![COE Centers of Excellence for Labor Market Research logo]

Program Endorsement Brief: 0708.10/Computer Networking
Amazon Web Services Associate Certificate
Cisco Certified Networking Administrator (CCNA) Certificate
CompTIA Certificate
Cybersecurity and Computer Networking Certificate
Cybersecurity Fundamentals Certificate
IT Foundation Certificate
MCSA: Windows 10 Certificate
Penetration Testing Certificate
Orange County Center of Excellence, April 2021

Summary Analysis

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 Orange County Center of Excellence for Labor Market Research (COE) prepared this report to provide Los Angeles/Orange County regional labor market supply and demand data for five occupations related to computer networking. To illuminate which occupations are immediately accessible to community college graduates, these computer networking occupations have been divided into middle-skill and above middle-skill occupation groups. Middle-skill occupations typically accommodate community college graduates, while above middle-skill occupations typically require a four-year degree and/or prior work experience. The occupations included in the **middle-skill** computer networking occupation group are: *computer network support specialists* (15-1231), *computer network architects* (15-1241), and *network and computer systems administrators* (15-1244). The occupations in the **above middle-skill** computer networking group are: *computer systems analysts* (15-1211) and *information security analysts* (15-1212). 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 computer networking occupations in the region. Furthermore, more than one-third of middle-skill computer networking workers in the field have completed some college or an associate degree, and entry-level wages exceed the living wage in both Los Angeles and Orange counties. **Therefore, due to all the criteria being met, the COE endorses this proposed program.** Detailed reasons include:

Demand:
- *Supply Gap Criteria –* Over the next five years, there is projected to be **3,697 computer networking jobs available annually** in the region due to new job growth

and replacements, **which is more than the 2,028 awards conferred annually** by educational institutions in the region.

- o Of these 3,697 annual openings, **the majority (52%)** will be for the **middle-skill group of computer networking occupations**.

- *Living Wage Criteria –* Within Orange County, **all of the annual job openings** for these computer networking occupations have **entry-level wages above the county's living wage** ($17.36/hour).[1]
- *Educational Criteria –* Within the LA/OC region, *61% of the annual job openings* for the middle-skill group of computer networking occupations *typically require a bachelor's degree.*
  - o However, the national-level educational attainment data indicates **between 37.2% and 40.7% of middle-skill computer networking workers in the field have completed some college or an associate degree.**

Supply:

- There are **26 community colleges** in the LA/OC region that issue awards related to computer networking, conferring an average of **706 awards annually** between 2016 and 2019.
- Between 2014 and 2017, there was an average of **1,322 awards conferred annually** in related training programs by non-community college institutions throughout the region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for the middle-skill group of computer networking occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 3% through 2024. There will be more than 1,900 job openings per year through 2024 due to job growth and replacements.

This report includes employment projection data by Emsi which uses EDD information. Emsi's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy, during the projection period, will be at approximately full employment. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, it may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Therefore, the projections included in this report do not take the impacts of COVID-19 into account.

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[1] Living wage data was pulled from California Family Needs Calculator on 3/31/2021. For more information, visit the California Family Needs Calculator website: https://insightcced.org/2018-family-needs-calculator/.

Exhibit 1: Middle-skill occupational demand in Los Angeles and Orange Counties[2]

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	17,061	17,559	498	3%	1,362
Orange	7,177	7,403	225	3%	574
Total	**24,238**	**24,962**	**724**	**3%**	**1,936**

Exhibit 2 shows the five-year occupational demand projections for the group of above middle-skill computer networking occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 6% through 2024. There will be nearly 1,800 job openings per year through 2024 due to job growth and replacements.

Exhibit 2: Above Middle-skill occupational demand in Los Angeles and Orange Counties[3]

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	14,021	14,895	874	6%	1,197
Orange	6,478	6,931	453	7%	564
Total	**20,500**	**21,826**	**1,326**	**6%**	**1,761**

Wages

The labor market endorsement in this report considers the entry-level hourly wages for all of the computer networking occupations (both middle-skill and above middle-skill) in Orange County as they relate to the county's living wage. Los Angeles County wages are included below in order to provide a complete analysis of the LA/OC region. Detailed wage information, by county, is included in Appendix A.

Orange County— All of the annual openings for these computer networking occupations have entry-level wages above the living wage for one adult ($17.36 in Orange County). Typical entry-level hourly wages are in a range between $25.29 and $37.57. Experienced workers can expect to earn wages between $40.85 and $68.24, which are higher than the living wage estimate. Orange County's average wages are below the average statewide wage of $51.01 for these occupations.

Los Angeles County— All of the annual openings for these computer networking occupations have entry-level wages above the living wage for one adult ($15.04 in Los Angeles County). Typical entry-level hourly wages are in a range between $25.55 and $38.60. Experienced workers can expect to earn wages between $40.74 and $70.20, which are higher than the living wage estimate. Los Angeles County's average wages are below the average statewide wage of $51.01 for these occupations.

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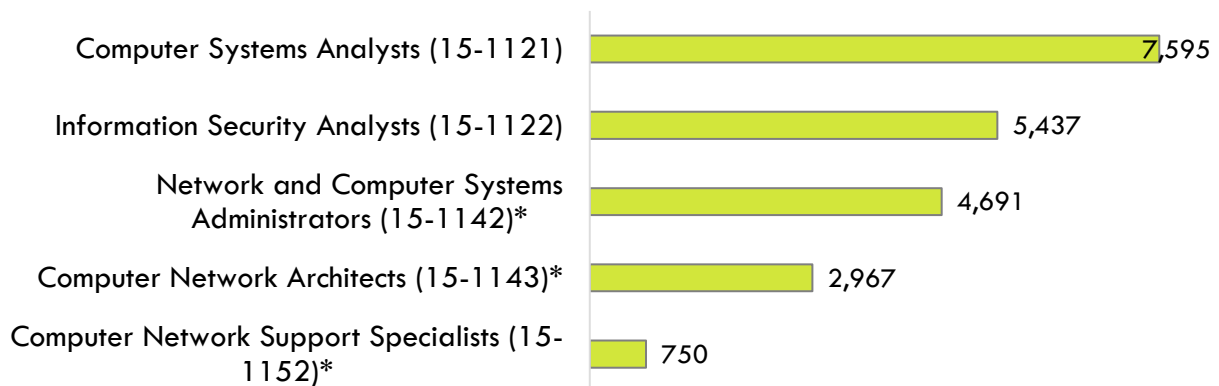
Job Postings

There were 21,440 online job postings related to computer networking occupations listed in the past 12 months. Exhibit 3 displays the job postings by occupation. The majority of job postings (35%) were for *computer systems analysts*, followed by *information security analysts* (25%), *network and computer systems administrators* (22%), *computer network architects* (14%), and *computer network support specialists* (3%). Above-middle skill computer networking occupations accounted for the majority of job postings (61%) as compared to middle-skill computer networking occupations (39%). The titles most often used in job postings were systems administrators, business systems analysts, network engineers, senior network engineers, and network managers. The top skills were: information security, project management, systems administration SQL, and Linux. The top three employers, by number of job postings, in the region were: Anthem Blue Cross, Northrop Grumman, and The Boeing Company.

It is important to note that the job postings data included in this section reflects online job postings listed in the past 12 months and does not yet demonstrate the impact of COVID-19. While employers have generally posted fewer online job postings since the beginning of the pandemic, the long-term effects are currently unknown.

Exhibit 3: Job postings by occupation (last 12 months)

Occupation	Job Postings
Computer Systems Analysts (15-1121)	7,595
Information Security Analysts (15-1122)	5,437
Network and Computer Systems Administrators (15-1142)*	4,691
Computer Network Architects (15-1143)*	2,967
Computer Network Support Specialists (15-1152)*	750

*Denotes the middle-skill computer programming occupations.

Educational Attainment

The Bureau of Labor Statistics (BLS) lists a bachelor's degree for *computer systems analysts, information security analysts, computer network architects,* and *network and computer systems administrators,* and an associate degree for *computer network support specialists.* In the LA/OC region, the majority of annual job openings for the middle-skill group of computer networking occupations (68%) typically require a bachelor's degree. However, the national-level educational attainment data indicates between 37.2% and 40.7% of middle-skill computer networking workers in the field have completed some college or an associate degree as their highest level of education. Of the 59% computer networking job postings listing a minimum education requirement in Los Angeles/Orange County, 86% (10,892) requested a bachelor's degree, 10% (1,298) requested a high school diploma and 4% (471) requested an associate degree.

Educational Supply

Community College Supply—Exhibit 4 shows the three-year average number of awards conferred by community colleges in the related TOP codes: Information Technology, General (0701.00), Computer Information Systems (0702.00), Computer Systems Analysis (0707.30), Computer Infrastructure and Support (0708.00), Computer Networking (0708.10), Computer Support (0708.20), and World Wide Web Administration (0709.00). The colleges with the most completions in the region are: West LA, Mt. San Antonio, and Coastline. Over the past 12 months, there were 24 other related program recommendation requests from regional community colleges.

Exhibit 4: Regional community college awards (certificates and degrees), 2016-2019

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
0701.00	Information Technology, General	East LA	8	15	23	15
		LA Harbor	7	6	-	4
		LA Mission	4	1	1	2
		Long Beach	27	25	34	29
		Mt San Antonio	61	79	74	71
		Santa Monica	-	-	39	13
		West LA	3	4	4	4
		LA Subtotal	**110**	**130**	**175**	**138**
		Cypress	1	-	-	0
		OC Subtotal	**1**	**0**	**0**	**0**
		Supply Subtotal/Average	**111**	**130**	**175**	**139**

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
0702.00	Computer Information Systems	Citrus	5	7	5	6
		Compton	1	-	1	1
		East LA	14	16	19	16
		El Camino	15	18	14	16
		Glendale	2	-	-	1
		LA City	3	4	1	3
		LA Mission	3	9	5	6
		LA Trade	23	14	8	15
		Pasadena	2	1	-	1
		Rio Hondo	10	19	21	17
		West LA	13	6	8	9
		LA Subtotal	**91**	**94**	**82**	**89**
		Cypress	5	8	5	6
		Fullerton	7	20	15	14
		Orange Coast	-	3	4	2
		Santa Ana	18	6	4	9
		Santiago Canyon	2	2	3	2
		OC Subtotal	**32**	**39**	**31**	**34**
		Supply Subtotal/Average	**123**	**133**	**113**	**123**
0707.30	Computer Systems Analysis	Cerritos	6	4	2	4
		LA Subtotal	**6**	**4**	**2**	**4**
		Cypress	-	5	2	2
		OC Subtotal	**0**	**5**	**2**	**2**
		Supply Subtotal/Average	**6**	**9**	**4**	**6**

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
0708.00	Computer Infrastructure and Support	LA Harbor	-	1	1	1
		LA Mission	-	-	2	1
		LA Valley	6	8	5	6
		Long Beach	1	1	3	2
		Mt San Antonio	16	20	24	20
		Pasadena	-	-	1	0
		West LA	-	-	4	1
		LA Subtotal	**23**	**30**	**40**	**31**
		Coastline	67	65	49	60
		Cypress	1	1	2	1
		OC Subtotal	**68**	**66**	**51**	**62**
	Supply Subtotal/Average		**91**	**96**	**91**	**93**
0708.10	Computer Networking	Cerritos	10	8	11	10
		Glendale	-	6	3	3
		LA City	11	37	23	24
		LA Pierce	37	23	39	33
		Long Beach	25	27	55	36
		Mt San Antonio	9	2	8	6
		Rio Hondo	-	-	5	2
		West LA	52	43	77	57
		LA Subtotal	**144**	**146**	**221**	**170**
		Coastline	20	12	38	23
		Cypress	28	37	70	45
		Irvine	19	12	11	14
		Saddleback	21	17	10	16
		Santa Ana	-	7	14	7
		OC Subtotal	**88**	**85**	**143**	**105**
	Supply Subtotal/Average		**232**	**231**	**364**	**276**

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
0708.20	Computer Support	Glendale	2	3	10	5
		LA Pierce	14	7	9	10
		Long Beach	-	1	8	3
		Pasadena	1	3	7	4
		LA Subtotal	**17**	**14**	**34**	**22**
		Cypress	3	1	3	2
		Santa Ana	-	10	9	6
		OC Subtotal	**3**	**11**	**12**	**9**
	Supply Subtotal/Average		**20**	**25**	**46**	**30**
0709.00	World Wide Web Administration	Glendale	3	9	6	6
		LA Pierce	5	5	9	6
		Long Beach	5	4	22	10
		West LA	8	24	13	15
		LA Subtotal	**21**	**42**	**50**	**38**
		Saddleback	5	-	-	2
		OC Subtotal	**5**	**0**	**0**	**2**
	Supply Subtotal/Average		**26**	**42**	**50**	**39**
	Supply Total/Average		**609**	**666**	**843**	**706**

Non-Community College Supply—For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for computer networking occupations. Exhibit 5 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Computer and Information Sciences, General (11.0101), Information Technology (11.0103), Computer and Information Sciences, Other (11.0199), Computer Systems Analysis/Analyst (11.0501), Computer Systems Networking and Telecommunications (11.0901), Network and System Administration/Administrator (11.1001), System, Networking, and LAN/WAN Management/Manager (11.1002), Computer and Information Systems Security/Information Assurance (11.1003), Web/Multimedia Management and Webmaster (11.1004), Information Technology Project Management (11.1005), Computer Support Specialist (11.1006), and Computer Technology/Computer Systems Technology (15.1202). Due to different data collection periods, the most recent three-year period of available data is from 2014 to 2017. Between 2014 and 2017, four-year colleges in the region conferred an average of 1,322 awards annually in related training programs.

Exhibit 5: Regional non-community college awards, 2014-2017

CIP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Award Average
11.0101	Computer and Information Sciences, General	ABCO Technology	15	-	-	5
		Azusa Pacific Univ.	10	20	19	16
		Brand College	1	2	-	1
		Brandman Univ.	19	14	26	20
		California Institute of Technology	48	56	-	35
		Chapman University	6	7	5	6
		Loyola Marymount University	15	16	19	17
		Pacific States Univ.	-	2	1	1
		UC Irvine	31	3	1	12
		Univ. of La Verne	14	21	19	18
11.0103	Information Technology	Argosy Univ.- OC	-	1	-	0
		Bethesda University	1	1	-	1
		Brand College	55	42	28	42
		California Int'l Univ.	-	-	1	0
		CSU-Los Angeles	102	92	117	104
		CSU-Northridge	49	48	43	47
		Stanbridge Univ.	29	21	25	25
		Trident Univ. Int'l	96	77	74	82
		University of Phoenix-CA	2	3	16	7
11.0199	Computer and Information Sciences, Other	Antioch University-LA	-	-	20	7
		Brand College	1	4	2	2
		CSU-Dominguez Hills	32	36	66	45
		CSU-Northridge	30	50	77	52
		Learnet Academy	40	-	-	13
		Pitzer College	1	-	-	0
11.0501	Computer Systems Analysis/ Analyst	Brand College	1	2	4	2
		DeVry University-CA	110	103	94	102
		University of Phoenix-CA	9	8	4	7

CIP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Award Average
11.0901	Computer Systems Networking and Telecommuni-cations	Advanced Computing Institute	6	5	98	36
		Brand College	-	1	2	1
		DeVry University-CA	166	154	135	152
		ITT Technical Institute-Sylmar	1	-	-	0
		Mt Sierra College	8	6	5	6
		PCI College	1	-	-	0
		University of Phoenix-CA	51	55	27	44
11.1001	Network and System Administration/ Administrator	Brand College	16	22	2	13
		University of Phoenix-CA	12	2	1	5
11.1002	System, Networking, and LAN/WAN Management/ Manager	ABCO Technology	-	16	10	9
		ITT Technical Institute-Orange	78	-	-	26
		ITT Technical Institute-San Dimas	43	-	-	14
		ITT Technical Institute-Sylmar	48	-	-	16
		ITT Technical Institute-Torrance	50	-	-	17
11.1003	Computer and Information Systems Security/ Information Assurance	Azusa Pacific Univ.	8	4	3	5
		ITT Technical Institute-Orange	37	-	-	12
		ITT Technical Institute-San Dimas	23	-	-	8
		ITT Technical Institute-Sylmar	19	-	-	6
		ITT Technical Institute-Torrance	6	-	-	2
		Learnet Academy	-	39	48	29
		Mt Sierra College	14	9	8	10
		University of Phoenix-California	111	74	71	85
11.1004	Web/ Multimedia Management and Webmaster	ABCO Technology	7	9	12	9
		Pepperdine Univ.	-	1	-	0
		University of Phoenix-CA	7	5	4	5

CIP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Award Average
11.1005	Information Technology Project Management	California Intercontinental University	-	-	2	1
11.1006	Computer Support Specialist	Palladium Technical Academy	6	-	-	2
		Southern California Institute of Technology	13	32	16	20
		University of Phoenix-CA	-	-	1	0
15.1202	Computer Technology/ Computer Systems Technology	Advanced Computing Institute	67	74	92	78
		Learnet Academy	-	13	11	8
Supply Total/Average			**1,515**	**1,186**	**1,266**	**1,322**

Appendix A: Occupational demand and wage data by county

Exhibit 6. Orange County

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Network Support Specialists (15-1231)	1,916	1,991	75	4%	174	$25.29	$32.13	$40.85
Computer Network Architects (15-1241)	1,781	1,814	33	2%	132	$37.57	$53.11	$68.24
Network and Computer Systems Administrators (15-1244)	3,481	3,599	118	3%	268	$33.30	$42.81	$53.76
Middle-Skill Subtotal	**7,177**	**7,403**	**225**	**3%**	**574**			
Computer Systems Analysts (15-1211)	5,554	5,843	289	5%	461	$37.02	$47.85	$60.44
Information Security Analysts (15-1212)	924	1,088	164	18%	103	$36.28	$48.94	$60.72
Above Middle-Skill Subtotal	**6,478**	**6,931**	**453**	**7%**	**564**			
Total	**13,656**	**14,334**	**678**	**5%**	**1,138**			

Exhibit 7. Los Angeles County

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Network Support Specialists (15-1231)	4,759	4,996	237	5%	444	$25.22	$32.08	$40.74
Computer Network Architects (15-1241)	3,823	3,877	54	1%	282	$38.60	$54.62	$70.20
Network and Computer Systems Administrators (15-1244)	8,479	8,685	207	2%	636	$34.14	$43.88	$55.12
Middle-Skill Subtotal	**17,061**	**17,559**	**498**	**3%**	**1,362**			
Computer Systems Analysts (15-1211)	12,075	12,641	566	5%	990	$38.07	$49.24	$62.18
Information Security Analysts (15-1212)	1,946	2,254	308	16%	208	$37.45	$50.53	$62.67
Above Middle-Skill Subtotal	**14,021**	**14,895**	**874**	**6%**	**1,197**			
Total	**31,082**	**32,454**	**1,372**	**4%**	**2,559**			

Exhibit 8. Los Angeles and Orange Counties

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings
Computer Network Support Specialists (15-1231)	6,675	6,987	312	5%	618
Computer Network Architects (15-1241)	5,604	5,691	87	2%	414
Network and Computer Systems Administrators (15-1244)	11,959	12,284	325	3%	904
Middle-Skill Subtotal	**20,500**	**21,826**	**1,326**	**6%**	**1,761**
Computer Systems Analysts (15-1211)	17,629	18,484	854	5%	1,451
Information Security Analysts (15-1212)	2,870	3,342	472	16%	310
Above Middle-Skill Subtotal	**24,238**	**24,962**	**724**	**3%**	**1,936**
Total	**44,738**	**46,788**	**2,050**	**5%**	**3,697**

Appendix B: Sources

- O*NET Online
- Labor Insight/Jobs (Burning Glass)
- Economic Modeling Specialists, International (Emsi)
- Bureau of Labor Statistics (BLS)
- Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- California Family Needs Calculator, Insight Center for Community Economic Development
- Chancellor's Office Curriculum Inventory (COCI 2.0)

For more information, please contact:

Jesse Crete, Ed. D., Director
Center of Excellence, Orange County
crete_jesse@rsccd.edu

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