Information Security and Cyber Defense

Inland Empire/Desert region (Riverside and San Bernardino counties combined)

Summary

- Employment for the cyber defense occupational group is expected to **increase by 7% between 2018 and 2023** in the Inland Empire/Desert region (IEDR). A total of **4,173 job openings or 835 annual job openings** will be available over the five-year timeframe.
- The **entry-level wages** for the cyber defense occupational group are **above the MIT Living Wage estimate of $12.39 per hour** for a single adult living in the IEDR.
- **There appears to be an opportunity for program growth** because there are more annual job openings for the cyber defense occupational group **(835 average annual openings)** than annual credentials issued for the selected community college programs in the region **(269 annual average community college credentials, 128 other educational institution credentials, 397 total).**

Introduction

This report provides data on the occupations related to the California Community College computer information systems (TOP 0702.00), computer systems analysis (TOP 0707.30), computer infrastructure and support (TOP 0708.00), and computer networking (0708.10) programs. Program descriptions and completion information is available in this report beginning on page 8. While there are entry-level positions within cyber defense, the majority of occupations working in this field typically require a bachelor's degree. The cyber defense occupational group is separated into **middle-skill occupations** and **above middle-skill occupations** to illuminate the opportunities available to students with various levels of educational attainment.

The **middle-skill cyber defense occupational group** consists of entry-level cyber defense occupations that typically require workers to obtain some postsecondary education. The occupations included in the middle-skill cyber defense occupational group are:

- Computer Network Support Specialists
- Computer User Support Specialists

The **above middle-skill cyber defense occupational group** consists of occupations that typically require workers to obtain a bachelor's degree. The occupations included in the above middle-skill cyber defense occupational group are:

- Computer Network Architects
- Computer Systems Analysts
- Database Administrators
- Information Security Analysts
- Network and Computer Systems Administrators

Job Opportunities

In 2018, there were 9,942 jobs in the cyber defense occupational group in the Inland Empire/Desert region (IEDR). Just under half of the jobs in the occupational group are middle-skill jobs, 49.9%. This occupational group is projected to increase employment by 7% by 2023; middle-skill jobs in this occupational group will increase slightly faster at 8%. Employers in the region will need to hire 4,173 workers over the next five years to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). There will be 2,230 job middle-skill job openings or 53% of job openings in this occupational group over the next five years. Exhibit 1 displays five-year projections for the cyber defense occupational group in the IEDR.

Exhibit 1: Five-year projections for the cyber defense occupational group

Occupational Group	2018 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Above Middle-Skill	4,976	7%	1,943	389	17%
Middle-Skill	4,966	8%	2,230	446	16%
Total	**9,942**	**7%**	**4,173**	**835**	**16%**

Source: EMSI 2019.2

Earnings

The entry-level wages for the cyber defense occupational group are above the MIT Living Wage estimate of $12.39 per hour for a single adult living in the IEDR (Glasmeier, 2019). These wages are also sufficient for two working adults and one child ($14.75 per hour, per adult, or $30,680 annually for each adult). Exhibit 2 displays wage information for the cyber defense occupational group in the IEDR.

Exhibit 2: Earnings for the cyber defense occupational group

Group	Occupation	Entry to Experienced Hourly Wage Range (25th to 75th percentile)	Median Wage (50th percentile)	Average Annual Earnings
Above Middle-Skill	Information Security Analysts	$29.72 to $59.66	$47.35	$96,400
	Computer Network Architects	$34.69 to $60.28	$44.32	$99,200
	Database Administrators	$30.24 to $51.18	$41.31	$85,200
	Computer Systems Analysts	$30.15 to $45.50	$36.91	$78,900
	Network and Computer Systems Administrators	$28.88 to $45.80	$36.20	$77,900
Middle-Skill	Computer Network Support Specialists	$24.77 to $40.00	$29.74	$68,300
	Computer User Support Specialists	$20.34 to $30.60	$25.87	$54,400

Source: EMSI 2019.2

Job Postings, Employers, Certifications, Skills, and Education

Exhibit 3 displays the number of job ads posted during the last 12 months along with the regional and statewide average time to fill for the cyber defense occupational group in the IEDR. On average, local employers fill online job postings for the cyber defense occupational group within 46 days. This regional average is four days longer than the statewide average, indicating that it is more difficult for local employers to find qualified candidates. Please note that job postings have been limited to cybersecurity-specific positions to illuminate demand for cybersecurity skills. Burning Glass's cybersecurity filter allows for analysis across industries through the selection of job postings with job titles, in-demand skills, and certifications that are specific to cybersecurity (Burning Glass, 2015). Job posting results reveal that 16% of the job postings for the cyber defense occupational group are for cybersecurity-specific jobs.

Exhibit 3: Job ads and time to fill, May 2018 – Apr 2019

Group	Occupation	Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Above Middle-Skill	Information Security Analysts	364	48	44
	Computer Network Architects	113	49	45
	Network and Computer Systems Administrators	95	41	39
	Computer Systems Analysts	16	45	42
	Database Administrators	12	45	41
Middle-Skill	Computer User Support Specialists	72	39	35
	Computer Network Support Specialists	20	39	35
	Total	**692**	**46**	**42**

Source: Burning Glass – Labor Insights

Exhibit 4 displays the employers posting the most job ads for the cyber defense occupational group during the last 12 months in the IEDR.

Exhibit 4: Employers posting the most job ads, May 2018 – Apr 2019

Group	Occupation	Employers
Above Middle-Skill	Information Security Analysts *(n=248)*	• Esri • Anthem Blue Cross
	Computer Network Architects *(n=63)*	• Anthem Blue Cross • Infinite Resource Solutions
	Network and Computer Systems Administrators *(n=62)*	• Booz Allen Hamilton, Inc. • VSolvit
	Computer Systems Analysts *(n=12)*	• Raytheon • Edison International
	Database Administrators *(n=9)*	• Booz Allen Hamilton, Inc. • Atrilogy Solutions Group
Middle-Skill	Computer User Support Specialists *(n=48)*	• General Dynamics • Cardenas Markets
	Computer Network Support Specialists *(n=13)*	• Iron Systems Incorporated • Frontier Communications

Source: Burning Glass – Labor Insights

Exhibit 5 displays in-demand certifications for each occupation in the cyber defense occupational group. Knowing which certifications are currently in demand may be useful for program development.

Exhibit 5: In-demand certifications for the cyber defense occupational group in the Inland Empire/Desert region, May 2018 – Apr 2019

Group	Occupation	Certification
Above Middle-Skill	Information Security Analysts *(n=208)*	• Certified Information Systems Security Professional (CISSP) • Certified Information Security Manager (CISM)
	Computer Network Architects *(n=105)*	• Cisco Certified Network Professional (CCNP) • Cisco Certified Network Associate (CCNA)
	Network and Computer Systems Administrators *(n=63)*	• CompTIA Security+ • Cisco Certified Network Professional (CCNP)
	Computer Systems Analysts *(n=11)*	• Project Management Certification • Microsoft Certified Solutions Associate (MCSA)
	Database Administrators *(n=6)*	• CompTIA Security+ • Microsoft Certified Solutions Associate (MCSA)
Middle-Skill	Computer User Support Specialists *(n=45)*	• CompTIA Security+ • CompTIA Network+
	Computer Network Support Specialists *(n=16)*	• Cisco Certified Internetwork Expert (CCIE) • Cisco Certified Network Professional (CCNP)

Source: Burning Glass – Labor Insights

Exhibit 6 displays a sample of specialized, employability, and software and programming skills that employers are seeking when looking for workers to fill positions in the cyber defense occupational group. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is commonly referred to as "soft skills." The skills requested in job postings may be utilized as a helpful guide for curriculum development.

Exhibit 6: Sample of in-demand skills from employer job ads for the cyber defense occupational group, May 2018 – Apr 2019

Group	Occupation	Specialized Skills	Employability Skills	Software and Programming Skills
Above Middle -Skill	Information Security Analysts *(n=326)*	• Information Systems • Project Management • Disaster Recovery Planning	• Communication Skills • Planning • Teamwork/ Collaboration	• Linux • Python • Microsoft Office
	Computer Network Architects *(n=113)*	• Network Administration • Telecommunications • Project Management	• Communication Skills • Teamwork/ Collaboration • Troubleshooting	• Voice over IP (VoIP) • Virtual Private Networking (VPN) • Cisco Switching
	Network and Computer Systems Administrators *(n=94)*	• System/Network Configuration • Network Troubleshooting • Network Security	• Planning • Communication Skills • Problem Solving	• VMware • Linux • Windows Server
	Computer Systems Analysts *(n=16)*	• Project Management • Information Security • Relational Databases	• Planning • Troubleshooting • Writing	• Microsoft Office • SQL • Voice over IP (VoIP)
	Database Administrators *(n=12)*	• Data Warehousing • Data Mining • Business Process	• Troubleshooting • Problem Solving • Creativity	• SQL • Teradata • Enterprise Resource Planning (ERP)
Middle -Skill	Computer User Support Specialists *(n=72)*	• Repair • Network Security • Hardware and Software Installation	• Troubleshooting • Problem Solving • Research	• Microsoft Office • Linux • VMware
	Computer Network Support Specialists *(n=20)*	• Network Security • Routers • Intrusion Detection	• Troubleshooting • Problem Solving • Planning	• Virtual Private Networking (VPN) • Cisco Switching • F5 Load Balancers

Source: Burning Glass – Labor Insights

Exhibit 7 displays the work experience and entry-level education typically required to enter each occupation according to the Bureau of Labor Statistics (BLS), educational attainment for incumbent workers with "some college, no degree" and an "associate degree" according to the U.S. Census (2016-17), and the minimum advertised education requirement from employer job ads. Except for the computer user support specialists occupation, most employers are searching for a candidate with a bachelor's degree or higher for jobs in the cyber defense occupational group.

Exhibit 7: Experience and education requirements for the cyber defense occupational group (middle-skill occupations appear below the line), May 2018 – Apr 2019

Occupation	Work Experience Required	Typical Entry-Level Education Requirement	Educational Attainment*	Minimum Advertised Education Requirement from Job Ads			
				Number of Job Ads (n=)	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Information Security Analysts	Less than 5 years	Bachelor's degree	28%	*266*	22%	8%	70%
Computer Network Architects	5 years or more	Bachelor's degree	35%	*83*	5%	1%	94%
Network and Computer Systems Administrators	None	Bachelor's degree	38%	*77*	26%	3%	71%
Computer Systems Analysts	None	Bachelor's degree	21%	*17*	-	-	100%
Database Administrators	None	Bachelor's degree	22%	*11*	-	-	100%
Computer User Support Specialists	None	Some college, no degree	41%	*48*	29%	23%	48%
Computer Network Support Specialists	None	Associate degree	41%	*15*	6%	27%	67%

Source: EMSI 2019.2, Burning Glass – Labor Insights
*Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework

Student Completions and Program Outcomes

This section contains completion and outcome data for the California Community College computer information systems (TOP 0702.00) and computer networking (TOP 0708.10) programs. Exhibits 8 and 11 display the average annual regional California Community College (CCC) credentials conferred during the three academic years between 2014 and 2017, from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, along with enrollments from the most recent

year available on LaunchBoard. Credentials are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case in order to calculate an annual average. This is done to minimize the effect of atypical variation that might be present in a single year. Enrollments are the count of enrollments in courses assigned to the TOP code in the selected year. The relevant TOP code is from the Taxonomy of Programs manual, and the corresponding program titles used at each college (in *italics*) is sourced from the Chancellor's Office Curriculum Inventory (COCI). Please note, a credential is not always equal to a single person in search of a job opening since a student may earn more than one credential, such as an associate degree in addition to a certificate.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which comes from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from records provided by California's Employment Development Department's Unemployment Insurance database. When available, outcomes for completers are reported in order to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2019a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2017). Data from the latest academic year for each metric is provided in Exhibits 9 and 12.

Program descriptions are sourced from the California Community Colleges Taxonomy of Programs. Descriptions for the programs included in this report are the following:

Computer Information Systems (TOP 0702.00): General programs in data and information storage and processing, including hardware, software, basic design principles, and user requirements.

Exhibit 8: Annual average community college credentials and enrollments for the computer information systems program in the Inland Empire/Desert region

0702.00 – Computer Information Systems	CCC Enrollments, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
Barstow – *Computer Information Systems/Computer Science/Information Systems Management*	351	
Associate Degree		1
Chaffey – *Computer Information Systems*	1,841	
Associate Degree		21
Certificate 30 to < 60 semester units		6
Copper Mountain – *Computer Information Systems*		
Associate Degree		4
Crafton Hills – *Computer Information Systems*		
Associate Degree		8
Certificate 18 to < 30 semester units		1
Certificate 6 to < 18 semester units		3
Desert – *Computer Information Systems*	1,658	
Associate Degree		3
Certificate 30 to < 60 semester units		2
Moreno Valley	587	
Mt. San Jacinto – *Computer Information Systems*	606	
Associate Degree		21
Certificate 30 to < 60 semester units		2
Norco	665	
Palo Verde – *Computer Information Systems*		
Associate Degree		1
Certificate 6 to < 18 semester units		58
Riverside	1,506	
San Bernardino – *Computer Science*	140	
Associate Degree		7
Certificate 18 to < 30 semester units		1
Victor Valley – *Computer Information Systems*	35	
Associate Degree		14
Total CCC Enrollments, Academic Year 2016-17	**7,389**	
Total Annual Average CCC Credentials, Academic Years 2014-17		**152**

Source: LaunchBoard, MIS Data Mart, COCI

Exhibit 9: Computer information systems strong workforce program outcomes

Strong Workforce Program Metrics: 0702.00 – Computer Information Systems Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	7,389	293
Completed 12+ units in one year (2016-17)	897	43
Economically disadvantaged students* (2016-17)	73%	75%
Transferred to a four-year institution (transfers)	547	48
Employed in the fourth fiscal quarter after exit (completers)	53%	68%
Median annual earnings* (completers)	$27,906	$29,465
Job closely related to the field of study (2014-15)	72%	73%
Median change in earnings (completers)	65%	111%
Attained a living wage (completers and skills-builders)	48%	57%

Source: LaunchBoard
*Data for these metrics is available in Community College Pipeline. All others are available in Strong Program Workforce Metrics.

Computer Systems Analysis (TOP 0707.30): Systems analysis and design, including the recognition, definition, and improvement of processes through the use of computer technology and methodologies.

The IEDR does not have any reported completions in TOP 0707.30 Computer Systems Analysis. Exhibit 10 displays the enrollments from the most recent year available on LaunchBoard for computer systems analysis in the IEDR.

Exhibit 10: Enrollments for the computer systems analysis program in the Inland Empire/Desert Region

0707.30 – Computer Systems Analysis	CCC Enrollments, Academic Year 2016-17
Moreno Valley – *Information Assurance Auditing*	45
Mt. San Jacinto	33
Norco	28
Palo Verde	126
Riverside	36
Total CCC Enrollments, Academic Year 2016-17	**268**

Source: LaunchBoard, COCI

Computer Infrastructure and Support (TOP 0708.00): Network and operating systems design and administration, including certification preparation.

There are currently no completions for the computer infrastructure and support (TOP 0708.00) program in the IEDR.

Computer Networking (TOP 0708.10): Principles of local, metropolitan, and wide area computer networking design, installation, maintenance, and troubleshooting.

Exhibit 11: Annual average community college credentials and enrollments for the computer networking program in the Inland Empire/Desert region

0708.10 – Computer Networking	CCC Enrollments, Academic Year 2016-17	CCC Annual Average Credentials, Academic Years 2014-17
Chaffey – *Network Specialist*	217	
Certificate 30 to < 60 semester units		48
Certificate 18 to < 30 semester units		50
Certificate 6 to < 18 semester units		2
Mt. San Jacinto – *CIS: Networking*	112	
Certificate 30 to < 60 semester units		2
Riverside – *Information Security and Cyber Defense*	259	
Certificate 6 to < 18 semester units		15
Victor Valley	30	
Total CCC Enrollments, Academic Year 2016-17	**618**	
Total Annual Average CCC Credentials, Academic Years 2014-17		**117**

Source: LaunchBoard, MIS Data Mart, COCI

Exhibit 12: Computer networking strong workforce program outcomes

Strong Workforce Program Metrics: 0708.10 – Computer Networking Academic Year 2015-16, unless noted otherwise	Inland Empire/Desert Region	California Median
Course enrollments (2016-17)	618	168
Completed 12+ units in one year (2016-17)	129	31
Economically disadvantaged students* (2016-17)	82%	71%
Transferred to a four-year institution (transfers)	22	15
Employed in the fourth fiscal quarter after exit (completers)	75%	72%
Median annual earnings* (completers)	$45,582	$39,155
Job closely related to the field of study (2014-15)	74%	75%
Median change in earnings (completers)	14%	59%
Attained a living wage (completers and skills-builders)	61%	74%

Source: LaunchBoard
*Data for these metrics is available in Community College Pipeline. All others are available in Strong Program Workforce Metrics

Credentials granted from other educational providers outside of the California Community College system are displayed in Exhibits 13, 14, and 15 along with the relevant CIP code. This is the final release data compiled from the Integrated Postsecondary Education Data System (IPEDS) for the most recent three years available.

Exhibit 13: Annual average other educational providers credentials awarded for network and system administration/administrator programs

11.1001 - Network and System Administration/Administrator	Other Educational Providers Annual Average Credentials, Academic Years 2013-16
Computer Training Academy	
Award < 1 academic yr	43
Total Annual Average Other Credentials, Academic Years 2013-16	**43**

Source: IPEDS

Exhibit 14: Annual average other educational providers credentials awarded for computer systems analysis/analyst programs

11.0501 - Computer Systems Analysis/Analyst	Other Educational Providers Annual Average Credentials, Academic Years 2013-16
Computer Training Academy	
Award < academic yr	82
Total Annual Average Other Credentials, Academic Years 2013-16	**82**

Source: IPEDS

Exhibit 15: Annual average other educational providers credentials awarded for computer systems networking and telecommunications programs

11.0901 - Computer Systems Networking and Telecommunications	Other Educational Providers Annual Average Credentials, Academic Years 2013-16
University of Redlands	
Award 1 < 2 academic yrs	3
Total Annual Average Other Credentials, Academic Years 2013-16	**3**

Source: IPEDS

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Appendix: Occupation definitions, sample job titles, five-year projections for cyber defense occupations

Occupation Definitions (SOC) code), Education and Training Requirement, Community College Educational Attainment

Above Middle-Skill Occupations

Computer Systems Analysts (15-1121)

Analyze science, engineering, business, and other data processing problems to implement and improve computer systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software.

Sample job titles: Applications Analyst, Business Analyst, Business Systems Analyst, Computer Analyst, Computer Systems Analyst, Computer Systems Consultant, Information Systems Analyst (ISA), Information Technology Analyst (IT Analyst), System Analyst, Systems Analyst

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 21%

Information Security Analysts (15-1122)

Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. May ensure appropriate security controls are in place that will safeguard digital files and vital electronic infrastructure. May respond to computer security breaches and viruses.

Sample job titles: Data Security Administrator, Information Security Officer, Information Security Specialist, Information Systems Security Analyst, Information Systems Security Officer, Information Technology Security Analyst (IT Security Analyst), Information Technology Specialist, Network Security Analyst, Security Analyst, Systems Analyst

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 28%

Database Administrators (15-1141)

Administer, test, and implement computer databases, applying knowledge of database management systems. Coordinate changes to computer databases. May plan, coordinate, and implement security measures to safeguard computer databases.

Sample job titles: Data Architect, Database Administration Manager, Database Administrator (DBA), Database Analyst, Database Coordinator, Database Developer, Database Programmer, Information Systems Manager, Management Information Systems Director (MIS Director), System Administrator

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 22%

Network and Computer Systems Administrators (15-1142)

Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Monitor network to ensure network availability to all system users and may perform necessary maintenance to support network availability. May monitor and test Web site performance to ensure Web sites operate correctly and without interruption. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software. May supervise computer user support specialists and computer network support specialists. May administer network security measures.

Sample job titles: Information Analyst, Information Systems Manager (IS Manager), Information Technology Specialist (IT Specialist), LAN Specialist (Local Area Network Specialist), Local Area Network Administrator (LAN Administrator), Network Administrator, Network Coordinator, Network Manager, Network Specialist, Systems Administrator

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 38%

Computer Network Architects (15-1143)

Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning. May also design network and computer security measures. May research and recommend network and data communications hardware and software.

Sample job titles: Design Engineer, Network Analyst, Network and Security Engineer, Network Consultant, Network Systems Consultant, Networking Systems and Distributed Systems Engineer, Solutions Architect, Telecommunications Analyst

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 35%

Middle-Skill Occupations

Computer User Support Specialists (15-1151)

Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, or via telephone or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.

Sample job titles: Computer Specialist, Computer Support Specialist, Computer Technician, Desktop Support Technician, Help Desk Analyst, Help Desk Technician, Information Technology Specialist (IT Specialist), Network Technician, Support Specialist, Technical Support Specialist

Entry-Level Educational Requirement: Some college, no degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 41%

Computer Network Support Specialists (15-1152)

Analyze, test, troubleshoot, and evaluate existing network systems, such as local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Perform network maintenance to ensure networks operate correctly with minimal interruption.

Sample job titles: Computer Network Specialist, IT Consultant (Information Technology Consultant), Network Engineer, Network Specialist, Network Support Specialist, Network Technical Analyst, Network Technician, Personal Computer Network Analyst, Senior IT Assistant (Senior Information Technology Assistant), Systems Specialist

Entry-Level Educational Requirement: Associate degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 41%

Table 1: 2018 to 2023 job growth, wages, education, training, and work experience required for the cyber defense occupational group, Inland Empire/Desert region (middle-skill occupations appear below the line)

Occupation (SOC)	2018 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry to Experienced Hourly Wage Range (25th to 75th percentile)	Median Wage (50th percentile)	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Computer Systems Analysts (15-1121)	2,140	117	5%	163	$30.15 to $45.50	$36.91	$78,900	Bachelor's degree & none	None
Network and Computer Systems Administrators (15-1142)	1,838	116	6%	139	$28.88 to $45.80	$36.20	$77,900	Bachelor's degree & none	None
Database Administrators (15-1141)	480	39	8%	39	$30.24 to $51.18	$41.31	$85,200	Bachelor's degree & none	None
Computer Network Architects (15-1143)	330	28	8%	28	$34.69 to $60.28	$44.32	$99,200	Bachelor's degree & none	5 years or more
Information Security Analysts (15-1122)	188	30	16%	19	$29.72 to $59.66	$47.35	$96,400	Bachelor's degree & none	Less than 5 years
Computer User Support Specialists (15-1151)	3,832	298	8%	346	$20.34 to $30.60	$25.87	$54,400	Some college, no degree & none	None
Computer Network Support Specialists (15-1152)	1,134	79	7%	100	$24.77 to $40.00	$29.74	$68,300	Associate degree & none	None
Total	**9,942**	**706**	**7%**	**835**	-	-	-	-	-

Source: EMSI 2019.2