Northrop Grumman Corporation

Our vision is to be the most trusted provider of systems and technologies that ensure the security and freedom of our nation and its allies. As the technology leader, we will define the future of defense – from undersea to outer space, and in cyberspace.

Our Mission And Our Commitment Is To Enable And Integrate

Northrop Grumman Integrated Systems is the premier integrator of joint battle management command and control weapon systems in the world today and the prime contractor for the Hawkeye family of aircraft. Our mission is to be the enabler, architect, and integrator of system-of-systems solutions for future knowledge-based, open-architecture/non-proprietary military networks. We are fully committed to understanding the underlying operational needs and requirements of both our military and civilian customers around the world.

Applied leadership in management and technology innovation enables us to develop complex system-of-systems solutions that harness the richness and reach of sensor technologies to optimize the effectiveness of network-enabled architectures.

Our global sustainment infrastructure, coupled with a roadmap for continual technology infusion, ensures that our system and solutions are fully supportable now and in the future.

NORTHROP GRUMMAN
Airborne Early Warning And Control – While on station, the Hawkeye simultaneously monitors all air and maritime traffic in a cylindrical volume greater than six million cubic miles.

Battle Management Command And Control – The network-enabled weapon system provides the required balance of battle-proven specification design for airborne early warning and battle management command and control missions.

Radar – Provides uniform, uninterrupted, simultaneous air and surface 360-degree coverage for ultra-high frequency, long-range detection of low radar cross-section targets.

Identification Friend Or Foe – System consists of a Mark-XII interrogator receiver/transmitter and an improved identification friend or foe processor, both of which are contained in a single enclosure. The identification friend or foe antenna is coaligned with the radar antenna in the rotodome assembly. This arrangement allows for more efficient correlation of radar and identification friend or foe track reports.

Electronic Support Measures – Hawkeye’s unique electronic support measures system can pick up and identify emitting targets well beyond radar limits.

Enhanced Air Defense Systems – United by high-speed digital data links, the Hawkeye and surface command centers work together to significantly extend the coverage, connectivity, and effectiveness of air defense systems.

Combat-Proven Aircraft – Designed for airborne early warning missions, twin turboprops ensure lower operating cost while providing optimal operational speed/altitude for maximized detection capabilities.

Future Growth – The Hawkeye’s systems and capabilities are designed for growth to meet today’s evolving mission requirements. The new Advanced Hawkeye configuration currently in development will include improved radar, a modular communication suite, an upgraded cockpit and navigation system, and enhanced maintainability and supportability technologies.
Uniform 360-Degree, Long-Range Surveillance Over Any Terrain, In Any Environment

The E-2 Hawkeye is capable of 360-degree automatic, single mode, simultaneous air and surface radar detection at low-speeds over water (down to 0 kt) and over land (down to <50 kt). Operating in a dense target environment at any altitude, the Hawkeye features multimode long-range identification friend or foe detection with automatic radar correlation and long-range passive detection and classification of emitters. The Hawkeye carries a highly integrated, automated system and is capable of extensive connectivity, thus making it a network centric warfare enabler. The Hawkeye multimission system enhances a force’s effectiveness through its advanced detection and information processing capabilities. The Hawkeye’s radar and identification friend or foe system can detect targets at ranges in excess of 300 nmi. Its electronic support measure system detects and classifies targets at distances beyond radar limits. The onboard communications and data processing/distribution subsystems are capable of transmitting the tactical picture to command centers at sea or ashore.

Flight And Mission Crew

The Hawkeye incorporates a high level of automation in its target, acquisition, and identification systems, therefore enabling the three operators to perform a wide range of battle management functions. Other airborne early warning weapon systems lack system automation and require larger crews to complete labor-intensive tasks. Designed for full autonomous tracking, distributed system control, and automated sensor fusion, using rigorously tested, operationally proven algorithms, the system optimizes the Hawkeye so that its operators can concentrate on battlespace situational awareness and battle management tactics without having to worry about system operation.

Lowest Crew Size Required Of Any Fixed Wing Airborne Early Warning Battle Management Command And Control Platform

Key Design Features
The Hawkeye carries multifunctional avionic system open architecture hardware with system characteristics that provide:

- Environmental processing of large track file (>30,000 reports per second)
- Three highly automated and common operator stations
- High-capacity, flat-panel color displays
- Extensive video type selection (radar and identification friend/foe)
- HF/VHF/UHF communications systems
- Extensive data link capabilities
- Inertial navigational system and global positioning system navigation and in-flight alignment
- Integrated and centralized diagnostic system.

Over the next decade, a series of planned upgrades, including in-flight refueling, will further increase the capabilities and technologies of Hawkeye aircraft. These upgrades are designed to meet future emerging threats, improve aircraft safety, improve availability, and enhance Hawkeye mission (persistence) effectiveness and interoperability.
The inherent diagnostics, reliability, and maintainability features of the Hawkeye system, coupled with a worldwide network of customers and support sites, and long-standing government and industry partnerships, guarantee that the Hawkeye is fully supported now and in the future.

Hawkeye support is tailored and integrated with existing customer capabilities and requirements, which minimizes operating costs while maximizing aircraft availability, and results in a flexible support environment that can be modified as missions and requirements evolve. Hawkeye support encompasses a complete range of services, including training and trainers, technical documentation, support equipment, logistics material and supply management, technical services, and facilities support.

Development and introduction of new logistics technologies is a key component of the Hawkeye sustainment roadmap and will provide improved availability, reduce operating costs, and enhance mission effectiveness during the entire life of the Hawkeye weapon system.
Airborne early warning and control is essential to battle management. It provides senior commanders with a comprehensive operational picture to make strategic decisions and bolster battlefield awareness; and provides connectivity for all air, ground, and maritime assets. While performing air, land, and sea surveillance, the Hawkeye’s sensors and communications suites provide the necessary elements to rapidly respond to changing battle situations. In a defensive, peacetime environment, the Hawkeye’s ability to electronically extend borders makes it a valuable asset for national protection and security.
Network-centric warfare connects nodes in a seamless, dynamic network enabling synergistic effects. Networked nodes include: sensor, weapons, and decision-making platforms; and command centers. Metcalfe’s Law states:

... The value of a network increases exponentially with the number of nodes.

For the network to have the value and reach the potential defined in Metcalfe's Law, pre-data must be driven by three metrics: accuracy, latency, and relevance. The Hawkeye network-centric approach is structured to maximize these three metrics.
Improving cruise missile defense capabilities is a critical component of a larger air defense strategy. Many national defense strategies emphasize the need for interservice synergy in the detection and interception of missiles such as theater ballistic missiles and advanced cruise missiles, which are proliferating at an increasingly rapid rate.

To effectively protect forces deployed in the areas and theaters of potential conflict, cruise missile defense requires rapid and accurate performance of a series of tasks known as the “kill chain.” The Hawkeye’s state-of-the-art, ultra-high frequency radar, improved in the new E-2D Advanced Hawkeye, provides protection from these missile threats.
Outside the combat arena, the Hawkeye’s sophisticated communications and surveillance can play important roles in national disaster relief and recovery and in the protection and patrolling of national borders.

**Disaster Recovery** – Using the same systems that track and coordinate efforts to stop enemy wartime threats, the Hawkeye crew can seamlessly perform the tasks to coordinate search and rescue missions, conduct air control during relief efforts, and act as communications relay for coordinating multi-organizational missions in a large-scale disaster recovery effort.

**Border Protection** – The Hawkeye’s capability to detect, monitor, and report extend to the missions of economic exclusion zone and border interdiction/intercept, anti-smuggling, and anti-piracy operations. The specific tasks the Hawkeye performs are: identify and monitor air and surface contacts of interest; establish country of origin from all source information; evaluate origin, destination, and behavior to report suspicious activity; validate shipping and flight plans and determine destination; and vector border patrol, coast guard, and navy assets to intercept. The benefits reaped for having the Hawkeye in these operations are the abilities to coordinate covert sea and air intercepts, provide close control of assets prosecuting a contact, provide over-the-horizon communications relay, and interdict and prevent incursions.
Hawkeye employment in real-world battle conditions has confirmed the critical capabilities an airborne battle management system brings to the battlespace. Hawkeye command and control capabilities coordinate the dynamic flow of the air campaign and many aspects of the ground campaign.

These data, with traditional track information, allow Hawkeye to build an even more complete picture of the battlespace.

Planned updates to maintain the latest technology in the Hawkeye’s capabilities will incorporate offboard images and video from unmanned air vehicles under Hawkeye control that may be processed onboard the aircraft for immediate weapon/target pairing and strike assignment.

Designed for growth, Hawkeye live experiments are now focused on demonstrations that permit the direct feed of images, video, data, digital chat, and internet protocol communication into the Advanced Hawkeye.
With a two-generation leap in radar technology and improved data processing and communications, the Advanced Hawkeye will be the foundation for a theater air missile defense. With improved detection and tracking capability, this system will fulfill an ever-expanding role in littoral and overland operations. Utilizing its open-architecture network connectivity, it will be a key network enabler and will provide the ability to coordinate time-critical targeting and strike operations. When fielded, the Advanced Hawkeye will be crucial in the transformation to a fully networked joint combat force, providing airborne battlespace command and control well into the 21st century!

The Advanced Hawkeye will participate in the distributed missile defense network. As various targets are detected and tracked, this potentially time-critical information will be transmitted to the appropriate integrated air defense network.

Simultaneously, collaborating with satellite intelligence, surveillance, and reconnaissance assets, the Advanced Hawkeye directs an unmanned aerial vehicle to precisely locate and identify the launch platform. As the airborne battle manager, the Advanced Hawkeye relays this information to strike aircraft, which deliver precision-guided weapons to eliminate the launcher before it can reposition or launch a second attack.
**Multilateral Cooperation**

For joint/multinational maritime activities, the Hawkeye promotes regional security and stability and combats terrorism and the proliferation of weapons of mass destruction. For international relations, it expands defense trade, improves interaction among armed forces, and increases opportunities for technology transfer, collaboration, co-production, and research and development.

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**Over 100 Aircraft Operational Worldwide**

More and more countries are looking at the acquisition of airborne early warning and control systems. The need is driven by an emerging threat from ballistic and cruise missiles, by the increasing use of aircraft for illegal activities such as smuggling, and by the proven value of airborne early warning and control as a force multiplier. The Hawkeye provides carrier-based and land-based operations over land and water in a combat-proven and mission-capable platform with a robust support infrastructure and product line.

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**Building A Worldwide Peacekeeping Capacity**
### E-2C Hawkeye 2000 Specifications

#### Dimensions
- **Wingspan**: 24.56 m (80 ft 7 in.)
- **Width, wings folded**: 8.94 m (29 ft 4 in.)
- **Length overall**: 17.60 m (57 ft 8.75 in.)
- **Height overall**: 5.58 m (18 ft 3.75 in.)
- **Diameter of rotodome**: 7.32 m (24 ft)

#### Weight
- **Weight empty**: 18,364 kg (40,484 lb)
- **Internal fuel**: 5,624 kg (12,400 lb)
- **Takeoff gross weight**: 24,689 kg (54,426 lb)

#### Performance
- **Maximum level speed**: 626 km/hr (338 kt)
- **Maximum cruise speed**: 602 km/hr (325 kt)
- **Cruise speed**: 480 km/hr (259 kt)
- **Approach speed**: 191 km/hr (103 kt)
- **Service ceiling**: 11,278 m (37,000 ft)
- **Minimum takeoff distance**: 564 m ground roll (1,850 ft)
- **Minimum landing distance**: 439 m ground roll (1,440 ft)
- **Ferry range**: 2,854 km (1,541 nmi)

#### General Data
- **Crew Members**: 5
- **Power Plant**: Two Rolls-Royce T56-A-427 Turboprop engines rated at 5100 eshp each

#### Endurance
- **Unrefueled**: >6.4 hr
- **In-flight refueling**: 12 hr

#### E-2C Production
- **Aircraft deliveries**: 200 through 2006
- **Total Flight Hours**: >1 million flight hr