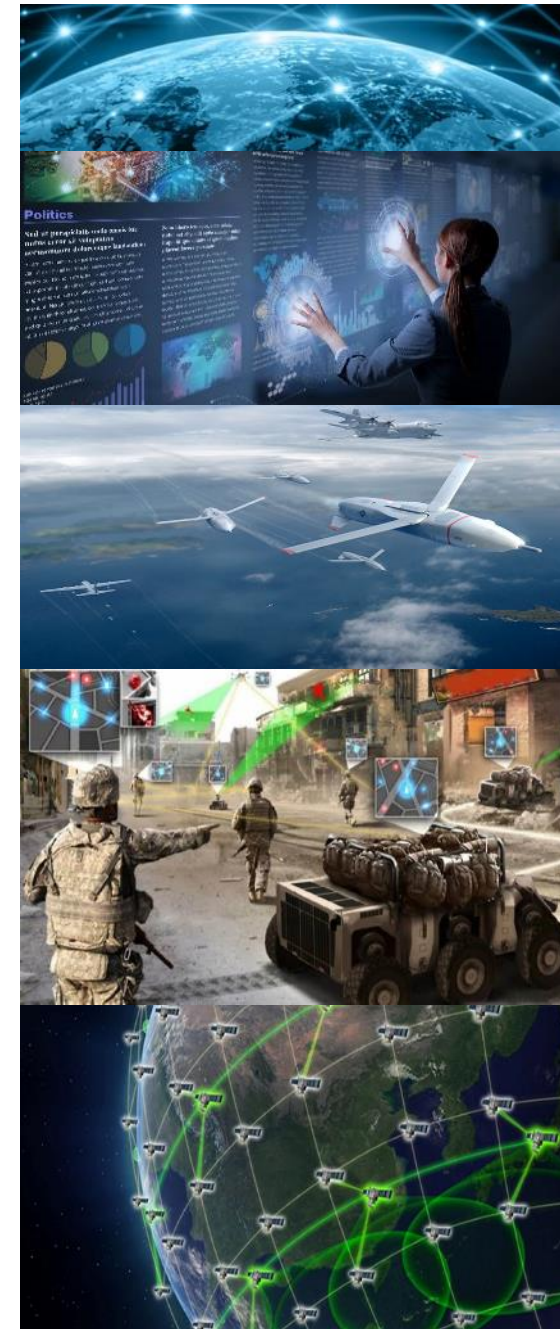




## DoD and 5G

*Dr. Lisa Porter  
Deputy Under Secretary of Defense  
Research & Engineering*

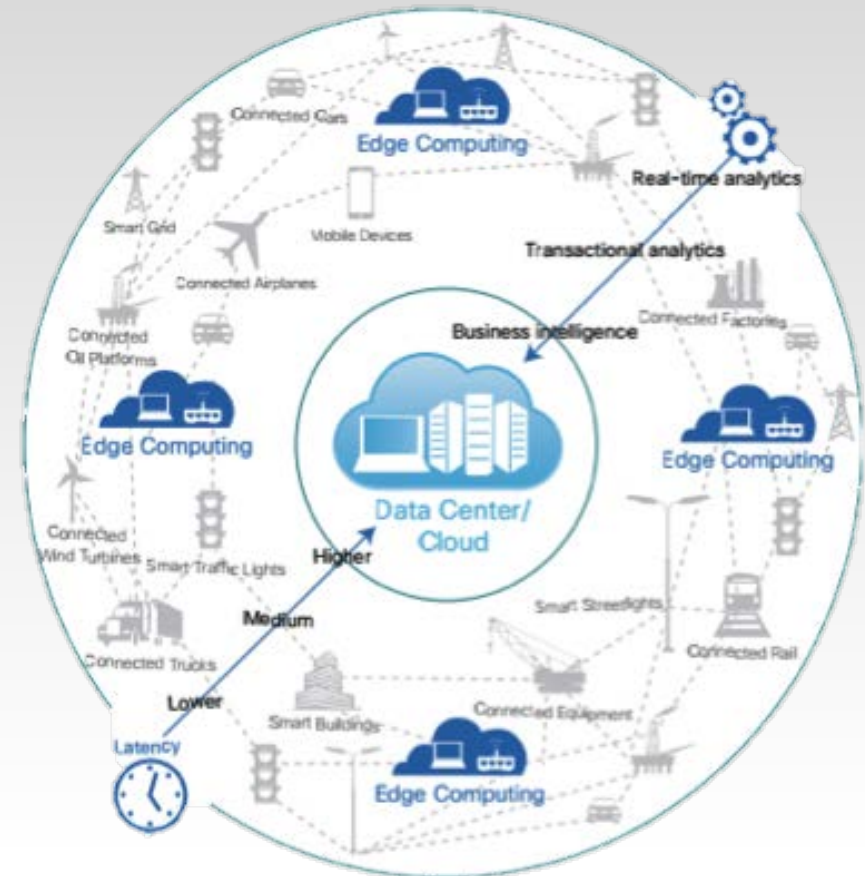
**Silicon Flatirons – Saving Our Spectrum  
10 October, 2019**





# 5G – Key Themes for DoD

- 5G is transformational...it is **“ubiquitous connectivity”**: human-to-human, machine-to-machine, human-to-machine connectivity
  - Moving from discrete to continuous communications, computation, data curation & management
  - 5G is not just about the Radio Access Network (RAN), and not just cell phones
- There is no such thing as a secure system - we can work to make things more secure, be more mindful of vulnerabilities, but ultimately, we must effectively use networks in which we have **“zero trust”**.
- The DoD will always assume that **we must operate through**, anywhere and anytime, regardless of the environment.



Source: [https://www.cisco.com/c/dam/en\\_us/solutions/trends/iot/docs/iot-data-analytics-white-paper.PDF](https://www.cisco.com/c/dam/en_us/solutions/trends/iot/docs/iot-data-analytics-white-paper.PDF)

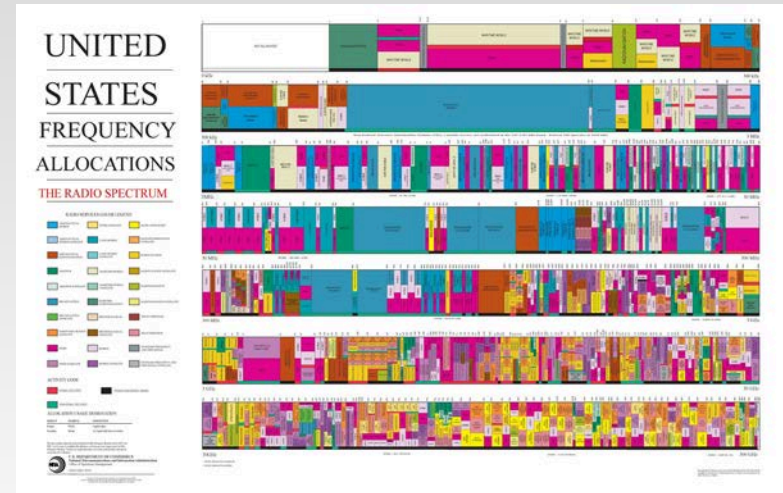
**The military that masters “ubiquitous connectivity” will maintain overmatch**



# Operate Through

- DoD tactical needs share common traits with first responder communications needs.
  - Ability to operate in congested and degraded spectrum
  - Ability to operate over networks that may be compromised
  
- DoD 5G initiative will emphasize ways to operate through using:
  - Dynamic spectrum utilization based on sensing, collaboration, and frequency agile radios
  - Robust network overlays and “zero-trust” architectures

From static and manual

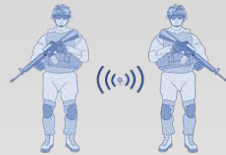


To dynamic and adaptive





# Overview of the DoD Plan



Warfighter to Warfighter



Warfighter to Machine



Machine to Machine

5G  
Use  
Cases  
for  
DoD



- **Accelerate** – Hasten DoD’s adoption of 5G
  - At-scale test facilities that enable rapid experimentation & dual-use application prototyping
- **Operate Through** – Ensure that US forces can operate through wherever and whenever we deploy
  - Dynamic spectrum utilization; “Zero Trust” architectures
- **Innovate** – Enhance 5G technology and invest in future “Next G” technologies
  - There is no finish line.



# 5G Engagement Opportunities

- The DoD 5G initiative will conduct multiple experiments at multiple DoD sites covering a variety of use cases including:
  - Mission planning/training
  - Depot operations
  - Global asset/supply chain management
  - Smart bases/ports
  
- Deployments at the DoD sites will also:
  - Advance dynamic spectrum utilization techniques for “Operating Through”
  - Employ Red Teaming to learn how to best defend 5G networks
  
- Engagement via the National Spectrum Consortium (NSC)
  - <https://www.nationalspectrumconsortium.org/>
  - Organizations can still join the NSC and participate in the upcoming RFP
  - Received ~ 260 technical concepts which were assessed in summer 2019
  - **Initial draft RFP expected in November 2019**

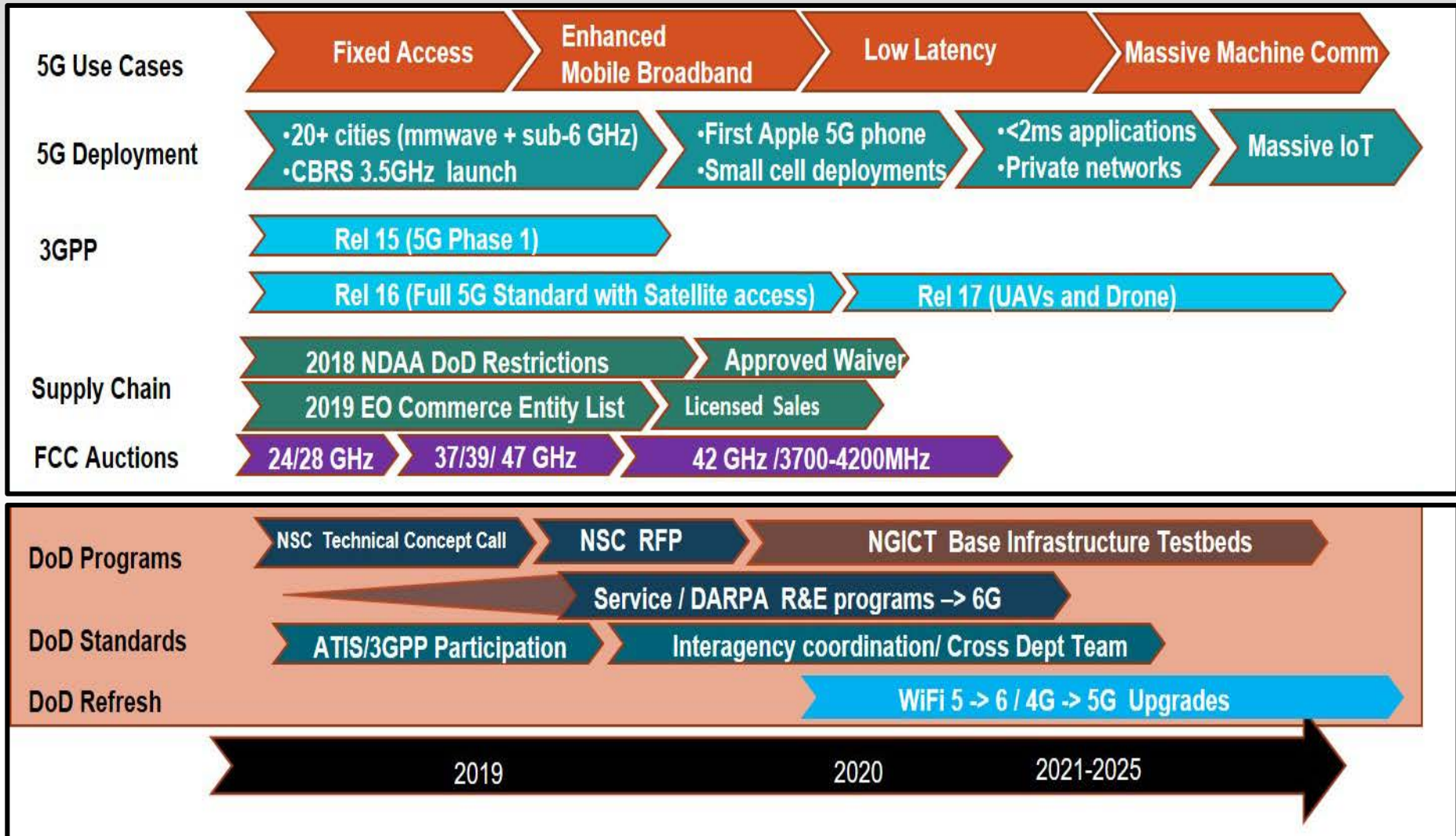


# Planned Outcomes

- We will drive toward **fieldable prototype capability** that will remain in place at designated DoD locations.
  - Prototypes delivered for final assessment approximately 36 months after awards
    - “Turnkey Solutions” that can be adapted for rapid deployment at additional sites without significant additional NRE
  - Not all activities are guaranteed to result in a fieldable prototype.
  - Efforts that do not perform sufficiently for leave behind capability will publish lessons learned to promulgate 5G knowledge and tradecraft.
- **Deliverables will include...**
  - 5G infrastructure sufficient to support prototype products and services
  - Software and firmware development kits that accelerate continued development and fielding at additional DoD locations
  - Upgraded test beds, facilities, and ranges that posture DoD to continue pursuit of emerging 5G and “Next 5G” technologies

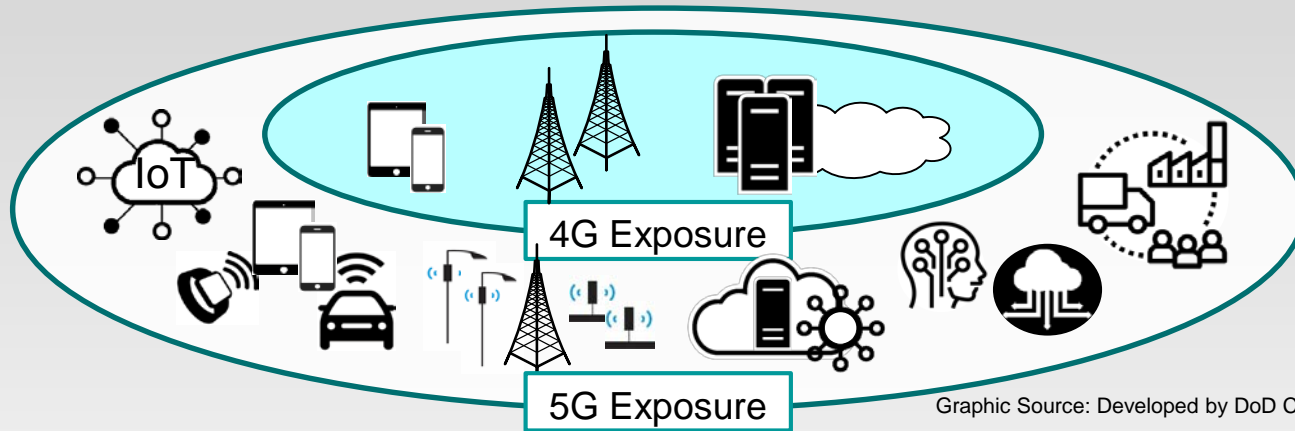


# 5G Timelines





# 5G and Security



Graphic Source: Developed by DoD CIO/MITRE for DSB 5G study.

- Many of the lessons we have learned with current (3G, 4G) networks will translate to 5G. E.g.,
  - Stronger encryption; improved privacy protection
- 5G will lead to a convergence of all communications modes (mobile, fixed, wireless, wireline)
  - Security solutions cannot be stove-piped by mode.
- 5G will generate numerous new attack vectors. E.g.,
  - MIoT (DDoS attacks against the 5G RAN, Endpoint security challenges, etc.)
  - NFV/SDN Exploitation
  - Attacks against the Edge from 3rd-party applications
- But 5G also presents some potential security advantages. E.g.,
  - SDN combined with containerization and AI/ML techniques for real-time monitoring and response





# Key Take-Aways

- The military that masters “ubiquitous connectivity” will maintain overmatch.
- 5G is not a race...there is no finish line. Hence our emphasis on 5G to Next G.
- 5G technologies are both enablers of and sources of vulnerability for:
  - Economic security
  - Homeland security
  - National security

**DoD strategy leverages the strength of U.S. innovation**





# Back-up Material



# National Defense Strategy

Resumption of Great Power Competition, Modernization of Priorities

Lethality, Partnerships, Reform



# USD(R&E) Mission

Military Technological Superiority, Modernization

Creating the Technologies of the Future Fight



# Modernization Priorities

- *Hypersonics*
- *Fully Networked Command, Control & Communication (FNC3)*
- *Directed Energy*
- *Space*
- *Biotechnology*
- *Next Generation Mobile Communications (5G)*
- *Cyber*
- *Quantum Science*
- *Artificial Intelligence / Machine Learning (AI/ML)*
- *Microelectronics*
- *Autonomy*

**There is a Portfolio Manager (Assistant Director) who is responsible for establishing the DoD-Wide, mission-focused strategy & execution plan for each modernization priority**



# DoD Research and Engineering Enterprise

*Creating the Technologies of the Future Fight*



DoD Research and Engineering Enterprise  
<https://www.CTO.mil/>

Twitter  
[@DoDCTO](https://twitter.com/DoDCTO)