



Cyber Security Occupations

December 2017

Prepared by the Los Angeles/Orange County Center of Excellence for Labor Market Research

Program Recommendation

This report was compiled by the Los Angeles/Orange County Center of Excellence to provide regional labor market data for the program recommendation of cyber security. This report may help determine whether there is demand in the local labor market that is not being met by the supply from programs of study (CCC and non-CCC) that align with this occupation group.

Based on the data, the COE has determined there is an unmet need for cyber security in the Orange County region. Reasons include:

- There will be over 500 annual job openings for occupations related to cyber security in Orange County through 2021
- Between 40% and 45% of the workforce in these occupations have completed some community college level coursework
- On average, seven certificates related to cyber security are awarded annually, signaling a possible under-supply in the regional workforce

Occupation Codes and Descriptions

Currently, there are two occupations in the standard occupational classification (SOC) system related to cyber security. The occupation titles, descriptions, and reported job titles are included in Exhibit 1.

Exhibit 1 – Occupations, descriptions and sample job titles

SOC (6-Digit)	Title	Description	Sample of Reported Job Titles
15-1142	Network and Computer Systems Administrators	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 they 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.	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

15-1152	Computer Network Support Specialists	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.	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
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Source: O*NET Online

Current and Future Employment

In Orange County, the number of cyber security jobs is expected to increase by 4% over the next five years. More than 500 job opportunities will be available annually for this group of occupations through 2021 due to new job growth and replacement need (e.g., retirements). Exhibit 2 contains detailed employment projections data for these occupations.

Exhibit 2 – Five-year projections for cyber security occupations in Orange County

SOC	Occupation	2016 Jobs	2021 Jobs	2016 - 2021 Change	2016 - 2021 % Change	Annual Openings
15-1142	Network and Computer Systems Administrators	4,873	5,097	224	5%	349
15-1152	Computer Network Support Specialists	2,131	2,238	107	5%	178
	Total	7,004	7,334	330	5%	527

Source: Economic Modeling Specialists International (EMSI)

Earnings

In Orange County, the entry-level average wages for both cyber security occupations are above the MIT Living Wage¹ estimate of \$14.48 per hour for a single adult. The average annual earnings for these occupations in the region are between \$72,000 and \$88,000 per year, assuming full-time employment.

Exhibit 3 contains hourly wages and annual average earnings for these occupations. Entry-level hourly earnings is represented by the 10th percentile of wages, median hourly earnings is represented by the 50th percentile of wages, and experienced hourly earnings is represented by the 90th percentile of wages, demonstrating various levels of employment.

¹ MIT Living Wage Calculator. <http://livingwage.mit.edu/>

Exhibit 3 – Earnings for cyber security occupations in Orange County

SOC	Occupation	Entry-Level Hourly Earnings	Median Hourly Earnings	Experienced Hourly Earnings	Average Annual Earnings
15-1142	Network and Computer Systems Administrators	\$22.04	\$41.14	\$64.28	\$88,000
15-1152	Computer Network Support Specialists	\$17.92	\$33.03	\$53.89	\$72,000

Source: Economic Modeling Specialists International (EMSI)

Employer Job Postings

In this research brief, real-time labor market information is used to provide a more nuanced view of the current job market, as it captures job advertisements for occupations relevant to the field of study. Employer job postings are consulted to understand who is employing cyber security occupations, and what they are looking for in potential candidates. It should be noted that only job postings that indicated an education requirement of less than a Bachelor's degree were included.

Top Occupations

In 2016, there were 220 job postings related to cyber security occupations. Approximately 75% of job postings were for network and computer systems administrators (164 job postings). There were 187 job postings for the same occupation group in 2015, and 132 job postings in 2014.

Exhibit 4 – Top occupations by number of job postings (n=220)

SOC Code	Occupation	Job Postings, Full Year 2016
15-1142	Network and Computer Systems Administrators	164
15-1152	Computer Network Support Specialists	56

Source: Labor Insight/Jobs (Burning Glass)

Top Titles

The top titles for employers posting job ads related to cyber security occupations are listed in Exhibit 5. Systems administrator was mentioned as the job title in 16% of all relevant job postings (35 postings).

Exhibit 5 –Job titles (n=220)

Title	Job Postings Full Year 2016
Systems Administrator	35
Network Technician	32
Network Administrator	29
Network Manager	11
Information Technology Administrator	8

Source: Labor Insight/Jobs (Burning Glass)

Top Employers

Exhibit 6 lists the major employers hiring professionals in the field of cyber security. Top employers postings job ads locally in 2016 included: UnitedHealth Group, Clean Energy Fuels Corporation, and RPM Consolidated Services Incorporated. The top worksite cities in the region for these occupations were Anaheim, Irvine, and Santa Ana.

Exhibit 6 – Top employers (n=136)

Employer	Job Postings, Full Year 2016
UnitedHealth Group	8
Clean Energy Fuels Corporation	5
RPM Consolidated Services Incorporated	5
Applecare Medical Management	4
Best Buy	4
Crown Castle International	4
Irvine Company	4
Konica Minolta	4

Source: Labor Insight/Jobs (Burning Glass)

Certifications and Skills

CISCO Certified Network Associate is the most sought after job certification within the occupation group, and was included on 28% of the job postings that specified certifications. Job-specific skills desired by employers are technical support, CISCO, routers, system administration and repair.

Exhibit 7 –Job certifications (n=78) and job skills (n=214)

Certifications	Job Postings, Full Year 2016	Skills	Job Postings, Full Year 2016
CISCO Certified Network Associate	22	Technical Support	70
Microsoft Certified Solutions Expert (MCSE)	16	CISCO	67
Certified Network Engineer	12	Routers	59
CISCO Certified Internetwork Expert (CCIE)	12	System Administration	53
CISCO Certified Network Professional (CCNP)	12	Repair	51

Source: Labor Insight/Jobs (Burning Glass)

Advertised Education Levels

Exhibit 8 displays the education level requested by employers in online job ads. The majority of cyber security employers in 2016 were looking for a candidate with high school or vocational training.

Exhibit 8 – Advertised education requirements for cyber security occupations (n=220)



Source: Labor Insight/Jobs (Burning Glass)

Industry Concentration

Cyber security jobs in Orange County are most often found in the custom computer programming services industry (8% of total jobs in the industry). Exhibit 9 shows the industries that employ the most cyber security workers in Orange County.

Exhibit 9 – Industries with the largest number of cyber security occupations

NAICS (6-Digit)	Industry	Occupation Group Jobs in Industry	% of Occupation Group in Industry
541511	Custom Computer Programming Services	582	8%
551114	Corporate, Subsidiary, and Regional Managing Offices	484	7%
541512	Computer Systems Design Services	421	6%
561320	Temporary Help Services	261	4%
903999	Local Government, Excluding Education and Hospitals	207	3%
517110	Wired Telecommunications Carriers	193	3%

Source: Economic Modeling Specialists International (EMSI)

Education and Training

Exhibit 10 shows the typical entry-level education requirement for the occupations of interest, along with the typical on-the-job training, and percentage of workers in the field who hold a community college award or less. Between 40% and 45% of the workforce in the two occupations has completed some community college education as their highest level of education.

Exhibit 10 – Education and training requirements

SOC	Occupation	Typical entry-level education	Typical on-the-job training	% of Community College Award Holders or Some Postsecondary Coursework
15-1142	Network and Computer Systems Administrators	Bachelor's degree	None	40%
15-1152	Computer Network Support Specialists	Associate degree	None	45%

Source: Economic Modeling Specialists International, Bureau of Labor Statistics Employment Projections (Educational Attainment)

Currently, two community colleges in Orange County train students in programs related to cyber security. Exhibit 11 displays the headcount and annual average community college awards for each of the colleges training in this field. Headcount is the actual number of students enrolled, regardless of credit hours. It is also important to note that an award is not equivalent to a single person in search of a job opening, since a student may earn more than one award (e.g. an associate degree and a certificate).

Between 2012-2015, the total annual average community college awards conferred was 7 (0 associate degrees and 7 certificates) across one program: Computer Infrastructure and Support (0708.00).

Exhibit 11 – CCC Student Awards (by TOP and College)

2012-2015 Annual Average						
TOP Code	Program	College	CCC Headcount	CCC Associate Degrees	CCC Certificates (2012-15)	Total Average CC Awards
0708.00	Computer Infrastructure and Support	Cypress	27	0	7	7
		Fullerton	108	0	0	0
		Total	135	0	7	7

Source: California Community Colleges Chancellor's Office MIS Data Mart

Student Outcomes

The CTE LaunchBoard provides student outcome data on the effectiveness of CTE programs. The following student outcome information was collected from exiters of the Computer Infrastructure and Support Taxonomy of Program (TOP) code (0708.00) in Orange County for the 2014-15 academic year.

- The median annual wage after program completion is \$58,110
- 88% of students are earning a living wage
- 45% of students are employed within six months after completing a program

Source: CTE LaunchBoard

Sources

O*Net Online, Labor Insight/Jobs (Burning Glass), Economic Modeling Specialists International (EMSI), MIT Living Wage Calculator, Bureau of Labor Statistics (BLS) Education Attainment, California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, CTE LaunchBoard, Statewide CTE Outcomes Survey, Employment Development Department Unemployment Insurance Dataset

Notes

Data included in this analysis represents the labor market demand for positions most closely related to cyber security. Standard occupational classification (SOC) codes were chosen based on the national education level required for employment (associate degree and postsecondary certificate) as well as the proportion of current workers who hold a community college award or have had some community college training. This selection process narrows the labor market analysis to the most relevant employment opportunities for students with community college education and/or training.

Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study and should not be used to establish current job openings, because the numbers may include duplicate job postings or postings intended to gather a pool of applicants. Real-time labor market information can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.