S&T Campaign: Information Sciences  
*Networks and Communications*

Dr. Robert Drost, (301) 394-0158  
robert.j.drost6.civ@mail.mil

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**Research Objective**

- Fundamental study of ultraviolet (UV) and visible light communications (VLC) channel modeling and system design with experimental validation
- Modeling and analysis of hybrid networking
- Prototype development for experimentation and demonstration to promote transition

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**Challenges**

- High link loss inherent in long-range UV channel
- Complex atmospheric channel in NLOS UV links
- Unconventional design constraints (e.g., UV safety and perceived visible-light emission)
- Limited experimental data for modeling & design
- Lack of commercial off-the-shelf components for UV system development

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**ARL Facilities and Capabilities Available to Support Collaborative Research**

- NLOS UV channel modeling framework  
- UV communication system analysis  
  - End-to-end link modeling
  - System design tradeoffs (e.g., rate/range/pointing)
- Patent-pending RGB visible light communication modulation design approach  
- UV channel-sounding measurement systems developed with academic collaborators  
  - Short-distance systems employing LED transmitters
  - Long-distance system employing pulsed UV laser
- ARL hybrid UV/RF Common Sensor Radio (CSR)  
  - Leverages mature CSR RF radio system with efficient power management & networking protocols
  - UV MODEM enhancement provides UV communication capabilities
  - Experimental platform for UV/RF hybrid networking
  - Demonstrated three-hop RF/UV/RF link

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**Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration**

- Device development: UV LEDs, APDs, & solar-blind filters
- Measurement and communication system development for expanded experimentation
- Rigorous experimental design, execution, and analysis
- Atmospheric modeling

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