Computer Networking Occupations
Labor Market Information Report

Prepared by the San Francisco Bay Center of Excellence
for Labor Market Research
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Recommendation

Based on all available data, there appears to be a large undersupply of Computer Networking workers in the Bay region and East Bay sub-region (Alameda and Contra Costa Counties). The labor market gap is 5,660 in the Bay region and 950 in the East Bay sub-region. Bachelor's degrees and post baccalaureate certificates are included in the supply numbers since the occupational cluster selected typically requires a Bachelor's degree for entry.

This report also provides student outcomes data on employment and earnings for Computer Networking programs (TOP 0708.10) in the sub-region, region and state. Outcomes data is also provided for Computer Infrastructure and Support (TOP 0708.00) since students at Las Positas College are taking courses on this TOP code for the awards issued on 0708.10 (where there are no students taking courses at Las Positas in 2016-17). It is recommended that this data be reviewed to better understand how outcomes for students at Las Positas taking courses on these two TOP codes compare to potentially similar programs at colleges in the sub-region, region and state, as well as to outcomes across all CTE programs at Las Positas College and in the region.

Introduction

This report profiles Computer Networking Occupations in the 12 county Bay region and the East Bay sub-region (Alameda and Contra Costa counties) for a new program at Las Positas College.

- **Computer Systems Analysts (SOC 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.
  Entry-Level Educational Requirement: Bachelor's Degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

- **Information Security Analysts (SOC 15-1122):** Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. 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.
  Entry-Level Educational Requirement: Bachelor's Degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 27%

- **Computer Network Architects (SOC 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.
  Entry-Level Educational Requirement: Bachelor's Degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%

- **Computer Network Support Specialists (SOC 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.

    Entry-Level Educational Requirement: Associate Degree
    Training Requirement: None
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 41%

Occupational Demand

Table 1. Employment Outlook for Computer Networking Occupations in Bay Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Openings	Annual Openings	10% Hourly Wage	Median Hourly Wage
Computer Systems Analysts	36,911	43,701	6,790	18%	19,467	3,893	$32.15	$52.01
Information Security Analysts	3,790	4,629	838	22%	2,219	444	$29.68	$55.54
Computer Network Architects	8,549	9,750	1,201	14%	4,101	820	$34.95	$64.10
Computer Network Support Specialists	8,325	9,539	1,213	15%	4,426	885	$23.72	$38.39
Total	**57,576**	**67,619**	**10,043**	**17%**	**30,213**	**6,043**	**$31.18**	**$52.07**

Source: EMSI 2018.2

Bay Region includes Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

Table 2. Employment Outlook for Computer Networking Occupations in East Bay Sub-Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Openings	Annual Openings	10% Hourly Wage	Median Hourly Wage
Computer Systems Analysts	6,795	7,788	994	15%	3,284	657	$27.92	$44.58
Information Security Analysts	557	672	115	21%	316	63	$37.36	$55.98
Computer Network Architects	1,727	1,892	165	10%	740	148	$33.09	$60.21
Computer Network Support Specialists	1,828	2,030	201	11%	895	179	$22.99	$36.79
Total	**10,907**	**12,382**	**1,475**	**14%**	**5,235**	**1,047**	**$28.40**	**$46.33**

Source: EMSI 2018.2

East Bay Sub-Region includes Alameda and Contra Costa counties

Job Postings in Bay Region and East Bay Sub-Region

Table 3. Number of Job Postings for Computer Networking Occupations (April 2017 – March 2018)

Occupation	Bay Region	East Bay
Computer Systems Analysts (15-1121.00)	9,224	1,698
Information Security Analysts (15-1122.00)	5,608	808
Computer Network Architects (15-1143.00)	3,851	662
Computer Network Support Specialists (15-1152.00)	695	142
Telecommunications Engineering Specialists (15-1143.01)	445	112
Informatics Nurse Specialists (15-1121.01)	29	5
Total	**19,852**	**3,427**

Source: Burning Glass

Table 4. Top Job Titles for Computer Networking Occupations for latest 12 months (April 2017 – March 2018)

Common Title	Bay	East Bay	Common Title	Bay	East Bay
Network Engineer	1,737	294	Technical Analyst	192	51
Business Systems Analyst	1,607	451	Senior Architect	175	16
Security Engineer	1,254	94	Business Analyst	157	17
Systems Analyst	611	139	Information Security Manager	155	23
Developer	518	77	Information Technology Business Analyst	148	43
Security Architect	360	47	Oracle Consultant	139	11
Technical Consultant	330	21	Security Consultant	135	29
Security Analyst	323	66	Wireless Engineer	119	6
Software Development Engineer	298	33	Information Technology Security Analyst	115	23
Information Security Engineer	288	54	Aem Developer	100	24
Information Security Analyst	237	55	Information Technology Auditor	99	26
Network Security Engineer	222	36	Information Technology Consultant	92	29
Security Manager	216	27	Team Lead	92	21
Network Architect	211	86	Cyber Security Engineer	88	26
Information Technology Analyst	201	28	Oracle Functional Consultant	88	5
Systems Engineer	200	45	Implementation Consultant	78	6

Source: Burning Glass

Industry Concentration

Table 5. Industries hiring Computer Networking Workers in Bay Region

Industry – 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2017)	Jobs in Industry (2022)	% Change (2017-22)	% in Industry (2017)
Custom Computer Programming Services (541511)	12,909	15,774	22%	22.4%
Computer Systems Design Services (541512)	8,306	10,206	23%	14.4%
Internet Publishing and Broadcasting and Web Search Portals (519130)	2,981	3,852	29%	5.2%
Data Processing, Hosting, and Related Services (518210)	2,857	3,990	40%	5.0%
Corporate, Subsidiary, and Regional Managing Offices (551114)	2,773	2,900	5%	4.8%
Electronic Computer Manufacturing (334111)	2,509	2,785	11%	4.4%
Software Publishers (511210)	1,965	2,422	23%	3.4%
Other Computer Related Services (541519)	1,812	2,413	33%	3.1%
Local Government, Excluding Education and Hospitals (903999)	1,073	1,140	6%	1.9%
R&D in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotech) (541715)	892	957	7%	1.5%
Temporary Help Services (561320)	858	982	14%	1.5%
Wired Telecommunications Carriers (517311)	784	767	(2%)	1.4%
General Medical and Surgical Hospitals (622110)	675	688	2%	1.2%
Computer and Computer Peripheral Equipment and Software Merchant Wholesalers (423430)	660	683	3%	1.1%
Colleges, Universities & Professional Schools (State Government) (902612)	656	692	5%	1.1%
Admin. Management & General Management Consulting Services (541611)	561	710	27%	1.0%
Colleges, Universities, and Professional Schools (611310)	557	623	12%	1.0%

Source: EMSI 2018.2

Table 6. Top Employers Posting Jobs for Computer Networking Occupations (April 2017 – March 2018)

Note: In the East Bay, 44% of records have been excluded because they do not include an employer. As a result, the chart below may not be representative of the full sample in the East Bay.

Employer	Bay	Employer	Bay	Employer	East Bay
Apple Inc.	389	Matchpoint Solutions Inc	71	Workday, Inc	95
Oracle	311	Autodesk Inc	67	Accenture	73
Wells Fargo	302	Okaya Infocom	65	Wells Fargo	68
Accenture	258	SAP	64	Oracle	62
Cisco Systems Inc	195	Intel Corporation	59	Kaiser Permanente	48
Google Inc.	183	Servicenow	58	Tesla Motors	33
Deloitte	178	Codeforce 360	57	General Electric Company	31
Salesforce	178	Gap Inc.	57	Bank of the West	29
Facebook	139	Aramark	56	Ellie Mae	29
Workday, Inc	126	Linkedin Limited	56	Uc San Diego	25
Nvidia Corporation	87	Uber	56	Lawrence Livermore National Lab	23
Republic Bancorp	82	Tesla Motors	54	Talbridge Limited	23
Palo Alto Networks	77	Kaiser Permanente	53	University California	21
Visa	73	Verizon Communications Inc	51	Safeway Incorporated	19
Xoriant Inc	72	Lockheed Martin Corporation	49	Ross Stores	17

Source: Burning Glass

Educational Supply

Note: At Las Positas College, there are awards issued on 0708.10 - Computer Networking; however, students are taking courses on Computer Infrastructure and Support (TOP 0708.00) for the awards issued on 0708.10 (where there are no students taking courses at Las Positas in 2016-17). Therefore, information for both TOP Codes are provided in the educational supply section.

In the Bay region on TOP 0708.10 – Computer Networking, there are 14 community colleges issuing 218 awards annually, and seven other postsecondary educational institutions issuing 100 awards annually (16 Postbaccalaureate certificates, 38 Bachelor's, 13 Associates, and 33 certificates), for a total of 318 awards annually. On TOP 0708.00 - Computer Infrastructure and Support, six colleges are issuing 62 awards annually.

There are six CIP codes that have programs training for the occupational cluster selected:
- 11.0103 Information Technology
- 11.0401 Information Science/Studies
- 11.0804 Modeling, Virtual Environments and Simulation
- 11.1006 Computer Support Specialist
- 15.1204 Computer Software Technology/Technician
- 52.1201 Management Information Systems, General

Table 7. Programs on TOP 0708.10 – Computer Networking or on CIP codes listed above

College	Sub-Region	CIP Code	TOP Code	Head-count	Bache-lor's	No. of Transfers	Asso-ciates	Certifi-cates	Total Awards
Cabrillo	SC-Monterey	n/a	070800	335	0	22	0	0	0
Contra Costa	East Bay	n/a	070810	216	0	23	3	12	15
			070800	0	0	0	0	1	1
Deanza	Silicon Valley	n/a	070810	151	0	29	10	10	20
			070800	312	0	36	0	0	0
Diablo Valley	East Bay	n/a	070810	167	0	10	5	2	7
			070800	125	0	25	0	0	0
Foothill	Silicon Valley	n/a	070810	0	0	0	1	0	1
			070800	304	0	16	0	0	0
Gavilan	Silicon Valley	n/a	070810	24	0	n<10	4	1	5
			070800	95	0	19	1	0	1
Las Positas	East Bay	n/a	070810	0	0	n<10	4	1	5
			070800	184	0	9	0	0	0
Los Medanos	East Bay	n/a	070810		0	0	7	8	15

College	Region	CIP Code	TOP Code	Headcount					Total
			070800	on another TOP	0	0	4	4	8
Mission	Silicon Valley	n/a	070810	230	0	27	12	28	40
			070800	43	0	n<10	0	0	0
Monterey	SC-Monterey	n/a	070810	97	0	11	0	2	2
Ohlone	East Bay	n/a	070810	495	0	41	3	17	20
			070800	64	0	16	0	1	1
San Francisco	Mid-Peninsula	n/a	070810	1,289	0	131	0	50	50
			070800	345	0	42	39	9	48
San Jose City	Silicon Valley	n/a	070810	154	0	<10	6	7	13
San Mateo	Mid-Peninsula	n/a	070810	38	0	n<10	0	0	0
			070800	0	0	0	1	2	3
Santa Rosa	North Bay	n/a	070810	39	0	0	0	20	20
			070800	205	0	29	0	0	0
Skyline	Mid-Peninsula	n/a	070810	0	0	0	4	1	5
			070800	112	0	n<10	0	0	0
Unitek College	East Bay	11.1006		n/a	0	n/a	0	24	24
Cogswell College	Silicon Valley	11.0804		n/a	3	n/a	0	0	3
		15.1204		n/a	4	n/a	0	0	4
Empire College	North Bay	11.0103		n/a	0	n/a	13	9	22
Golden Gate University	Mid-Peninsula	11.0401		n/a	1	n/a	0	0	1
Naval Postgraduate School *(Postbac Certs)	SC-Monterey	11.0804		n/a	16*	n/a	0	0	16
Santa Clara University	Silicon Valley	52.1201		n/a	21	n/a	0	0	21
University of San Francisco	Mid-Peninsula	11.0103		n/a	8	n/a	0	0	8
		52.1201		n/a	1	n/a	0	0	1
Total Bay Region				n/a**	54	510	116	234	380
Sub-Total on TOP 070810 in Bay Region				2,892	n/a	294	72	216	318
Sub-Total on TOP 070800 in Bay Region				2,110	n/a	216	44	18	62
Total East Bay Sub-Region				n/a**	0	126	26	64	96
Sub-Total on TOP 070810 in East Bay				878	n/a	76	22	64	86
Sub-Total on TOP 070800 in East Bay				373	n/a	50	4	6	10

Sources: IPEDS, Data Mart and Launchboard

NOTE: For community colleges, the annual average for awards is 2014-17. Headcount is for 2016-17, and number of transfer students is for 2015-16. For other postsecondary, the annual average for awards is 2013-16.

**Headcount at the regional and sub-regional level for the two TOP codes added together is not available since there would be double counting of students who are taking courses on both TOP codes at colleges. At the TOP04 level (which would also include TOP06 0708.20 Computer Support), there are 5,188 students in the region and 1,259 students in the sub-region.

Gap Analysis

The labor market appears to be significantly undersupplied in the Bay Region. On the demand side, there are 6,043 annual openings in the Bay region with 380 annual awards for an annual gap of 5,663. In the East Bay, there are 1,047 annual openings and 96 annual awards for an annual gap of 951. Bachelor's degrees and Postbaccalaureate Certificates are included in the supply calculation since three of the four SOC codes selected require a Bachelor's degree for entry. The annual openings for these three SOC codes account for about 85% of the total annual openings in the region and sub-region.

Student Outcomes

Table 8a. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0708.10 - Computer Networking in the Bay Region and East Bay Sub-Region

2015-16	Bay Region (All CTE Programs)	Las Positas (All CTE Programs)	State (0708.10)	Bay Region (0708.10)	East Bay Sub-Region (0708.10)	Top Colleges in Region on TOP (0708.10)	
% Employed Four Quarters After Exit	74%	75%	72%	75%	71%	Santa Rosa	86% (28 students)
Median Earnings Two Quarters After Exit	$10,310	$11,400	$9,740	$11,755	$9,000	De Anza	$19,495 (20 students)
Median % Change in Earnings	46%	39%	49%	51%	36%	De Anza	126% (16 students)
% of Students Earning a Living Wage	63%	65%	40%	74%	68%	De Anza	89% (19 students)

Source: Launchboard (version available on 4/21/18)

Table 8b. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0708.00 - Computer Infrastructure and Support in the Bay Region and East Bay Sub-Region

2015-16	Bay Region (All CTE Programs)	Las Positas (All CTE Programs)	State (0708.00)	Bay (0708.00)	East Bay (0708.00)	Las Positas (0708.00)	Top Colleges in Region on TOP (0708.00)	
% Employed Four Quarters After Exit	74%	75%	67%	72%	78%	76% (29 students)	Ohlone	82% (17 students)
Median Earnings Two Quarters After Exit	$10,310	$11,400	$10,150	$11,705	$12,545	$10,855	De Anza	$17,750 (35 students)
Median % Change in Earnings	46%	39%	46%	39%	35%	35%	Cabrillo	62% (30 students)
% of Students Earning a Living Wage	63%	65%	62%	68%	75%	75% (16 students)	De Anza	78% (27 students)

Source: Launchboard (version available on 4/21/18)

Skills, Certifications and Education

Table 9. Top Skills for Computer Networking Occupations in Bay Region (April 2017 – March 2018)

Skill	Postings	Skill	Postings	Skill	Postings
Teamwork/Collaboration	4,740	Salesforce	1,048	Product Management	629
Information Security	3,052	C++	1,007	Process Improvement	628
Project Management	2,982	Scheduling	1,002	Web Application Development	628
Java	2,807	Software as a Service (SaaS)	996	Cisco Switching	624
Python	2,732	PERL Scripting Language	962	Security Operations	618
Linux	2,708	Quality Assurance and Control	945	Computer Engineering	616
SQL	2,517	OSPF	934	Microsoft Active Directory	603
Oracle	2,339	Change Management	872	SSL	596
Business Process	2,311	Data Analysis	856	Microsoft Visio	591
Network Engineering	2,268	E-Commerce	852	Voice over IP (VoIP)	588
Software Development	2,255	Network Troubleshooting	850	Splunk	586
Cisco	2,196	Enterprise Resource Planning (ERP)	842	Big Data	563
Business Systems Analysis	1,950	Virtualization	834	Systems Engineering	551

Information Systems	1,851	DevOps	809	System Design	538
Business Systems	1,836	Telecommunications	805	Staff Management	533
Customer Service	1,741	Domain Name System (DNS)	801	Network Administration	527
Network Security	1,733	Customer Contact	794	Product Development	526
UNIX	1,478	System/Network Configuration	789	Configuration Management	508
JavaScript	1,467	Network Infrastructure (Edge POE Devices)	761	Business Development	503
Systems Analysis	1,459	Juniper Networks	743	Sales	502
Technical Support	1,327	Technical Writing / Editing	738	Health Insurance Portability & Accountability Act (HIPAA)	498
Software Engineering	1,324	System Administration	737	Systems Development	498
Transmission Control Protocol/Internet Protocol (TCP/IP)	1,298	Ruby	718	Apache Hadoop	482
Business Analysis	1,273	Debugging	697	Agile Development	480
SAP	1,237	Project Planning & Development Skills	691	System Architecture	480
Routers	1,193	Extensible Markup Language (XML)	683	Scalability Design	478
Cryptography	1,160	Scrum	671	Data Warehousing	468
Wide Area Network (WAN)	1,108	Systems Development Life Cycle (SDLC)	671	ITIL	468
Budgeting	1,054	VMware	667	Disaster Recovery Planning	466
Virtual Private Networking (VPN)	1,051	IT Industry Knowledge	645	Accounting	465

Source: Burning Glass

Table 10. Certifications for Computer Networking Occupations in the Bay Region (April 2017 – March 2018)

Note: 78% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

Certification	Postings	Certification	Postings
Certified Information Systems Security Professional (CISSP)	1,751	Juniper Networks Certified Internet Associate	100
Cisco Certified Network Professional (CCNP)	779	Juniper Networks Certified Internet Specialist	91
Certified Information Systems Auditor (CISA)	765	GIAC Certified Intrusion Analyst	89
Certified Information Security Manager (CISM)	647	Cisco Certified Design Professional (CCDP)	87
SANS/GIAC Certification	621	Juniper Networks Certified Internet Professional	84
Cisco Certified Network Associate (CCNA)	578	Security+	83
Cisco Certified Internetwork Expert (CCIE)	520	Juniper Networks Certified Internet Expert	81
IT Infrastructure Library (ITIL) Certification	507	Microsoft Certified Solutions Expert (MCSE)	71
Project Management Certification	307	CompTIA Network+	70
Information Systems Certification	291	Microsoft Certified Solutions Associate (MCSA)	65
CompTIA Security+	253	Certified A+ Technician	63
Security Clearance	248	Certified in The Governance of Enterprise IT (CGEIT)	57
Certified in Risk and Information Systems Control	201	Certified Ethical Hacker (CEH)	53
Driver's License	175	Check Point Certified Security Expert	53
GIAC Certified Incident Handler (GCIH)	169	Certified Information Privacy Professional (CIPP)	49
Project Management Professional (PMP)	145	GIAC Certified Forensic Analyst	46
ITIL Certification	123	Certified Scrum Trainer (CST)	43
Cisco Certified Security Professional	118	Certified Scrum Professional (CSP)	33

Source: Burning Glass

Table 11. Education Requirements for Computer Networking Occupations in Bay Region

Note: 46% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

Education (minimum advertised)	Latest 12 Mos. Postings
High school or vocational training	519 (5%)
Associate Degree	264 (2%)
Bachelor's Degree	9,351(87%)
Master's Degree	404 (4%)
Doctoral Degree	224 (2%)

Source: Burning Glass

Methodology

Occupations for this report were identified by use of skills listed in O*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

Sources

O*Net Online

Labor Insight/Jobs (Burning Glass)

Economic Modeling Specialists International (EMSI)

CTE LaunchBoard www.calpassplus.org/Launchboard/

Statewide CTE Outcomes Survey

Employment Development Department Unemployment Insurance Dataset

Living Insight Center for Community Economic Development

Chancellor's Office MIS system

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