



BHEF's National Higher Education and Workforce Initiative

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Creating Solutions. Inspiring Action.®

About the Business-Higher Education Forum

BHEF is a member organization of Fortune 500 CEOs, college and university presidents, and other leaders who collaborate to enhance U.S. global competitiveness.

BHEF OVERVIEW

- BHEF members collaborate to increase baccalaureate attainment and improve alignment between higher education and business by focusing on pathways to achieve high skill workforce outcomes in high-demand **and** emerging fields.
- BHEF convenes business and higher education leaders, and provides program development design, seed funding support, and scaling guidance focused on the undergraduate experience and baccalaureate outcomes.
- BHEF facilitates peer-to-peer engagement through its personal membership base and works on behalf of its members to create solutions and inspire peer leaders to act.

PILLARS

Provide Value for Corporations and Universities to Engage in Collaboration for Workforce Development

Address Workforce Needs through Programmatic Initiatives

Influence Practice and Policy through Research and Thought Leadership

BHEF's National Higher Education and Workforce Initiative Strategy

What are the supply challenges?

- Innovation and competitiveness increasingly rely on new technologies and emerging fields
- Nationally, competition for talent has increased dramatically
- Lack of alignment between business and higher education in developing talent in key emerging fields such as data science and cybersecurity

What is BHEF's strategy?

- Deploy a model of strategic business engagement with higher education to shift from transactional relationships to strategic partnerships to develop talent ecosystems
- Create undergraduate career pathways that address employer demand for a high-skilled workforce, especially for women, minorities, and veterans

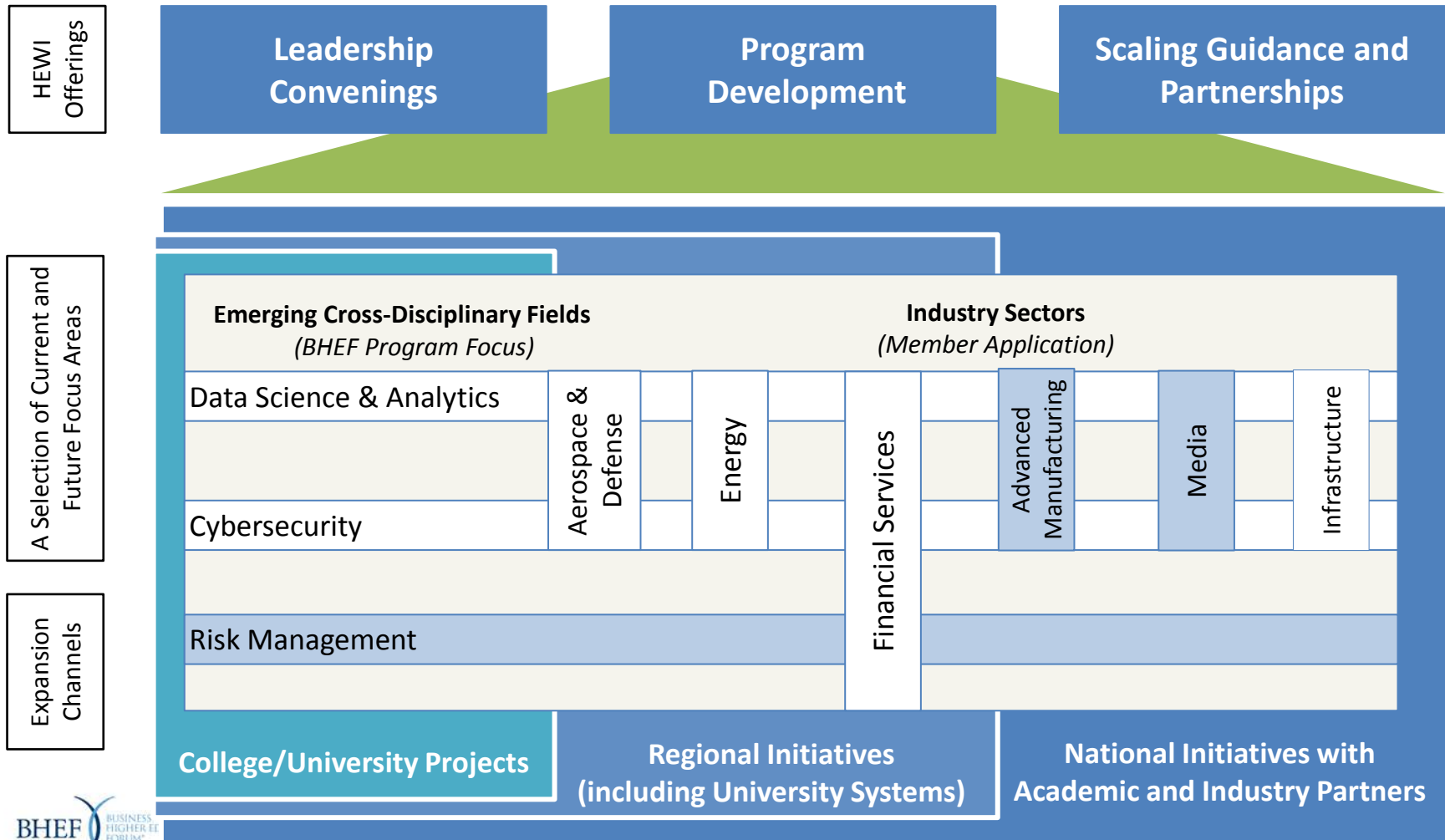
Why does this strategy work?

- This initiative creates a CEO-led talent acquisition strategy for high-skill, high-demand talent from member companies and peers
- The effort is supported by a network of CEOs and university presidents and system chancellors
- BHEF implements this strategy in multiple locations

BHEF Strategy

National Higher Education and Workforce Initiative Framework

Through HEWI, BHEF catalyzes regional market-driven projects in emerging cross-disciplinary fields in partnership with member academic institutions and companies in high-demand industries.



Key: Current focus areas

Future focus areas

HEWI High Points

- Through a significant grant from the Office of Naval Research, BHEF will expand its cybersecurity work throughout D.C. and Virginia. BHEF will strengthen community college pathways and integrate work-based applied learning experiences into academic credentials.
 - Understand workforce landscape with Burning Glass
 - Apply learning from Maryland to launch Virginia, DC, Maryland network
 - Develop new community college pathways in networking and cyber
 - Explore new cyber physical systems minor with UVA
- BHEF received a \$650K award from the Alfred P. Sloan Foundation to build undergraduate pathways in data science across a swath of sectors. BHEF will lead a New York City-wide task force with its colleges and universities, companies, government agencies, and cultural institutions.
- Funded by NSF's \$4.5M grant, BHEF launched a network of 5 industry/higher education partnerships, which build new pathways to STEM degrees for community college transfer students.



Report on Cybersecurity Jobs in Virginia and the DMV

Prepared by: Burning Glass Technologies



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Cybersecurity:

Cybersecurity roles are defined as roles with a specific focus on cybersecurity that have either a cybersecurity-specific title, require a cybersecurity certification, or request cybersecurity-specific skills.

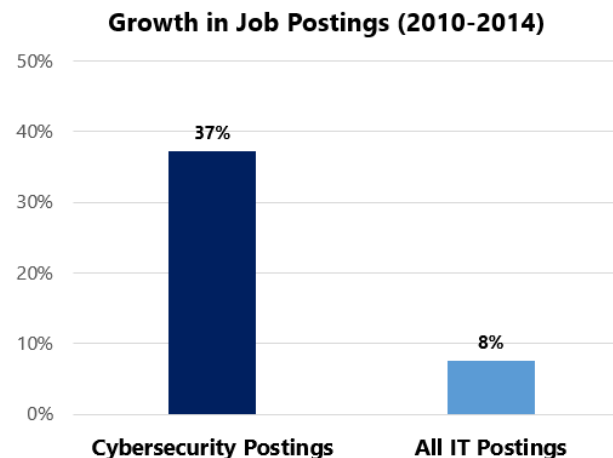
Market Overview: Cybersecurity Jobs Nationally

The Market for Cybersecurity Jobs Is Large and Growing

- In 2014, there were 198,627 postings for cybersecurity jobs nationally.
- Cybersecurity postings have **grown 90% nationally** from 2010-2014. This growth rate is over **3x faster than all US IT jobs**.
- Cybersecurity postings have **grown 37% in the DMV Region** since 2010, **5x faster than IT postings**.

Demand for Cybersecurity Talent Is Outstripping Supply

- The Certified Information Systems Security Professional (CISSP) certification is the most commonly requested cybersecurity credential. The demand for cybersecurity talent appears to be outstripping supply. In the US in 2014, **employers posted 44,000 jobs requesting CISSP, recruiting from a pool of only 64,000 CISSP holders***.
- Cybersecurity job postings calling for CISSP **stay open 15% longer in the DMV Region** compared to the nation overall.

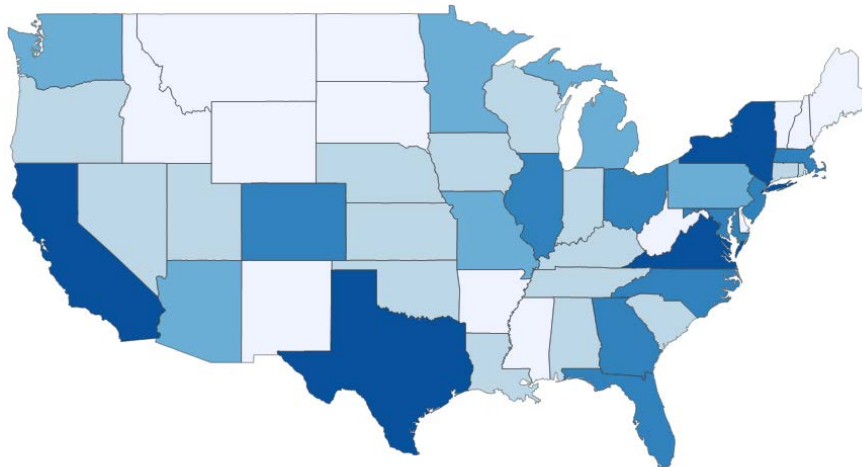


*According to the International Information System Security Certification Consortium, Inc., (ISC)²® membership counts as of March 3, 2015

DMV Region Leads the Nation in Cybersecurity Demand

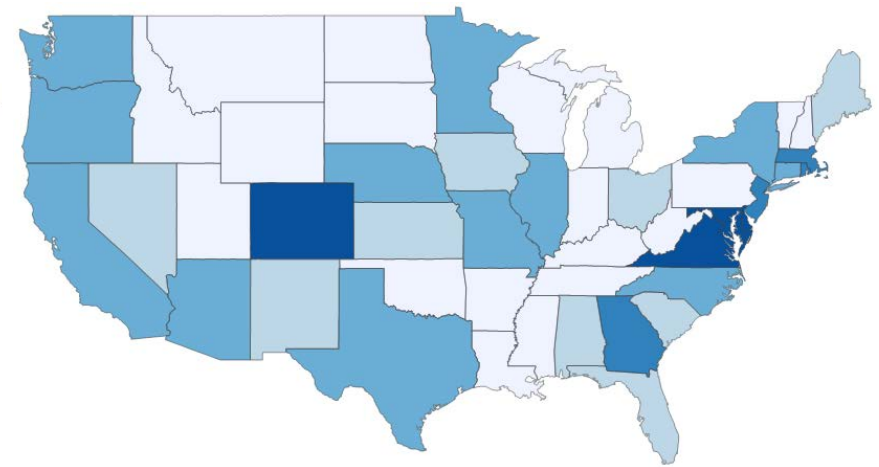
- In 2014, there were 33,087 cybersecurity postings in the DMV Region.
- Cybersecurity postings comprised 16% of all IT jobs in the region compared to 9% in the nation.
- Networking roles, which can serve as a talent pipeline for cyber roles comprised another 26% of IT posting.
- Washington, D.C., Virginia, and Maryland have the three highest counts of job postings per capita, respectively, of all states in the nation.
- In 2014, Virginia had the second highest posting count overall in the country with 17,227 postings, behind only California.

Cybersecurity Postings by State (2014)



Cyber Postings 0 to 999 1,000 to 2,499 2,500 to 4,999 5,000 to 10,000 10,000+

Cybersecurity Postings per Capita (2014)



Cyber Postings Location Quotients Very Low Low Average High Very High

The Location Quotient (LQ) measures a state's concentration of cybersecurity jobs relative to the national average.

Geographies Included In This Analysis

For this analysis, we included data for the following geographies:

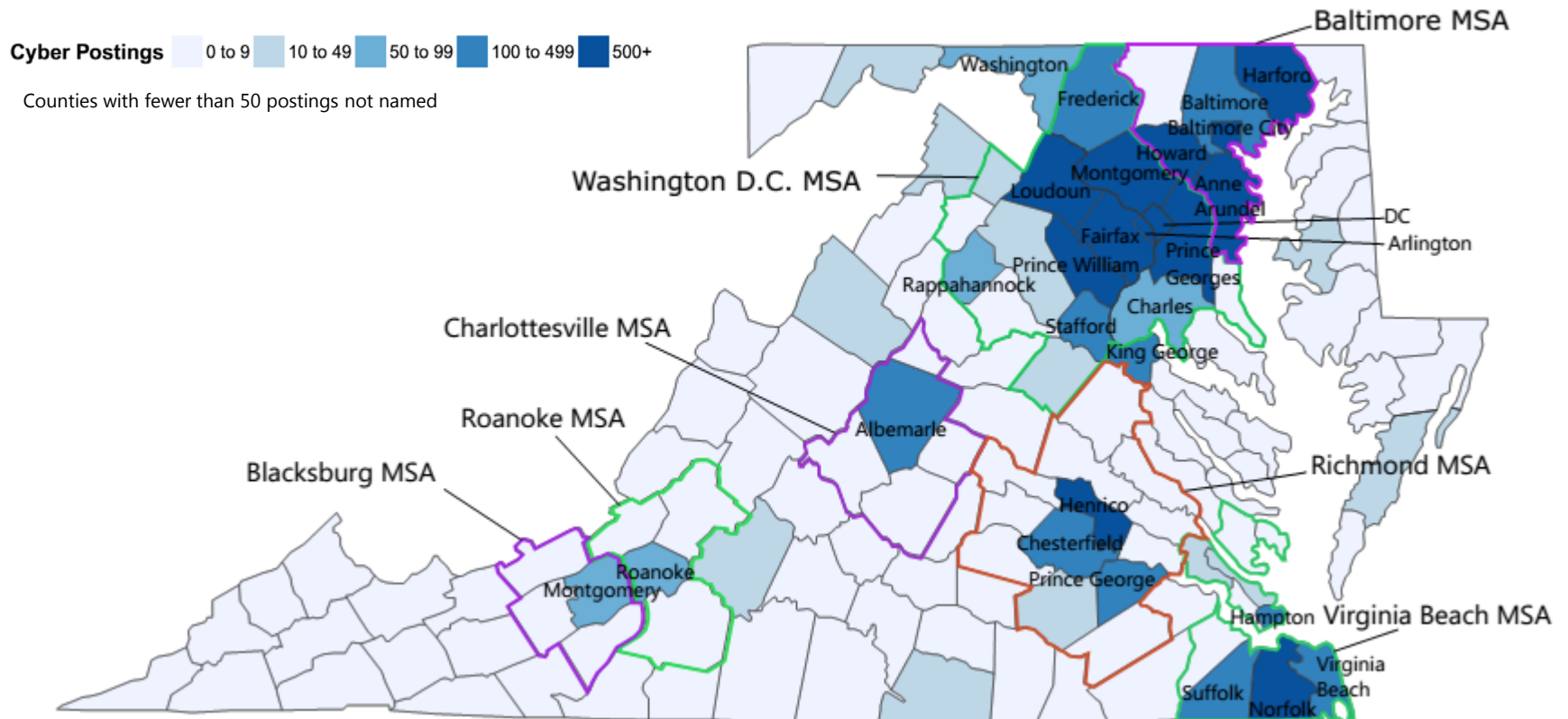
- **The DMV Region** – The combination of the states of Maryland and Virginia, as well as the Washington, D.C. Metropolitan Statistical Area
- **State of Maryland**
- **State of Virginia**
- **Washington, D.C. Metropolitan Statistical Area** – The Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Statistical Area.
- **Richmond, VA Metropolitan Statistical Area** – The Richmond, VA Metropolitan Statistical Area.
- **Virginia Beach, VA Metropolitan Statistical Area** – The Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area.

In order to capture job postings in Washington, D.C., Richmond, VA, and Virginia Beach, VA, we used their respective Metropolitan Statistical Areas (MSAs), which are defined by the OMB to cover local labor markets and incorporate commuting patterns into their design, making them the ideal geographic unit of analysis. Metropolitan Statistical Areas, hereafter referred to as “metropolitan areas,” consist of a major city and the surrounding counties that contribute towards that city’s economic output.

Overview of Cybersecurity Jobs in the DMV Region

- Postings are concentrated in Washington DC, Baltimore, Richmond, and Virginia Beach metropolitan areas, with 70% of total postings in the Washington DC, MSA.
- Average posted salaries for cybersecurity jobs in the DMV Region were \$89,579, compared to \$84,385 for cybersecurity jobs nationally and \$82,471 for other IT jobs in the DMV Region.

Cybersecurity Jobs by County in the DMV Region



Geographic Summary Table

- This summary details cybersecurity and networking postings by geography

Summary by Geography	Total Cybersecurity Postings (2014)	Total Networking Postings (2014)	Cybersecurity as Share of All IT	Networking as Share of All IT
National	198,627	597,696	9%	27%
Capital Region (MD, VA & DC) Combined	33,087	53,333	16%	26%
States				
Maryland (MD)	9,437	17,799	14%	27%
District of Columbia (DC)	6,423	9,998	16%	25%
Virginia (VA)	17,227	25,536	18%	26%
Metropolitan Statistical Areas				
Washington-Arlington-Alexandria, DC-VA-MD-WV	22,774	34,161	17%	26%
Baltimore-Towson, MD	3,882	7,876	13%	27%
Virginia Beach-Norfolk-Newport News, VA-NC	1,530	2,601	18%	30%
Richmond, VA	1,320	2,827	12%	25%
Charlottesville, VA	131	366	11%	31%
Hagerstown-Martinsburg, MD-WV	116	293	16%	40%

Unique Features of Local Demand

Washington D.C. Metropolitan Area

- Washington D.C. has the largest demand for cybersecurity professionals of any city in the nation.
- Demand is heavily concentrated among professional services and defense contractors providing services to the federal government.
- Cybersecurity and related networking roles account for over 40% of all IT job demand.

Richmond Metropolitan Area

- Demand for cybersecurity professionals in Richmond is strongest in the Finance sector, in contrast to the other cities included in this report.
- Cybersecurity roles in the finance sector often have distinct training requirements such as a Certified Information Systems Auditor certification.

Virginia Beach Metropolitan Area

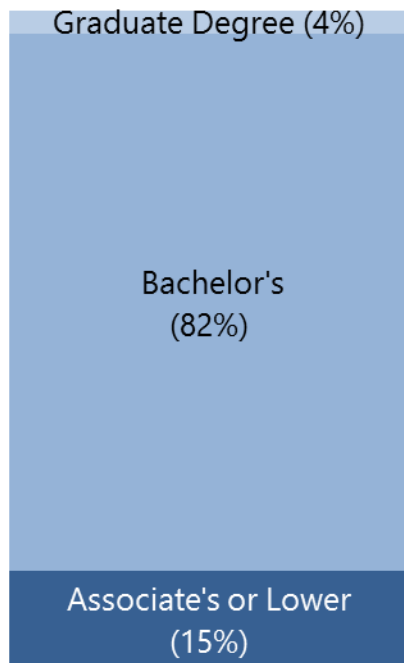
- Demand for cybersecurity professionals in the Tidewater Region is heavily concentrated in the US Navy and related defense contractors.
- Cybersecurity roles in the Tidewater region are more likely to call for a Security+ certification and are more likely be cybersecurity specialists (as opposed to engineers, auditors etc.).

Cybersecurity: Education and Experience

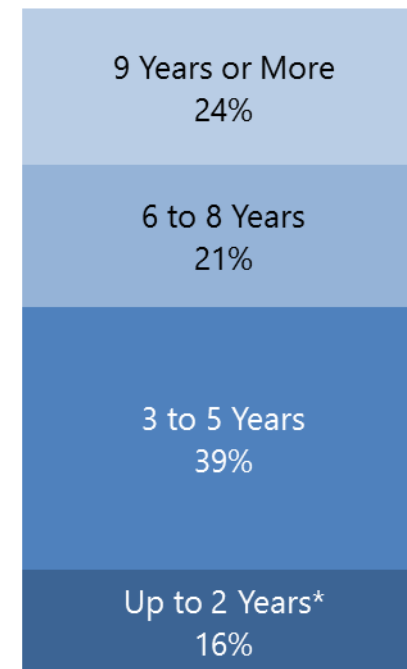
Cybersecurity Jobs Require Significant Education and Experience

- 85% of cybersecurity postings in the DMV Region specify at least a Bachelor's.
- 45% of cybersecurity postings in the DMV Region require at least 6 years of experience, as compared to 36% of cybersecurity postings nationally that require at least 6 years of experience.

Minimum Education Level



Minimum Experience



* 23% of cybersecurity postings in the DMV region do not specify experience requirements

Cybersecurity: Top Employers

Top Employers by Industry Sector

(Minimum 100 postings in 2014)

Professional, Scientific and Technical Services

- Booz Allen Hamilton
- ManTech
- Computer Sciences Corp
- SRA International
- PwC
- Preferred Systems Solutions
- Accenture
- BAE Systems
- MITRE Corporation
- CACI
- SAIC
- CGI Group
- Deloitte
- Engility
- Knowledge Consulting Group

Finance and Insurance

- Capital One
- Freddie Mac

Manufacturing & Defense

- General Dynamics
- Northrop Grumman
- Raytheon
- Hewlett-Packard
- Lockheed Martin
- TASC

Information

- AT&T
- Symantec
- Verizon

Government

- US Department Of Defense
- National Security Agency

Cybersecurity: Employment of New Entrants

Top Employers asking for New Entrants

(Minimum 30 postings in 2014, at least 25% asking for 2 Years or less experience)

PricewaterhouseCoopers

Accenture

Deloitte Development

US Department Of Defense

ITT Corporation

KEYW

EY

Accuvant

Grant Thornton

Federal Bureau Of Investigation

Nana Regional Corporation

US Navy

Defense Point Security

UnitedHealth Group

US Marine Corps

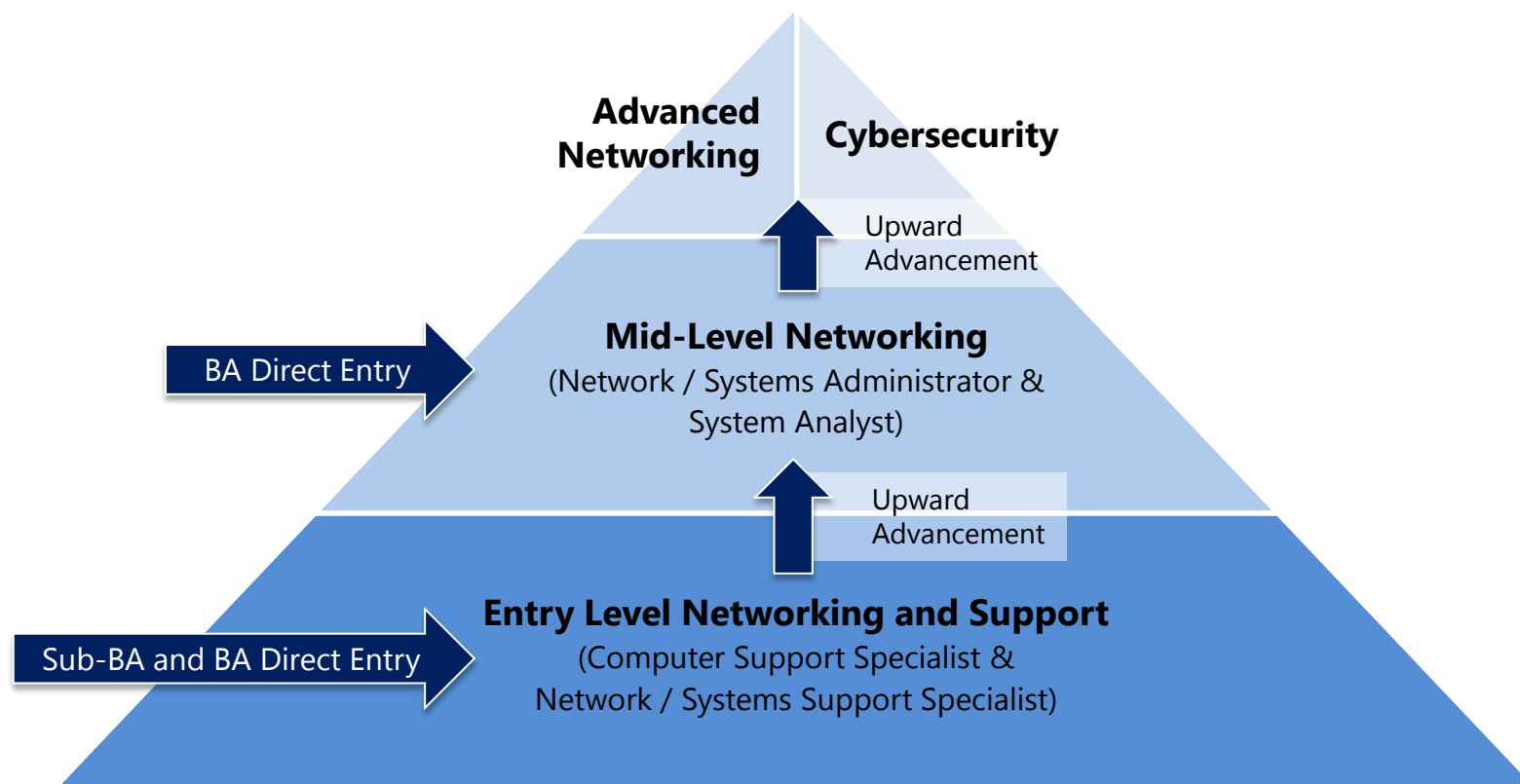
George Mason University

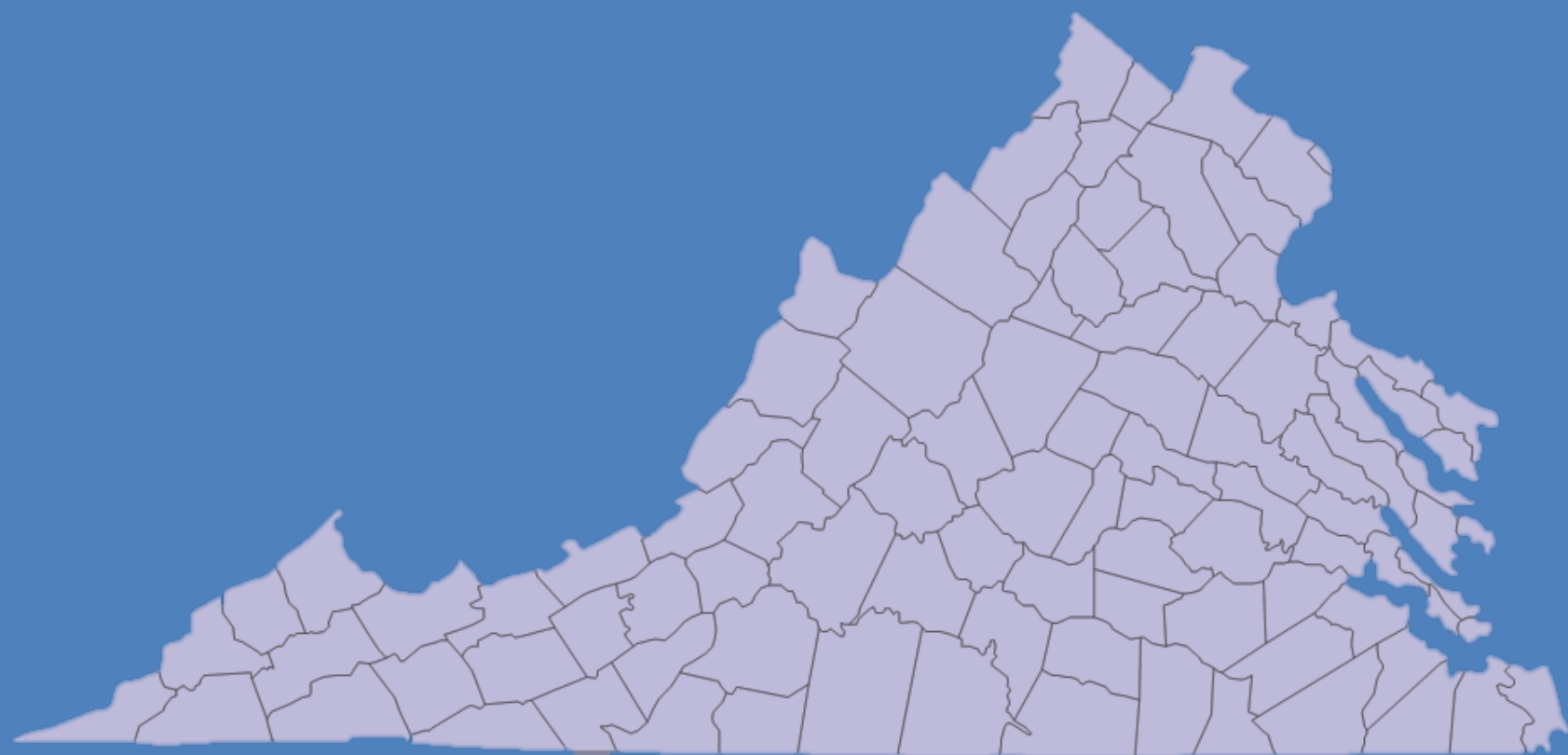
Pipeline Roles for Advancement into Cybersecurity Careers:

Pipeline roles are defined as other networking and systems occupations which can serve as a pipeline for students and job seekers to move into cybersecurity roles, which in most cases require more advanced credentials or experience.

Networking and Cybersecurity Career Ecosystem

Cybersecurity roles tend to require significant experience and credentials. In order to identify the roles which job seekers can use to move up a career ladder into cybersecurity roles, we have included an analysis of the full networking occupation landscape. There are many entry level roles which students can use to build relevant skills and credentials to enter the cyber workforce.



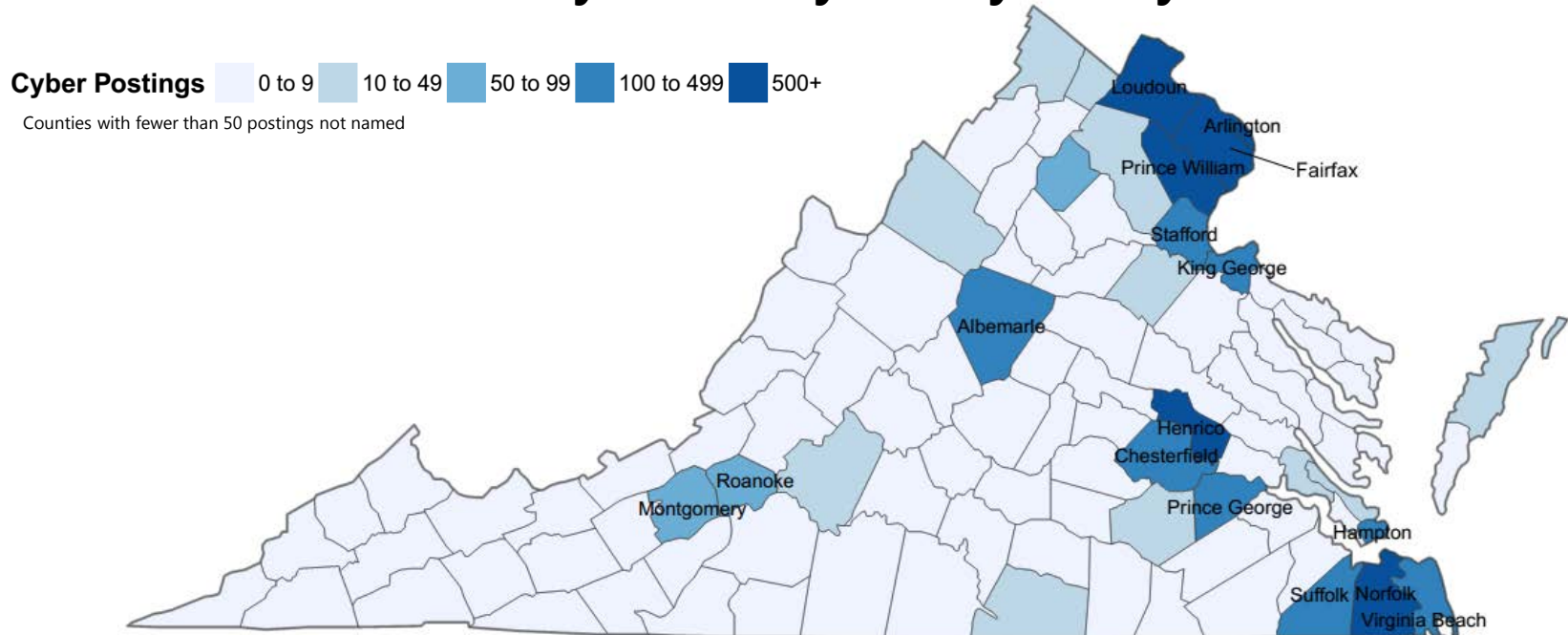


Virginia

Overview of Cybersecurity Jobs in Virginia








- In 2014, there were 17,227 cybersecurity postings in Virginia.
- Cybersecurity postings comprised 14% of all IT postings in Virginia, with networking comprising another 26% of all IT postings in the state.
- Cybersecurity postings grew 37% in Virginia in 2010 - 2014, compared to 8% for all IT in Virginia.
- Average posted salaries for cybersecurity jobs in Virginia were \$88,541, compared to \$84,385 for cybersecurity jobs nationally and \$80,666 for other IT jobs in Virginia.




VA Cybersecurity Jobs by County



Cybersecurity: Demand by Role

- Engineers and Analysts are the most commonly demanded cybersecurity roles in Virginia.
- Virginia employers demand proportionally more cybersecurity Engineers and Specialists/Technicians than national employers.

Title	% of Cybersecurity Postings	Number of Cybersecurity Postings (2014)	Comparison to National
Engineer	32%	3,607	
Analyst	18%	1,959	
Manager/Admin	17%	1,910	
Specialist/Technician	14%	1,577	
Architect	5%	498	
Consultant	2%	246	
Auditor	2%	207	

 : % of Cybersecurity jobs in this role in VA > % in the nation
 : % of Cybersecurity jobs in this role in VA = % in the nation
 : % of Cybersecurity jobs in this role in VA < % in the nation

Cybersecurity: Demand by Industry Sector

- Professional Services & Defense and Finance are the leading industry sectors for cybersecurity professionals in Virginia.
- Compared to the nation, a higher proportion of cybersecurity demand in Virginia comes from the Professional Services & Defense and the Public Administration sectors, reflecting the concentration of professional services companies, government agencies and defense contractor jobs in the state.

Industry Sector	% of Cybersecurity Postings	Number of Cybersecurity Postings (2014)	Growth (2010-2014)	Comparison to National
Prof. Services & Defense*	68%	11,758	28%	
Finance	9%	1,522	58%	
Public Administration	7%	1,206	N/A	
Information	7%	1,126	54%	
Education	3%	455	118%	
Health Care	2%	256	3%	
Other Services	1%	194	-34%	
Other	4%	710	-32%	

*The Professional Services & Defense industry sector includes professional services firms such as Booz Allen Hamilton and ManTech, defense contractors such as General Dynamics and Northrop Grumman, the service divisions of computer manufacturers such as Hewlett Packard and Dell.

: % of Cybersecurity jobs with this sector in VA > % in the nation
 : % of Cybersecurity jobs with this sector in VA = % in the nation
 : % of Cybersecurity jobs with this sector in VA < % in the nation

Cybersecurity: Top Employers

Top Employers by Industry Sector

(Minimum 30 postings in 2014)

Professional, Scientific and Technical Services

- ManTech
- Booz Allen Hamilton
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- Preferred Systems Solutions
- SRA International
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- CACI
- MITRE Corporation
- BAE Systems
- Accenture
- CGI Group
- Deloitte
- Engility
- SAIC
- Knowledge Consulting Group
- Whitney Bradley & Brown
- Leidos

Government

- US Department Of Defense

Manufacturing & Defense

- General Dynamics
- Northrop Grumman
- Raytheon
- Hewlett-Packard
- Lockheed Martin
- TASC

Information

- AT&T
- Symantec
- Verizon

Retail Trade

- amazon.com

Finance and Insurance

- Capital One
- Freddie Mac

Cybersecurity: Demand for Certifications

Certification requirements are more common in cybersecurity roles than in IT generally.

- 54% of all cybersecurity positions in Virginia request at least one certification.
- 36% of all IT positions in Virginia request a certification of any kind.

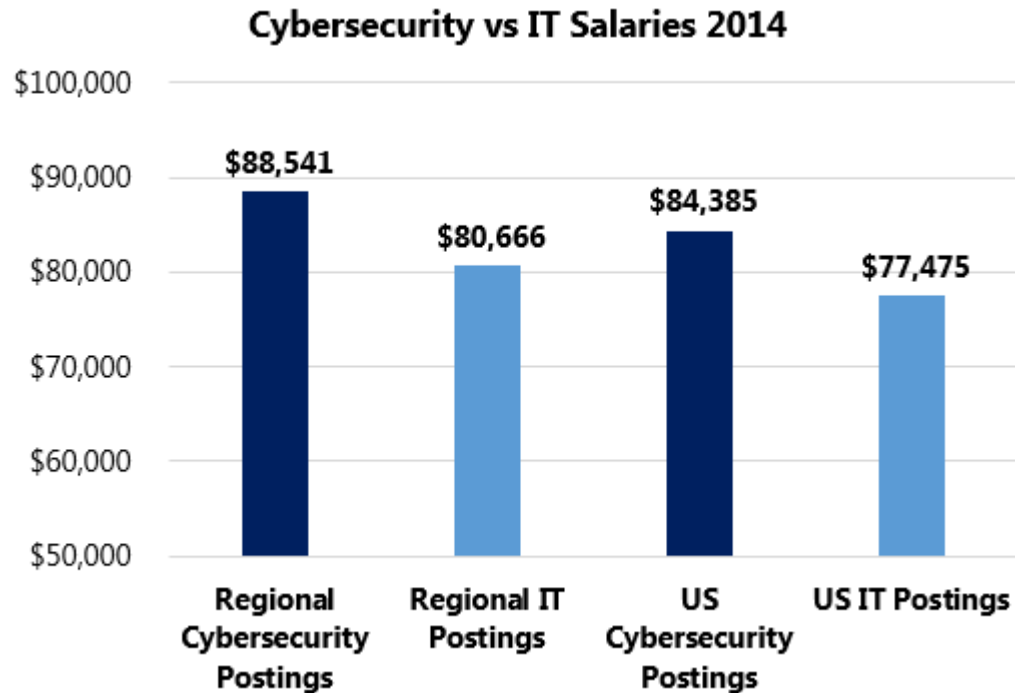
Certification	% of Cybersecurity Postings	Number of Cybersecurity Postings (2014)	Comparison to National
CISSP Certified Information Systems Security Professional	48%	4,387	—
Security+	30%	2,795	▲
CISA Certified Information Systems Auditor	17%	1,605	▼
CISM Certified Information Security Manager	11%	1,023	▼
SSCP Systems Security Certified Practitioner	7%	675	▲
GSE GIAC Security Essentials	7%	653	▲
GCIH GIAC Certified Incident Handler	6%	510	▲
GCI GIAC Certified Intrusion Analyst	3%	307	▲

▲ : % of Cybersecurity jobs with this certification in VA > % in the nation
 — : % of Cybersecurity jobs with this certification in VA = % in the nation
 ▼ : % of Cybersecurity jobs with this certification in VA < % in the nation

Cybersecurity: Salaries

Cybersecurity Jobs Pay a Premium

On average, cybersecurity salaries in Virginia offer a premium of almost \$8,000 over the salaries for all IT jobs in Virginia.



Region: Virginia

Pipeline Roles for Advancement into Cybersecurity Careers:

Pipeline roles are defined as other networking and systems occupations which can serve as a pipeline for students and job seekers to move into cybersecurity roles, which in most cases require more advanced credentials or experience.

Pipeline Roles into Cybersecurity in Virginia

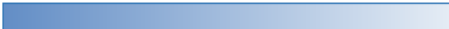















Understand the Career Ladder into Cybersecurity Roles

- There were 25,536 postings for networking jobs in Virginia in 2014, comprising 26% of all IT postings.




Top Occupations	Total Openings Postings in 2014	Entry Level % of Total Openings Requiring <=2 Years of Experience	Educational Requirements % of Postings Calling For a BA or Graduate Degree
Cybersecurity			
All Cybersecurity Roles	17,227	15%	85%
Advanced Networking			
Network Engineer / Architect	3,446	16%	89%
Computer Systems Engineer / Architect	4,371	10%	92%
Mid-Level Networking			
Systems Analyst	5,513	18%	94%
Network / Systems Administrator	5,063	26%	76%
Entry-Level Networking and Support			
Network / Systems Support Specialist	1,568	11%	72%
Computer Support Specialist	5,575	40%	57%

Pipeline Roles into Cybersecurity: Demand by Industry Sector

- Professional Services & Defense and Finance are the leading industry sectors for networking professionals in Virginia.
- Compared to the nation, a higher proportion of networking demand in Virginia comes from the Professional Services & Defense, and the Public Administration sectors, reflecting the concentration of professional services companies, government agencies and defense contractor jobs in the state.

Industry Sector	% of Cybersecurity Postings	Number of Cybersecurity Postings (2014)	Growth (2010-2014)	Comparison to National
Prof. Services & Defense*	66%	19,584 	9%	
Finance	7%	2,131 	32%	
Public Administration	6%	1,903 	N/A	
Information	5%	1,507 	-8%	
Education	4%	1,151 	125%	
Health Care	3%	788 	25%	
Retail	2%	663 	116%	
Other	7%	1,999 	-35%	

*The Professional Services & Defense industry sector includes professional services firms such as Booz Allen Hamilton and ManTech, defense contractors such as General Dynamics and Northrop Grumman, the service divisions of computer manufacturers such as Hewlett Packard and Dell.

-  : % of Networking jobs with this sector in VA > % in the nation
-  : % of Networking jobs with this sector in VA = % in the nation
-  : % of Networking jobs with this sector in VA < % in the nation

Methodology

Report Overview

This report provides insight into the demand for cybersecurity roles and related occupations for the DMV Region, consisting of Virginia, Washington, D.C., and Maryland. Across the nation, cybersecurity roles are growing quickly and facing significant skill gaps. This report highlights the specific requirements demanded by employers for these roles so that training providers can more effectively address the needs of employers and the economy in this critical area.

The data included is from Burning Glass's proprietary database of over 100M online job postings, collected from over 40,000 job sites. Burning Glass uses advanced text analytics to extract and normalize data on jobs, skills, employers, industries and educational qualifications from online job postings. This report focuses on two categories of jobs:

- **Cybersecurity Roles:** Defined as roles with a specific focus on cybersecurity that have either a cybersecurity-specific title, require a cybersecurity certification, or request cybersecurity-specific skills.
- **Pipeline Roles for Advancement into Cybersecurity Careers:** Other networking and computer systems occupations which can serve as a pipeline for students and job seekers to move into cybersecurity roles, which in most cases require more advanced credentials or experience.

This report illustrates the magnitude of demand for these two categories of jobs along with key characteristics such as top employers and industries and analysis of the credentials required for the DMV Region as a whole, each of its constituent states, and for selected metropolitan areas.

Methodology

All jobs data in this report are drawn from Burning Glass's database of online job postings, which includes nearly 100M worldwide postings collected since 2007. Each day, Burning Glass visits over 38,000 online jobs sites to collect postings. Using advanced text analytics, over 70 data fields are extracted from each posting including job title, occupation, employer, industry, required skills and credentials and salary. Postings are then deduplicated and placed in a database for further analysis.

Definitions Used in the Report:

- **Geography:** This report looks at the DMV Region, which includes the states of Virginia and Maryland, as well as the District of Columbia. It further looks at the three metropolitan statistical areas (MSAs) in the region: Washington-Arlington-Alexandria, DC-VA-MD-WV MSA, Richmond, VA MSA and Virginia Beach-Norfolk-Newport News, VA-NC MSA. All references to Washington (or DC), Richmond or Virginia Beach should be assumed to reference the MSAs.
- **Cybersecurity Jobs:** This report classifies cybersecurity jobs as those which have a cybersecurity-related title, require a cybersecurity certification or request cybersecurity specific skills. Cybersecurity related titles used to define the roles analyzed in this report include "network security", "information security", "information assurance", and "penetration tester". Cybersecurity skills include information assurance, cryptography, computer forensics, forensic analysis, 800-53, Federal Information Security Management Act, computer network defense, network security and ArcSight.
- **Pipeline Roles:** This report classifies pipeline roles for cybersecurity as any jobs within a set of networking occupations that do not call for cybersecurity-specific skills or certifications, but with additional training could transition into cybersecurity roles. These roles occupations are Network / Engineer Architect, Computer Systems Engineer / Architect, Systems Analyst, Network / Systems Administrator, Network / Systems Support Specialist, and Computer Support Specialist.