

CAPABILITY STATEMENT

Cage Code: 95PU7

SAM Unique ID: URVSUGMSVM17

Contact Information

Ruffy (Rafi) Zarookian, Founder

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<https://www.signalsystemmanagement.com>

Past Performance

OUUSD R&E (Sub-ctr)

NTIA (5G Challenge awardee)

DeepSig, Inc

Jacobs/Blacklynx

Differentiators

Unique blend of government and commercial wireless experience. Mission Critical software defined radio, commercial wireless product development.

Contract Vehicles

CABIS IDIQ (sub-ctr)

Certifications

Certified Small Business

Keywords

5G NR, 4G, LTE, WCDMA/UMTS, GSM,

CDMA2000, IS-95, EVDO, 3GPP

Cellular, Push to Talk, Satellite

Communications Systems, RAN, 5GC

VoIP, SIP, RTP, RTCP, geo-location, and

direction finding (DF)

Software Defined Radio (SDR), Software

Defined Networks (SDN)

DDoS Defense, Zero-Day DoS Defense,

Software Defined Networks

C, C++, Python, Java, Google Protocol

Buffers, Design Patterns

Git, Docker, GovCloud, C2S, Hybrid Cloud



Signal System Management

Secure 5G and FutureG Solutions

Signal System Management, LLC is a **certified small Business Administration (SBA) firm**. We provide product development, advanced research, data analysis, and cybersecurity services. We perform prototype development and productization for government and commercial sectors.

Commitment

We are committed to mission success and technology transition. We pursue research and product development that we believe has a high mission impact or high likelihood of broad commercial success.

Services

Cyber

We are experts in multi-domain cyber security with a proven track record for advanced R&D for network security, threat modeling, software defined networking, Denial/Degradation of Service Defense, and practical tactical product development for wireless technologies.

Wireless

We offer a full suite of services from idea to commercialization of advanced wireless topics. Our services include ideation, modeling/simulation, prototype development, hardware/software development, lab setup, system integration, test plan development and final acceptance test execution.

Analytics

From traditional techniques such as Bayesian inference and Markov modeling to the latest in Machine Learning including Natural Language Processing and Neural Networks our experts can help you find the proper analysis tools and techniques to solve your problems.

Software Development and Dev Ops

Our team is well versed in state of the art software methodologies including Software as a Service, Machine as a Service, orchestration, and virtualization. And we are well versed in low level system programming and hardware/software integration.

Products

Cloud Virtual 5G

Our suite of products include a 5G Centralized Unit (CU), 5G Core (5G), and 5G Management and Orchestration Solutions (MANO) for physical or virtual deployment of private or public networks. We offer customized solutions for commercial or government deployments.

5G In a Box

Get up and running fast with our 5G in a Box solution. Our 5G in a Box includes everything you need to begin end to end experimentation with a commercial handset including RF Isolation Chamber, Radio Transceivers, Handsets, SIM Cards/Burners, and Servers for the 5G Radio Access Network and the 5G Core.

NAICS: 541715, 334220, 541330, 541511, 541512, 541618, 541690, 541990

We are available to discuss your requirements and answer any questions.



Key Personnel

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Our principal investigator Dr. Patrick McNeely has worked in data science, cybersecurity, and computational biology for nearly 10 years. In that time, he has worked on numerous projects, including network and software cybersecurity DARPA programs (including XD3, EdgeCT, LADS, and others), as well as bioinformatics projects in conjunction with George Washington University, FDA, and NIH. Pat received his master's in chemical engineering and Ph.D. in chemical engineering at the University of Delaware graduating summa cum laude with an undergraduate in chemical engineering from North Carolina State University.

Pat's experience relevant to the proposed scope of work includes abstract network and graph modeling, network testbed development, applied machine learning, and capture and analysis of running software. Specific experience includes design of probabilistic network failure and response, as well as writing the base code modeling the same system. Pat has contributed heavily to the CABIS IDIQ program under Jacobs/Blacklynx where he has developed a novel technique to classify 3GPP networks to assess their risk profile. Patrick's vast knowledge in orchestration and Docker as well as his sound multi-disciplinary research and testing experience will be instrumental in assisting in the overall design of our solution and support its implementation.

Ruffy Zarookian founded Signal System Management in August 2021 after becoming frustrated with the state of Stand-Alone 5G development in the commercial and government sectors. He comes from one of the most innovative AI based 5G RAN, DeepSig. Before this he spent 4 years pursuing DARPA research as a Principal at Apogee-Research where he investigated cybersecurity aspects for Software Defined Networks, novel DDoS defenses, and vulnerability analysis. This was preceded by a career in producing software defined radio products for government customers at Digital Receiver Technologies (a wholly owned subsidiary of The Boeing Company). Ruffy Zarookian received his undergraduate degree from Virginia Polytechnic and State University and his master's degree in electrical engineering is also from Virginia Tech. His master's thesis studied the feasibility of non-cooperative spectrum sharing between wireless networks and airborne weather radar. His collaborations with the Wireless @ VT (formally the Mobile Portable Radio Research Group (MPRG)) included modeling a ray tracing direction finding algorithm, and defining novel data structures for managing collaborative spectrum sharing.

Gareth Rader comes to us from Colorado University where he is majoring in Computer Science and Music. At Signal System Management he is responsible for our continuous integration and continuous delivery pipeline of our cloud based commercial products. Before joining us, he worked at NIST to maintain a full stack codebase including FGPA, microcontroller code, and GUIs for spectroscopy phase lock lasers and other embedded systems. His programming languages include C++, JavaScript, Java, Python, Docker, AWS, and DevOps.

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Relevant Work

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Our key personnel have experience in software modeling of complex computer networks as performers on the DARPA I20 EdgeCT and XD3 programs. In both programs we conducted research, defined a model, and implemented a working prototype using distributed controllers. In EdgeCT our distributed controller measured the network state and took actions to optimize parameters of loss, latency, and delay based on a mission plan. This software defined network showed resiliency to link degradation and link interruptions. On the XD3 program we defined the model and implemented a working prototype of a non-Bayesian reputation-based system that could defend against a low and slow degradation attack. To our knowledge this solution, published in the paper, "The NNBC Anti-DDoS Firewall" is still state of the art (Frazier, et al., 2019).

At Ruffy Zarookian and Dr. Patrick McNeely contributed to the OUSD R&E CABIS IDIQ effort where we studied security implications of new 5G technologies such as virtual network functions (VNF) and how to protect US person's information on untrusted 5G networks. During this time, Dr. Patrick McNeely developed a novel method for creating a "signature" of the network to quantitatively and qualitatively evaluate the security risk potential of that network.

For multiple customers including DeepSig and Jacobs/Blacklynx we established and supported lab operations for 5G End to End Testing using proprietary and open source hardware and software.



Facilities

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Our location in McLean, Virginia is equipped with a multi-node computer cluster for on-site compute and our 5G Lab.

Our 5G Lab includes an end-to-end SA/NSA and 4G LTE systems including Open Air Interface and SRSRan. This end-to-end system is both a development environment and testbench for 5G components, both virtual and physical. We have all equipment necessary to stand-up, run, and operate end-to-end 5G networks including servers for the RAN, servers for the 5GC, radios for the RU, servers for MANO, equipment for SIM card activation, and commercial UEs. Being fully containerized and virtualized our implementation is cloud native which makes available cloud providers including GovCloud providers such as Amazon, Google, and Microsoft to expand the capabilities of the compute cluster and lab on demand.