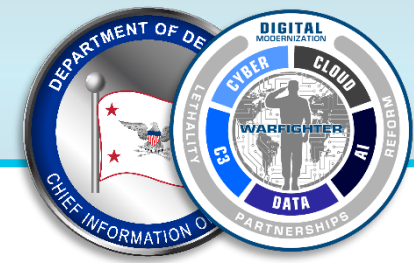
# DoD Systems

- Army and USMC ground-based radars
  - Three-dimensional air search and surveillance radar systems to provide accurate information on artillery or rockets and their launch sites
  - Detect airborne objects, and measure target altitude, range, and bearing
  - Some of the airborne targets are small and some targets are detected at ranges as great as 300 nautical miles
  - Utilized for testing, system calibration, and training domestically in addition to select operational missions
- Air Force airborne radar
  - Enhances flight safety and facilitates the formation flight of cargo aircraft
  - Formations can range in size from two-aircraft element to multi-element formations
  - Utilized for high-tempo training operations domestically
  - System is expected to vacate the 3.45 GHz band in 2034



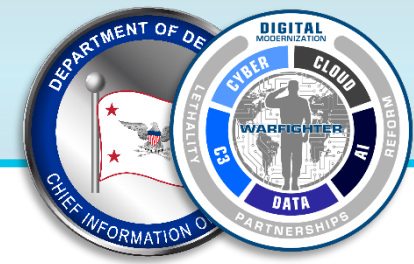
# DoD Systems Con't

- Navy shipboard radar
  - Operates along the coasts, as well as on the high seas, for three-dimensional air search and surveillance to provide accurate information on aircraft and missiles
  - High-powered radar systems detect airborne objects, and measure target altitude, range, and bearing
  - Some of the airborne targets are small and some targets are detected at ranges as great as 300 nautical miles
  - Also operates in ports, shipyards, and land-based test sites for testing, system calibration, and measurement activities
- Testing and training infrastructure and activities
  - Critical test locations to meet a variety of developmental and operational testing requirements across all DoD platforms
  - Electronic Warfare (EW) development, testing, and training activities

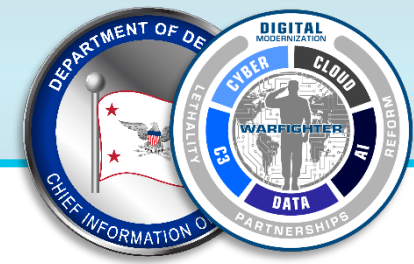


# Sources of Further Information

- NTIA Letter to FCC, September 8, 2020  
([https://www.ntia.doc.gov/files/ntia/publications/ntia-osm\\_letter\\_to\\_fcc-oetwtb\\_re\\_3450-3550\\_mhz\\_fnprm\\_9-8-20.pdf](https://www.ntia.doc.gov/files/ntia/publications/ntia-osm_letter_to_fcc-oetwtb_re_3450-3550_mhz_fnprm_9-8-20.pdf))
- Feasibility of Commercial Wireless Services Sharing with Federal Operations in the 3100-3550 MHz Band, Department of Commerce, July 2020  
([https://www.ntia.doc.gov/files/ntia/publications/ntia\\_3100-3550\\_mhz\\_mobile\\_now\\_report\\_to\\_congress.pdf](https://www.ntia.doc.gov/files/ntia/publications/ntia_3100-3550_mhz_mobile_now_report_to_congress.pdf))
- ITU-R Recommendation M.1465-3 (<https://www.itu.int/rec/R-REC-M.1465-3-201801-I/en>)
- Federal Government Spectrum Use Reports  
([https://www.ntia.doc.gov/files/ntia/publications/compendium/3300.00-3500.00\\_01DEC15.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/3300.00-3500.00_01DEC15.pdf) and  
[https://www.ntia.doc.gov/files/ntia/publications/compendium/3500.00-3650.00\\_01DEC15.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/3500.00-3650.00_01DEC15.pdf))



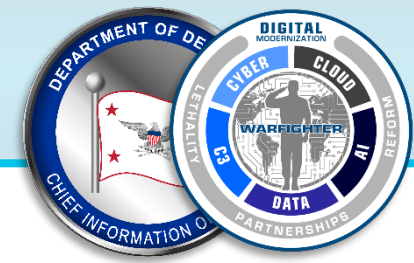
# Regulatory Overview



# Footnote US431B

- Cooperative Planning Areas (CPAs)
  - Geographic locations in which non-Federal operations shall coordinate with Federal systems in the band to deploy non-Federal operations in a manner that shall not cause harmful interference to Federal systems operating in the band
  - Operators of non-Federal stations may be required to modify their operations to protect Federal operations against harmful interference and to avoid, where possible, interference and potential damage to the non-Federal operators' systems
  - Non-Federal operations may not claim interference protection from Federal systems
- Periodic Use Areas (PUAs)
  - Geographic locations in which non-Federal operations in the band shall not cause harmful interference to Federal systems operating in the band for episodic periods. During these times and in these areas, Federal users will require interference protection from non-Federal operations

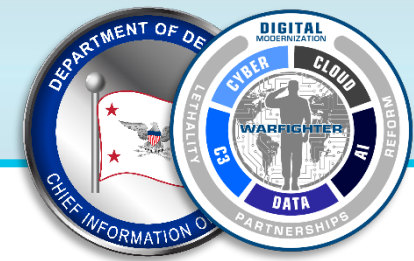
**CPAs and PUAs are coordination zones, not exclusion zones**



# PUAs

- PUAs are required to provide quiet environment to test and calibrate radar equipment, to support large-scale military exercises, or for short duration high power radar operations
- Processes for activating a PUA and any restrictions on commercial operations when the PUA is activated will be documented in operator-to-operator agreements for each location
- Operators may agree to alternate arrangements (e.g., technical restrictions) in lieu of activating a PUA
- DoD operations requiring the activation of PUAs currently typically range between 28-60 days per year
  - PUA activation rates are based on DoD mission requirements and are subject to change due to new or altered requirements

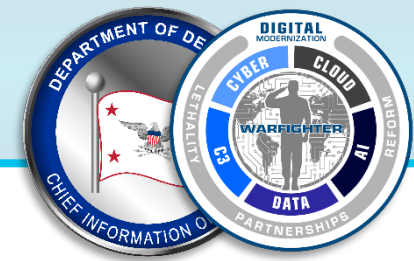




# CPA and PUA Locations

Location name	State	CPA	PUA
Little Rock	AR	Yes	-
Yuma Complex (includes Yuma Providing Grounds and MCAS Yuma)	AZ	Yes	Yes
Camp Pendleton	CA	Yes	-
Edwards Air Force Base	CA	Yes	Yes
National Training Center	CA	Yes	Yes
Naval Air Weapons Station, China Lake	CA	Yes	Yes
Point Mugu	CA	Yes	Yes
San Diego Includes Point Loma SESEF range	CA	Yes	-
Twentynine Palms	CA	Yes	-
Eglin Air Force Base Includes Santa Rosa Island and Cape Sand Blas site	FL	Yes	Yes
Mayport Includes Mayport SESEF range	FL	Yes	-
Pensacola	FL	Yes	Yes
Joint Readiness Training Center	LA	Yes	Yes
Chesapeake Beach	MD	Yes	Yes
Naval Air Station, Patuxent River	MD	Yes	Yes
St. Inigoes	MD	Yes	Yes

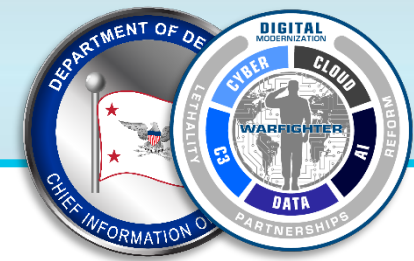
Location name	State	CPA	PUA
Bath	ME	Yes	Yes
Pascagoula	MS	Yes	Yes
Camp Lejeune	NC	Yes	-
Cherry Point	NC	Yes	-
Fort Bragg	NC	Yes	Yes
Portsmouth	NH	Yes	Yes
Moorestown	NJ	Yes	Yes
White Sands Missile Range	NM	Yes	Yes
Nevada Test and Training Range	NV	Yes	Yes
Fort Sill	OK	Yes	Yes
Tobyhanna Army Depot	PA	Yes	-
Dahlgren	VA	Yes	Yes
Norfolk Includes Fort Story SESEF range	VA	Yes	-
Wallops Island	VA	Yes	Yes
Bremerton	WA	Yes	Yes
Everett Includes Ediz Hook SESEF range	WA	Yes	-



# CPA/PUA Encumbrance Breakdown

Location name	State	CPA	PUA	Service/System
Little Rock	AR	Yes	-	AF – Airborne Radar
Yuma Complex (includes Yuma Providing Grounds and MCAS Yuma)	AZ	Yes	Yes	Army – Ground Radar USMC – Ground Radar
Camp Pendleton	CA	Yes	-	USMC – Ground Radar
Edwards Air Force Base	CA	Yes	Yes	Test and Training Systems
National Training Center	CA	Yes	Yes	Army – Ground Radar
Naval Air Weapons Station, China Lake	CA	Yes	Yes	Test and Training Systems
Point Mugu	CA	Yes	Yes	USMC – Ground Radar
San Diego Includes Point Loma SESEF range	CA	Yes	-	Navy – Shipboard Radar
Twentynine Palms	CA	Yes	-	USMC – Ground Radar
Eglin Air Force Base Includes Santa Rosa Island and Cape Sand Blas site	FL	Yes	Yes	Test and Training Systems
Mayport Includes Mayport SESEF range	FL	Yes	-	Navy – Shipboard Radar
Pensacola	FL	Yes	Yes	Navy – LBTTS
Joint Readiness Training Center	LA	Yes	Yes	Army – Ground Radar
Naval Research Laboratory, Chesapeake Beach	MD	Yes	Yes	Navy – LBTTS
Naval Air Station, Patuxent River	MD	Yes	Yes	Test and Training Systems
St. Inigoes	MD	Yes	Yes	Navy LBTTS

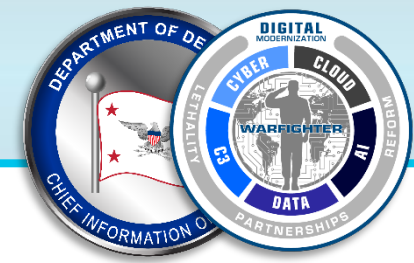
\*LBTTS – Land Based Test and Training Site



# CPA/PUA Encumbrance Breakdown Con't

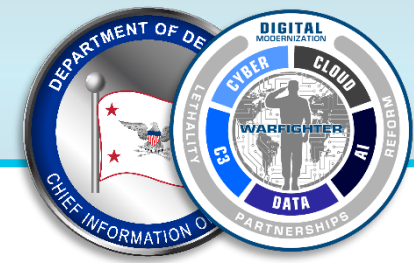
Location name	State	CPA	PUA	Service/System
Bath	ME	Yes	Yes	Navy – Shipboard Radar
Pascagoula	MS	Yes	Yes	Navy – Shipboard Radar
Camp Lejeune	NC	Yes	-	USMC – Ground Radar
Cherry Point	NC	Yes	-	USMC – Ground Radar
Fort Bragg	NC	Yes	Yes	AF – Airborne Radar
Portsmouth	NH	Yes	Yes	Navy – Shipboard Radar
Moorestown	NJ	Yes	Yes	Navy – LBTTTS
White Sands Missile Range	NM	Yes	Yes	Army – Ground System USMC – Ground System Test and Training System
Nevada Test and Training Range	NV	Yes	Yes	Test and Training Systems
Fort Sill	OK	Yes	Yes	Army – Ground Radar
Tobyhanna Army Depot	PA	Yes	-	Army – Ground Radar
Dahlgren	VA	Yes	Yes	Navy – LBTTTS
Newport News	VA	Yes	Yes	Navy – Shipboard Radar
Norfolk Includes Fort Story SESEF range	VA	Yes	-	Navy – Shipboard Radar
Wallops Island	VA	Yes	Yes	Navy – LBTTTS USMC – Ground Radar
Bremerton	WA	Yes	Yes	Navy – Shipboard Radar
Everett Includes Ediz Hook SESEF range	WA	Yes	-	Navy – Shipboard Radar

\*LBTTTS – Land Based Test and Training Site



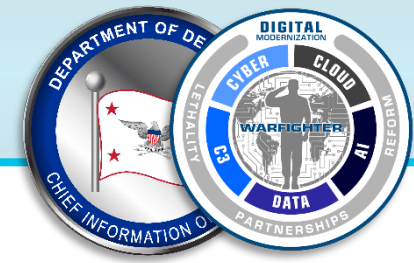
# High Power Radar Locations

- San Diego, CA (includes Point Loma SESEF range)
- Mayport, FL (includes Mayport SESEF range)
- Pensacola, FL
- Chesapeake Beach, FL
- St. Inigoes, MD
- Bath, ME
- Pascagoula, MS
- Portsmouth, NH
- Moorestown, NJ
- Dahlgren, VA
- Newport News, VA
- Norfolk, VA (includes Fort Story SESEF range)
- Wallops Island, VA
- Bremerton, WA
- Everett, WA (includes Ediz Hook SESEF range)

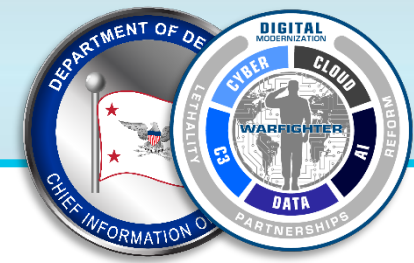


# Areas of Particular Note

- Little Rock, AR
  - Non-Federal operations will only be approved to commence approximately 12 months from the close of the auction
  - Non-Federal operations shall coordinate with Federal systems in only the 3450-3490 MHz band segment
  - 3490-3550 MHz band segment will be available for non-federal use without coordination
- Fort Bragg, NC
  - No time restrictions on the commencement of non-Federal operations
  - Non-Federal operations shall coordinate with Federal systems in only the 3450-3490 MHz band segment
  - 3490-3550 MHz band segment will be available for non-federal use without coordination
- Naval Air Station, Patuxent River, MD
  - CPA and PUA zones are different (PUA is larger)

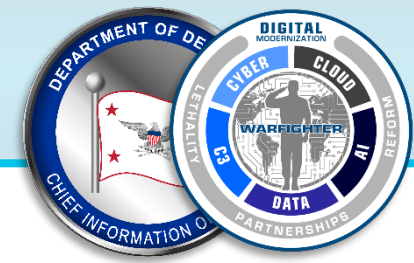


# Coordination Overview



# Coordination Overview

- Joint Public Notice on coordination lays out processes and timelines
- DoD will be launching a coordination portal to handle all formal coordination requests
  - Portal will open 9 months after the close of the auction
  - Processes will be similar to current 1755-1780 MHz coordination processes
- Submission of a coordination request will trigger the initiation of an operator-to-operator discussion for PUAs
- DoD will engage in informal coordination with winning bidders after the conclusion of the auction
- DoD is offering a streamlined coordination process for many of its high power radar locations
  - Does not require the submission of a full coordination request
  - Utilizes template provided in the Joint Public Notice

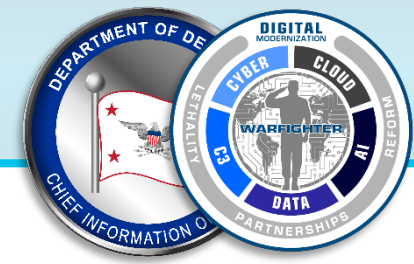


# Streamlined Coordination

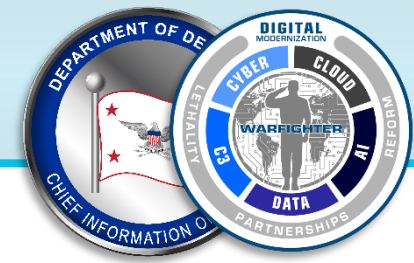
DoD will be offering streamlined coordination for the following CPAs—

- San Diego, CA (includes Point Loma SESEF range)
- Mayport, FL (includes Mayport SESEF range)
- Bath, ME
- Pascagoula, MS
- Portsmouth, NH
- Newport News, VA
- Norfolk, VA (includes Fort Story SESEF range)
- Bremerton, WA
- Everett, WA (includes Ediz Hook SESEF range)



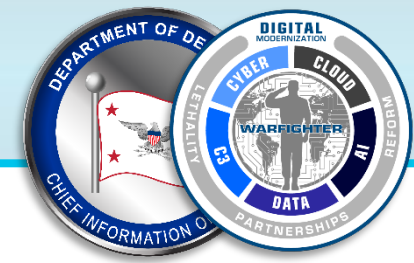


# Analysis Methodology



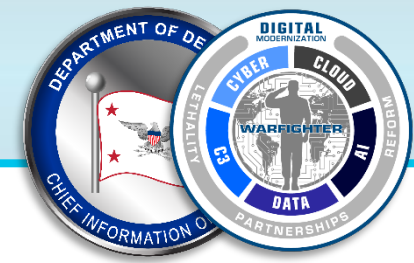
# Analysis Intent

- Analysis was based on worst case scenarios to determine the maximum area impacted for regulatory protection
- For high-powered radars, calculated boundary where DoD could cause interference based on 5G Base Station Receiver Characteristics
  - Assumes DoD implements revised procedures to minimize 3.45 GHz operations
- For low-powered radars, calculated boundary to protect DoD radars from commercial operations based on 5G Base Station Transmitter Characteristics
  - CPAs and PUAs protect DoD radars from harmful interference



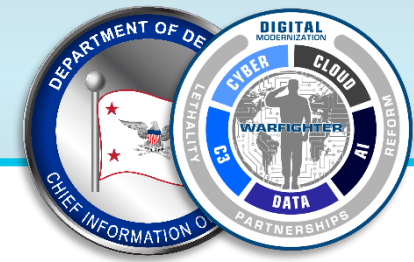
# Modeling Parameters

- Irregular Terrain Model (ITM) with SRTMv2 30 meter terrain data
- Standard, well-mixed, atmosphere
- No clutter loss for foliage or building assumed
- Excludes atmospheric ducting
- 5G parameters and assumptions derived from NTIA TR 14-506 “Effects of Radar Interference on LTE (FDD) eNodeB and UE Receiver Performance in the 3.5 GHz Band”
  - FCC and Office of Science and Technology Policy (OSTP) experts recommended this approach
  - FCC’s 2<sup>nd</sup> FNRPM requested input on the 5G parameters and assumptions used in the calculations

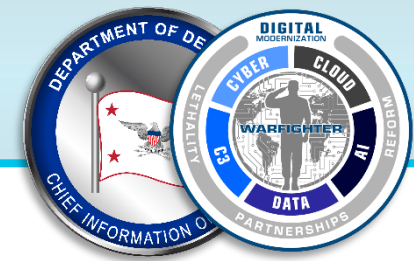


# CPA/PUA Calculation Assumptions

- 5G Base Station Transmitter Power Output as Effective Isotropic Radiated Power (EIRP)
  - Urban: 1640 Watts per Megahertz (W/MHz)
  - Non-Urban: 3280 W/MHz
- 5G Base Station Receiver Characteristics
  - Interference Power Input Density
    - -35 dBm per meter squared (dBm/m<sup>2</sup>) or 0.01 Volts per meter (V/m)
  - Maximum Power Input
    - +35 dBm/m<sup>2</sup>
  - 1 dB Compression (P1dB)
    - -25 dBm for continuous wave signals referenced at antenna port
- 100 meter tower height

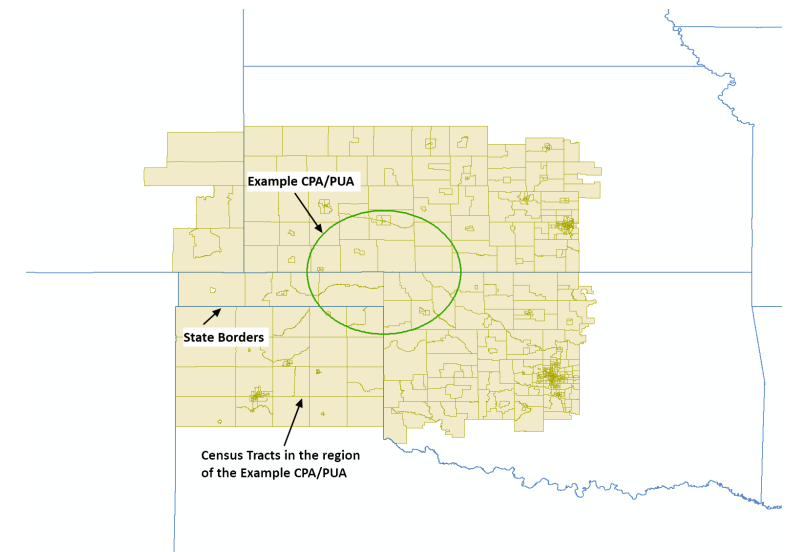


# DoD Workbook Overview



# How to read DoD Workbook

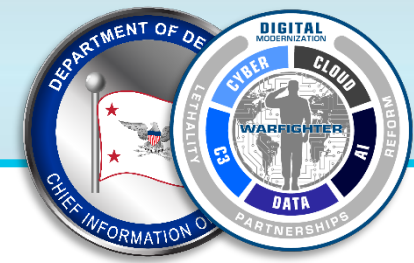
- Each Workbook tab represents 10 MHz frequency auction blocks
- Geographic Information System (GIS) mapping used 2010 US census tract boundaries – 75,000 census tracts
- GIS overlay of CPA/PUA boundaries based on Footnote US431B
- Determine which census tracts overlap with CPA/PUA
  - Includes partial overlap or touching boundary
- Export to readable spreadsheets



Workbook: [https://www.ntia.doc.gov/files/ntia/publications/3450-3550\\_mhz\\_dod\\_workbook.xlsx](https://www.ntia.doc.gov/files/ntia/publications/3450-3550_mhz_dod_workbook.xlsx)

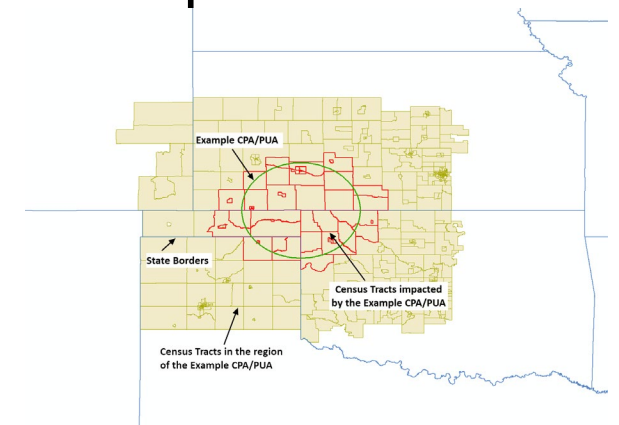
Workbook ReadMe: [https://www.ntia.doc.gov/files/ntia/publications/3450-3550\\_mhz\\_dod\\_workbook.xlsx](https://www.ntia.doc.gov/files/ntia/publications/3450-3550_mhz_dod_workbook.xlsx)

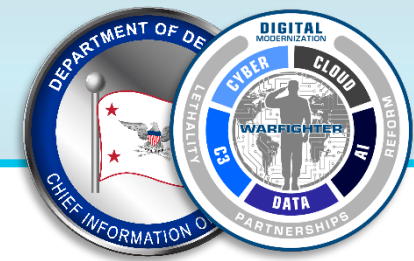
Census Tract to License Area Crosswalk: [https://www.ntia.doc.gov/files/ntia/publications/3450-3550\\_mhz\\_dod\\_workbook.xlsx](https://www.ntia.doc.gov/files/ntia/publications/3450-3550_mhz_dod_workbook.xlsx)



# How to read DoD Workbook Con't

- Only census tracts containing encumbrances are listed
- Total encumbrances (ie CPA/PUA overlays) provided for each census tract
  - Separate columns for encumbrance based on 100 meter and 100 foot tower heights
  - Coordination required within entirety of CPA determined by 100 meter tower height
  - 100 foot tower height data provided for supplemental information purposes only
  - For example, a census tract encumbered by two different CPAs will have “2” total
- Each CPA/PUA has column to indicate which census tracts it impacts
  - Yellow CPA/PUA blocks signify 100m towers
  - Blue CPA/PUA blocks signify 100ft towers

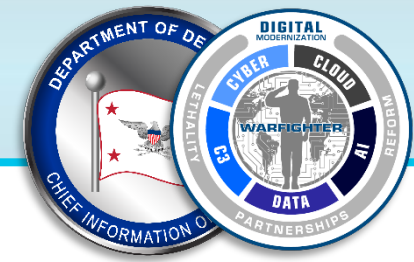




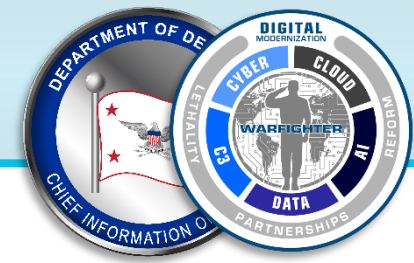
# How to read DoD Workbook Con't

Column Heading	Description
GEOID	Census Tract GEOID Value
State	State Census Tract is located
Latitude	Latitude coordination of census tract center
Longitude	Latitude coordination of census tract center
Total Encumbrances 100m	Total number of encumbrances affecting specified census tract from CPA/PUA for 100m antenna height
Total Encumbrances 100ft	Total number of encumbrances affecting specified census tract from CPA/PUA for 100m antenna height
100 m CPA/PUA Data	Encumbered census tracts from listed CPA/PUA for 100m antenna height
	Blank column to help with distinguishing 100m and 100 feet antenna height data
100 ft CPA/PUA Data	Encumbered census tracts from listed CPA/PUA for 100 feet antenna height



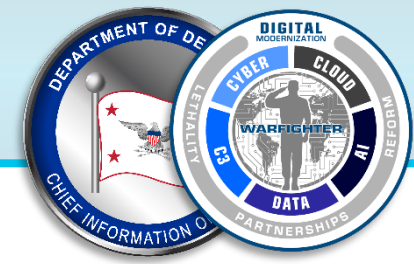


# National Emergency

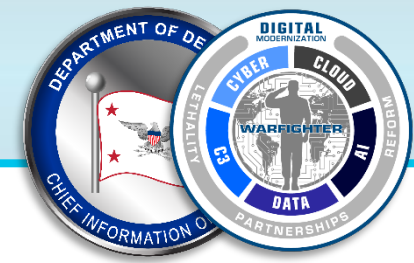


# National Emergency

- DoD's operational needs can be accommodated under and consistent with section 706(c) of the Communications Act and other relevant authorities
- Under section 706(c), a national emergency would be triggered by a “proclamation by the President that there exists a war or threat of war or a state of public peril or disaster or other national emergency”
- Type of event triggering the national emergency clause for this band is primarily anticipated to be an impending or on-going attack on the U.S.
- Geographic and time impacts will depend on the specific situation
  - DoD cannot predict when, where, or for how long the national emergency clause would need to be invoked

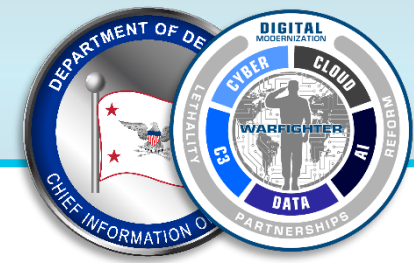


# Federally Authorized Contractor Test (FACT) Sites



# FACT Sites

- Several radar manufacturing and integration facilities operating under Part 5 licenses will continue to require access to the 3450-3550 MHz band to perform experimentation and testing for radionavigation and other systems contracted for by DoD
- These facilities typically operate in an outdoor environment to accommodate physically large operational systems
- It is critical that these facilities retain access to the spectrum for this testing and experimentation so DoD's contracting requirements will be fulfilled



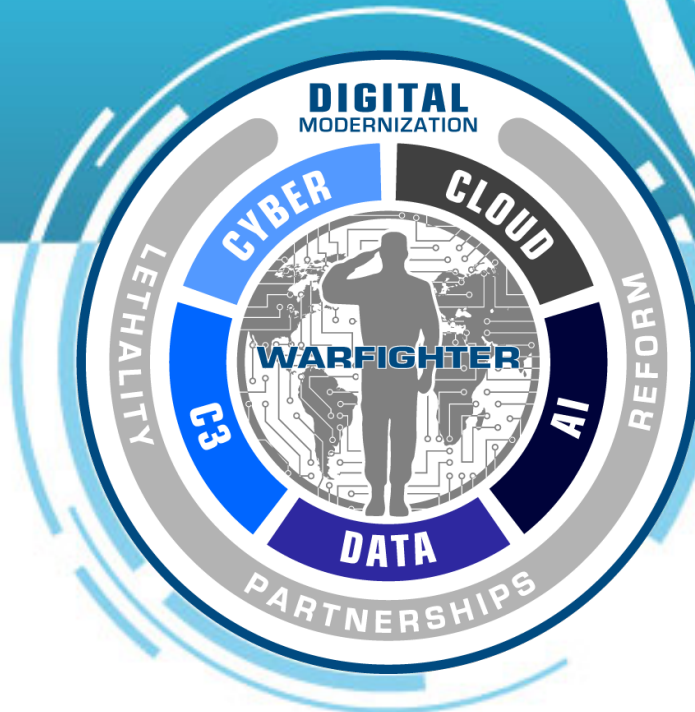
# FACT Site Locations

## Sites Located within a CPA/PUA

- Georgetown, DE (Pax River PUA) – Northrop Grumman
- Annapolis, MD (Chesapeake Beach CPA/PUA) – Northrop Grumman
- Hanover, MD (Chesapeake Beach CPA/PUA) – Northrop Grumman
- Linthicum, MD (Chesapeake Beach CPA/PUA) – Northrop Grumman
- Pelham, NH (Portsmouth CPA/PUA) – Raytheon Technologies
- Moorestown, NJ (Moorestown CPA/PUA) – Lockheed Martin

## Sites Not Located within a CPA

- St. Louis, MO – The Boeing Company
- Liverpool, NY – Lockheed Martin
- Cazenovia, NY – Lockheed Martin
- Portsmouth, RI – Raytheon Technologies
- McKinney, TX – Raytheon Technologies



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