

First Responders Group

NEXT GENERATION FIRST RESPONDER APEX PROGRAM



Homeland Security

Science and Technology

MAKING RESPONDERS BETTER PROTECTED, CONNECTED AND FULLY AWARE

MOVING FORWARD, FASTER

Responders today save lives with yesterday's technology—taking obsolete communications and protective gear, and making the best of them to serve their communities. Both responders and American communities deserve public safety services enabled by all the tools technology makes possible.



PROTECTED

Of EMS Providers Surveyed in 2015, **86% Experienced Critical Stress** Related to the Job

56% More Officers Killed in Firearm-Related Incidents in 2016 vs. 2015
68% of Firefighters Get Cancer from Exposure to Contaminants

CONNECTED

70% of Responders Think Data is as Critical as Voice Communications

1 in 10 Rural 9-1-1 Callers Wait Nearly **30 minutes** for Aid
60% of States had 9-1-1 Public Safety Answering Points Targeted by Cyber Attacks

FULLY AWARE

20 states have Adopted and Implemented Next Generation 9-1-1

66% of Responders Say Their Public Safety Networks are Vulnerable to Security Threats
78% of Responders Use Mobile Devices on the Job

VISIONING

459 Smart Cities Projects Planned from 2015 to 2017

Worldwide Public Safety and Security Market Exceeds **\$300 Billion**

34 Billion Devices will be Connected to the Internet by 2020

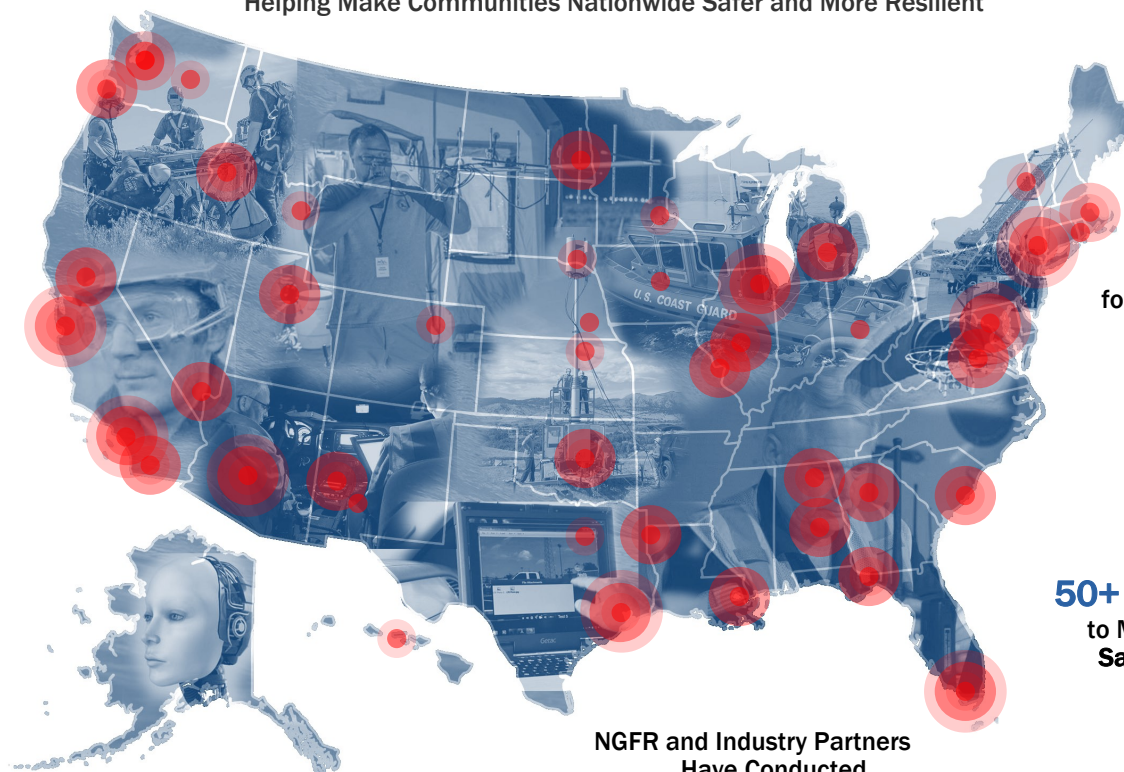
The Next Generation First Responder (NGFR) Apex program seeks to **help tomorrow's first responder be better protected, connected and fully aware**. When firefighters, law enforcement officers and emergency medical services have enhanced protection, communication and situational awareness, they are better able to save lives and make it home safely. **Responders of tomorrow deserve to have the same cutting-edge consumer technologies that civilians routinely use today**. By bringing enhanced capabilities to the public safety space and giving responders the options to build the systems they need for their mission and budget, **DHS S&T is increasing hometown and homeland security**.

NGFR Collaborates with Partners in **44 States** and **5 Foreign Countries** to Develop and Test Game-Changing Technologies

NGFR Partners with **250+ Responder Organizations** to Refine Requirements and Pilot Technologies

NGFR Industry Partners are **65% Small Businesses**

NGFR Works with Local Responders that Represent **46+ Million Americans**, Helping Make Communities Nationwide Safer and More Resilient



NGFR Includes **40+ Projects** for Research, Development, Testing and Evaluation

NGFR Works with **50+ Federal Partners** to Maximize Impact and Save Taxpayer Dollars

NGFR and Industry Partners Have Conducted **15 Pilot Programs**

RETURN ON INVESTMENT

By collaborating with responders and industry, NGFR is helping fulfill responder needs faster. The NGFR Apex program is building value for responders, industry and communities by focusing on three specific areas.

Maximizing Mission Impact While Reducing Costs

- Lowering barriers to help innovators adapt commercial technologies for first responders faster, **increasing the diversity of the First Responder Industrial Base** and lowering costs.
- Partnering with the U.S. Coast Guard and U.S. Border Patrol to **deploy dual-use NGFR technologies** to support federal missions, as well as public safety.
- Leveraging existing public television systems that **reach 97% of the U.S. population** to support datacasting tools that assist responders with sharing video and data, helping to save lives.

Expanding the First Responder Industrial Base

- Helped **26 startups** speed up the time-to-market for responder wearable technology through the **EMERGE Program**—connecting them to investors, manufacturers and responder test beds.
- Joined forces with **5 academic institutions** to leverage student innovation and research.
- Connected NGFR performers to commercialization partners, **increasing the viability of successful transition** to the first responder marketplace.

NGFR Technologies Get Results in Your Communities

- Expanded Houston-area situational awareness by deploying datacasting during Super Bowl LI, the NCAA Final Four and Hurricane Harvey relief, processing **more than 31,000 hours of video**.
- Increased communications resiliency in 15 cities across America by demonstrating vulnerabilities and recommending mitigation strategies. Several communities, including Los Angeles and Houston, have **successfully implemented these tactics to improve their operational efficiency**.
- Augmented rural response capabilities in Grant County, WA, testing deployable networks, drone video surveillance and blue-force tracking, which were **successfully used for search and rescue**.

MAKING FIRST RESPONDERS SAFER AND MORE EFFECTIVE

The NGFR Apex program leverages the best of existing and emerging technologies to enhance first responder protection and safety, enable consistent and secure communications, and provide real-time situational awareness to **avoid and withstand threats encountered during mission response**.

POWERING INDUSTRY AND SPURRING INNOVATION

Our strategy is simple: by defining a suite of open standards for responder technologies, it is easier for industry to develop and integrate diverse communications and sensor networks for responders. By lowering the barriers to entry, the NGFR Apex program is **increasing competition and advancing development of emerging technologies**.

SECURING COMMUNITIES ACROSS AMERICA

Communities rely on first responders, and first responders rely on technologies. NGFR develops the tools that help first responders stay safe, communicate with their peers, and make quick and informed decisions so that when emergencies occur, **not a second is wasted in saving lives and securing American communities**.



NEXT GENERATION FIRST RESPONDER
PROTECTED, CONNECTED & FULLY AWARE

PROTECTED – DEFENDING AGAINST LIFE-THREATENING HAZARDS

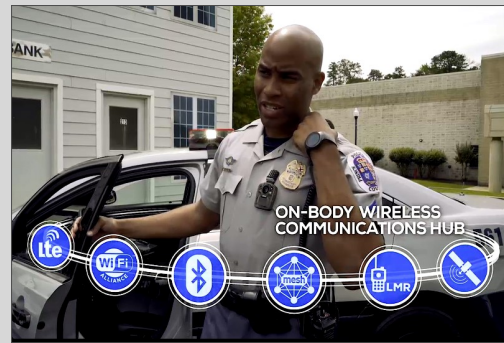
Responders put their lives on the line every day to protect our communities using technologies that have not changed for decades. DHS S&T wants to leverage new technologies that can help keep responders safer in the line of duty. NGFR's Protected portfolio includes: physiological monitoring to understand when responders are in distress; Internet of Things sensors to detect chemical threats, hydration levels or dangerous changes in the incident environment; and advanced protective materials that can protect them against frequent hazards. These tools will assist not only the responders, but also help incident commanders make better decisions to protect their public safety partners.

Physiological Monitoring: First responders may experience significant physiological stress during emergency response. Miniaturized, wearable sensors on responders provide incident command with alerts about an individual's health status and specific hazards at the incident scene—allowing them to extract at-risk responders before they get injured. NGFR is testing a number of different physiological monitoring solutions.

Enhanced Personal Protective Equipment: First responders operate in hazardous environments and are often exposed to unanticipated threats, such as extreme temperatures, sharp objects, toxic chemicals, bodily fluids, fire or HAZMAT conditions. Through advanced textile research, NGFR's enhanced duty uniform protects responders from these hazards.



CONNECTED – HAVING A LIFELINE WHEN IT'S NEEDED MOST



More than any other piece of technology, responders rely on their communications systems to accomplish their mission and stay safe. No matter the emergency, ensuring reliable and resilient voice, video and data communications is a top priority. NGFR's Connected portfolio targets: interoperable communications systems that can reliably exchange messages; deployable networks to give connectivity anywhere, anytime and in any condition; and universal data and interface standards for public safety to make information sharing easy and secure. Our goal is an open plug-and-play system, so responders can build their own Next Generation First Responder system with industry partners.

Communications Hub: An intelligent communications interface that securely and efficiently routes incoming and outgoing information—voice, video and data from radio, cellular and on-body sensors—to the destination using the best available communications pipeline. The NGFR Comms Hub streamlines connectivity and leaves responders free to focus on the mission.

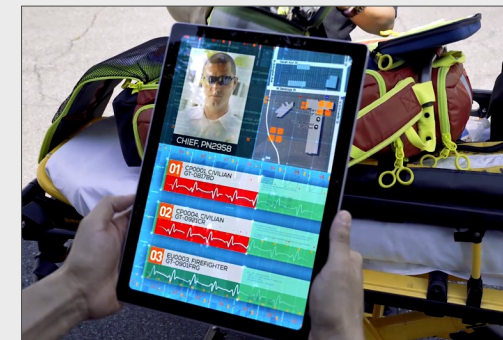
Datacasting: Secure, one-to-many broadcasting for voice, video and data uses available public television spectrum rather than broadband. Datacasting provides more functionality than cellular networks, without bandwidth constraints or commercial cellular costs, and has been successfully deployed to assist with video and information sharing during Super Bowl LI and Hurricane Harvey relief efforts.

FULLY AWARE – MAKING INFORMED DECISIONS THAT SAVE LIVES

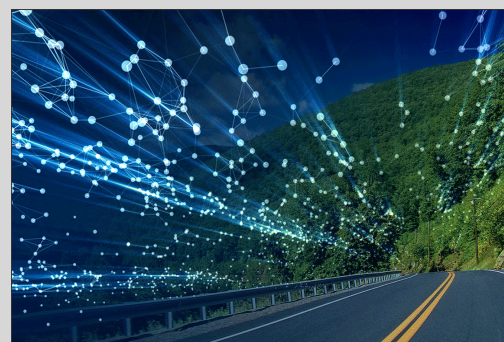
The Internet of Things is here—how can we take sensors, video and endless data and turn it into actionable information that helps first responders make better decisions? By integrating wearables, sensors and remote monitoring, and then analyzing the data they provide, NGFR's Fully Aware portfolio can help convey the right information to responders at the right time. Situational awareness tools can provide critical context even before responders arrive on scene, allowing them to jump into the response already knowing what to do. Every minute saved could mean a life saved, and by enabling better informed incident response, NGFR helps increase responder safety and mission effectiveness.

AUDREY: Next generation communication tools and sensors, while useful, also risk overwhelming or distracting first responders with information overload. NGFR's Assistant for Understanding Data through Reasoning, Extraction and Synthesis (AUDREY) is an artificial general intelligence tool to help sift through the data and extract the key insights responders need. AUDREY performs data mining, analysis and alerting, and manages Internet of Things data, with three current pilot programs.

Interoperable Information Sharing: Voice interoperability is just one part of a mutual aid response. As technology advances, NGFR will help define protocols for streamlined information sharing during coordinated responses, including developing cybersecurity requirements.



VISIONING – FORECASTING RESPONDER TECHNOLOGIES ON THE HORIZON



Technology is rapidly developing and the commercial sector is lightyears ahead of either government or public safety technology. NGFR's Visioning portfolio explores the current and future landscape of technologies that could be applicable to public safety missions, and looks for ways to plug them into NGFR via common data standards and interfaces. Using NGFR's modular and scalable architecture means that new technologies can be more easily integrated into responder systems and adopted faster by the community. NGFR works with start-ups from across the country to test out this model, and helps connect them to first responder partners for field testing and marketing.

EMERGE: Startups have the innovation and agility to adapt disruptive commercial technologies into game-changing capabilities for responders. NGFR worked with 26 startups through two cycles of the DHS EMERGE program, which uses business accelerators to speed up the delivery of the latest innovative wearable technologies to responders.

Smart Cities Integration: Smart responders will work hand-in-hand with Smart Cities technologies—enabling greater situational awareness and operational efficiencies, while keeping responders and those they serve safer. NGFR is collaborating with industry partners to integrate Internet of Things technologies into commercial buildings to better detect hazardous conditions and improve search and rescue capabilities during incidents.

- **DHS Partners:** DHS Office of Emergency Communications, Federal Law Enforcement Training Center, U.S. Coast Guard, Federal Emergency Management Agency, U.S. Customs and Border Protection, U.S. Immigration and Customs Enforcement, Federal Protective Service, Office of Infrastructure Protection
- **Federal Partners:** National Institute of Standards and Technology Public Safety Communications Research, Federal Communications Commission, First Responder Network Authority, National Institute of Justice
- **International Partners:** International Forum to Advance First Responder Innovation, Defence Research and Development Canada, Industry Canada, Home Office United Kingdom, Sweden
- **Stakeholder Groups:** First Responder Resource Group, SAFECOM, InterAgency Board, National Public Safety Telecommunications Council, Association of Public Safety Communications Officials, National Council of Statewide Interoperability Coordinators
- **Responder Partners:** Harris County (TX), Los Angeles County (CA), Chicago (IL), Gwynette County (GA), Huntsville (AL), New York City (NY), Seattle (WA), Boston (MA), Grant County (WA), Rockville (MD), Washington (DC), Sacramento (CA), Richmond (VA), St. Cloud (MN), Portland (OR), Oklahoma City (OK), Butler (PA), Newport (RI), Charleston (SC), Albuquerque (NM), Lansing (MI), St. Louis (MO), Las Vegas (NV), Hallowell (ME), Shreveport (LA), Manhattan (KS), Brownsburg (IN), Nevada (IA), Boise (ID), Wahiawa (HI), Orlando (FL), Dover (DE), Denver (CO), Norwalk (CT), Phoenix (AZ), Salt Lake City (UT), Fargo (ND), Leesburg (OH), and more
- **National Laboratories:** National Urban Security Technology Laboratory, NASA Jet Propulsion Laboratory, Pacific Northwest National Laboratory, Air Force Research Laboratory, Idaho National Laboratory
- **Performers:** IJIS Institute, Ardent MC, Johns Hopkins University Applied Physics Laboratory, Lower Colorado River Authority, MITRE Corporation, MIT Lincoln Laboratory, Integrated Solutions For Systems, Oceanit, Physical Optics Corporation, SpectraRep, Open Geospatial Consortium, Luna, North Carolina State University, Purdue University, TDA, BAE, Balfour, Parallel Wireless, Botts Innovative Research, Kappler, Geospatial Huntsville, CSRA, Inc., Booz Allen Hamilton, Corner Alliance, Noblis, Center for Innovative Technologies, Tech Nexus, and more
- **Start-Ups:** Augmate, CommandWear Systems, HAAS Alert, Human Systems Integration, Inc., Lumenus, LuminAID, Pear Sports, Six15 Technologies, Vault RMS, Visual Semantics, BearTek Gloves, CyberTimez, EnergyBionics, LLC, International Thermodyne, Juxtopia, SensorSphere, Kofman Technologies, LanguageMAPS, MindTalk Technology, Neumitra, NuCurrent, Pivothead, Rithmio, TRX Systems, Select Engineering Services, LLC, Telesense

