DoD and 5G

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Silicon Flatirons – Saving Our Spectrum
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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.


The military that masters “ubiquitous connectivity” will maintain overmatch
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
Overview of the DoD Plan

- **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/](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

Distribution Statement A; Approved for public release, Distribution is unlimited.
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 Use Cases
- Fixed Access
- Enhanced Mobile Broadband
- Low Latency
- Massive Machine Comm

5G Deployment
- 5G Use Cases
  - 20+ cities (mmwave + sub-6 GHz)
  - CBRS 3.5GHz launch
  - First Apple 5G phone
  - Small cell deployments
  - <2ms applications
  - Private networks
  - Massive IoT

3GPP
- Rel 15 (5G Phase 1)
- Rel 16 (Full 5G Standard with Satellite access)
- Rel 17 (UAVs and Drone)

Supply Chain
- 2018 NDAA DoD Restrictions
- Approved Waiver
- 2019 EO Commerce Entity List
- Licensed Sales

FCC Auctions
- 24/28 GHz
- 37/39/47 GHz
- 42 GHz /3700-4200MHz

DoD Programs
- NSC Technical Concept Call
- NSC RFP
- NGICT Base Infrastructure Testbeds
- Service / DARPA R&E programs -> 6G

DoD Standards
- ATIS/3GPP Participation
- Interagency coordination / Cross Dept Team

DoD Refresh
- WiFi 5 -> 6 / 4G -> 5G Upgrades

2019
2020
2021-2025
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:
  o Economic security
  o Homeland security
  o 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.
Creating the Technologies of the Future Fight