

# IT Technician Pathway Cybersecurity Analyst

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

## Summary

- Employment for the cybersecurity analyst occupational group is expected to **increase by 7% between 2018 and 2023** in the Inland Empire/Desert region. A total **292 annual job openings** will be available over the five-year timeframe.
- The entry-level wage for each of the occupations in the cybersecurity analyst occupational group is **above the MIT Living Wage estimate of \$12.39 per hour** for a single adult living.
- **There appears to be an opportunity for program growth** because there are more annual job openings for the cybersecurity analyst occupational group (**292 annual job openings**) than annual credentials issued for the selected community college program in the region (**84 total credentials; 2 annual average community college credentials, 82 other educational institution credentials**).
- The **COE recommends** creating new or expanding existing training based on the number of annual job openings, self-sustainable wages, and current low number of community college completions.

## Introduction

This report provides data on the occupations related to the California Community College computer systems analysis program (TOP 0707.30). This program prepares students for employment through the instruction of systems analysis and design, including the recognition, definition, and improvement of processes through the use of computer technology and methodologies (Taxonomy of Programs, 2012). The occupations included in the cybersecurity analyst occupational group are the following:

- *Computer Network Architects*
- *Computer Network Support Specialists*
- *Computer Systems Analysts*

## Job Opportunities

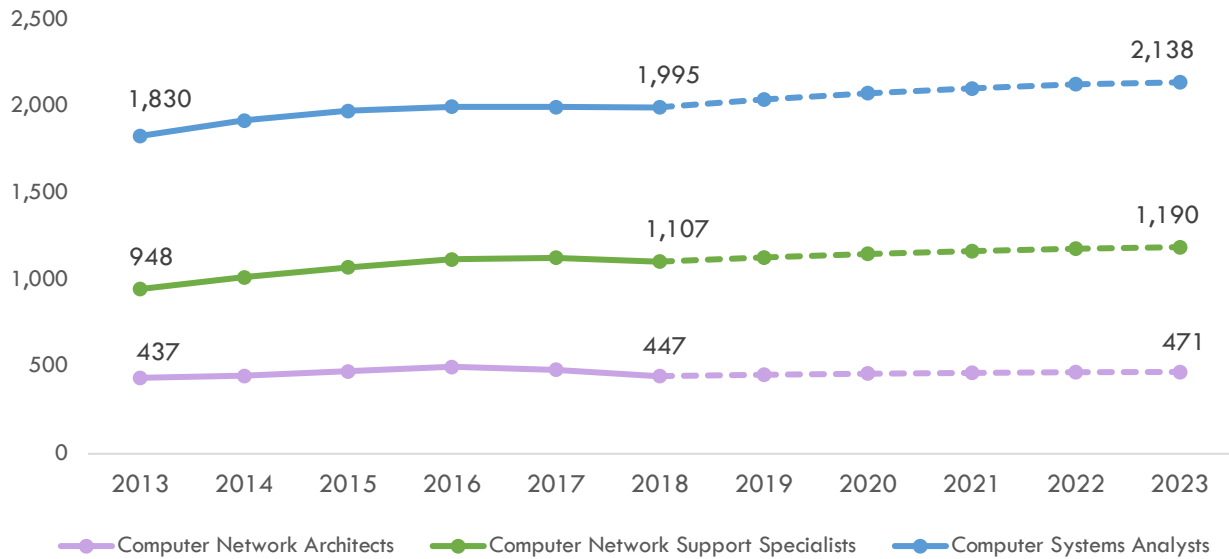
In 2018, there were 3,549 jobs in the cybersecurity analyst occupational group in the Inland Empire/Desert region (IEDR). This occupational group is projected to increase employment by 7% by 2023. Employers in the region will need to hire 1,462 workers over the next five years to fill new jobs and backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). Exhibits 1 & 2 display five-year projected job growth for the cybersecurity analyst occupational group.

**Exhibit 1: Five-year projections for the cybersecurity analyst occupational group**

2018 Jobs	2023 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
3,549	3,799	7%	1,462	292	17%

Source: EMSI 2019.3

**Exhibit 2: Number of jobs for cybersecurity analyst occupational group, 2013-2023**

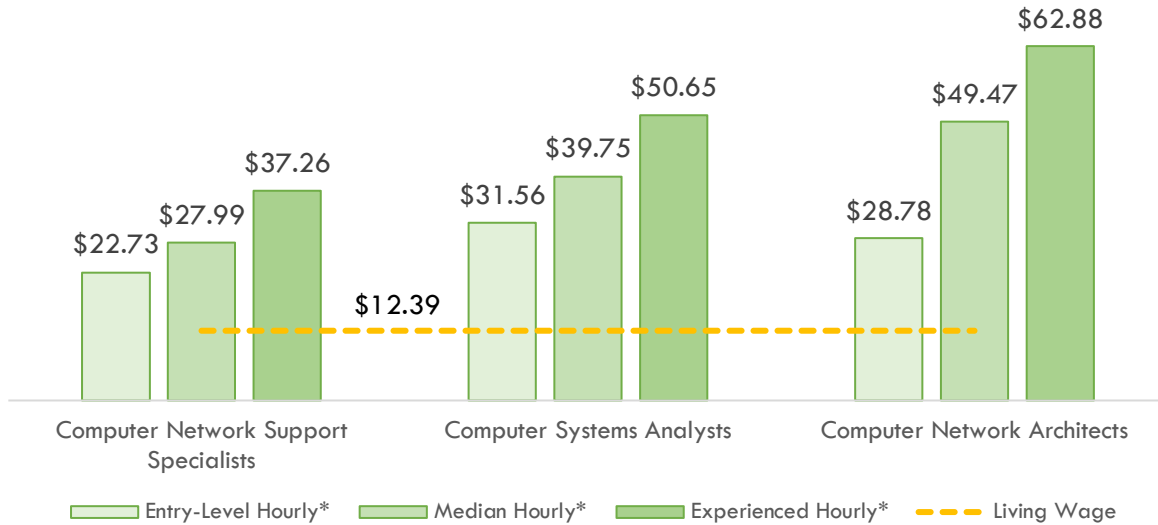


Source: EMSI 2019.3

## Earnings

The entry-level wage for each of the cybersecurity analyst occupations is 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 3 displays wage information for the cybersecurity analyst occupational group.

**Exhibit 3: Earnings for the cybersecurity analyst occupational group**



Source: EMSI 2019.3

\*Entry Hourly is 25<sup>th</sup> percentile wage, the median is 50<sup>th</sup> percentile wage, and experienced is 75<sup>th</sup> percentile wage.

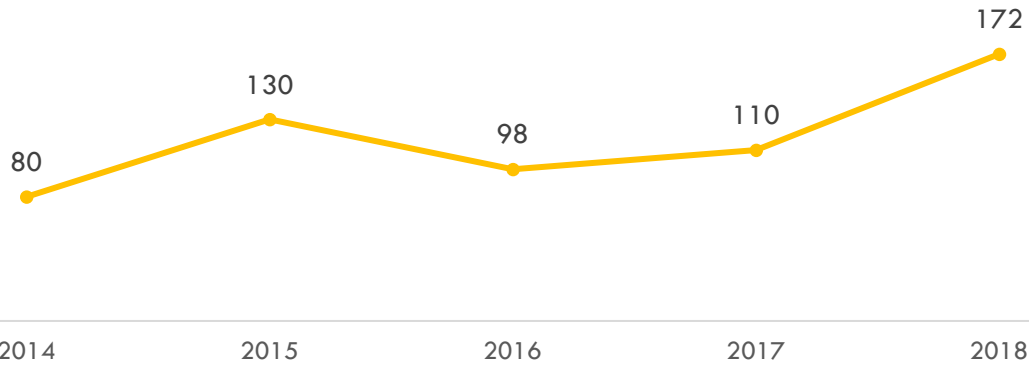
## Job Postings, Employers, Skills, Certifications, and Education

Gauging demand for these three occupations via online job postings allows us to isolate and quantify job ads seeking workers for *cybersecurity-specific* jobs using Burning Glass’s cybersecurity filter. This 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, such as Cybersecurity Information Systems Professional, or CISSP (Burning Glass, 2015). For more information on how Burning Glass developed this filter, along with research findings on the cybersecurity job market across the United States, please see the web link in the references section of this report.

A search revealed that 10% of the job postings for the occupations included in the cybersecurity analyst group are for cybersecurity-specific jobs. This means that there are approximately ten times more job postings online that are seeking workers for these occupations, but not in the field of cybersecurity. The remainder of this job posting analysis focuses *solely on job postings related to cybersecurity*.

Although the trend is not precisely linear, cybersecurity-specific job postings for the cybersecurity analyst occupational group have increased 115% over the past five full calendar years, with an average of 118 annual postings during this timeframe. Exhibit 4 displays the number of cybersecurity-related job ads for this occupational group over the last five years.

*Exhibit 4: Number of job postings for the cybersecurity analyst occupational group, 2014 – 2018*



Source: Burning Glass – Labor Insights

Exhibit 5 displays the number of job ads posted during the last 12 months along with the regional and statewide average time to fill for the cybersecurity analyst occupational group in the IEDR. On average, local employers fill online job postings for the cybersecurity analyst occupational group within 46 days. This regional average is three days longer than the statewide average, indicating that local employers may face more challenges when seeking candidates to fill these positions than California employers outside the IEDR.

Exhibit 5: Job ads and time to fill for the cybersecurity analyst occupational group, Aug 2018 – July 2019

Occupation	Cybersecurity Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Computer Network Architects	88	48	44
Computer Systems Analysts	24	45	42
Computer Network Support Specialists	21	39	35
<b>Total</b>	<b>133</b>	<b>46</b>	<b>43</b>

Source: Burning Glass – Labor Insights

Exhibit 6 displays the employers posting the most job ads for the cybersecurity analyst occupational group during the last 12 months in the Inland Empire/Desert region.

Exhibit 6: Employers posting the most job ads for the cybersecurity analyst occupational group, Aug 2018 – July 2019

Occupation	Employers
------------	-----------

Computer Network Architects (n=49)	<ul style="list-style-type: none"> <li>• Anthem Blue Cross</li> <li>• Infinite Resource Solutions</li> <li>• Niagara Bottling, LLC.</li> <li>• Co-Op Financial Services</li> </ul>
Computer Systems Analysts (n=16)	<ul style="list-style-type: none"> <li>• 22<sup>nd</sup> Century Technologies</li> <li>• Raytheon</li> </ul>
Computer Network Support Specialists (n=10)	<ul style="list-style-type: none"> <li>• Frontier Communications</li> <li>• Iron Systems Inc.</li> </ul>

Source: Burning Glass – Labor Insights

Exhibit 7 displays a sample of specialized, employability, and software and programming skills that employers are seeking when looking for workers to fill positions in the cybersecurity analyst 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 7: Sample of in-demand skills from employer job ads for the cybersecurity analyst occupational group, Aug 2018 – July 2019*

Occupation	Specialized Skills	Employability Skills	Software and Programming Skills
Computer Network Architects (n=88)	<ul style="list-style-type: none"> <li>• Network Engineering</li> <li>• Virtual Private Networking (VPN)</li> <li>• Project Management</li> </ul>	<ul style="list-style-type: none"> <li>• Communication Skills</li> <li>• Teamwork/Collaboration</li> <li>• Troubleshooting</li> </ul>	<ul style="list-style-type: none"> <li>• Voice over IP (VoIP)</li> <li>• Cisco Switching</li> <li>• Border Gateway Protocol</li> </ul>
Computer Systems Analysts (n=27)	<ul style="list-style-type: none"> <li>• Information Security</li> <li>• Project Management</li> <li>• Relational Databases</li> </ul>	<ul style="list-style-type: none"> <li>• Planning</li> <li>• Communication Skills</li> <li>• Analytical Skills</li> </ul>	<ul style="list-style-type: none"> <li>• Microsoft Office</li> <li>• SAP</li> <li>• SQL</li> </ul>
Computer Network Support Specialists (n=21)	<ul style="list-style-type: none"> <li>• Wide Area Network (WAN)</li> <li>• Network Troubleshooting</li> <li>• Network Security</li> </ul>	<ul style="list-style-type: none"> <li>• Planning</li> <li>• Problem Solving</li> <li>• Computer Literacy</li> </ul>	<ul style="list-style-type: none"> <li>• Cisco Switching</li> <li>• F5 Load Balancers</li> <li>• Voice over IP (VoIP)</li> </ul>

Source: Burning Glass – Labor Insights

Exhibit 8 displays in-demand certifications for each occupation in the cybersecurity analyst occupational group. Knowing which certifications are currently in demand may also be useful for program development.

*Exhibit 8: In-demand certifications for the cybersecurity occupational group in the Inland Empire/Desert region, Aug 2018 – July 2019*

Occupation	Certification
Computer Network Architects (n=79)	<ul style="list-style-type: none"> <li>• Cisco Certified Network Professional (CCNP)</li> <li>• Cisco Certified Network Associate (CCNA)</li> </ul>
Computer Systems Analysts (n=12)	<ul style="list-style-type: none"> <li>• Project Management Institute – Agile Certified Practitioner (PMI – ACP)</li> <li>• Certified Information Systems Auditor (CISA)</li> </ul>
Computer Network Support Specialists (n=16)	<ul style="list-style-type: none"> <li>• Cisco Certified Network Professional (CCNP)</li> <li>• Cisco Certified Internetwork Expert (CCIE)</li> </ul>

Source: Burning Glass – Labor Insights

Exhibit 9 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. Most employers are searching for a candidate with a bachelor’s degree or higher for jobs in the cybersecurity analyst occupational group.

*Exhibit 9: Work experience required, typical entry-level education, educational attainment, and minimum advertised education requirements for the cybersecurity analyst occupational group, Aug 2018 – July 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
Computer Network Architects	5 years or more	35%	Bachelor’s degree	67	3%	1%	96%
Computer Systems Analysts	None	21%	Bachelor’s degree	22	14%	9%	77%
Computer Network Support Specialists	None	41%	Associate degree	17	12%	23%	65%

Source: EMSI 2019.3, Burning Glass – Labor Insights



\*Percentage of incumbent workers with a Community College Credential or Some Postsecondary Coursework

## **Student Completions and Program Outcomes**

Since there isn't a specific TOP code designated for cybersecurity programs, measuring student completions can be a challenge due to fact that each regional college is coding their cybersecurity program(s) under different TOP codes, six in total. Exhibit 10 displays all the regional programs from the Chancellor's Office Curriculum Inventory (COCI) that pertain to information security, cybersecurity, and information assurance within the Information Technology discipline (TOP 07), along with their related TOP code and type of award offered. According to COCI, all of these programs are less than two years old.

Exhibit 10: Cybersecurity-related programs currently offered in the IEDR

College	TOP Code	Program Title	Award Offered
<b>CHAFFEY</b>	0708.00 Computer Infrastructure and Support	Cyber Security Analyst	Certificate requiring 8 to less than 16 semester units
		Cyber Security Defender	Certificate requiring 16 to less than 30 semester units
		Cyber Security Professional	A.S. Degree
<b>DESERT</b>	0701.00 Information Technology, General	Security+ Preparatory	N/A
<b>MORENO VALLEY</b>	0707.30 Computer Systems Analysis	Information Assurance Auditing	Certificate requiring 12 to fewer than 18 semester units
	0708.20 Computer Support	Computer Maintenance and Security	Noncredit program
<b>RIVERSIDE CITY</b>	0708.10 Computer Networking	Information Security and Cyber Defense	Certificate requiring 16 to less than 30 semester units
		Information Systems: Cyber-Skills	Noncredit program
<b>SAN BERNARDINO</b>	0702.00 Computer Information Systems	Information Security and Cyber Defense	Certificate requiring 16 to less than 30 semester units
		Android Application Security Support Specialist	Certificate requiring 16 to less than 30 semester units
		iOS Application Security Support Specialist	Certificate requiring 16 to less than 30 semester units
		Web Application Security Support Specialist	Certificate requiring 16 to less than 30 semester units

Source: Chancellor's Office Curriculum Inventory (COCI)

Exhibit 11 displays the annual average regional California Community College (CCC) credentials conferred during the three academic years between 2015 and 2018, from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, along with the enrollments from the most recent year available on LaunchBoard for the computer systems analysis (TOP 0707.30) program. Credentials are the combined total of associate degrees and certificates issued during the timeframe, divided by three 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*) are 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.

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

<b>0707.30 – Computer Systems Analysis</b>	<b>CCC Enrollments, Academic Year 2016-17</b>	<b>CCC Annual Average Credentials, Academic Years 2015-18</b>
<b>Moreno Valley – Information Assurance Auditing</b>	45	
<b>Mt. San Jacinto</b>	33	
<b>Norco</b>	28	
<b>Palo Verde</b>	126	
<b>Riverside</b>	36	
Certificate 6 to < 18 semester units		2
<b>Total CCC Enrollments, Academic Year 2016-17</b>	<b>268</b>	
<b>Total Annual Average CCC Credentials, Academic Years 2015-18</b>		<b>2</b>

Source: LaunchBoard, MIS Data Mart, Community College Catalogs 2019-20

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 come 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 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 Exhibit 12.

*Exhibit 12: 0707.30 – Computer systems analysis strong workforce program outcomes*

<b>Strong Workforce Program Metrics: 0707.30 – Computer Systems Analysis Academic Year 2015-16, unless noted otherwise</b>	<b>Inland Empire/Desert region</b>	<b>California Median</b>
Course enrollments (2016-17)	268	38
Completed 12+ units in one year (2016-17)	66	18
Economically disadvantaged students* (2016-17)	86%	78%
Transferred to a four-year institution (transfers)	20	0
Employed in the fourth fiscal quarter after exit (all exiters)	35%	75%
Median annual earnings* (all exiters)	\$16,910	\$22,070
Median change in earnings (all exiters)	N/A	38%

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 Exhibit 13 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. Other CIP codes related to cybersecurity are Computer and Information Systems Security/Information Assurance (CIP 11.1003), Cyber/Electronic Operations and Warfare (CIP 29.0207), and Cyber/Computer Forensics and Counterterrorism (CIP 43.0116). However, there were no regional community college-level credentials issued for these programs during the last three years.

*Exhibit 13: Annual average other educational providers credentials awarded for computer systems analysis/analyst program*

<b>11.0501 - Computer Systems Analysis/Analyst</b>	<b>Other Educational Providers Annual Average Credentials, Academic Years 2014-17</b>
<b>California Technical Academy</b>	
Award 1 < 2 academic years	23
Award < 1 academic year	59
<b>Total Annual Average Other Credentials, Academic Years 2014-17</b>	<b>82</b>

Source: IPEDS

## Recommendation

The computer systems analysis program prepares students for employment by providing instruction related to systems analysis and design, including the recognition, definition, and improvement of processes through the use of computer technology and methodologies. The regional community colleges issued an annual average of two credentials over the last three academic years in the **Computer Systems Analysis**



program while other educational providers in the region issued 82 awards. Several other community college programs offer cybersecurity training, but the number of credential awards is not available.

The occupations related to the training provided by this program are projected to have 292 annual openings over the next five years. Each of these occupations provides an entry-level wage that exceeds the regional living wage of \$12.39 per hour.

The COE recommends creating new or expanding existing programs to meet the demand of local employers. Community college starting new cybersecurity programs should partner with other regional colleges to understand the pipeline of current students and to strategize on curriculum alignment. The COE also recommends that the colleges partner with local employers to discuss their future hiring needs and specific training requirements.

### **Contact**

Michael Goss, Director  
Center of Excellence, Inland Empire/Desert Region  
[michael.goss@chaffey.edu](mailto:michael.goss@chaffey.edu)  
August 2019

## References

- Burning Glass Technologies. (2019). *Labor Insights/Jobs*. Retrieved from <https://www.burning-glass.com/>
- Burning Glass Technologies. (2015). *Recruiting Watchers for the Virtual Walls*. Retrieved from <https://www.burningglass.com/research-project/cybersecurity/>
- California Community Colleges Chancellor's Office. LaunchBoard. (2019). *California Community Colleges LaunchBoard*. Retrieved from <https://www.calpassplus.org/Launchboard/Home.aspx>
- California Community Colleges Chancellor's Office. (2019). *Chancellor's Office Curriculum Inventory (COCI), version 3.0*. Retrieved from <https://coci2.ccctechcenter.org/programs>
- California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. (2019). *Data Mart*. Retrieved from <https://datamart.cccco.edu/datamart.aspx>
- California Community Colleges Chancellor's Office, Curriculum and Instructional Unit, Academic Affairs Division. (2012). *Taxonomy of Programs, 6<sup>th</sup> Edition, Corrected Version*. Retrieved from <https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Digital-Innovation-and-Infrastructure/Research/Files/TOPmanual6200909corrected12513.ashx?la=en&hash=94C709CA83C0380828415579395A5F536736C7C1>
- Economic Modeling Specialists International (EMSI) (2019). *Datarun 2019.3*. Retrieved from <https://www.economicmodeling.com/>
- Glasmeier, A. Massachusetts Institute of Technology (MIT). (2019). Retrieved from <http://livingwage.mit.edu/>
- National Center for O\*NET Development. (2019). *O\*NET OnLine*. Retrieved from <https://www.onetonline.org/>

## **Appendix: Occupation definitions, sample job titles, five-year projections for cybersecurity analyst occupations**

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

### **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%*

### **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%*



### **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 cybersecurity analyst occupational group, Inland Empire/Desert region

Occupation (SOC)	2018 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage (25 <sup>th</sup> to 75 <sup>th</sup> percentile)	Median Hourly Wage (50 <sup>th</sup> percentile)	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Computer Systems Analysts (15-1121)	1,995	143	7%	159	\$31.56 to \$50.65	\$39.75	\$89,300	Bachelor's degree & None	None
Computer Network Support Specialists (15-1152)	1,107	83	7%	99	\$22.73 to \$37.26	\$27.99	\$66,700	Associate degree & None	None
Computer Network Architects (15-1143)	447	24	5%	34	\$28.78 to \$62.88	\$49.47	\$101,200	Bachelor's degree & None	5 years or more
<b>Total</b>	<b>3,549</b>	<b>250</b>	<b>7%</b>	<b>292</b>	-	-	-	-	-

Source: EMSI 2019.3