Labor Market Analysis: 0708.10/Computer Networking
Cyber Security Essentials (Associate Degree & Certificate)
Los Angeles Center of Excellence, January 2023

Summary

Program Endorsement:	Endorsed: All Criteria Met	☒	Endorsed: Some Criteria Met	☐	Not Endorsed	☐
Program Endorsement Criteria						
Supply Gap:	Yes ☑			No ☐		
Living Wage: (Entry-Level, 25th)	Yes ☑			No ☐		
Education:	Yes ☑			No ☐		
Emerging Occupation(s)						
Yes ☐				No ☑		

The Los Angeles Center of Excellence for Labor Market Research (LA COE) prepared this report to provide regional labor market supply and demand data related to five middle-skill occupations:

- *Information Security Analysts* **(15-1212)** Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. Assess system vulnerabilities for security risks and propose and implement risk mitigation strategies. 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.[1]

- *Computer Network Support Specialists* **(15-1231)** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.[2]

- *Computer User Support Specialists* **(15-1232)** Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, 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.[3]

- *Computer Network Architects* **(15-1241)** 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, including analysis of capacity needs for network infrastructures. May also design network and computer security measures. May research and recommend network and data communications hardware and software.[4]

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[1] Information Security Analysts : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)
[2] Computer Support Specialists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)
[3] Computer Support Specialists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)
[4] Computer Network Architects : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)

- ***Network and Computer Systems Administrators (15-1244)*** Install, configure, and maintain an organization's local area network (LAN), wide area network (WAN), data communications network, operating systems, and physical and virtual servers. Perform system monitoring and verify the integrity and availability of hardware, network, and server resources and systems. Review system and application logs and verify completion of scheduled jobs, including system backups. Analyze network and server resource consumption and control user access. Install and upgrade software and maintain software licenses. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software.[5]

Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree.[6] Although some of the occupations in this report typically require a bachelor's degree, they are considered middle-skill because approximately one-third of workers in the field have completed some college or an associate degree. This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for these middle-skill cyber security occupations in the region. Furthermore, entry-level wages exceed the self-sufficiency standard wage in both Los Angeles and Orange counties, and the majority of annual openings for the occupations in this report typically require some college, but no degree. **Therefore, due to all the criteria being met, the LA COE endorses this proposed program.** Detailed reasons include:

Demand:
- ***Supply Gap Criteria –*** Over the next five years, **3,923 jobs are projected to be available annually** in the region due to new job growth and replacements, **which is more than the three-year average of 1,805 awards conferred** by educational institutions in the region.
- ***Living Wage Criteria –*** Within Los Angeles County, **all five occupations have entry-level wages <u>above</u> the self-sufficiency standard hourly wage** ($18.10/hour).[7]
- ***Educational Criteria –*** Within the greater LA/OC region, **52% of the annual job openings** for occupations related to cyber security **typically require some college, but no degree.**

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[5] Network and Computer Systems Administrators : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)

[6] The COE classifies middle-skill jobs as the following:
- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

[7] Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California. For more information, visit: http://selfsufficiencystandard.org/california.

o   Furthermore, the national-level educational attainment data indicates **between 32% and 51%** of workers in the field have **completed some college/associate degree or less education.**

Supply:

- There are **27 community colleges** in the greater LA/OC region that issue awards related to cyber security, conferring an average of **952 awards annually** between 2018 and 2021.
- Between 2017 and 2020, there was an average of **852 awards conferred annually** in related training programs by non-community college institutions throughout the greater LA/OC region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for these middle-skill cyber security occupations. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to increase by 4% through 2026. There will be more than 3,900 job openings per year through 2026 due to job growth and replacements.

Exhibit 1: Occupational demand in Los Angeles and Orange Counties[8]

Geography	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	Annual Openings
Los Angeles	35,092	36,473	1,381	4%	2,746
Orange	14,691	15,409	718	5%	1,177
Total	**49,783**	**51,882**	**2,099**	**4%**	**3,923**

Wages

The labor market endorsement in this report considers the entry-level hourly wages for these middle-skill cyber security occupations in Los Angeles County as they relate to the county's self-sufficiency standard wage. Orange County wages are included below in order to provide a complete analysis of the greater LA/OC region. Detailed wage information, by county, is included in Appendix A.

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[8] Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Los Angeles County— All five occupations have entry-level wages <u>above</u> the self-sufficiency standard wage for one adult ($18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between $21.92 and $45.78. Experienced workers can expect to earn wages between $38.48 and $73.57, which are higher than the self-sufficiency standard.

Exhibit 2: Hourly Earnings for Occupations in LA County

| Occupation	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Information Security Analysts (15-1212)	$45.78	$57.89	$67.07
Computer Network Support Specialists (15-1231)	$25.12	$31.15	$40.05
Computer User Support Specialists (15-1232)	$21.92	$29.09	$38.48
Computer Network Architects (15-1241)	$38.24	$54.14	$73.57
Network and Computer Systems Administrators (15-1244)	$34.69	$45.22	$57.46

Orange County— All five occupations have entry-level wages <u>above</u> the self-sufficiency standard wage for one adult ($20.63 in Orange County). Typical entry-level hourly wages are in a range between $22.00 and $44.48. Experienced workers can expect to earn wages between $37.45 and $71.14, which are higher than the self-sufficiency standard.

Exhibit 3: Hourly Earnings for Occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Information Security Analysts (15-1212)	$44.48	$56.23	$65.23
Computer Network Support Specialists (15-1231)	$25.16	$30.79	$39.02
Computer User Support Specialists (15-1232)	$22.00	$28.69	$37.45
Computer Network Architects (15-1241)	$37.50	$52.69	$71.14
Network and Computer Systems Administrators (15-1244)	$34.66	$44.79	$56.52

On average, the entry-level earnings for the occupations in this report are $33.03; this is above the living wage for one single adult in Los Angeles County ($18.10). Exhibit 4 shows the average wage for the occupations in this report, from entry-level to experienced workers.

Exhibit 4: Average Hourly Earnings for Middle-Skill Cyber Security Occupations in LA/OC
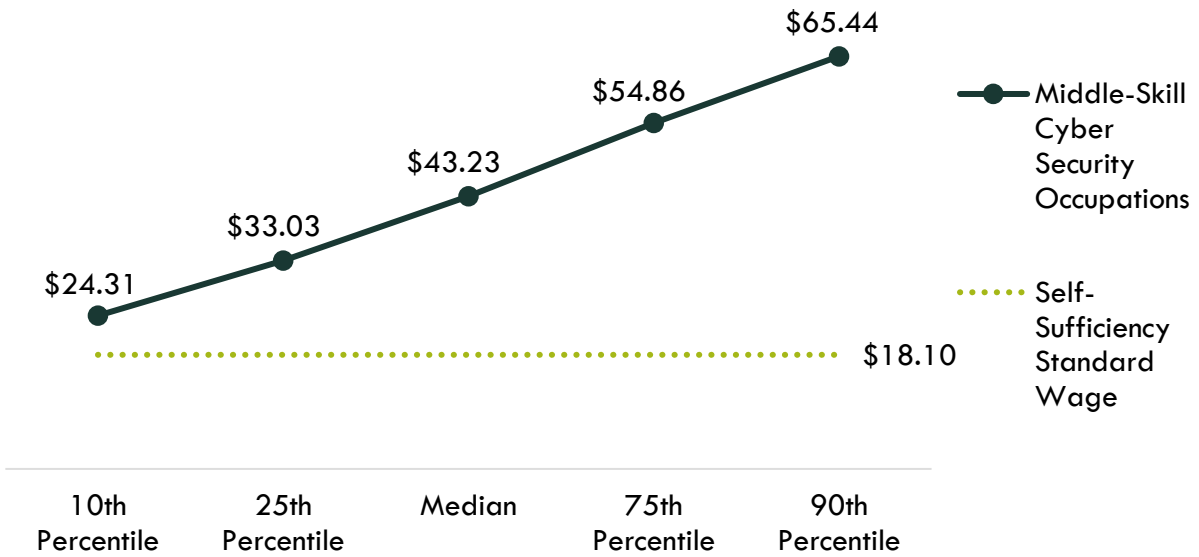
Job Postings

There were 33,455 online job postings related to cyber security listed in the past 12 months. The majority of job postings (49%) were for *computer user support specialists*, followed by *information security analysts* (20%) and *network and computer systems administrators* (17%). The highest number of job postings were for network engineers, systems administrators, IT support specialists, desktop support technicians, and help desk technicians. The top skills were computer science, help desk support, operating systems, technical support, and cyber security. The top three employers, by number of job postings, in the region were Robert Half, Northrop Grumman, and Boeing.

Exhibit 5: Job postings by occupation (last 12 months)
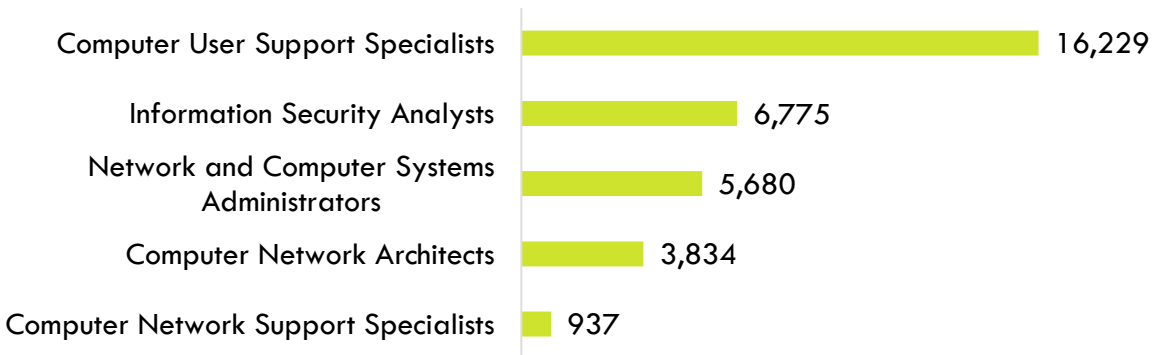
Educational Attainment

The Bureau of Labor Statistics (BLS) lists the following typical entry-level education levels for the occupations in this report:

- **Bachelor's degree:** *Information security analysts; computer network architects; network and computer systems administrators*

- **Associate degree:** *Computer network support specialists*
- **Some college, no degree:** *Computer user support specialists*

In the greater LA/OC region, the majority of annual job openings (52%) typically require some college, but no degree. Furthermore, the national-level educational attainment data indicates between 32% and 51% of workers in the field have completed some college/associate degree or less education. Of the 58% of cyber security job postings listing a minimum education requirement in the greater Los Angeles/Orange County region, 22% (4,297) requested high school or vocational training, 12% (2,343) requested an associate degree, and 66% (12,748) requested a bachelor's degree.

Educational Supply

Community College Supply—Exhibit 6 shows the annual and three-year average number of awards conferred by community colleges in programs that have historically trained for the occupations of interest. The colleges with the most completions in the region are Long Beach, Mt. San Antonio, and Coastline.

Exhibit 6: Regional community college awards (certificates and degrees), 2018-2021

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
0701.00	Information Technology, General	East LA	23	10	4	12
		Glendale	-	-	3	1
		LA Harbor	-	-	1	0
		LA Mission	1	3	1	2
		LA Southwest	-	-	2	1
		Long Beach	34	64	106	68
		Mt San Antonio	74	90	49	71
		Santa Monica	39	-	1	13
		West LA	4	5	-	3
		LA Subtotal	**175**	**172**	**167**	**171**
		Santa Ana	-	-	3	1
		OC Subtotal	**-**	**-**	**3**	**1**
	Supply Subtotal/Average		**175**	**172**	**170**	**172**
0702.00	Computer Information Systems	Citrus	5	8	4	6
		Compton	1	-	-	0
		East LA	19	15	23	19
		El Camino	14	21	11	15
		Glendale	-	5	6	4
		LA City	1	1	4	2
		LA Mission	5	1	1	2

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
		LA Trade-Tech	8	20	15	14
		Long Beach	-	-	3	1
		Mt San Antonio	-	79	6	28
		Rio Hondo	21	10	6	12
		West LA	8	10	9	9
		LA Subtotal	**82**	**170**	**88**	**113**
		Cypress	5	4	-	3
		Fullerton	15	11	31	19
		Irvine	-	2	-	1
		Orange Coast	4	2	-	2
		Saddleback	-	-	1	0
		Santa Ana	4	2	16	7
		Santiago Canyon	3	4	1	3
		OC Subtotal	**31**	**25**	**49**	**35**
	Supply Subtotal/Average		**113**	**195**	**137**	**148**
0707.30	Computer Systems Analysis	Cerritos	2	3	-	2
		East LA	-	1	-	0
		LA City	-	-	1	0
		LA Harbor	-	-	1	0
		LA Mission	-	1	1	1
		LA Pierce	-	-	6	2
		LA Subtotal	**2**	**5**	**9**	**5**
		Cypress	2	-	-	1
		OC Subtotal	**2**	**-**	**-**	**1**
	Supply Subtotal/Average		**4**	**5**	**9**	**6**
0708.00	Computer Infrastructure and Support	Cerritos	-	4	4	3
		Glendale	-	3	4	2
		LA City	-	3	5	3
		LA Harbor	1	1	1	1
		LA Mission	2	12	17	10
		LA Valley	5	2	4	4
		Long Beach	3	8	8	6
		Mt San Antonio	24	24	24	24
		Pasadena	1	1	24	9
		Rio Hondo	-	10	11	7

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
		West LA	4	15	16	12
		LA Subtotal	**40**	**83**	**118**	**80**
		Coastline	49	46	73	56
		Cypress	2	3	1	2
		Orange Coast	-	7	5	4
		Saddleback	-	-	3	1
		Santa Ana	-	-	27	9
		OC Subtotal	**51**	**56**	**109**	**72**
		Supply Subtotal/Average	**91**	**139**	**227**	**152**
0708.10	Computer Networking	Cerritos	11	9	8	9
		Glendale	3	3	-	2
		LA City	23	-	4	9
		LA Pierce	39	20	12	24
		Long Beach	55	47	48	50
		Mt San Antonio	8	11	4	8
		Rio Hondo	5	7	2	5
		West LA	77	48	58	61
		LA Subtotal	**221**	**145**	**136**	**167**
		Coastline	38	59	92	63
		Cypress	70	95	61	75
		Fullerton	-	-	1	0
		Irvine	11	21	10	14
		Saddleback	10	21	19	17
		Santa Ana	14	12	23	16
		OC Subtotal	**143**	**208**	**206**	**186**
		Supply Subtotal/Average	**364**	**353**	**342**	**353**
0708.20	Computer Support	Citrus	-	1	1	1
		Glendale	10	7	2	6
		LA Pierce	9	8	6	8
		LA Valley	-	-	1	0
		Long Beach	8	14	40	21
		Pasadena	7	30	34	24
		LA Subtotal	**34**	**60**	**84**	**59**
		Cypress	3	5	3	4
		Santa Ana	9	-	-	3

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
		OC Subtotal	**12**	**5**	**3**	**7**
		Supply Subtotal/Average	**46**	**65**	**87**	**66**
0709.00	World Wide Web Administration	Glendale	6	7	10	8
		LA Pierce	9	-	2	4
		Long Beach	22	24	34	27
		Santa Monica	-	-	16	5
		West LA	13	9	6	9
		LA Subtotal	**50**	**40**	**68**	**53**
		Fullerton	-	-	1	0
		Saddleback	-	2	2	1
		OC Subtotal	**-**	**2**	**3**	**2**
		Supply Subtotal/Average	**50**	**42**	**71**	**54**
		Supply Total/Average	**843**	**971**	**1,043**	**952**

Non-Community College Supply—For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for middle-skill cyber security occupations. Exhibit 7 shows the annual and three-year average number of awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent three-year period of available data is from 2017 to 2020. Between 2017 and 2020, non-community college institutions in the region conferred an average of 852 awards.

**Exhibit 7: Regional non-community college awards, 2017-2020**

CIP	Program	Institution	2017-18 Awards	2018-19 Awards	2019-20 Awards	3-Year Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	26	30	21	26
		Brand College	2	-	-	1
		Brandman University	20	20	30	23
		Chapman University	12	13	18	14
		LA Pacific College	-	-	6	2
		Loyola Marymount Univ.	42	32	27	34
		Pacific States University	-	2	-	1
		The Master's Univ. & Seminary	6	7	11	8
		UC-Irvine	-	1	-	0
		University of La Verne	18	39	23	27
		University of the People	100	80	203	128

CIP	Program	Institution	2017-18 Awards	2018-19 Awards	2019-20 Awards	3-Year Average
		Vanguard Univ. of Southern CA	1	-	-	0
11.0103	Information Technology	Abraham Lincoln Univ.	1	1	-	1
		Brand College	37	50	13	33
		CA Intercontinental Univ.	-	-	2	1
		CSU-Dominguez Hills	1	5	4	3
		CSU-Los Angeles	127	122	166	138
		CSU-Northridge	54	54	29	46
		Platt College-Anaheim	1	11	15	9
		Platt College-LA	-	6	12	6
		Trident Univ. Int'l	87	71	-	53
		University of La Verne	-	3	2	2
11.0199	Computer and Information Sciences, Other	Antioch University-LA	47	4	-	17
		Brand College	-	2	-	1
		CSU-Dominguez Hills	59	55	65	60
		CSU-Northridge	77	87	73	79
11.0201	Computer Programming/ Programmer, General	ABCO Technology	23	29	46	33
		Platt College-Anaheim	4	4	4	4
11.0501	Computer Systems Analysis/ Analyst	Brand College	2	-	-	1
11.0901	Computer Systems Networking and Telecommunications	Brand College	-	2	2	1
11.1001	Network and System Administration/ Administrator	ABCO Technology	13	5	25	14
		Brand College	6	23	9	13
		CA Intercontinental Univ.	1	3	1	2
11.1002	System, Networking, and LAN/WAN Management/ Manager	ABCO Technology	7	9	19	12
		Brand College	-	-	1	0
11.1003	Computer and Information Systems Security/ Auditing/ Information Assurance	Learnet Academy	17	-	5	7

CIP	Program	Institution	2017-18 Awards	2018-19 Awards	2019-20 Awards	3-Year Average
11.1004	Web/ Multimedia Management and Webmaster	ABCO Technology	17	24	37	26
		LA Pacific College	-	-	1	0
		Pepperdine University	2	-	-	1
11.1005	Information Technology Project Management	CA Intercontinental Univ.	-	1	-	0
11.1006	Computer Support Specialist	Southern California Institute of Technology	26	25	26	26
15.1202	Computer/ Computer Systems Technology/ Technician	Learnet Academy	1	-	4	2
		Supply Total/Average	**837**	**820**	**900**	**852**

Exhibit 8 shows the proportion of community college awards conferred in LA/OC compared to the number of non-community college awards for the programs in this report. Just over half of the awards conferred in these programs are awarded by community colleges in the LA/OC region.

Exhibit 8: Community College Awards Compared to Non-Community College Awards in LA/OC Region, 3-Year Average
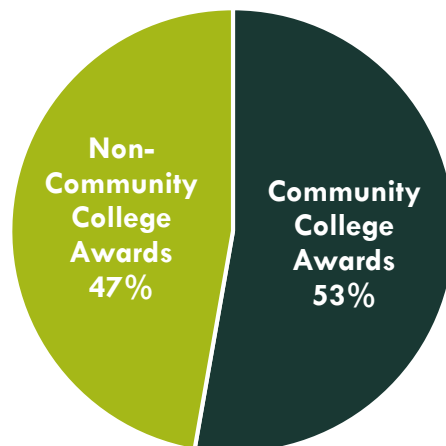
Appendix A: Occupational demand and wage data by county

Exhibit 9. Los Angeles County

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Information Security Analysts (15-1212)	2,602	2,943	341	13%	264	$45.78	$57.89	$67.07
Computer Network Support Specialists (15-1231)	4,037	4,253	216	5%	341	$25.12	$31.15	$40.05
Computer User Support Specialists (15-1232)	17,206	17,992	785	5%	1,422	$21.92	$29.09	$38.48
Computer Network Architects (15-1241)	4,297	4,271	(26)	(1%)	254	$38.24	$54.14	$73.57
Network and Computer Systems Administrators (15-1244)	6,950	7,015	65	1%	465	$34.69	$45.22	$57.46
Total	**35,092**	**36,473**	**1,381**	**4%**	**2,746**	-	-	-

Exhibit 10. Orange County

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Information Security Analysts (15-1212)	1,161	1,336	174	15%	123	$44.48	$56.23	$65.23
Computer Network Support Specialists (15-1231)	1,583	1,665	82	5%	133	$25.16	$30.79	$39.02
Computer User Support Specialists (15-1232)	7,199	7,584	386	5%	609	$22.00	$28.69	$37.45
Computer Network Architects (15-1241)	1,953	1,972	19	1%	120	$37.50	$52.69	$71.14
Network and Computer Systems Administrators (15-1244)	2,794	2,852	58	2%	192	$34.66	$44.79	$56.52
Total	**14,691**	**15,409**	**718**	**5%**	**1,177**	-	-	-

Exhibit 11. Los Angeles and Orange Counties

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry-Level Education
Information Security Analysts (15-1212)	3,763	4,278	515	14%	386	Bachelor's degree
Computer Network Support Specialists (15-1231)	5,620	5,918	298	5%	474	Associate degree
Computer User Support Specialists (15-1232)	24,405	25,576	1,171	5%	2,031	Some college, no degree
Computer Network Architects (15-1241)	6,251	6,244	(7)	(0%)	374	Bachelor's degree
Network and Computer Systems Administrators (15-1244)	9,744	9,866	123	1%	658	Bachelor's degree
Total	**49,783**	**51,882**	**2,099**	**4%**	**3,923**	**-**

Appendix B: Sources

- O*NET Online
- Lightcast (formerly Emsi)
- Bureau of Labor Statistics (BLS)
- California Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- Self-Sufficiency Standard at the Center for Women's Welfare, University of Washington
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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