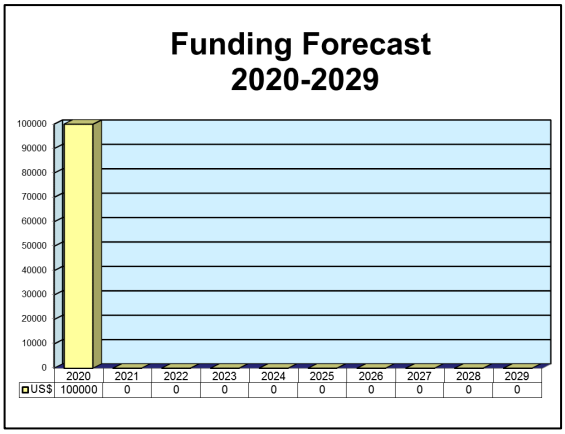
C3 Technology (U.S. Army)

Outlook

- Program dissolved and realigned due to funding restrictions, with efforts transferred and integrated into other programs
- Funding peaked in FY19 at around $55 million



Orientation

Description. The U.S. Army's Command, Control, Communications Technology program conducts research and development into C3 technologies, electronics components and subcomponents, and software that provide the U.S. Army with enhanced capabilities for secure, mobile, networked communications and assured information delivery.

Sponsor

U.S. Army Research, Development, and Engineering Command (RDECOM)
Aberdeen Proving Ground, Maryland

Status. Research and development. Program efforts realigned and transferred in FY20.

Application. C3 technology development.

Contractors

Contractor(s) not selected or not disclosed.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

The Command, Control, Communications Technology program (PE#0602782A) comprises Project 779 (C2 and Platform Electronics Technology), Project CY2 (Communications Technology), and Project H92 (Communications Technology).

Project 779: Command, Control and Platform Electronics Technology. Project 779 conducts research into technologies that enable commanders at all echelons to have better and more timely information and to command from anywhere on the battlefield. Project work is focused on data management and automated

C3 Technology (U.S. Army)

analysis in order to provide course of action determination and for purposes of mission planning and rehearsal, mission execution monitoring and replanning, and precision positioning and navigation.

Project 779 develops technologies that support multimodal man-machine interactive technology, battle space visualization, positioning and navigation in degraded environments, and data transfer. The project also conducts research into technologies that support automated cognitive decision aids, real-time collaborative tactical planning tools, distributed databases, open system architectures, and integration concepts that contribute to more mobile operations.

Project CY2: Communications Technology. Project CY2 was realigned in FY19 as a new start for this program element. This project investigates cyber electromagnetic activities, cyber security devices, software and techniques that can be applied to harden wireless communications networks against cyber attacks, and new mobile networking protocols that afford resilience within networks "to autonomically fight through and/or evade hostile cyber effects." This project also investigates and applies robust cyber security techniques to advanced communications and networking devices, software, algorithms and protocols utilized within wireless tactical networks. These techniques protect against "nation state level" cyber effects by hardening the "blue force attack surface."

Project H92: Communications Technology. Project H92 investigates, develops, and applies advanced communications and network technologies. The project leverages the commercial research and communications and network sciences work conducted by the Army Research Lab and the Network Science Collaborative Technology Alliance. Project H92 utilizes developments in wireless transport – e.g., mobile radio-based communications systems – to develop ways to improve communications in high radio frequency (RF) interference environments and to increase the communications capacity of terrestrial and satellite communications systems.

This project seeks to reduce the visual signature of antennas on soldier, vehicular, and airborne platforms and to reduce co-site interference on platforms with multiple transceivers such as radios and jammers. Additionally, Project H92 investigates cybersecurity devices, software, and techniques that could be used to harden narrow-band, wireless communications networks against cyber attacks. The project also investigates new mobile networking protocols to make wireless, on-the-move communications networks more responsive to user needs.

Additionally, Project H92 investigates network operations software and techniques that would improve the ability of the soldier to manage and maintain complex, dynamic networks. Finally, Project H92 investigates improved spectrum management software tools that could be applied to make more efficient use of RF spectrum that is over-subscribed.

C3 Technology is a U.S. Army program.

Source: FBI

Program Review

The following summarizes the recent activity in the three projects that make up the U.S. Army's Command, Control, Communications Technology program.

Project 779: Command, Control and Platform Electronics Technology. In FY06, Project 779 investigated ways to improve Micro-Electro Mechanical System (MEMS) inertial measurement units (IMUs) for dismounted soldier and tactical vehicle applications. This work carried on through FY07 with the development of automated wargaming tools that allow U.S. commanders to project the potential effects of decisions and to assess the "sensitivity" of options on the future battle state.

Come FY08, Project 779 partnered with the Space Technology division of the U.S. Space and Missile Defense Command to develop intelligent software agents that operate in both space and strategic (e.g., missile defense) and terrestrial domains.

By FY09, progress had been made in developing ways to incorporate radio network algorithms and processes that enable robust position information to be provided for enhanced situational awareness in GPS-denied, urban, and other complex environments.

This work was followed up with the fabrication of advanced positioning/navigation sensors in FY10, especially the type that exploit the synergy between communications and position such as RF ranging and network-assisted navigation sensors that operate in GPS-denied environments.

Work during FY11 focused on expanding machine translation services to include speech-to-speech capabilities, as well as evaluating candidate positioning / navigation sensors. From FY12-FY14, work centered on developing sensor integration algorithms in order to combine positioning/navigation sensors in radios both with and without radio-based navigation technologies. In addition, alternative/emerging technologies that could be used to enhance navigation in challenged environments were investigated. Also investigated were advanced anti-jam antennas and pseudo-lite sources that will protect and enhance weak GPS signals.

In FY15-FY16, new sensor technologies such as atomic sensors, were investigated, as was a common interface for positioning, navigation, and timing (PNT) applications to enable the seamless incorporation of new sensors.

During FY17-FY19, software tools were designed to support the location and adjustment of pseudo-lite and autonomous navigation assets on the battlefield in order to maximize the availability of PNT information. Additionally, new methods of time transfer were explored, as were novel ways to create expendable pseudo-lites that minimize the risks resulting from compromised assets.

As of FY20, this program was broken up in a funding realignment effort, with various projects transferred and absorbed into other programs.

Project CY2: Communications Technology. Efforts under Project CY2 began in FY19 with plans pertaining to cybersecurity technologies, cyber hardening methodologies, and "robust" built-in techniques that enable systems and networks to absorb, fight through, and adapt to adversary attacks. Other efforts support the convergence of defensive and offensive cyber, EW, and network/spectrum management information to improve decision response; research and validate block-chaining methodologies that trace and validate the "pedigree" of tactical information as it traverses the network; and research and validate robust non-intrusive identity authentication techniques that support tactical access control.

Project H92: Communications Technology. Project H92 began in FY06 with laboratory tests of Communications Planner for Operational and Simulation Effects with Realism (COMPOSER) technology. This was followed in FY07 with an analysis of available radio models and waveforms and integration of the waveforms into the COMPOSER architecture. Enhancements to the Communications Effects Simulator were completed in FY08. The project also completed development of the final version of COMPOSER for transition to the Coalition Joint Spectrum Management Planning Tool Joint Concept Technology demonstrations conducted during this timeframe.

In FY10, Project H92 "assessed C/Ku directional antenna and integrated platform feed and evolutionary aperture design" as part of an effort to reduce antenna profile and cost. The project completed the development of K/Ka/Q multibeam, low-profile, electronically steered satcom components during FY11.

From FY12-FY13, research was conducted on "coding intrusion detection system" technology to ascertain local computer threats on tactical host systems and networks using minimal system resources. Additional research was conducted on different types of frameworks upon which future cybersecurity can be developed to remove redundancies and conflicts between disparate software tools and techniques.

C3 Technology (U.S. Army)

Efforts during FY14 focused on conducting R&D into software and hardware techniques that will allow EW and communications systems to interoperate without mutual interference. In FY15 a smart switching system for distributed antenna arrays was designed and matured. This system will enable higher output power, interoperability, and improved link connectivity for satellite communications.

The schedule for FY16 called for completing, and demonstrating in a lab environment, antennas and antenna arrays that provide improved communications and reliability through EW-jammed environments. This was followed by the design of models and algorithms in support of computer network defense and counter attack models during FY17.

During FY18, new short-range wireless transmission technologies underwent laboratory experiments with a goal of improving the performance and robustness of secure wireless personal area networks (PANs). These technologies will be applied to on-soldier sensors and ancillary devices.

FY19 plans called for development of product architectures based on a Modular Open System Architecture (MOSA) approach that incorporates components of network technologies into a unified solution.

At the start of FY20, this program was broken up in a funding realignment effort, with various projects transferred and absorbed into other programs.

Funding

U.S. FUNDING

	FY18 QTY	FY18 AMT	FY19 QTY	FY19 AMT	FY20 QTY	FY20 AMT	FY21 QTY	FY21 AMT
RDT&E (U.S. Army)								
PE#0602782A, Command, Control, Communications Technology	-	32.4	-	54.9	-	0	-	0

All $ are in millions.

Note: In FY20 this PE was realigned, with efforts transferred and integrated into PE#0602146A Network C3I Technology and PE#0602213A C3I Applied Cyber. All FY20 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy. The cited work is consistent with the priority focus areas of the Under Secretary of Defense for Research and Engineering and the Army Modernization Strategy. Work under this project is performed by the U.S. Army Futures Command (AFC).

Source: U.S. Department of the Army FY20 RDT&E budget document

Contracts/Orders & Options

No contract information on the U.S. Army's Command, Control, Communications Technology program has been made public.

Timetable

Year	Major Development
FY02	Test to determine the benefits of GPS anti-jam integration technologies
FY03	Automated Net Management software to include on-the-move network components
FY05	Enhanced Automated Net Management tools evaluated
FY06	MEMS IMUs for dismounted soldier and tactical vehicle applications improved
FY07	Low-profile antenna technologies developed
FY08	Advanced positioning/navigation sensor technologies developed
FY09	Ka- and Q-band power amplifier developed and demonstrated
FY10	Cognitive network tools for a mobile ad hoc network designed and developed
FY11	Machine translation services expanded to include speech-to-speech capabilities
FY12	Research conducted into "coding intrusion detection system" technology
FY13	Alternative/emerging technologies explored that will enhance navigation in challenged environments
FY14	Investigation of advanced anti-jam antennas and pseudo-lite sources that will protect and enhance weak GPS signals
FY15	New sensor technologies, such as atomic sensors, explored

Year	Major Development
FY16	Antennas and antenna arrays that provide improved communications and reliability through EW-jammed environments explored in a lab environment
FY17	Design and development of software tools that support the location and adjustment of pseudo-lite and autonomous navigation assets on the battlefield
FY18	New short-range wireless transmission technologies that improve the performance and robustness of secure wireless PANs researched in a laboratory
FY20	Program dissolved and efforts realigned to other programs

Worldwide Distribution/Inventories

C3 Technology is a **United States Army** program.

Forecast Rationale

The U.S. Army's Command, Control, Communications Technology program conducts research and development into C3 technologies, electronics components and subcomponents, and software that provide the Army with enhanced capabilities for secure, mobile, networked communications and assured information delivery.

The program has been dissolved and realigned due to funding restrictions, with efforts transferred and integrated into other programs.

This report will be archived in 2021.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR RDT&E FUNDING (in US$)												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
MFR Varies												
C3 TECHNOLOGY (U.S. ARMY) <> United States <> Army												
	606,610,000	100000	0	0	0	0	0	0	0	0	0	100,000
Total	606,610,000	100000	0	0	0	0	0	0	0	0	0	100,000