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**Department of Homeland Security
(DHS) Science and Technology (S&T)
Directorate**

NextGen Firefighter Helmet

TECHNOLOGY SCOUTING RESEARCH SUMMARY

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**Homeland
Security**

Science and Technology

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NextGen Firefighter Helmet



Overview: Subject matter experts, proprietary commercial datasets, and open-source research were utilized to compile a preliminary list of Solution Options. A summary of the request is outlined below, and 9 solutions identified thus far are displayed on the following pages. Upon the initial scan, there were **zero solutions found that meet all requirements**, but the 9 Solutions listed partially meet the specified requirements.

Problem Description:

Firefighters are increasingly called upon to respond to potentially violent situations (PVS), including active shooters, armed crowd and terrorist incidents, hazardous materials mitigation, and disaster response. Currently, firefighters must carry one helmet for fire protection and one helmet for ballistic protection, which creates a logistical burden when firefighters must switch gear on the scene. The need for two helmets also necessitates additional costs for fire departments that must procure and maintain the additional equipment. In some cases, ballistic protection has been considered only necessary for law enforcement, so firefighters lack any ballistic protection. Often, situations change rapidly and there is not enough time for firefighters to retrieve ballistic protection. Thus, firefighters are either put at great risk or are unable to enter PVS incident scenes to attend to victims, which adds vital time between injuries and medical treatment. Over the past several years instances of shooting injuries and deaths of firefighters responding to emergency calls has increased, consequently increasing the need for firefighter ballistic head-protection.

This report will examine solutions that provide a combination of fire and ballistic head-protection for firefighters. Ideally, fire departments would be able to issue one helmet per firefighter that complies with both the NFPA 1971:2018 fire protection and NIJ Level 111A ballistic protection standards, so that the helmet could be worn in a range of emergency situations and fast-changing environments. This solution would be government-off-the-shelf (GOTS) or commercial-off-the-shelf (COTS) and available for purchase in the next 8-12 months.

Desired Use Case:

Firefighters equipped with combination fire/ballistic protection helmets would be able to move throughout the incident scene and periphery environment in order to execute their mission in the case of an emergency. Firefighters would not need to change or retrieve additional equipment separate from their fire personal protective equipment (PPE). For example, in the event of an active shooter incident, firefighters would have the adequate protection to attend to victims in the incident scene before the shooter is apprehended by law enforcement, enabling victims to get medical attention faster. The aim is to improve response time and increase the probability of saving victim lives as well as decrease rates of firefighter injury and death in PVS.

Technology Requirements:

The solutions identified were assessed against the following technology requirements. The top considerations when evaluating fire helmets including being able to provide:

Fire Protection	Must meet NFPA 1971:2018 structural firefighting or EU Regulation 2016/425 CE marking standards/British Standard EN443-2008
Ballistic Protection	Must meet NIJ Level 111A or European VPAM certification standards
SCBA	Must integrate with a variety of self-contained breathing apparatus (SCBA) masks
Communications (Comms)	Must have integrated communications systems
Lighting (Light)	Must have integrated lighting or ability to add lighting accessory

Firefighter Helmet Market Overview:

Ballistic Protection: There are no readily available firefighter helmets designed to provide both fire and ballistic protection up the NFPA 1971:2018 and NIJ Level 111A standards. There are individual fire departments that have purchased ballistic protection in the form of bullet-resistant vests and riot helmets, but this equipment is not designed to perform the function of traditional firefighter helmets and turnout gear. From an initial market scan, it is likely that a select number of private companies are beginning to design ballistic firefighter helmets, but these products have low technology readiness levels and probably will not be widely available in the next 8-12 months. Relevant Solutions are included below; however, none of the helmets identified were able to meet all specifications.

Helmet Shape: Advances in helmet technology have led to the increasing production of modern “jet-style” firefighter helmets, which resemble the shape of helmet worn by fighter jet pilots. Jet-style helmets offer significant safety advantages over traditional helmets but have yet to gain widespread popularity in the United States in part due to cultural affinities within the firefighter community for traditional helmets. Both jet-style and traditional helmets are currently commercially available, though there are fewer options for the newer jet-style.

1. **Jet-Style:** Jet-style helmets feature a brimless design that prevents snagging when navigating confined spaces, which is advantageous for vehicle extrications and navigating confined spaces during a structural fire. The cut of the helmet also allows for increased head protection, particularly for the occipital lobe, while still allowing for the head to move in all directions, including up and down (which is more difficult in traditional fire helmets). New models contain in-helmet communications technologies that can be fully integrated with existing communications systems used by fire departments. Additionally, in-helmet lighting features, such as LED flashlights, can reduce snag and the need to carry lighting accessories. In some models, lights are placed on each side of the helmet, improving visibility while decreasing the likelihood of blinding others. Jet-style helmets are popular in Europe and have been used there for years. Accordingly, manufacturers of such helmets tend to be European companies (though several American manufacturers do offer jet-style helmets as well). Like traditional helmets, jet-style helmets can be used with a variety of self-contained breathing apparatus (SCBA) masks.
2. **Traditional:** Traditional helmets – iconic symbols of firefighting in America – are heavier than the jet-style and feature front and back brims. The back brim was designed to prevent heat and water from getting on the neck and down the back of a firefighter, but current customized turnout gear and flame-retardant shields prevent water saturation of this kind. The heavier materials of these helmets often cause greater fatigue. Given their design, these helmets are more prone to knocking and snagging on a scene, which can be distracting and dangerous to firefighters. Traditional helmets also lack the communications and lighting integration upgrades available in the newer jet-style designs, requiring firefighters to manage separate communications and lighting accessories.

End Users:

Technologies identified through this Technology Scouting Report could be used by firefighters and fire departments across the United States to provide NFPA 1971:2018 and NIJ Level 111A standard fire and ballistic protection when responding to PVS emergencies.

NextGen Firefighter Helmet

Key Performance Parameter Criteria:



Solution Meets Criteria















Additional Information Required from Vendor to Determine if the Solution Meets Criteria



























Solution Does Not Meet Criteria

Technology Solutions



















While there are many more modern, jet-style firefighter helmets readily available on the commercial market, **zero Solutions** were found that meet all of the requirements. Specifically, there are no solutions listed below that meet both the fire protection and ballistic protection requirement. Additional investigation is required to determine if there are any Solutions available either via U.S. government or commercial industry with a high technology readiness level. Listed below are 9 solutions that meet many, but not all of the stated requirements.

#	Solution	Description	Fire Protection	Ballistic Protection	SCBA Integration	Comms	Light
1	Cairns XF1 Fire Helmet by MSA 	<p>The Cairns XF1 helmet is a jet-style fire helmet with no brim. It has an integrated light module, a robust, compact light accessory housed inside of the helmet, reducing exposure to heat, flames, and impact. The Cairns XF1 fire helmet's modular design allows it to be quickly disassembled for thorough inspection, care and maintenance. Compliant with ANSI/ISEA Z87.1-2015. This helmet is COTS.</p> <p>Weight: 56-62 oz depending on size Country of Origin: United States</p>	 NFPA1971: 2018				 Flashlight integrated into helmet
2	Pacific F15 by Pacific Helmets 	<p>Pacific F15 Structural Fire Helmet from Pacific Helmets (NZ) Ltd combines Pacific's unique DuPont™ Kevlar® and Fiberglass reinforced composite shell technology with an advanced polymer chassis. This jet-style helmet uses an elliptic dual pivot system to provide full coverage, and an internal face shield that can be fully deployed when in use with SCBA. It can be used with optional side mounted flashlights which clip low and tight on the shell to maintain optimal center of gravity and reduce snag risk. Recommended for structural firefighting and technical rescue. Compliant with ANSI Z87.1-2015. This helmet is COTS.</p> <p>Weight: Vendor outreach required Country of Origin: New Zealand</p>	 NFPA1971: 2018				 Flashlight accessory available

NextGen Firefighter Helmet

#	Solution	Description	Fire Protection	Ballistic Protection	SCBA Integration	Comms	Light
3	Gallet F1 XF by MSA Europe 	<p>Gallet F1 XF jet-style fire helmet has a configurable design meant for response to structural and outdoor fires, technical rescue operations and road traffic accidents. It contains a fully integrated lighting module, supporting work and safe navigation in the dark, as well as a helmet mounted headset for communication. This model is commonly used by French fire departments. This helmet is COTS.</p> <p>Weight: 1450-1550g (~51-55oz) Country of Origin: Germany</p>	 EU MED, SOLAS and CE marking				 Contains integrated lighting module
4	Magma® Fire Helmet Platform by Bullard GmbH 	<p>The Magma jet-style helmet system is based on a platform that enables the user to configure his/her individual helmet. The Magma is available in the type A half-shell helmet or type B three-quarter-shell helmet. The system allows for customized choices without compromising comfort, safety and functionality. This helmet is COTS.</p> <p>Weight: 1,500 grams (~53 oz) Country of Origin: Germany (note that parent company is American)</p>	 British Standard EN443-2008			 Comms not integrated, accessories available	 Flashlight accessory available
5	Solo TI by Halo Thermal Imaging 	<p>The Solo TI is a jet-style fire helmet comprised of a glass fiber/Kevlar® shell-bonded with European Class 1 fire-retardant resin and Class 1 Gelcoat. It contains a communications system design to be integrated with existing radio systems. The mask is enabled with a heads-up thermal imaging camera and 320x240 thermal imaging sensor. The full coverage design provides complete head, face and neck protection. This helmet is COTS.</p> <p>Weight: Vendor outreach required Country of Origin: United Kingdom</p>	 EU MED, SOLAS and CE marking				 Uses integrated thermal imaging
6	First Due Structural Helmet by Phoenix Technology Inc. 	<p>The First Due Structural helmet is a contemporary helmet with a traditional-style brim, but smooth top ridge to prevent snagging. This helmet contains a lightweight, heat-resistant thermoplastic shell that is lightweight. This helmet is COTS.</p> <p>Weight: Vendor outreach required Country of Origin: United States</p>	 NFPA 1971-2018				

NextGen Firefighter Helmet

#	Solution	Description	Fire Protection	Ballistic Protection	SCBA Integration	Comms	Light
7	<u>USRX Series by Bullard USA</u> 	<p>USRX Series by Bullard are thermoplastic rescue helmets specifically designed for extreme search and rescue conditions. This helmet has traditional-style brims with streamlined ridge on top to prevent snagging. USRX series helmets are made of lightweight materials to prevent fatigue during rescue missions. This helmet is COTS.</p> <p>Weight: Vendor outreach required Country of Origin: United States</p>	 NFPA 1971-2018				
8	<u>MSA Cairns® 1044 Traditional Fire Helmet</u> 	<p>The MSA Cairns 1044 Fire Helmet is a traditional-style helmet that provides thermal impact and penetration protection. This helmet features replaceable soft goods, which are easy to remove and clean. It does not contain integrated communications or lighting systems, but a light accessory can be attached to the brim. This helmet is COTS.</p> <p>Weight: Vendor outreach required Country of Origin: United States</p>	 NFPA 1971- 2018				 Light accessory can be attached to side-brim
9	<u>Busch Protective AMP-1 TP by Armor Express</u> 	<p>The AMP-1 TP is a light composite ballistic helmet with design specifically for law enforcement and first responders. The helmet includes side rails with speed-system connection point, advanced padding system with improved wheel dial for ultimate sizing flexibility, and harness system with no loose ends. These helmets were purchased by Orange County Fire Rescue Department (OCFRD) in Florida for ballistic protection. This helmet is COTS.</p> <p>Weight: Vendor outreach required Country of Origin: United States</p>		 EU VPAM (HVN-2009) Certification			 Flashlight accessory available