INTEGRATED VEHICLE SYSTEM
For Tactical Command & Control (C2) Applications
The Harris Integrated Vehicle System provides a flexible and technically advanced communications infrastructure for a command and control (C2) vehicle.
A simpler approach to C4ISR systems procurement

Today’s military and security forces must perform a multitude of operational tasks. Their tactical vehicles require a comprehensive Command, Control, Communications, and Computers (C4) capability to enable these missions. Harris provides just such a flexible system solution.

Procuring a complex C4 system is usually no easy matter. Too often customers spend substantial time and resources, only to find themselves behind schedule and over budget, with a system that does not meet their requirements. Harris Corporation’s new, simplified approach to C4ISR* systems procurement uses pre-engineered system configurations that provide fast, cost-effective solutions to today’s most critical operational needs, such as tactical command and control.

Instead of designing a unique system for every customer, Harris has developed a comprehensive family of preconfigured systems. Each system is fully integrated and includes all equipment, cables, software, and manuals, with training and installation available. Every system has undergone extensive testing and can be relied upon to meet its objectives.

This executive summary describes the Harris Integrated Vehicle System for Tactical Command and Control Applications and outlines the advantages of our packaged C4ISR systems:

- **Low Risk** – Field proven and comprehensively tested systems provide existing, cost-effective solutions
- **Fast Delivery** – Complete systems can be delivered in a matter of months to meet urgent operational needs
- **Simplified Procurement** – Systems can be purchased as off-the-shelf items, eliminating long system definition and development phases
- **Phased Implementation** – Packaged systems form building blocks that enable the incremental acquisition of capability, protecting current investment and supporting future goals
- **Flexibility** – Systems are readily customized and can be integrated by in-country partners

All this from Harris, a company with over 50 years of large-scale international communications systems experience, the most comprehensive range of tactical communications products, and world-class systems engineering and integration capabilities.

*C4ISR = Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance

Contact Harris now to discuss your C4ISR systems needs: [www.harris.com/systems](http://www.harris.com/systems)
Armed services and security forces are always on the move—and their command and control capabilities must keep pace. While every mission is different, there is an ever-present need for a consistent flow of actionable information from lower-level soldiers up through the chain of command. Conversely, command and control information must flow down in a timely, efficient, and secure manner.

Commanders need immediate, comprehensive knowledge of battlefield or event conditions, threat attributes, and force location and synchronization, while soldiers or agents in the field need up-to-date situational awareness and command information. To meet these needs, there is a growing trend toward mobile command centers at all levels, and a new demand for command and control (C2) capabilities which can be effectively deployed from a variety of vehicles. Increasingly, the C2 vehicle, when equipped with advanced, high-data rate communications capabilities, is the new, vital link between deployed forces and their commanders.

Today’s C2 vehicular systems must accommodate data and video, in addition to voice communications, to stay abreast of asymmetric and conventional threats. The data must be gathered quickly and disseminated equally rapidly to local and national command and control facilities, and this requires a high-bandwidth transmission capability and a specialized complement of high-speed communications equipment and functionality.

Such command and control vehicles need to:
- Maintain a secure communications link with fixed and mobile command centers
- Send and receive secure voice, data, and video to/from deployed soldiers and field personnel
- Dynamically link to similarly programmed networks and nodes within range
- Maintain intra-vehicle communication among crew members in an inherently noisy environment
- Provide a means of communicating high-bandwidth data (multiple video streams, etc.)
- Support shared situational awareness
- Communicate with coalition partner or third-party radios

The Harris Command and Control Vehicle System (C2VS) addresses these needs by providing the core communications capabilities required to operate in the fast-paced world of modern peacekeeping, policing and warfare operations. Our pre-engineered, integrated packaged system solution provides real-time voice, data, and video between front-line forces and their commanders, for improved mission planning and execution.

The C2VS can be utilized by military or security forces dealing with riots, or by border security personnel apprehending illegal immigrants; it also has many purely military applications such...
as combat operations and peacekeeping. These diverse missions and dynamic command structures demand a flexible, scalable and robust communications suite to provide reliable connectivity. Mobile, Ad Hoc Networking (MANET) technologies enable the system to rapidly join existing networks or to create new networks of its own. And the system can easily be extended with optional equipment. For example, a SATCOM terminal is available for beyond line-of-sight communications, and a long-range high frequency radio option also enables strategic communications, especially useful for linking to an existing HF network.

The C2 Vehicle System is designed specifically for command and control applications. Customers who need a C4ISR capability should consider the Harris Tactical Reconnaissance Vehicle, which is described in a separate executive summary.

The Harris C2 Vehicle System provides commanders:

- **Real-Time Situational Awareness** — Soldiers in the field can access situational awareness (SA) data in real-time, enhancing their fighting capabilities and reducing fratricide
- **Real-Time Command and Control** — The system enables real-time dissemination of voice and data, providing for timely command and control
- **Support for the Dismounted Soldier** — Secure, advanced voice communications between the vehicle and local patrols is standard
- **Networking** — Voice, data, and video capabilities are all networked together, and provide connectivity with your existing system and nets
- **Rapid Delivery** — The system equipment is available now to help commanders deal with the rapidly changing battlefield
- **Scalability** — The C2 Vehicle System is modular and easily scaled to meet a customer’s deployment scenario and mission needs on a per-vehicle basis
The Harris Command and Control Vehicle System (C2VS) utilizes the strengths of our Falcon III® products. It provides an integrated suite of radios and ancillary communications tools designed for advanced, mobile C2 capabilities.

Forces dealing with counter-narcotics or counter-terrorism, as well as military users performing reconnaissance, surveillance, border control, or peacekeeping missions, can benefit from our comprehensive solution. While the principal function of this system is to provide a secure, robust command and control capability, the core communications architecture can be extended to support other uses.

Consider the following military and security force command and control applications:

- A small group is tasked with securing a road and enforcing a roadblock. Upon arrival, the C2 vehicle can establish communications with locally dismounted soldiers and with remotely located headquarters. The soldiers can then gather video and biometric data in real time and transfer it to headquarters via the C2 Vehicle System. Data can be immediately reviewed and analyzed, and the command decisions sent back down to the soldiers in the field via the secure links provided by the system. Any video gathered can be stored on the mobile computing platform and retrieved by higher headquarters as needed.

- A C2 vehicle is dispatched to support an intelligence-gathering mission. This involves deploying along an extended length of the forward area of operations. As the vehicle accompanies the associated intelligence units through the area, it can disseminate data in real time to upper echelons. The system’s advanced communications capabilities allow the vehicle to roam at will and to join, leave, and create networks dynamically, ensuring communications are enabled at all times.

- A combat team becomes detached from its chain of command during the heat of battle. Using available SA data already provided to the combat team’s commander, it navigates toward the last known location of a C2 vehicle. Once in range, communications to the vehicle—and hence to the command headquarters—can be established. The mission can then continue apace.

Advanced communications capabilities support better decisions and actions.
The C2 Vehicle System provides connectivity from the deployed soldier in the field up through the chain of command, and has interoperability options for linking with third party radios and systems.

Key Features:

- **Integrated Communications** — Vehicle occupants are seamlessly connected to each other, dismounted squad members, the tactical network, and battle management systems.

- **Seamless Voice, Data, and Video Integration** — From the front line to the commander at headquarters, to allow timely decision-making without the “fog of war.”

- **Exceptional Human Factors Attributes** — Translate into ease of operation and quick training of personnel at all levels.

- **Open Standards-Based Architecture** — Internet Protocol (IP) and similar interfaces are used for ease of scalability and feature upgrades.

- **Robust IP Networking** — Allows the data to flow to any level, providing flexibility in command and control on a per-mission basis.

The Harris C2 Vehicle System is easy to learn and to use.
Delivery of the Harris Command and Control Vehicle System is a low-risk proposition. The equipment has been utilized in our well-established vehicular systems. This means that all of the system interfaces have been proven on previous deliveries to other customers.

A standard C2 Vehicle System includes the communications infrastructure for one vehicle:

- Mobile Computing Platform (MCP)
- Intercom
- Rugged PC with BMS software
- Vehicle-mounted Secure Personal Radio (SPR)
- Two 50-watt Multiband Networking Radios (MBNR) for wideband data distribution

This configuration is very flexible, and additional equipment and capabilities can be integrated at initial purchase or as a subsequent system upgrade. Typical customizations include beyond line-of-sight communications links (HF radio and BGAN SATCOM), legacy third party radio interface support, and installation in a wide variety of customer-supplied vehicular platforms. Optionally, Harris can provide a suitable tactical vehicle with the system pre-installed.

The standard system can be delivered within four months, as shown on the opposite page. If customization is required, the delivery schedule may be impacted. Harris will work with every customer to provide the appropriate system, without the need for long hardware or software development cycles.

A recent award for a Harris Integrated Vehicle System provides a good example of a customized solution. The customer had four different vehicle configurations to be outfitted: Company Commander, Platoon Commander, Mortarman, and Observer. Harris was able to provide an initial system delivery within three months of contract award, with the final delivery only two months later.

Customization of a packaged system is inherently low risk:

- Harris has more than 50 years of experience developing custom solutions
- Data is converted to IP packets for seamless delivery over a variety of Harris and commercial networks, when applicable
- Standard external interfaces are used to support the widest variety of products and to facilitate upgrades and product improvements

As with all of the Harris packaged system offerings, the C2 Vehicle System can be easily incorporated into the Harris Integrated Tactical Area Communications System (ITACS), which is an IP-based suite of communications vehicles, shelters, and equipment. ITACS links the soldiers and commanders at the tactical edge to commanders at all levels of the organization.
Low-Risk System Characteristics:

- Pre-engineered system implementation
- Integration risks are eliminated
- Standard interfaces and protocols ease incorporation of future enhancements
- Leverages Harris Falcon III® radio technology
- Expandable, with ability to add vehicles and data distribution to support additional echelons
SYSTEM DESCRIPTION

The C2 Vehicle System is a flexible, expandable solution

The Harris Command and Control Vehicle System leverages the secure, advanced communications properties of our Falcon III® products to enable an integrated suite of C2 equipment and functionality. The diagram at right shows the system’s standard components, and the chart lists some of the available options.

The diverse missions and dynamic command structure of modern armed services require a flexible, scalable, and robust system solution to provide reliable connectivity and improve operational effectiveness. With this C2 communications system, Harris offers a highly flexible, extendible, and upgradable vehicular network and integrated service platform.

While missions change and interoperability needs vary, the user requires a consistent, highly automated flow of information from soldiers at the tactical edge up to their commanders, as well as timely and concise commands flowing down through the echelons to control the mission. Vehicles hosting the Harris system may be allocated communications resources specific to their mission, as it supports a wide range of applications and complexity.

In the Harris Command and Control Vehicle System, dismounted soldiers participate in voice conversations, share situational awareness data, and/or collect and stream video to peer or higher echelon users through the system’s routing and rebroadcast capabilities. Each vehicle’s communications suite participates in a tactical network that ensures high-capacity, reliable, and secure communications between dismounted soldiers and their commanders and headquarters.

The system solution provides connectivity with both Harris and third party radios, and introduces next-generation communications modes. These radios are integrated using an open standards-based, highly capable and scalable mobile computing platform and intercom system. Together, they deliver unprecedented capability while ensuring customer independence in selecting, integrating and sustaining an optimal mix of applications and technologies with minimal development and maximum flexibility.

Intra-vehicle communications are provided by the RF-7800I Vehicle Intercom. Three stations—signal officer, driver, and crew—are supported in the standard configuration, which can easily be extended. Inter-vehicle communications are provided by Harris RF-7800M Multiband Networking Radios (MBNR). These radios provide a high-capacity, ad hoc IP networking backhaul to other vehicles and/or headquarters. A vehicle-mounted RF-7800S Secure Personal Radio (SPR) provides a communications link to locally dismounted soldiers.

The RF-7800N-CP001 Mobile Computing Platform provides a comprehensive vehicle computing capability including tactical voice rebroadcast, data routing, and video and network management. The Harris RF-5410FC (FalconCommand™) C2 application runs on the system’s rugged laptop and provides route planning, friendly force tracking, combat status and alert notifications, and other situational awareness functions.
RF-7800I Vehicular Intercom Kit links the driver, operator, and crew to each other and to the vehicle’s radios

RF-7800N-CP001 Mobile Computing Platform provides digitization and storage capability; video/data is made available to others on the network

RF-5410FC FalconCommand and laptop provide Battle Management System capabilities including Blue Force Tracking

Two 50W RF-7800M Multiband Networking Radios (Vehicle Version) provide wideband data distribution to the TOC/Intel Center; ANW2 waveform supports Mobile Ad Hoc Networking (MANET), where networks can be dynamically configured on-the-fly

OPTIONAL CAPABILITIES

Installation in a Harris-supplied tactical vehicle

RF-7800B BGAN SATCOM terminal for extended range data distribution when the vehicle is out of range of the RF-7800M network

RF-5800H HF radio provides long-range, low-rate data distribution to strategic networks

Support for third party radios in the vehicle
ENABLING TECHNOLOGIES

The system is based on Harris wideband radios and other advanced communications equipment

**Mobile Computing Platform**
At the heart of the C2 Vehicle System is the RF-7800N-CP001 Mobile Computing Platform (MCP), integrated with the intercom system to provide advanced networking features and connectivity for all Harris radios and other IP-based equipment in the vehicle. This server can receive and process streaming video sent from dismounted video capture systems, from cameras mounted on the vehicle, or from a remote weapon station. It also provides connectivity for battle management systems (BMS).

The MCP provides advanced dynamic routing capabilities based on Internet Protocol (IP) industry standards. By selecting the optimal radio equipment for a given transmission, the RF-7800N-CP001 can greatly improve the system’s overall performance. In addition to its networking capabilities, the unit provides interfaces for connecting to vehicular electronics (using the industry standard CANbus interface), as well as to analog video sources and camera systems. A built-in storage system can capture hundreds of hours of video for subsequent playback, and facilitates retransmission of recorded material to other vehicles on demand.

**Intercom System**
The RF-7800I Vehicular Intercom System provides a network backbone to integrate in-vehicle voice and data communications with tactical networks and battle management systems. Featuring a modular and network-centric design, the system provides access to vehicle crew members and communications equipment in a lightweight, power-efficient unit, allowing for maximum mission flexibility with a minimal vehicle footprint. The intercom system has an intuitive user interface that will facilitate training and implementation.

**Secure Personal Radio**
The vehicle-mounted Secure Personal Radio (SPR) provides a vital link to the intra-team voice communications of deployed soldiers and field agents. The RF-7800S is the most advanced personal team radio in the world. It was designed specifically to meet the unique demands of providing secure and reliable voice, data, and situational awareness communications at the soldier level. More than just a “walkie talkie,” the RF-7800S provides key benefits (see table opposite) in a package that weighs only 300 grams. For example, the embedded GPS receiver and automatic encrypted location-tracking feature means that the C2 vehicle’s location will always be available to team members.

**Multiband Networking Radio**
The RF-7800M enables the high-speed flow of real-time battlefield situational awareness information and video across a secure, mobile tactical wireless network. In a command and control context, this radio provides the critical connection between squad level forces and up-echelon command platforms. This means that deployed forces can communicate high-value information including intelligence data, logistics, and medevac needs with superior speed and accuracy. The increased flow and timeliness of operational information and intelligence data from the field supports faster, more informed decisions.
### FEATURES vs BENEFITS

#### Mobile Computing Platform (MCP) RF-7800N-CP001

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet Interface</td>
<td>Provides complete tactical IP data-routing capability</td>
</tr>
<tr>
<td>Video Management</td>
<td>Enables comprehensive management of video data: encoding and publishing, meta-tagging, and DVR control</td>
</tr>
<tr>
<td>Radio Support</td>
<td>Supports all Harris Falcon III™ radios as well as third party systems such as INMARSAT, TETRA, GPRS, etc. and ensures that all connected communications systems can be utilized</td>
</tr>
<tr>
<td>5 Mbps High-Speed Waveform</td>
<td>Provides necessary bandwidth for transmitting video to the next echelon</td>
</tr>
<tr>
<td>Ad Hoc Networking</td>
<td>Keeps mobile nodes connected to the network to expand the deployed range; eliminates the need for extensive pre-planning of networks before a mission</td>
</tr>
<tr>
<td>Simultaneous Voice and Data</td>
<td>Allows real-time discussion of information contained in transmitted video or other data transmissions</td>
</tr>
</tbody>
</table>

#### Intercom System RF-7800I

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-Vehicle Communications</td>
<td>Provides a network backbone for voice and data connectivity among crew members and integration of vehicle communications systems</td>
</tr>
<tr>
<td>Advanced Noise Cancelling</td>
<td>Provides maximum voice intelligibility using digital signal processing technology to eliminate vehicle background noise</td>
</tr>
</tbody>
</table>

#### Secure Personal Radio (SPR) RF-7800S

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded GPS Receiver</td>
<td>Enhances soldier safety by automatically transmitting encrypted location information</td>
</tr>
<tr>
<td>256 kbps High-Speed Digital Waveform</td>
<td>Supports the transmission of real-time video to the next echelon Allows commander and team members to conduct simultaneous voice communications for mission coordination</td>
</tr>
<tr>
<td>Standard USB Interface</td>
<td>Ensures interoperability with a host of COTS equipment</td>
</tr>
<tr>
<td>High-Grade Security</td>
<td>AES encryption protects sensitive communications</td>
</tr>
</tbody>
</table>

#### Multiband Networking Radio (MBNR) RF-7800M

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Mbps High-Speed Waveform</td>
<td>Provides necessary bandwidth for transmitting video to the next echelon</td>
</tr>
<tr>
<td>Ad Hoc Networking</td>
<td>Keeps mobile nodes connected to the network to expand the deployed range; eliminates the need for extensive pre-planning of networks before a mission</td>
</tr>
<tr>
<td>Simultaneous Voice and Data</td>
<td>Allows real-time discussion of information contained in transmitted video or other data transmissions</td>
</tr>
</tbody>
</table>
After-sales service supports mission-critical systems worldwide

Harris has earned a worldwide reputation as the low-risk vendor of choice for tactical radios and systems, with 99 percent of our international program customers reporting that Harris meets or exceeds their expectations. Our responsive program management team and customer service organization will deliver and support a highly capable C2 communications system.

An agile manufacturing process enables Harris to modify production to meet customer demands. With one of the highest-volume defense communications manufacturing facilities in the world, we have the commitment and capability to deliver on our promises.

Unlike many other companies, Harris has “boots on the ground” experience, supporting our products from initial fielding to obsolescence. In fact, we are currently servicing systems that have been deployed for more than 20 years, underscoring our absolute commitment to customer satisfaction. Our customers rate Harris an average of two times higher than our nearest competitor.

As a proven provider of advanced radio, sensor, and integrated systems to customers in over 120 countries, Harris has extensive experience in providing logistics and sustainment support throughout the world. We have developed highly successful processes for fielding, maintaining, supporting, repairing, and upgrading our equipment, no matter where it is deployed.

Many of our product and technical service representatives have prior military experience, and establish a close, personal bond with our customers. Our comprehensive service offering includes classic telephone and email support as well as web-based services. Harris’s Premier website (https://premier.harris.com/) provides customized access to:

- Computer-based training courses and manuals
- Frequently asked questions
- Application notes
- Purchase of accessories and ancillaries

Customers also can use the website to:

- Download and track software upgrades
- Receive warranty and maintenance support, including RMA numbers and returned goods status

System training is another important consideration. Harris trains approximately 5,000 students per year on the installation, operation, and maintenance of its equipment and systems. This process occurs in Harris’s classrooms, at customer locations, and in the field. Our students (our customers) consistently rate the training they receive as meeting or exceeding their expectations.
The Harris Command and Control Vehicle System provides economic benefits throughout its entire life cycle:

**Low Risk** – Our customer knowledge, program management, technical expertise, and world-class customer support serve to reduce fielding risk.

**High Performance** – The open architecture design capitalizes on technology refresh of components, maximizing the value of customers’ investments over an extended time period.

**System Sustainment and Supportability** – Sustainment issues are reduced by the use of rugged military equipment (with existing training and ILS packages) and the availability of Harris field service representatives.

**Life-cycle costs are reduced by:**
- Use of common equipment and software applications
- 24/7 support capabilities
- Available in-country training and training material
- Common equipment interfaces and programming
- Availability of installation and maintenance by in-country partners
- Availability of extended warranties beyond the standard 12 months
- Low-cost upgrade paths
Harris supplies tactical and public safety radio products in over 120 countries worldwide

Millions of people and hundreds of government agencies throughout the world rely on assured communications® solutions from Harris to deliver critical information to the right place at the right time. They know there is too much riding on the outcome to risk anything less. What sets Harris apart is our depth of expertise, breadth of experience, and focus on providing the most advanced products, systems, and services that meet or exceed the requirements of our customers.

Harris is one of the only companies in the world specializing in advanced technology for capturing, aggregating, distributing, and analyzing the full breadth of wireless communications including voice, data, video, and imaging. We use this unique capability to provide systems and networks for customers in defense, intelligence, government, public safety, healthcare, and energy markets.

Harris RF Communications Division (RFCD) is the leading supplier of tactical, secure voice and data communications products, systems, and networks to military, government, and commercial organizations worldwide. Over 50 years of international experience is leveraged into the design and deployment of Harris RFCD’s packaged C4ISR system solutions.

The Command and Control Vehicle System is one more example of Harris responding to the needs of its customers.

I firmly believe that Harris RF Communications really listens to their customer base and lives by the creed: the customer is king. I truly feel that sense of partnership with Harris, and I’ve been dealing with Harris for years now.

Harris has internationally acclaimed products which have left everyone else in the dust. — International Customer

NATO Staff Member
Always connected. Never alone.

Our proven solutions provide:

- Voice, data, and video where it’s needed, when it’s needed
- Cost effectiveness over the life cycle of the system
  - No long, costly development cycle
  - Unsurpassed in-country support during and after delivery
- Scalability and growth options
- Configurable solution sets
- On-time delivery of quality systems
As your partner, Harris is committed to your success

Harris Corporation welcomes the opportunity to discuss the Command and Control Vehicle System in more detail, and how it can be applied to your missions and applications.

We believe that our packaged systems provide a significant value to you, our customer, in the following ways:

- The systems are available now, eliminating long and expensive development and procurement cycles.
- The use of the latest wideband Falcon III® tactical radios supports new operational capabilities, such as live video and situational awareness, that have not previously been possible.
- Falcon III software-defined radio technology uses open architectures and standard interfaces, allowing the system to incorporate new capabilities and stave off obsolescence.
- Pre-engineered system designs emphasize commonality of equipment and resources to reduce life-cycle sustainment costs such as training, sparing, and maintenance.
- Harris systems engineers and in-country partners can readily customize the solution, as required.
- The systems are supported by our world-class customer service organization that operates in every part of the world and is second to none.

Harris Corporation is a $5 billion (USD) international communications systems company serving government and commercial markets worldwide. We are confident that our packaged C4ISR system solutions represent the best value with the lowest schedule, cost, and technical risks for meeting your complex operational challenges.

Our solutions leverage:

- Falcon III® wideband radio technology
- Harris’s Mobile, Ad Hoc Networking (MANET) technology
- Open standards and interfaces
- Focused program teams
- Over 50 years experience providing state-of-the-art military systems
- Product service teams that deploy to our customer
- Over 6,000 engineers and scientists throughout the corporation
Always connected, never alone with advanced C2 capabilities from Harris