

## Program Endorsement Brief: 0708.00/Computer Infrastructure and Support Cybersecurity

Los Angeles/Orange County Center of Excellence, March 2020

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### Summary Analysis

The Los Angeles/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 three occupations related to cybersecurity. To illuminate which occupations are accessible to community college graduates, the cybersecurity occupations in this report have been separated into middle-skill and above middle-skill occupations. Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree.<sup>1</sup>

The **middle-skill** cybersecurity occupations include: network and computer systems administrators (15-1142) and computer network support specialists (15-1152). While network and computer systems administrators typically require workers to have bachelor's degree, 38.3% of these workers have completed some college or an associate degree. The **above middle-skill** occupation included in this report is information security analysts (15-1122). This occupation typically requires workers to obtain a bachelor's degree or higher and have prior work experience.

Based on the available data, there **appears to be an oversupply of middle-skill cybersecurity workers** from regional training programs. However, since this **report considers the supply from nine programs that have historically trained for the occupations of interest** and these programs are as broad, the **number of qualified student completers may be overstated**. Therefore, the **COE cautiously endorses this proposed program**. Reasons include:

#### Demand:

- Over the next five years, there is projected to be **1,690 middle-skill jobs available annually** in the region due to new jobs and replacements.
- Over the last twelve months, there were **1,748 online job postings** for the two middle-skill cybersecurity-specific jobs.
- The national-level educational attainment data indicates that between 38.3% and 41.1% of incumbent workers have completed some college or an associate degree.

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<sup>1</sup> 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.

- Typical **entry-level hourly wages** for middle-skill cybersecurity occupations throughout the region are between \$25.36 and \$33.97, **which are higher than the California Family Needs Calculator** hourly wage for one adult in the region (\$15.04 in Los Angeles County and \$17.36 in Orange County)<sup>2</sup>.

**Supply:**

- **Twenty-eight community colleges** in the region provide training programs that have historically trained for the occupations of interest – conferring an average of **1,059 awards annually** between 2016 and 2019.
- Between 2013 and 2016, there were an average of **735 awards conferred annually** in related training programs by non-community college institutions the region.

**Occupational Demand**

Exhibit 1 shows the five-year occupational demand projections for the two middle-skill cybersecurity-related occupations. In Los Angeles/Orange County, the number of jobs for these occupations is projected to increase by 4% through 2023. There will be nearly 1,700 job openings per year through 2023 due to new jobs, retirements, and workers leaving the field.

**Exhibit 1: Occupational demand in Los Angeles and Orange Counties<sup>3</sup>**

<b>Geography</b>	<b>2018 Jobs</b>	<b>2023 Jobs</b>	<b>2018-2023 Change</b>	<b>2018-2023 % Change</b>	<b>Annual Openings</b>
Los Angeles	14,239	14,827	588	4%	1,193
Orange	5,865	6,133	268	5%	497
<b>Total</b>	<b>20,103</b>	<b>20,960</b>	<b>857</b>	<b>4%</b>	<b>1,690</b>

**Wages** — Typical entry-level hourly wages for the two middle-skill cybersecurity-related occupations throughout the region are between \$25.36 and \$33.97.<sup>4</sup> These wages surpass the California Family Needs Calculator hourly wage for one adult living in the region (Los Angeles County (\$15.04) and Orange County (17.36)).<sup>5</sup> Wage information, by county, is included in Appendix A.

<sup>2</sup> Living wage data was pulled from California Family Needs Calculator on 2/26/20. For more information, visit the California Family Needs Calculator website: <https://insightcced.org/2018-family-needs-calculator/>.

<sup>3</sup> Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

<sup>4</sup> Entry-level wage is defined as the twenty-fifth percentile hourly wage. Wages for experienced workers are defined as the seventy-fifth percentile hourly wage.

<sup>5</sup> Living wage data was pulled from California Family Needs Calculator on 2/26/20. For more information, visit the California Family Needs Calculator website: <https://insightcced.org/2018-family-needs-calculator/>.

**Job Postings** — Job posting information provided in this report has been limited to postings classified as cybersecurity-specific by Burning Glass. Job posting data reveals that 20% (1,748) of the 8,576 total job postings related to middle-skill cybersecurity occupations listed over the last twelve months are cybersecurity-specific. The highest number job postings were for systems administrator, network administrator, and Linux systems administrator. The top skills were: system administration, Linux, VMware, Cisco, and hardware and software configuration. The top three employers, by number of job postings, in the region were: Northrop Grumman, Raytheon, and Lockheed Martin Corporation. Of the 1,748 online job postings, 71% list a minimum education requirement.

During the same time period, there were 6,346 online job postings for the above middle-skill occupation (Information Security Analysts (15-1122)) listed in the region. The highest number of job postings were for security engineer, security analyst, information security analyst, and cybersecurity engineer. The top specialized skills were information security, network security, Linux, and project management. The top employers were Northrop Grumman, Deloitte, and Raytheon. Of the 6,346 online job postings, 66% listed a minimum education requirement.

**Educational Attainment** — The Bureau of Labor Statistics (BLS) lists an associate degree as the typical entry-level education for computer support specialists; a bachelor's degree for network and computer systems administrators. The national-level educational attainment data indicates that between 38.3% and 41.1% of workers in the field have completed some college or an associate degree. Of the 71% of middle-skill job postings listing a minimum education requirement in Los Angeles/Orange County, 16% (196) requested high school or vocational training, 5% (65) requested an associate degree, and 79% (979) requested a bachelor's degree.

The Bureau of Labor Statistics (BLS) lists a bachelor's degree as the typical entry-level education for information security analysts. Additionally, this above middle-skill occupation typically requires workers have five years or less of previous work experience. BLS data indicates that 28.1% of the above middle-skill cybersecurity have completed some college or an associate degree as their highest level of education. Of the 66% of online job postings listing a minimum education requirement in Los Angeles/Orange County, 10% (422) requested a high school or vocational training, 3% (115) requested an associate degree, and 87% (3,621) requested a bachelor's degree.

## **Supply**

**Community College Supply** — Exhibit 2 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. Based on data below, community colleges with the most regional completions are Mt. San Antonio, Long Beach City, and West LA. Over the past 12 months, there were no other related program recommendation requests from regional community colleges.

**Exhibit 2: 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
		<b>LA Subtotal</b>	<b>110</b>	<b>130</b>	<b>175</b>	<b>138</b>
		Cypress	1	-	-	0
		<b>OC Subtotal</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>0</b>
		<b>Subtotal/Average</b>	<b>111</b>	<b>130</b>	<b>175</b>	<b>139</b>
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
		<b>LA Subtotal</b>	<b>91</b>	<b>94</b>	<b>82</b>	<b>89</b>
		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
		<b>OC Subtotal</b>	<b>32</b>	<b>39</b>	<b>31</b>	<b>34</b>
		<b>Subtotal/Average</b>	<b>123</b>	<b>133</b>	<b>113</b>	<b>123</b>
0707.10	Computer Programming	Cerritos	1	4	-	2
		East LA	5	6	8	6
		Glendale	1	2	2	2
		LA City	43	-	-	14
		LA Mission	2	5	6	4
		LA Pierce	6	9	18	11
		LA Southwest	2	1	-	1
		LA Valley	26	10	7	14

		Long Beach	-	2	4	2
		Mt San Antonio	68	62	119	83
		Pasadena	1	8	11	7
		Santa Monica	25	42	44	37
		West LA	-	-	1	0
		<b>LA Subtotal</b>	<b>180</b>	<b>151</b>	<b>220</b>	<b>184</b>
		Cypress	27	18	22	22
		Fullerton	-	-	16	5
		Irvine	16	10	8	11
		Orange Coast	29	29	31	30
		Santa Ana	-	1	13	5
		Santiago Canyon	-	30	9	13
		<b>OC Subtotal</b>	<b>72</b>	<b>88</b>	<b>99</b>	<b>86</b>
		<b>Subtotal/Average</b>	<b>252</b>	<b>239</b>	<b>319</b>	<b>270</b>
0707.30	Computer Systems Analysis	Cerritos	6	4	2	4
		<b>LA Subtotal</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>4</b>
		Cypress	-	5	2	2
		<b>OC Subtotal</b>	<b>-</b>	<b>5</b>	<b>2</b>	<b>2</b>
		<b>Subtotal/Average</b>	<b>6</b>	<b>9</b>	<b>4</b>	<b>6</b>
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
		<b>LA Subtotal</b>	<b>23</b>	<b>30</b>	<b>40</b>	<b>31</b>
		Coastline	67	65	49	60
		Cypress	1	1	2	1
		<b>OC Subtotal</b>	<b>68</b>	<b>66</b>	<b>51</b>	<b>62</b>
		<b>Subtotal/Average</b>	<b>91</b>	<b>96</b>	<b>91</b>	<b>93</b>
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

		<b>LA Subtotal</b>	<b>144</b>	<b>146</b>	<b>221</b>	<b>170</b>
		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
		<b>OC Subtotal</b>	<b>88</b>	<b>85</b>	<b>143</b>	<b>105</b>
		<b>Subtotal/Average</b>	<b>232</b>	<b>231</b>	<b>364</b>	<b>276</b>
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
		<b>LA Subtotal</b>	<b>17</b>	<b>14</b>	<b>34</b>	<b>22</b>
		Cypress	3	1	3	2
		Santa Ana	-	10	9	6
		<b>OC Subtotal</b>	<b>3</b>	<b>11</b>	<b>12</b>	<b>9</b>
		<b>Subtotal/Average</b>	<b>20</b>	<b>25</b>	<b>46</b>	<b>30</b>
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
		<b>LA Subtotal</b>	<b>21</b>	<b>42</b>	<b>50</b>	<b>38</b>
		Saddleback	5	-	-	2
		<b>OC Subtotal</b>	<b>5</b>	<b>-</b>	<b>-</b>	<b>2</b>
		<b>Subtotal/Average</b>	<b>26</b>	<b>42</b>	<b>50</b>	<b>39</b>
0934.30	Telecommunication Technology	LA Pierce	12	8	4	8
		LA Trade	35	8	10	18
		Long Beach	8	6	1	5
		Mt San Antonio	2	6	3	4
		<b>LA Subtotal</b>	<b>57</b>	<b>28</b>	<b>18</b>	<b>34</b>
		<b>Subtotal/Average</b>	<b>57</b>	<b>28</b>	<b>18</b>	<b>34</b>
2105.40	Forensics, Evidence, and Investigation	East LA	28	34	35	32
		El Camino	2	6	6	5
		Long Beach	11	8	15	11
		<b>LA Subtotal</b>	<b>41</b>	<b>48</b>	<b>56</b>	<b>48</b>
		<b>Subtotal/Average</b>	<b>41</b>	<b>48</b>	<b>56</b>	<b>48</b>
		<b>Total/Average</b>	<b>959</b>	<b>981</b>	<b>1,236</b>	<b>1,059</b>

**Non-Community College Supply** — It is important to consider the supply from non-community college institutions that provide cybersecurity training in the region. Exhibit 3 shows the annual and three-year average number of awards conferred by institutions in over a dozen programs. Due to different data collection periods, the most recent three-year period of available data is from 2013 to 2016. Between 2013 and 2016, non-community college institutions in the region conferred an average of 735 awards annually in related training programs.

**Exhibit 3: Regional Non-Community College awards, 2013-2016**

CIP Code	Program	College	2013-14 Awards	2014-15 Awards	2015-16 Awards	3-Year Award Average
11.0101	Computer and Information Sciences, General	ABCO Technology	-	15	-	5
		Allied American University	-	10	12	7
		Baldwin Park Adult & Community Education	15	-	-	5
		Brand College	1	1	2	1
		Charter College-Canyon Country	24	5	-	10
		University of the People	-	-	23	8
<b>Subtotal/Average</b>			<b>40</b>	<b>31</b>	<b>37</b>	<b>36</b>
11.0199	Computer and Information Sciences, Other	Brand College	2	1	4	2
		Learnnet Academy Inc	193	40	-	78
<b>Subtotal/Average</b>			<b>195</b>	<b>41</b>	<b>4</b>	<b>80</b>
15.1202	Computer Technology/Computer Systems Technology	Advanced Computing Institute	66	67	74	69
		Baldwin Park Adult & Community Education	33	-	-	11
		ICDC College	6	-	-	2
		Learnnet Academy Inc	-	-	13	4
		United Education Institute-Huntington Park Campus	275	-	-	92
		University of La Verne	10	-	-	3
<b>Subtotal/Average</b>			<b>390</b>	<b>67</b>	<b>87</b>	<b>181</b>
11.0103	Information Technology	Brand College	38	55	42	45
		Stanbridge College	26	29	11	22
		University of Phoenix-California	2	1	-	1
<b>Subtotal/Average</b>			<b>66</b>	<b>85</b>	<b>54</b>	<b>68</b>
11.0899	Computer Software and Media Applications, Other	Learnnet Academy Inc	-	59	45	35

		<b>Subtotal/Average</b>	<b>-</b>	<b>59</b>	<b>45</b>	<b>35</b>
11.0201	Computer Programming/ Programmer, General	ABCO Technology	-	6	12	6
		Allied American University	13	6	4	8
		University of Phoenix-California	-	-	1	0
		<b>Subtotal/Average</b>	<b>13</b>	<b>12</b>	<b>17</b>	<b>14</b>
11.0299	Computer Programming, Other	Advanced Computing Institute	56	52	48	52
		<b>Subtotal/Average</b>	<b>56</b>	<b>52</b>	<b>48</b>	<b>52</b>
11.0501	Computer Systems Analysis/ Analyst	Brand College	1	1	2	1
		<b>Subtotal/Average</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>
11.0802	Data Modeling/ Warehousing and Database Administration	ABCO Technology	-	6	3	3
		University of Phoenix-California	-	-	1	0
		<b>Subtotal/Average</b>	<b>-</b>	<b>6</b>	<b>4</b>	<b>3</b>
11.0901	Computer Systems Networking and Telecommunications	Advanced Computing Institute	9	6	5	7
		Brand College	-	-	1	0
		DeVry University-California	74	57	47	59
		ICDC College	6	-	-	2
		PCI College	-	1	-	0
		UEI College-Gardena	71	-	-	24
		<b>Subtotal/Average</b>	<b>160</b>	<b>64</b>	<b>53</b>	<b>92</b>
11.1001	Network and System Administration/ Administrator	Brand College	8	16	22	15
		Palladium Technical Academy	6	-	-	2
		University of Phoenix-California	-	1	1	1
		<b>Subtotal/Average</b>	<b>14</b>	<b>17</b>	<b>23</b>	<b>18</b>
11.1003	Computer and Information Systems Security/ Information Assurance	Charter College-Canyon Country	-	-	1	0
		Learnet Academy Inc	-	-	39	13
		<b>Subtotal/Average</b>	<b>-</b>	<b>-</b>	<b>40</b>	<b>13</b>
11.1006	Computer Support Specialist	Palladium Technical Academy	-	6	-	2
		Southern California Institute of Technology	21	13	32	22
		<b>Subtotal/Average</b>	<b>21</b>	<b>19</b>	<b>32</b>	<b>24</b>
11.0801	Web Page, Digital/ Multimedia	Advanced Computing Institute	103	73	46	74



	and Information Resources Design	Allied American University	2	8	1	4
		DeVry University-California	36	40	16	31
		Fremont College	3	8	1	4
		InterCoast Colleges-Anaheim	3	-	-	1
		<b>Subtotal/Average</b>	<b>147</b>	<b>129</b>	<b>64</b>	<b>113</b>
11.1004	Web/Multimedia Management and Webmaster	ABCO Technology	-	7	9	5
		<b>Subtotal/Average</b>	<b>-</b>	<b>7</b>	<b>9</b>	<b>5</b>
		<b>Total/Average</b>	<b>1103</b>	<b>590</b>	<b>519</b>	<b>735</b>

## Appendix A: Occupational demand and wage data by county

### Exhibit 4. Los Angeles County

Occupation (SOC)	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Network and Computer Systems Administrators (15-1142)	9,471	9,797	326	3%	740	\$34.24	\$43.80	\$54.69
Computer Network Support Specialists (15-1152)	4,768	5,030	262	5%	454	\$25.56	\$32.71	\$42.68
<b>Middle-Skill Subtotal</b>	<b>14,239</b>	<b>14,827</b>	<b>588</b>	<b>4%</b>	<b>1,193</b>			
Information Security Analysts (15-1122)	1,727	2,027	300	17%	192	\$36.27	\$48.91	\$61.08
<b>Above Middle-Skill Subtotal</b>	<b>1,727</b>	<b>2,027</b>	<b>300</b>	<b>17%</b>	<b>192</b>			
<b>Total</b>	<b>15,966</b>	<b>16,854</b>	<b>888</b>	<b>6%</b>	<b>1,385</b>			

### Exhibit 5. Orange County

Occupation (SOC)	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Network and Computer Systems Administrators (15-1142)	3,906	4,077	171	4%	313	\$33.35	\$42.67	\$53.26
Computer Network Support Specialists (15-1152)	1,958	2,056	98	5%	184	\$24.89	\$31.88	\$41.64
<b>Middle-Skill Subtotal</b>	<b>5,865</b>	<b>6,133</b>	<b>268</b>	<b>5%</b>	<b>497</b>			
Information Security Analysts (15-1122)	820	982	162	20%	96	\$34.84	\$46.98	\$58.67
<b>Above Middle-Skill Subtotal</b>	<b>820</b>	<b>982</b>	<b>162</b>	<b>20%</b>	<b>96</b>			
<b>Total</b>	<b>6,685</b>	<b>7,115</b>	<b>430</b>	<b>6%</b>	<b>593</b>			

### Exhibit 6. Los Angeles and Orange Counties

Occupation (SOC)	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Network and Computer Systems Administrators (15-1142)	13,377	13,874	497	4%	1,053	\$33.97	\$43.47	\$54.28
Computer Network Support Specialists (15-1152)	6,727	7,086	359	5%	637	\$25.36	\$32.47	\$42.38
<b>Middle-Skill Subtotal</b>	<b>20,103</b>	<b>20,960</b>	<b>857</b>	<b>4%</b>	<b>1,690</b>			
Information Security Analysts (15-1122)	2,547	3,009	462	18%	288	\$35.79	\$48.26	\$60.32
<b>Above Middle-Skill Subtotal</b>	<b>2,547</b>	<b>3,009</b>	<b>462</b>	<b>18%</b>	<b>288</b>			
<b>Total</b>	<b>22,650</b>	<b>23,969</b>	<b>1,319</b>	<b>6%</b>	<b>1,978</b>			

#### 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
- Employment Development Department, Unemployment Insurance Dataset
- Living Insight Center for Community Economic Development
- 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:

Juan Madrigal, Assistant Director  
 Los Angeles/Orange County Center of Excellence  
[jmadrigal@mtsac.edu](mailto:jmadrigal@mtsac.edu)  
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