Before the
UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, D.C. 20230

In the Matter of	)	
5G Challenge Notice of Inquiry	)	Docket No. 210105-0001
	)	

COMMENTS OF THE NATIONAL SPECTRUM CONSORTIUM

Sal D'Itri,
Chair

Randy Clark,
Vice Chair

National Spectrum Consortium

315 Sigma Drive
Summerville, SC 29486
P. 843.760.3344

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The National Spectrum Consortium ("NSC")[1] is pleased to offer, via these comments, strategies the National Telecommunications and Information Administration ("NTIA") can employ, in collaboration with the Department of Defense ("DoD") 5G Initiative, to structure a 5G Challenge that will accelerate the development of an open 5G stack ecosystem in support of Department of Defense missions.[2] NSC is a unique 400+ member organization that is a collaboration between the defense industry, wireless industry, academia, and government partners to accelerate research, development, and prototyping for advanced wireless technologies. NSC is actively working with government, academia and industry to solve the nation's toughest challenges related to enabling 5G and beyond, and was recently awarded a five-year, $2.5 billion "Spectrum Forward" Other Transaction Agreement ("OTA") to continue to invest in the development of a new wave of capabilities that will once again redefine the technology landscape. NSC strongly supports NTIA's exploration of the creation of the 5G Challenge.

In these comments, NSC highlights the critical role of collaboration between the federal government, industry, and academia in facilitating the development and deployment of advanced wireless technologies, including 5G, and encourages NTIA to create a 5G Challenge that: (1) facilitates broad participation and leverages cross-functional research and development, by permitting and encouraging consortia such as NSC to participate; (2) establishes clear goals and criteria at the outset, including with respect to funding of the 5G Challenge and the technology developed by participants. Any 5G challenge should make clear the degree to which such technology will be available for dual-use purposes in order to maximize the benefit of the 5G Challenge for the U.S. Government and industry alike. Ultimately, a challenge that results in technologies and ecosystems that cross between government and industry will have a multiplying effect on the economic activity that such

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[1] *See* https://www.nationalspectrumconsortium.org/.

[2] 86 Fed. Reg. 1949 (Jan. 11, 2021) (the "NTIA Notice of Inquiry").

technologies enable – from new research and development, to new applications, to new services and the thousands of uses they enable.

Finally, NSC appreciates NTIA's and DoD's focus on the open 5G stack and believes that government and industry collaboration can be very helpful in producing robust standards for dual use cases, including for zero trust architectures to help ensure security across both government and commercial networks. By working through collaborative organizations, like NSC, that incorporate large and small industrial players – including non-traditional contractors and our Nation's top academics in this space – NTIA can enhance the Challenge and ultimately further support a robust U.S. ecosystem for 5G and beyond.

I. The 5G Challenge Should Maximize Participation and Facilitate NTIA and DoD Access to NSC's Diverse and Expert Membership by Permitting Consortia to Participate.

NTIA asks in its Notice of Inquiry how the 5G Challenge could be structured to "encourage more participation in open 5G stack development including encouraging new participants, and identify any roadblocks to broader participation."[3] In NSC's view, one crucial means by which the 5G Challenge could readily and effectively enable broader participation is by encouraging consortia such as NSC to participate. By doing so, NTIA and DoD could leverage the fact that these groups exist today and can efficiently bring together experts from industry and academia. Indeed, consortia such as NSC can provide evaluation of domestic suppliers of 5th and future generations of wireless communications equipment, engage with the private sector about 5G production issues, share information about systems and infrastructure, participate in standards' setting bodies, enable joint testing environments, and enable research and development in close partnership with the federal government, academia, trusted suppliers and strategic partners.

Permitting these groups to participate in the 5G Challenge would further allow for government and private sector collaboration across all stakeholders, including smaller and non-traditional contractors that are developing new technologies and creating test beds alone, or in combination with existing contractors or service providers. Collaboration among a diversity of companies, academics, and government users, has generated, and will continue to generate, fruitful innovations for 5G and beyond. Such collaboration in the context of the 5G Challenge could also potentially lead to improved interoperability among technologies, standards, industries, and use cases.[4] By leveraging groups like NSC, NTIA would better and more efficiently leverage their expansive resources and membership.

Such an approach would also allow the 5G Challenge to take advantage of the fact that the federal government, including DoD, has a key role in the development and wide-scale

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[3] *Id.* at 1950.

[4] *Id.* (seeking comment on the "incentives in open 5G stack ecosystem development that would maximize cooperation and collaboration, promote interoperability amongst varied open 5G stack components developed by different participants").

adoption of next-generation wireless technologies such as 5G.[5] In particular, DoD has been an early adopter of 5G technology and has taken a significant leadership role in the development and deployment of such technology through its 5G Initiative and its recent award of its Spectrum Forward OTA to NSC. Spectrum Forward will facilitate a partnership between the U.S. technology and industrial base and the U.S. Government to develop dual-use technologies across a range of advanced technologies that rely upon electromagnetic spectrum, from machine learning, to autonomous navigation, to next-generation radio access networks. By permitting and encouraging consortia such as NSC to participate in the 5G Challenge, NTIA could build on this existing program to further stimulate research and development of 5G and other next-generation wireless technologies.

To that end, the below provides background on NSC and describes its ongoing critical 5G research, prototyping, and testbeds, as an illustration of the effectiveness of the consortium model and the potential impact of leveraging NSC's diverse membership and existing infrastructure for collaboration and cross-functional research and development on the breadth of participation in the 5G Challenge.

A. **Background on NSC.**

NSC was formed in 2015 to facilitate a five-year, $1.25 Billion, Section 815 Prototype OTA with DoD, executed through the Office of the Deputy Assistant Secretary of Defense, Emerging Capabilities and Prototyping. NSC was established as a critical source of research, development, and prototyping that leverages traditional defense contractors – and importantly non-traditional contractors – in commercial industries, plus academic leaders for world-class research institutions. It is this makeup that makes NSC incredibly unique – its 402 members represent a breadth and depth of wireless expertise across industries, academia, and non-traditional defense contracting unlike any other contracting organization in the U.S.[6]

In December 2020, DoD awarded its five-year, $2.5 billion Spectrum Forward OTA to NSC. Pursuant to the OTA, NSC plays an important role in the development of new wireless technologies, fostering collaboration between the government and the private sector to identify critical needs in wireless systems and services, and developing effective solutions. Indeed, NSC's mission is to foster collaboration among government, industry and academia to identify, develop, prototype and demonstrate enabling technologies that will broaden both government and commercial access to, and use of, spectrum and technologies for 5G and beyond.

The DoD is deeply involved in evaluating and researching 5G technologies through its OTA with NSC, in large part because of the vendor diversity, academic participation, and expertise within NSC's membership. NSC recognized from the beginning that leadership on advanced spectrum, radio and networking technologies, artificial intelligence, and cybersecurity is found in a variety of settings – small start-up technology companies, major

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[5] *Id.* (asking how the 5G Challenge could be structured to "take advantage of DOD's role as an early U.S. Government adopter of 5G technology").

[6] A full list of current NSC members is attached in Appendix A.

telecommunications carriers and vendors, traditional government contractors, and academia. NSC members are required to be cleared through the Defense Logistics Agency Joint Certification Program, which allows members to access unclassified export controlled technical information.

Beyond its diverse vendor community, NSC resources include our Nation's leading technologists, engineers, scientists, manufacturers, and program managers from industry, academia, and government. These individuals already are working together through NSC to solve the toughest problems facing the nation with regard to 5G and future radio and network technologies, accessing scarce spectrum resources and securing our wireless networks. NSC's efforts are enabling the development and demonstration of dynamic spectrum access and sharing technologies on a timescale far more efficient than traditional approaches, facilitating early and impactful action.

Success for NSC has been driven by bringing all these diverse players together to help facilitate and accelerate technology transformation. In view of all its ongoing 5G work, its broad and diverse membership, and its research and partnerships, NSC hopes that NTIA will leverage the existence of consortia such as NSC to maximize participation in, and the success of, the 5G Challenge by permitting and encouraging such consortia to take part.

B. Examples of Ongoing 5G Research, Prototyping, and Testbeds.

NSC has, to date, granted individual awards for DoD projects ranging from $360,000 to $60 million. Many of the 80 awarded projects[7] are essential to 5G success, including, just by way of example – prototyping of new radio hardware and elements of 5G testbeds, design and operation of a localized, private 5G mobile cellular network, 5G network enhancements, monitoring for spectrum coexistence and sharing, integrating network intelligence via machine learning, and advancing phased array and MIMO antenna technologies.

Through NSC, the DoD recently released the following 5G Requests for Prototype Proposals ("RPPs"), calling on NSC members to develop technology related to dynamic spectrum sharing that is critical for 5G, at testbeds established at Hill Air Force Base and a Utah Test and Training Range:

- NSC-20-2070 – 5G Prototype Testbed to design, construct and operate a localized, private full scale 5G mobile cellular network in order to evaluate the impact of the 5G network on airborne radio systems.

- NSC-20-2080 – 5G Prototype Enhancements specifically to enhance dynamic spectrum sharing and spectrum co-existence capabilities.

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[7] *See, National Spectrum Consortium, Project Awards, available at* *https://www.nationalspectrumconsortium.org/project-awards/.*

- NSC-20-2090 – 5G Prototype Applications to design, construct and deploy a Spectrum Coexistence and Sharing (SCS) system to identify and demonstrate deployable SCS.

In addition, in 2020, through NSC, DoD issued two 5G Smart Warehouse RPPs for technology development at the Marine Corps Logistics Base in Albany, Georgia and Naval Base San Diego, and a third RPP for Augmented Reality/Virtual Reality prototypes at Joint Base Lewis-McChord in Washington state. All NSC members in good standing are permitted to submit proposals in response to RPPs, and there is broad participation across the membership.

As illustrated above, NSC's consortium model and diverse membership offer NTIA and DoD a ready structure that fosters and promotes federal/non-federal research on 5G, affords access to the Nation's top scientists, provides valuable research results, and provides avenues and diverse partners for the research and development activities that will ensure a successful 5G Challenge.

II. NTIA Should Clearly Articulate the Goals, Criteria, Funding Amounts and Mechanisms, and Availability of Developed Technology for Dual-Use Purposes at the Outset of the 5G Challenge.

NTIA can also encourage broad participation in the 5G Challenge by establishing and clearly articulating the parameters of the Challenge at the outset, so that all stakeholders and prospective participants have a common understanding and can prepare proposals and conduct their research and development accordingly.

First, NTIA should develop and provide to all prospective participants a well-defined set of goals and priorities for the Challenge, including with respect to the portions of the open 5G stack that are of particular interest or concern to NTIA and DoD, the importance of interoperable solutions, or the like. Specifically, this set of goals and priorities should clearly state of the areas of development within the open 5G stack that are to be the focus of the Challenge, including software, hardware, system architecture, interoperability, standards, and security. Providing such clarity will enable all possible participants to appropriately align their capabilities with the goals of the Challenge. By contrast, without a clear articulation of the goals in advance of the submission of proposals, the Challenge would be unlikely to generate proposals sufficiently targeted at the issues of concern to NTIA and DoD, and thus would likely fail to maximize the potential benefit of the Challenge to government and industry stakeholders alike.

Second, NTIA should state clearly the criteria by which proposals will be judged and selected, as well as the criteria by which any ongoing judging will occur. This information should also provide clarity as to how technology developed in the context of the 5G Challenge will be used and funded. Such clarity will allow prospective participants to appropriately develop and submit proposals that are consistent both with the goals of the Challenge and the criteria by which participants will be selected, and to design projects whose scope is consistent with the Challenge funding amounts and mechanisms. To further facilitate the broadest possible

participation, NSC encourages NTIA and DoD to ensure robust funding for Challenge participants, which will enable a larger universe of prospective participants—including smaller and start-up ventures, as well as academic institutions—to develop and submit proposals that aim to satisfy the goals of the Challenge.

Third, NTIA should strongly consider that the technology developed in the context of the Challenge should be available for commercial licensing upon the conclusion of the Challenge, for use by government and industry broadly. Specifically, NTIA should seek to ensure, through its parameters for the Challenge and the selection criteria, that any standards and technology developed during the Challenge are not bespoke, use-case-specific solutions targeted at solely a DoD or federal government need. Such an outcome would significantly inhibit adoption of any such standards or technology, and instead would only exacerbate the problem NTIA has correctly identified with respect to the fact that "different open 5G stack organizations are focused on different portions of the stack, with no clear division among the multiple implementations currently available . . . the various implementations are often created with the intention to be used with code sourced from a single organization, where interoperability among the community's implementations is not guaranteed."[8]

The development of such bespoke standards and technology through the Challenge would also greatly limit their dual-use potential, to the detriment of both federal government users and industry writ large.[9] This is particularly true for zero trust architectures, which NTIA and DoD could help stimulate by supporting the implementation of such architectures in federal and non-federal technologies, systems, and standards. Indeed, 5G technologies hold particular promise for dual-use applications. Although the goals for government use of 5G and commercial use of 5G do not always align, such alignment of goals is not essential. By design, 5G technologies can meet myriad commercial and federal goals and use cases, without significant modification.[10] Commercially, 5G technologies can enable fixed and mobile services, the Internet-of-things, vehicle communications, smart grid, and countless other services. By nature, these technologies can serve similar purposes to meet federal needs. These technologies are fundamentally focused on providing wireless connectivity for any application, with any bandwidth requirement, and any quality of service demands. NTIA should therefore ensure that its parameters for the use of technologies developed during the Challenge promote the development of these dual-use technologies, which will intrinsically lead to improved capabilities and utilities for 5G across both commercial and government uses, and will accelerate development of 5G and future wireless technologies for our nation.

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[8] NTIA Notice of Inquiry at 1950.

[9] *Id.* (asking how the Challenge could be structured to "provide dual benefit to both the Government and the open 5G stack market").

[10] As NTIA is aware, 5G differs in character significantly from prior networking technologies due to its ambitious reach into societal and economic spheres well-beyond mere network provisioning and attendant services by an operator. However, the advent of 5G networks and technologies, combined with increased intensity of spectrum sharing between federal and non-federal users, has changed this paradigm to the benefit of both federal agencies and the commercial sector.

III.   Conclusion.

NSC strongly supports NTIA's exploration of the creation of a 5G Challenge, and encourages NTIA to act expeditiously to establish and commence the Challenge. For the foregoing reasons, NSC urges NTIA to: (1) permit and encourage consortia and other formal or informal groups to participate in the Challenge, to best leverage their expertise and existing infrastructure for cross-functional collaboration and development; and (2) clearly articulate the parameters for the Challenge, particularly with respect to goals and priorities, criteria for selection of proposals, and funding and use of technologies developed during the Challenge, to enhance participation and ensure that proposals are appropriately designed and scoped. By taking these steps, NTIA will encourage broad participation in the Challenge and maximize its potential to facilitate the development of robust, scaled, secure open 5G stack solutions that inure to the benefit of all U.S. 5G stakeholders, including both the federal government and industry.

Appendix A:
List of Current Active NSC Members

1901 Group, LLC
Aarna Networks, Inc.
AASKI Technology, Inc.
Abside Networks, Inc.
Accenture Federal Services LLC
Adjacent Link LLC
Advanced Ground Information Systems, Inc.
AECOM Management Services
Aeronix, Inc.
Aerospace Corporation, The
Aether Argus Inc
AiRANACULUS
Alion Science and Technology Corporation
All Purpose Networks LLC
American Systems Corporation
ANDRO Computational Solutions, LLC
Anokiwave, Inc.
Anritsu Company
Ansys, Inc.
Antenna Research Associates, Incorporated
AnTrust
Aperio Global, LLC
Applied Technology Associates
Aqsacom Incorporated
Arizona State University
Aspen Consulting Group
Associated Universities, Inc.
Astrapi Corporation
AT&T Corp.
AT&T Government Solutions, Inc
ATDI Government Services, LLC
Athena Technologies, LLC
Augmntr, Inc.
Augustine Consulting, Inc. (ACI)
AuresTech Inc.
AVANTech Inc
AVT Simulation
Axellio Inc.
BAE Systems
Ball Aerospace & Technologies Corp
BANC3, Inc
Baylor University
Bear Systems
Beartooth Radio,Inc.
Beatty and Company Computing Inc.
BlackHorse Solutions Incorporated
Blackwatch International
Blue Danube Systems, Inc.
Boeing Company
Boonton Electronics, A Wireless Telecom Group Company
Booz Allen Hamilton Inc.
Bridge 12 Technologies
BridgeSat Inc.
Brigham Young University

Cambium Networks, Inc
Capraro Technologies, Inc.
Catholic University of America, The
CellAntenna Corporation
Celona Inc
CesiumAstro
CGI Federal Inc.
Charles Stark Draper Laboratory, Inc., The
Chesapeake Technology International Corporation
Ciena Government Solutions, Inc.
CIPHIR-TM, LLC
Cirrus360 LLC
Cisco Systems, Inc.
Cobalt Solutions Inc.
Cobham Advanced Electronic Solutions
Cohere Technologies, Inc.
Cole Engineering Services, Inc. (CESI)
Collins Aerospace
Colorado Engineering Inc.
Colorado Engineering, Inc.
Columbia University
CommScope
Comsearch
ComSovereign Corp.
Comtech Mobile Datacom Corporation
Concurrent Technologies Corporation
Conductive Composites Company
Connected Devices
Consolidated Resource Imaging LLC (CRI)
Corner Alliance, Inc.
Corning Specialty Materials
Corvus Consulting, LLC
Creative Digital Systems Integration, Inc.
CRFS Inc.
CTIA - The Wireless Association
Cubic Defense Applications, Inc.
Cybernet Systems Corporation
DEEPSIG Inc.
Dell Federal Systems L.P.
Deloitte Consulting, LLP
Device Solutions Inc
Digital Global Systems, Inc
DTC Communications, Inc.
Dualos, LLC
Dynetics, Inc.
EFW, Inc.
Eigen Wireless
Electronic Design and Development Corp (ED2)
Emerging Technology Ventures Inc.
Enveil, Inc.
EPIC Scientific
Epiq Solutions
EpiSys Science, Inc.
Epsilon Systems Solutions

Erebus Solutions Inc.
Ericsson, Inc.
Eridan Communications, Inc.
eSimplicity, Inc.
EWA Government Systems Inc.
Ewing Engineered Solutions
Expression Networks LLC
Federal Data Systems LLC (FEDDATA)
Federated Wireless
Fenix Group, Inc.
Florida Atlantic University
Freedom Technologies, Inc.
Frequency Electronics, Inc
Garou Inc.
GATR Technologies
GBL Systems Corporation
GE Research
General Dynamics Information Technology, Inc.
General Dynamics Mission Systems, Inc. (GDMS)
GenOne Technologies LLC
GenXComm, Inc.
Geon Technologies, LLC
George Mason University
Georgia Tech Applied Research Corporation
GIRD Systems Inc.
Global Technical Systems
Gonzaga University
GPS Source, Inc.
Granite Telecommunications
GreenSight Agronomics, Inc.
Hanwha International LLC
Harris Corporation
Harris Corporation RF Communications Division
HawkEye 360, Inc.
Herrick Technology Laboratories, Inc
Herrick Technology Laboratories, Inc.
Hewlett Packard Enterprise Company (HP)
Honeywell International, Inc.
HRL Laboratories, LLC
Huckworthy LLC
Hughes Network Systems, LLC
IAI, LLC
IERUS Technologies, Inc.
IJK Controls LLC
IMSAR LLC
InCadence Strategic Solutions
Indiana Microelectronics, LLC
Innovative Power LLC
Institute for Building Technology and Safety (IBTS)
Integration Innovation Inc. (i3)
Intel Federal LLC
Intelligent Automation, Inc.
Intelligent Fusion Technology, Inc.
Intelsat General Communications LLC
InterDigital Communications
Intuitive Research and Technology Corporation
IOMAXIS, LLC
iPosi Inc.

Iron Bow Technologies, LLC
IT Consulting Partners, LLC (ITC)
ITAMCO
Jacobs Technology
James River Design & MFG LLC
Janus Communications
JANUS Research Group, LLC
JC3 LLC
John Mezzalingua Associates, LLC
Johns Hopkins University Applied Physics Laboratory
Kenjya-Trusant Group, The
Key Bridge Wireless
Keysight Technologies, Inc
KinetX, Inc.
Knowledge Based Systems, Inc
Knowledge Management Inc.
KPMG LLP
Kumu Networks
L3 Communications
L3 Communications Systems East
L3 Communications Systems West
L3 Communications Telemetry West
Laulima Systems
Leidos, Inc.
LGS Innovations (CACI)
LinQuest Corporation
LocatorX, Inc.
Lockheed Martin Corporation
Logistics Management Institute (LMI)
LS telcom Inc.
M2 Technology, Inc.
Mantech Advanced Systems International Incorporated
Mavenir Systems, Inc.
MaXentric Technologies, LLC
McKean Defense Group
MegaWave
Mercury Systems, Inc.
Metamagnetics Inc.
MicroHealth, LLC
Micron Technology Inc.
Microsoft Corporation
Mimyr, LLC
Mississippi State University
MixComm, Inc.
Mobilestack, Inc.
Motorola Solutions, Inc.
National Instruments Corporation
NEC Corporation of America
NetApp, Inc.
NetObjex Inc
NetScout Systems, Inc.
New Mexico State University
NewEdge Signal Solutions LLC
Nexagen Networks Inc
NextGen Federal Systems, LLC
Nokia of America Corporation
North Carolina State University
Northeast Information Discovery, LLC (NEID)

Northeastern University
Northern Arizona University
Northrop Grumman Systems Corporation, Electronic Systems
NorthWest Research Associates, Inc.
Novaa Ltd
Novowi LLC
NTS Technical Systems
Numerati Partners, LLC
Nuvotronics, Inc.
NVIDIA Corporation
NxGen Partners Manager, LLC
Oceus Networks Inc.
Old Dominion University Research Foundation
Omnispace
Opex Systems LLC
ORSA Technologies, LLC
OST, Inc.
Otava, Inc.
Pacific Antenna Systems LLC
Pacific Star Communications, Inc.
PAE Applied Technologies
Palo Alto Networks Public Sector, LLC
Parallel Wireless, Inc.
Parry Labs, LLC
Parsons Government Services, Inc.
PathFinder Digital LLC
Pathfinder Wireless Corp.
Paul Christoforou dba Lociva
Peraton, Inc.
Peregrine Technical Solutions, LLC
Persistent Systems, LLC
Perspecta Labs
Phase Sensitive Innovations, Inc.
Photonic Systems, Inc.
Physical Optics Corporation
Pi Radio Inc.
Pinnacle Solutions, Inc.
PlusN, LLC
Pn Automation, Inc.
Polaris Alpha Advanced Systems, Inc.
Power Fingerprinting Inc.
Purdue University
Q Networks, LLC
QinetiQ, Inc.
Qorvo Texas, LLC
QRC Technologies
Quantum Dimension, Inc.
Qubitekk, Inc.
Qwest Government Services, Inc. dba CenturyLink QGS
Radiance Technologies, Inc.
Rajant Corporation
Rakuten USA, Inc.
RAM Laboratories, Inc.
Rampart Communications, Inc.
Raven Wireless, LLC
Ravenswood Solutions
Raytheon Company

RDA Technical Services (Robert Doto Associates, LLC)
Red Hat Professional Consulting, Inc.
ReFirm Labs, Inc.
Resonant Sciences LLC
Rivada Networks LLC
Riverside Research Institute
RKF Engineering Solutions, LLC
Roberson and Associates LLC.
Rodriguez, Jonathan
Rohde & Schwarz USA, Inc.
RT Logic
RunSafe Security, Inc.
Rutgers, The State University of New Jersey
S2 Corporation
SA Photonics, Inc.
Sabre Systems, Inc.
Samsung Research America, Inc.
Science Applications International Corporation (SAIC)
Scientific Research Corporation
SecureG, Inc
Selex Galileo Inc
Sentar, Inc.
Sentrana
Shared Spectrum Company
Shipcom Federal Solutions, LLC
Siemens Industry Software, Inc
Sierra Nevada Corporation
Signal Hound, Inc.
Signal Point Systems, Inc.
Signal Processing Technologies, Inc.
Silvus Technologies, Inc.
Simba Chain, Inc.
Skylark Wireless, LLC
Social Mobile
SOLUTE, Inc.
Southern Methodist University
Southern Research
Southwest Research Institute
Space Exploration Technologies Corp
Spectral Labs Incorporated
Spectrum Bullpen, LLC
Spirent Communications, Inc.
Sprint Solutions, Inc.
SRC Inc.
SRI International
SSC Innovations
Starry, Inc.
Stevens Institute of Technology
Strategic Data Systems, Inc.
Stratom, Inc.
Summation Research, Inc.
Syncopated Engineering Inc
Synoptic Engineering, LLC
Systems & Technology Research, LLC
T-Mobile
T2S, LLC
Technology Service Corporation
Technology Service Corporation (TSC)

Technology Unlimited Group
Techximius Corp
Terry Consultants, Inc.
Texas A&M Engineering Experiment Station
Textron Systems Corporation
Thales Defense & Security, Inc.
The Kenjya-Trusant Group, LLC
The University of Texas at Dallas
Thinklogical, LLC
Tilson Technology Management Inc
TITENN Inc
TLC Solutions, Inc.
Toyon Research Corporation
Trabus Technologies, Inc.
TrellisWare Technologies
Trex Enterprises Corporation
Tribalco, LLC
TrustComm, Inc.
Two Six Labs, LLC
Ultra Communications, Inc.
Undergrid Networks, Inc.
University at Albany
University at Buffalo
University of Arizona - Electrical and Computer
Engineering
University of Colorado Boulder
University of Illinois
University of Kansas Center for Research, Inc.
University of Mississippi
University of Notre Dame (Wireless Institute)
University of Oklahoma
University of South Carolina

University of Texas at San Antonio
University of Virginia
University of Washington
US Ignite, Inc.
UTRC
Vectrona, LLC
Vectrus Mission Solutions Corporation
Veritech, LLC
Verizon
Verus Research
ViaSat Inc.
Viavi Solutions Inc
Virginia Tech Applied Research Corporation
Vision Engineering Solutions, Inc.
VIStology Inc.
Vitruvian Labs, LLC
Vmware, Inc
W5 Technologies, Inc.
Waterleaf International LLC
WaveLink, Inc.
Whitney Strategic Services, LLC
William Marsh Rice University
Wind River Systems
Wind Talker Innovations, Inc.
Wireless @ Virginia Tech
Wireless Research Center of North Carolina
World Wide Technology, Inc.
Wyle Laboratories, Inc.
X-COM Systems LLC
XCOM-LABS, INC.
Zoic Labs, LLC
Zylinium Research LLC