

Next Steps to Revolutionary Change of Spectrum Usage



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Thesis

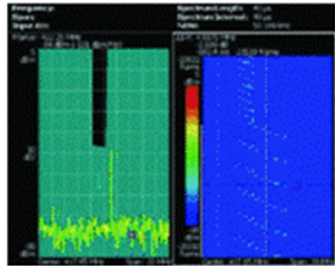
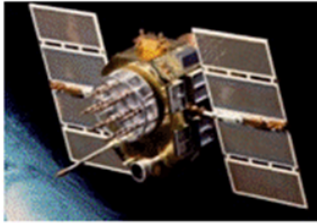
“Spectrum is an essential engine for economic strength, driving U.S. leadership domestically and worldwide. It also provides our armed forces the ability to dominate the battlefield in the event of conflict. Continued collaboration between industry and DoD is the key to enabling both our economy and our armed forces to make optimal use of this scarce resource.”

“The next fight will be network vs network, NOT platform vs platform. Platform vs platform is a 20th century construct”

“US leadership and economic strength is, in part, driven by the ability to move information rapidly and efficiently throughout the world.”

“Spectrum is the medium to move the information”

Spectrum--An Operational Imperative



Impacts the ability to SENSE, PROTECT and ATTACK, in other words OPERATE & SURVIVE

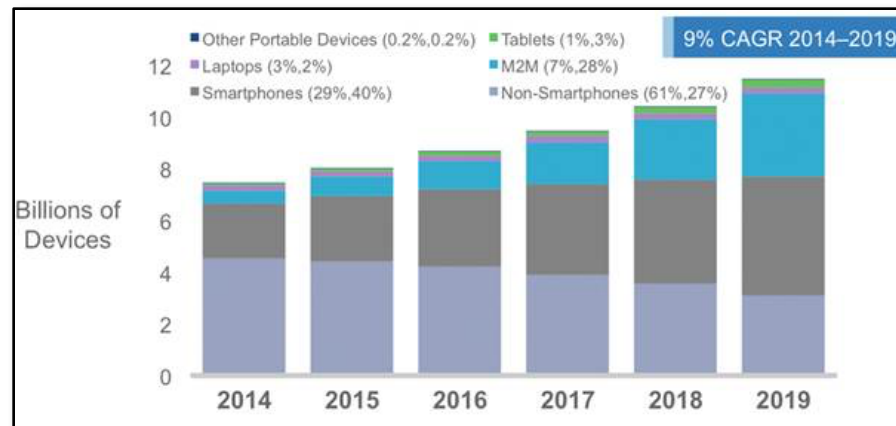
Industry Has Operational Needs.....

Worldwide race for mobile broadband access is not just “who” (cable providers, wireless carriers, MSS, unlicensed developers)...

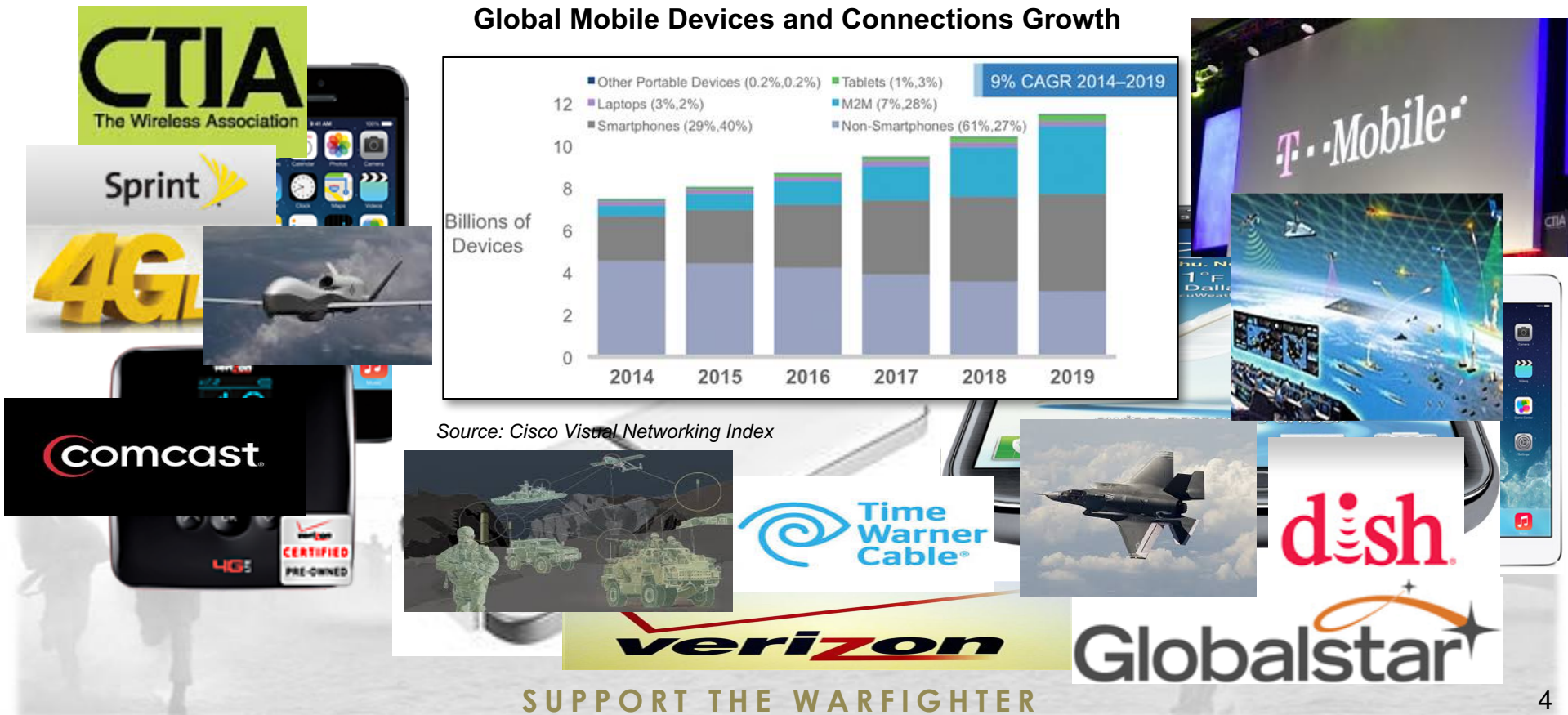
... but “what”: Internet of everything, 5G, Wi-Fi, LTE, MSS, white spaces

Shared challenges: Reallocation focus; need to balance commercial requirements; ops environment that is growing increasingly complex, fueled by cheap commercial devices; being squeezed into smaller slices of govt. bands makes our adversaries' jobs easier.

Global Mobile Devices and Connections Growth



Source: Cisco Visual Networking Index

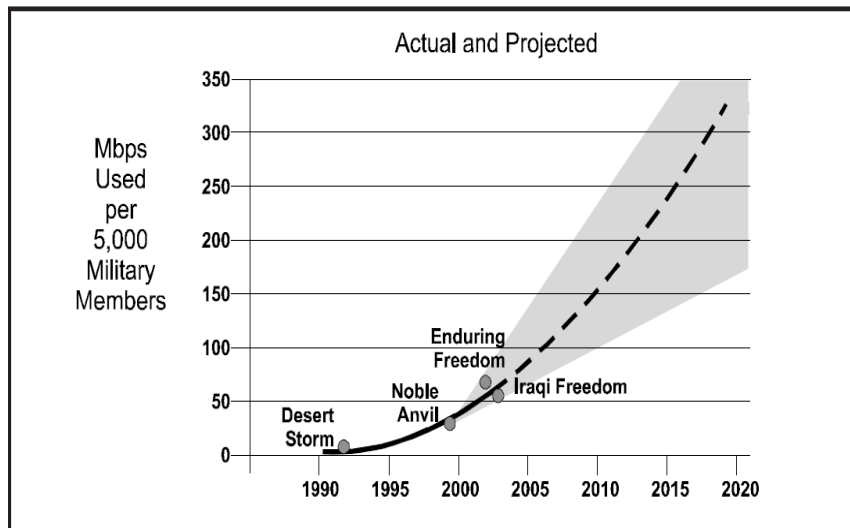


SUPPORT THE WARFIGHTER

The Real Problem

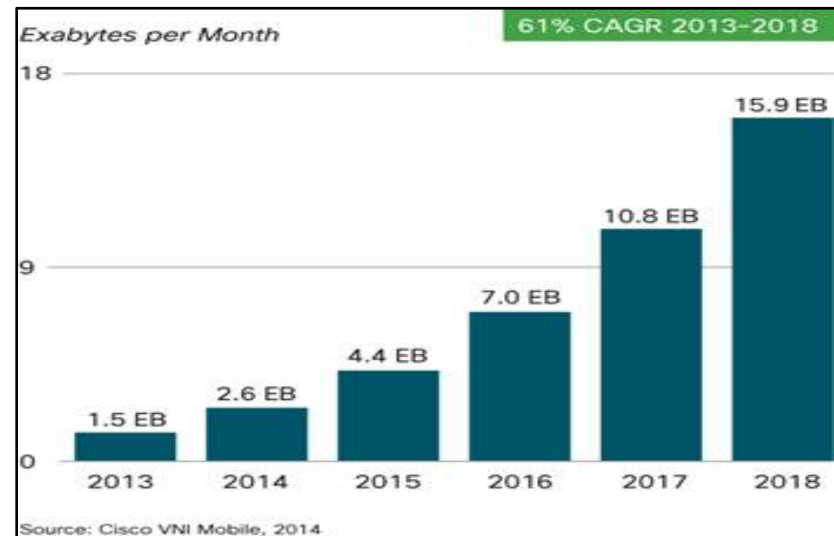
DoD NEED FOR SPECTRUM:

- Increasing data rate needed for DoD data-rich applications (imagery, video, etc)
- Resiliency to net attack and jamming



COMMERCIAL NEED FOR SPECTRUM:

- Commercial mobile data traffic growing: Cisco predicts growth to 15.9 exabytes per month by 2018, nearly an 11-fold increase over 2013



Both DoD/Federal & Industry Needs Increasing!

Building on Success

- Advanced Wireless Spectrum Auction 3 (2015) – 1755-1780 MHz
- **DOD: Channeled \$3.5 Billion to Department of Defense**
 - New equipment, better capabilities, and increased readiness
 - Major benefits to DOD(base comms, training capability and lower cost) as well as military families of expanded wireless communications within CONUS
 - SRF: Provided \$500 Million to new DoD technologies
- **ECONOMY: Increased spectrum for U.S. wireless infrastructure buildout**
 - Huge impact to economy and government with coast to coast 5G access
 - Secures US position to compete
 - Job creation
 - Enables disruptive technologies to move forward maintaining US economic leadership
- **TREASURY: Increased revenue**
 - Non-tax
 - Non-debt

Filling Gaps: Follow-on DOD Access to Spectrum Funds

Completing unfinished AWS-3 obligations

- **Opportunity to fund upgraded/enhanced Air Combat Training System (ACTS) from SRF money to benefit DOD**
 - ACTS is significant user of the AWS-3 band (1755-1830 MHz) using outdated equipment
 - Upgrade went unfunded in initial DOD transition plan due to lack of advanced replacement technology
 - Equipment now available to upgrade capabilities, while enabling early transition
 - System is a major training and rehearsal tool that gives US edge in combat operations
- **Major benefits of faster transition**
 - Expedites important DOD modernization at zero cost to DoD (funds above TOA)
 - Enhances capabilities from legacy system and allows complete joint interoperability/coalition interoperability (something we don't have today)
 - Allows enhanced cyber security to be burned in at the systems level
 - Enhances ACTS while enabling USG to auction additional spectrum and keep US economically competitive

New targets of opportunity for DOD modernization funding

- **Commercially-valuable spectrum is ripening for auction to benefit DOD**
 - Candidate bands: 1755-1830MHZ
 - DoD has previously studied leaving this band
 - This band is primarily telecom in most places except the US
 - Moving will align us primarily with 5 eyes and coalition partner bands
- **Funding can also “pay for” two major DOD requirements**
 - Modernizing defense systems transitioning from the auctioned band
 - Upgrading the cyber-security of DOD legacy networks (NIPR/SIPR/JWICS)
 - ❑ JIE needs funding to speed implementation and create a true modernized environment

Options & consequences

- **Status quo:**
 - Slows modernization
 - Impedes capability enhancements and daily training
 - Further strains the DOD budget
 - Adversely impacts national security and U.S. economic strength
- **Access to DOD funding from existing and future spectrum auction revenue:**
 - Enables near-term improvements in U.S. defense capabilities and deployability at lower cost to DOD
 - Resources long-needed critical network upgrades

Questions?



SUPPORT THE WARFIGHTER

Spectrum Access R&D Program

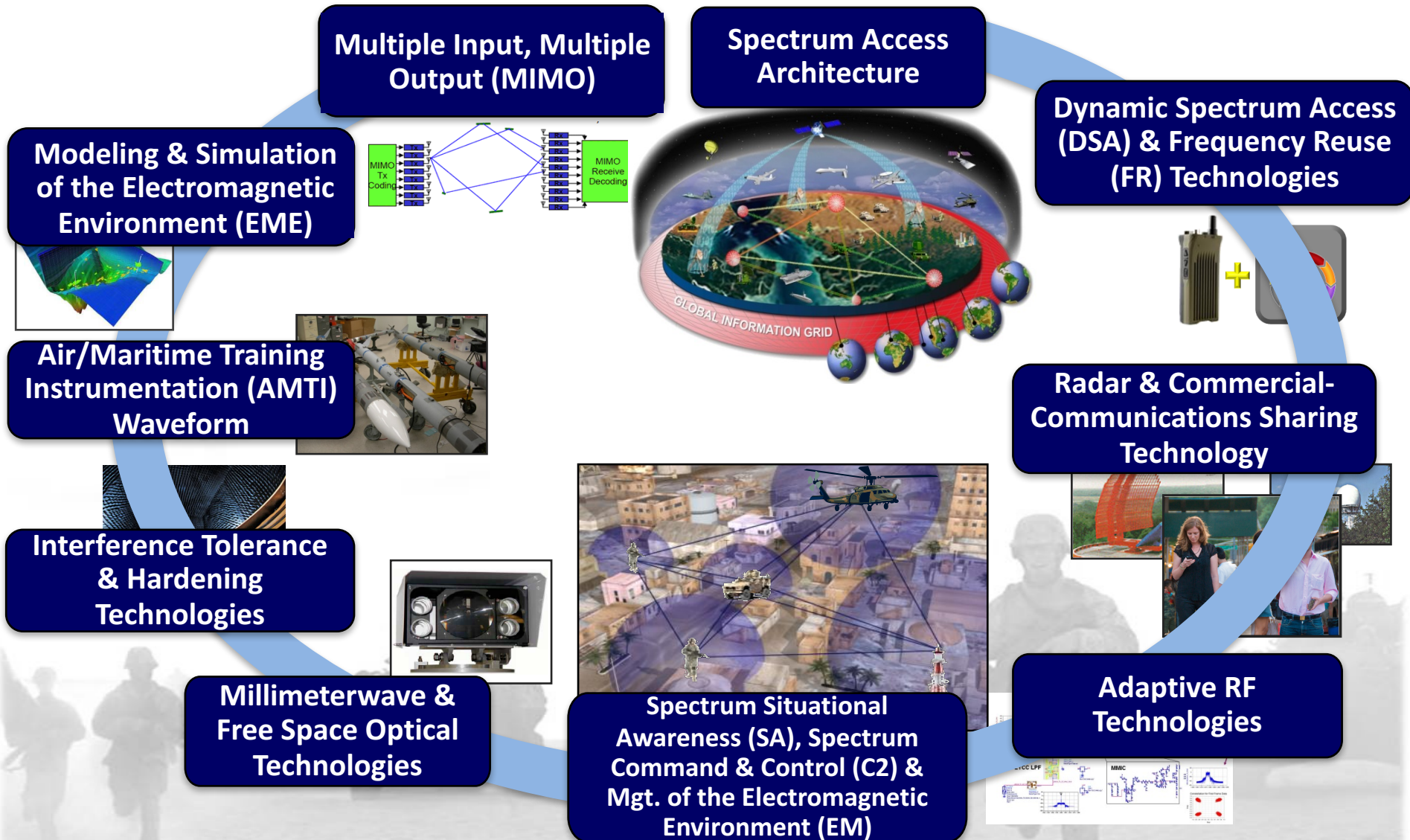
- The **Spectrum Access R&D Program (SAR&DP)** initiated via *partnership between ASD(R&E), DoD CIO and Joint Staff J6* to develop and implement innovative spectrum technologies:
 - First, mitigate risks associated with the third Advanced Wireless Services (AWS-3) auction and associated transition
 - Enhance Operational Capability
- The AWS-3 auction generated ~\$41B in revenue, of which a portion goes to the Spectrum Relocation Fund (SRF)
- \$3.1B for DoD transition of systems to allow for commercial operations in the 1695-1710 MHz and 1755-1780 MHz bands. Transition plans were based on existing technologies to minimize the cost and schedule
- OMB reserved \$500M of the SRF for DoD R&D to mitigate transition and operational risks associated with the AWS-3 transition
- The SAR&DP encompasses development efforts to support 38+ systems/capabilities affected by the AWS-3 transition that must relocate, compress into, or share spectrum

***How do we maintain operational capabilities
in the face of increasingly congested and contested spectrum environments?***

Spectrum Access R&D Program

- **DoD has entered into an Other Transaction Agreement (OTA) with the National Spectrum Consortium**
 - Purpose of the OTA is to bring spectrum access improvement through collaboration with industry faster to meet rapidly evolving requirements
 - First task was assessing submitted technical concepts to identify potential projects for funding
- **First portfolio for funding is currently review for funding**
 - A request for technical concepts to address these risks was released in July 2015 and the received concepts were assessed by teams of DoD and NSC subject matter experts
 - Industry, academia, and DoD entities are eligible to submit technical concepts
 - Synthesized portfolio received Senior-level approval in December 2015
- **Portfolio is comprised of 32 projects representing \$500M**
 - Per OMB guidance, portfolio is being reviewed in two “tranches”
 - First tranche was given initial review in February 2016, second tranche in March 2016
 - Entire package will be submitted for funding in March 2016
 - Two projects require additional work and will include a second call for technical concepts:
 - Real Time Spectrum Management: ability to resolve technology and policy interdependencies
 - ACTS Optimization: ability to pursue additional transition strategy beyond sharing and compression

EMS S&T and R&D Focus: Initial Sharing Technologies



National Advanced Spectrum and Communications Test Network (NASCTN)

- Spectrum Sharing Through Collaboration
- One stop shop for coordinating and integrating government, academia, and commercial capabilities to facilitate trusted testing of spectrum sharing technologies
- Mission: Increase Federal and commercial spectrum access by accelerating the development of spectrum sharing technologies
- Goal: To create an environment of trust to support impartial testing and evaluation of new spectrum sharing technologies and, ultimately, balanced policy decisions that are driven by scientifically sound tests and evaluations
- Benefits: Access to 23 test ranges, 3 service labs plus DARPA, Speed to meet tight time constraints, and more.....



TECHNOLOGY, POLICY, ENGINEERING WORKING TOGETHER