5G/NextG Tranche 1 Virtual Industry Day

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DoD 5G Approach

• **5G is transformational**
  - Not just new radios and cell phones
  - “Ubiquitous connectivity”: human-to-human, machine-to-machine, human-to-machine

• **Critical for DoD use, but – there is no such thing as a secure system**
  - DoD must use networks in which we have "zero trust"
  - Must operate through adversary impediments

• **DoD approach: partner with industry to understand / influence 5G**
  - Fully utilize the advantages
  - Mitigate and work with the vulnerabilities
  - Collaborative experimentation to leverage the > $350B industry investment in the U.S. over the next 5 years

Ultimately, the military that masters ubiquitous connectivity will maintain overmatch.
Overview of DoD 5G Activities

Technology Focus Areas
- **Military Use of 5G**
  - Prototyping and experimentation
- **5G Security**
  - Mitigate and work with vulnerabilities
- **Spectrum**
  - Experiment and evaluate sharing

Standards
- **DoD Department-wide effort**
  - Engage with 5G organizations, e.g., 3GPP
- **Interagency activities**
  - Coordinated with NSC/NEC

Policy and “Whole of Government” Strategy
- **Shape to protect US interests**
  - Statutes, policies, regulations, standards
- **Interagency coordination**
  - FCC, NTIA, DHS, NSA, State, DOJ, NSC/NEC 5G PCC

Industry Engagement
- **Leverage innovation of US industry**
  - National Spectrum Consortium, CBRS Alliance, WInnForum

International Engagement
- **Promote robust global infrastructure**
  - Cooperation on supply chain, sourcing, validation/verification
- **Strengthen allied 5G infrastructure**
  - Collaborative experiments on alternatives
DoD 5G Prototyping & Experimentation

• **Accelerate – Hasten DoD’s adoption of 5G**
  - At-scale test facilities that enable rapid experimentation & dual-use application prototyping
  - Red/blue-teaming to identify and mitigate vulnerabilities

• **Operate Through – Ensure that US forces can operate through wherever and whenever we deploy**
  - Dynamic spectrum utilization
  - “Zero Trust” architectures
  - DoD-specific enhancements to commercial technology

• **Innovate – Enhance 5G technology and invest in future “Next G” technologies**
  - There is no finish line.

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5G to Next G – Use Cases

- Logistics Asset Management
- Smart Installations
- Augmented & Virtual Reality
- Smart Depot / Warehouse

Dynamic Spectrum Utilization

Distribution Statement A; Approved for public release, Distribution is unlimited.
5G to Next G Program – Tranche 1

- 4 initial experimentation sites with 3 initial use cases
  - Hill AFB, UT
    – dynamic spectrum sharing between 5G and high-power military radars
  - Joint Base Lewis-McChord, WA
    – AR/VR for high-fidelity training
  - Naval Base San Diego, CA
    – smart warehouse and logistics
  - Marine Corps Logistics Base Albany, GA
    – smart warehouse

- Site attributes include
  - Streamlined access to site spectrum bands for experimentation
  - Wireless & wired infrastructure
  - Support for infrastructure requirements
  - Congested communications environs
  - Ability to experiment with dynamic spectrum sharing

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Dynamic Spectrum Sharing Access
Hill AFB, UT

- **Dynamic Spectrum Sharing**
  - Develop Sharing Coexistence System (SCS) prototype
  - Provide interoperability between airborne radar and 5G cellular system in 3.1-3.45 GHz Band
  - Promising SCS can be evaluated with users and airborne system

- **Hill Air Force Base, UT**
  - Design, build, and deploy mobile 5G network infrastructure and devices (cell on wheels)
  - Deploy on Hill AFB and Utah Test Range
  - Evaluate with real-world at-scale network
Augmented Reality/Virtual Reality
Joint Base Lewis McChord (JBLM), WA

- **AR/VR**
  - Develop/integrate 5G-networked AR/VR hardware and software to support enhanced distributed ground combat training
  - Demonstrate 5G-networked AR/VR prototype in lab
  - Demonstrate 5G-networked AR/VR prototype in the field at the brigade level

- **JBLM and Yakima Training Center (YTC)**
  - Design, build, and deploy mobile 5G network infrastructure and devices
    - JBLM Mission Training Center
    - Yakima Training Center
  - Employ and test advanced 5G features
Smart Warehouse
Naval Base San Diego, CA

• Smart Warehouse
  - Digitization, automation, and optimization
  - Autonomous systems
  - AR/VR systems
  - Machine vision
  - Integration Navy logistics systems

• Naval Base San Diego
  - Design and deploy 5G infrastructure in and around warehouse test site
  - Employ and test advanced 5G features
Smart Warehouse
USMC Logistics Base Albany, GA

- **Smart Warehouse**
  - Digitization, automation, and optimization
  - Autonomous systems
  - AR/VR systems
  - Machine vision
  - Integration Marine Corp logistics systems

- **USMC Log Base Albany**
  - Design and deploy 5G infrastructure in and around warehouse test site
  - Employ and test advanced 5G features
Example DoD 5G Outcomes

Accelerate 5G

- 5G that can be deployed at DoD sites – more quickly, lower cost – e.g.,
  - Enterprise TTPs
  - Pre-approved “bill of materials”
  - Expedited ATOs

- 5G that improves DoD facility operations – increase efficiency, lower cost – e.g.,
  - Networked automated vehicles, e.g., tractors, forklifts
  - Networked automated logistics hardware and software

- 5G that improves DoD tactical operations – rapid deployment / adaptation – e.g.,
  - Deployable 5G multi-antenna systems
  - Deployable 5G base stations
  - Accredited 5G endpoints (phones, sensors, machines)
  - Mission planning AR/VR applications with real-time sensor integration

- Counter adversary attempts to deny access to the RF spectrum, e.g.,
  - Hardware and software for dynamically using the spectrum

- Counter adversary attempts to deny access to 5G networks, e.g.,
  - “Zero Trust” architectures that mitigate attacks on network roles / authorities

Operate Through

- Enhance 5G technology and invest in future “Next G” technologies, e.g.,
  - Highly directional mid-band systems for LPI/LPD
  - Robust network protocols for multiple security levels

Innovate for “Next G”
5G Standards Engagement

• Ongoing participation in 5G standards - 3GPP, ATIS, IEEE
  - DoD wide membership access
  - Monitoring standards working groups/proposals
  - Example: Supply Chain Working Group with industry via ATIS

• Developed DoD 5G Standards Engagement Plan
  - Established cross-Department SME team to represent DoD
  - Prioritizing standards relevant to DoD
  - Organizing technical teams - Physical layer (spectrum), security, networking, and 5G services such as IoT, V2X, SAT5G, AR/VR
  - Expand coordination to FVEY and international partners

• Ongoing interagency coordination
  - Led by National Security Council and National Economic Council
  - Manage common effort with NTIA, NIST, DoT, DoJ, FCC, DHS, ...

ATIS: Alliance for Telecommunications Industry Solutions
IEEE: Institute of Electrical & Electronics Engineers
3GPP: 3rd Generation Partnership Project
AR/VR: Augmented / Virtual Reality
V2X: Vehicle to Everything
SAT5G: Satellite 5G
IoT: Internet of Things
DoD 5G Engagement with Industry

• National Spectrum Consortium
  - Established in 2013 as a public/private partnership
  - Now has over 400 industry members
  - Over 250 5G technical concepts received
  - Over 1500 comments on draft 5G RFPs from 50 companies
  - Final 5G RFPs to be issued in February 2020

• Information Warfare Research Program (IWRP) Consortium
5G to Next G Next Steps

- Rolling Requests For Proposals
- Iterative industry engagement
- Continued engagement with FCC, NTIA, OGAs, & international partners
Rapid Prototypes

• 5G Network Testbeds
  - RAN, Connectivity, Core

• 5G Network Enhancements
  - network slicing, security, Open 5G implementations, etc.

• 5G Technologies
  - AR/VR, SCS, Autonomous Systems, etc.
Intellectual Property

- SOWs currently assert Government Purpose Rights
- IP is negotiable at the Project Agreement level
- Include IP assertions in your proposal
- Won’t hurt your proposal if you negotiate
- Article XI of the NSC Base Agreement discusses Data Rights, and includes three categories of data
  - All subject to negotiation
DoD 5G Impact

• 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

Leverage and accelerate innovation of U.S. 5G industry