Microsoft Windows Networking Occupations
Labor Market Information Report
City College of San Francisco

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 significant undersupply of Networking workers compared to the demand for this cluster of occupations in the Bay region and in the Mid-Peninsula sub-region (San Francisco and San Mateo Counties.) There is a projected annual gap of about 5,731 students in the Bay region and 2,318 students in the Mid-Peninsula Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0708.10 - Computer Networking in the state and region. It is recommended that these data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at City College of San Francisco and in the region.

Introduction

This report profiles Networking Occupations in the 12 county Bay region and in the Mid-Peninsula sub-region for the review and modification of an existing program at City College of San Francisco.

- **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. Excludes "Network and Computer Systems Administrators" (15-1142) and "Computer Network Architects" (15-1143).
  Entry-Level Educational Requirement: Associate's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 41%
- **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. Excludes "Information Security Analysts" (15-1122), "Network and Computer Systems Administrators" (15-1142), and "Computer Network Support Specialists" (15-1152).
  Entry-Level Educational Requirement: Bachelor's *degree*
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%
- **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. Excludes "Computer Network Architects" (15-1143).
  Entry-Level Educational Requirement: Bachelor's *degree*
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 27%

- **Network and Computer Systems Administrators (SOC 15-1142):** Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Monitor network to ensure network availability to all system users and may perform necessary maintenance to support network availability. May monitor and test Web site performance to ensure Web sites operate correctly and without interruption. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software. May supervise computer user support specialists and computer network support specialists. May administer network security measures. Excludes "Information Security Analysts"(15-1122), "Computer User Support Specialists" (15-1151), and "Computer Network Support Specialists" (15-1152).

  Entry-Level Educational Requirement: Bachelor's *degree*

  Training Requirement: None

  Percentage of Community College Award Holders or Some Postsecondary Coursework: 38%

- **Computer Occupations, All Other (SOC 15-1199):** All computer occupations not listed separately. Excludes "Computer and Information Systems Managers" (11-3021), "Computer Hardware Engineers" (17-2061), "Electrical and Electronics Engineers" (17-2070), "Computer Science Teachers, Postsecondary" (25-1021), "Multimedia Artists and Animators" (27-1014), "Graphic Designers" (27-1024), "Computer Operators" (43-9011), and "Computer, Automated Teller, and Office Machine Repairs" (49-2011).

  Entry-Level Educational Requirement: Bachelor's *degree*

  Training Requirement: None

  Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%

Occupational Demand

Table 1. Employment Outlook for Microsoft Windows Networking Occupations in Bay Region

Occupation	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Average Annual Open-ings	25% Hourly Wage	Median Hourly Wage
Computer Network Support Specialists	6,558	7,464	905	14%	3,401	680	$29.28	$38.92
Computer Network Architects	7,692	8,531	839	11%	3,394	679	$48.45	$64.71
Information Security Analysts	3,298	4,169	871	26%	2,073	415	$41.35	$55.30
Network and Computer Systems Administrators	14,165	15,762	1,597	11%	6,126	1,225	$38.24	$49.06
Computer Occupations, All Other	34,144	37,249	3,105	9%	14,791	2,958	$40.95	$55.84
Total	**65,858**	**73,175**	**7,317**	**11%**	**29,786**	**5,957**	**$40.10**	**$53.71**

Source: EMSI 2019.3
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 Microsoft Windows Networking Occupations in Mid-Peninsula Sub-Region

Occupation	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	5-Yr Open-ings	Average Annual Open-ings	25% Hourly Wage	Median Hourly Wage
Computer Network Support Specialists	2,227	2,686	459	21%	1,326	265	$33.32	$42.29
Computer Network Architects	2,427	2,887	460	19%	1,284	257	$51.67	$65.39
Information Security Analysts	1,222	1,648	426	35%	883	177	$47.55	$61.05
Network and Computer Systems Administrators	4,470	5,282	812	18%	2,272	454	$41.38	$51.93
Computer Occupations, All Other	12,658	14,399	1,741	14%	6,139	1,228	$42.44	$55.57

TOTAL	23,004	26,901	3,897	17%	11,904	2,381	$42.59	$54.90

Source: EMSI 2019.3
Mid-Peninsula Sub-Region includes San Francisco and San Mateo Counties

Job Postings in Bay Region and Mid-Peninsula Sub-Region

Table 3. Number of Job Postings by Occupation for latest 12 months (December 2018 - November 2019)

Occupation	Bay Region	Mid-Peninsula
Computer Systems Engineers/Architects	25,341	8,989
Information Technology Project Managers	16,841	6,887
Software Quality Assurance Engineers and Testers	14,464	4,556
Business Intelligence Analysts	13,800	5,714
Information Security Analysts	9,459	3,888
Network and Computer Systems Administrators	8,000	2,669
Computer Network Architects	6,119	1,947
Database Architects	3,753	1,387
Data Warehousing Specialists	2,501	930
Computer Occupations, All Other	2,456	1,055
Document Management Specialists	1,450	541
Computer Network Support Specialists	1,330	457
Video Game Designers	1,295	676
Search Marketing Strategists	1,173	676
Geospatial Information Scientists and Technologists	801	302
Telecommunications Engineering Specialists	476	147
Web Administrators	394	203
Geographic Information Systems Technicians	137	46
Total	**109,790**	**41,070**

Source: Burning Glass

Table 4a. Top Job Titles for Microsoft Windows Networking Occupations for latest 12 months (December 2018 - November 2019) Bay Region

Common Title	Bay	Common Title	Bay
Data Analyst	4,999	Machine Learning Engineer	1,039
Systems Engineer	4,379	Sap Consultant	975
Solutions Architect	3,617	Project Manager	958
Quality Assurance Engineer	3,307	Business Intelligence Analyst	782
Network Engineer	3,027	Software Quality Assurance Engineer	777
Software Development Engineer	2,480	Quality Assurance Analyst	777
Security Engineer	2,265	Security Analyst	773
Systems Administrator	1,732	Quality Assurance Tester	720
Senior Systems Engineer	1,466	Software Test Engineer	642
Firmware Engineer	1,374	Architect	560
Data Architect	1,225	Technical Architect	546
Information Technology Project Manager	1,211	Java Architect	532
Technical Project Manager	1,161	Scrum Master	526
Information Technology Manager	1,079	Business Data Analyst	521

Table 4b. Top Job Titles for Microsoft Windows Networking Occupations for latest 12 months (December 2018 - November 2019) Mid-Peninsula Sub-Region

Common Title	Mid-Peninsula	Common Title	Mid-Peninsula
Data Analyst	2,378	Firmware Engineer	371
Solutions Architect	1,533	Quality Assurance Analyst	370
Systems Engineer	1,150	Project Manager	369
Security Engineer	1,033	Business Intelligence Analyst	323

Quality Assurance Engineer	934	Security Analyst	308
Network Engineer	907	Enterprise Architect	272
Software Development Engineer	836	Technology Manager	255
Systems Administrator	628	Scrum Master	246
Information Technology Project Manager	504	Architect	223
Machine Learning Engineer	498	Quality Assurance Tester	221
Information Technology Manager	498	Java Architect	213
Data Architect	453	Technical Architect	209
Senior Systems Engineer	450	Sap Consultant	208
Technical Project Manager	422	Infrastructure Engineer	196

Source: Burning Glass

Industry Concentration

Table 5. Industries hiring Microsoft Windows Networking Workers in Bay Region

Industry – 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2018)	Jobs in Industry (2022)	% Change (2018-22)	% in Industry (2018)
Custom Computer Programming Services (541511)	13,018	15,079	16%	20%
Computer Systems Design Services (541512)	7,831	8,690	11%	12%
Internet Publishing and Broadcasting and Web Search Portals (519130)	3,997	5,062	27%	6%
Software Publishers (511210)	3,511	4,291	22%	6%
Data Processing, Hosting, and Related Services (518210)	3,266	4,307	32%	5%
Corporate, Subsidiary, and Regional Managing Offices (551114)	2,911	3,104	7%	4%
Federal Government, Civilian, Excluding Postal Service (901199)	2,097	2,042	-3%	3%
Other Computer Related Services (541519)	1,846	2,216	20%	3%
Electronic Computer Manufacturing (334111)	1,729	1,846	7%	3%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715)	1,103	1,184	7%	2%
Local Government, Excluding Education and Hospitals (903999)	1,084	1,122	4%	2%
Temporary Help Services (561320)	1,032	1,080	5%	2%
Wired Telecommunications Carriers (517311)	880	788	-10%	1%
Colleges, Universities, and Professional Schools (State Government) (902612)	782	802	3%	1%
Colleges, Universities, and Professional Schools (611310)	728	787	8%	1%
Engineering Services (541330)	696	752	8%	1%
Administrative Management and General Management Consulting Services (541611)	663	790	19%	1%
Research and Development in Biotechnology (except Nanobiotechnology) (541714)	626	831	33%	1%

Source: EMSI 2019.3

Table 6. Top Employers Posting Microsoft Windows Networking Occupations in Bay Region and Mid-Peninsula Sub-Region (December 2018 - November 2019)

Employer	Bay	Employer	Bay	Employer	Mid-Peninsula
Python	23,727	UNIX	7,076	Machine Learning	5,276
SQL	18,973	Scheduling	6,959	Big Data	5,228
Project Management	18,826	JavaScript	6,887	Tableau	5,203
Linux	16,161	Cisco	6,767	Product Management	5,086
Java	15,402	Systems Engineering	6,760	Network Engineering	5,002

Quality Assurance and Control	13,860	Atlassian JIRA	6,671	Project Planning and Development Skills	4,949
Software Development	13,575	System Administration	6,479	Software as a Service	4,874
Data Analysis	9,965	Business Process	6,443	Data Warehousing	4,826
Software Engineering	9,449	DevOps	6,204	Product Development	4,790
Customer Service	8,496	Information Systems	5,927	PERL Scripting Language	4,744
Oracle	8,117	Information Security	5,910	Extraction Transformation and Loading (ETL)	4,689
Budgeting	7,680	Debugging	5,895	Git	4,634
Scrum	7,429	VMware	5,881	Salesforce	4,615
C++	7,240	Virtualization	5,719	Transmission Control Protocol / Internet Protocol (	4,418
SAP	7,142	Technical Support	5,326	Apache Hadoop	4,412
Python	23,727	UNIX	7,076	Machine Learning	5,276
SQL	18,973	Scheduling	6,959	Big Data	5,228

Source: Burning Glass

Educational Supply

There are 15 community colleges in the Bay Region issuing 226 awards on average annually (last 3 years) on TOP 0708.10 - Computer Networking. There are two colleges in the Mid-Peninsula Sub-Region issuing 63 awards on average annually (last 3 years) on this TOP code.

Table 7. Awards on TOP 07081.0 - Computer Networking in Bay Region

College	Sub-Region	Associates	Certificate 18+ units	Certificate Low unit	Total
Cabrillo College	Santa Cruz-Monterey	3			3
City College of San Francisco	Mid-Peninsula		1	48	49
Contra Costa College	East Bay	3		13	16
De Anza College	Silicon Valley	13	3	8	24
Diablo Valley College	East Bay	7	2	0	9
Foothill College	Silicon Valley	1			1
Gavilan College	Santa Cruz-Monterey	4	2		6
Las Positas College	East Bay	4	1		5
Los Medanos College	East Bay	8	5	3	16
Mission College	Silicon Valley	14	6	9	29
Monterey Peninsula College	Santa Cruz-Monterey		1	1	2
Ohlone College	East Bay	3	4	12	19
San Jose City College	Silicon Valley	8	6	2	16
Santa Rosa Junior College	North Bay			23	23
Skyline College	Mid-Peninsula	7	1		8
Total Bay Region		**75**	**31**	**120**	**226**
Total Mid-Peninsula Sub-Region		**24**	**11**	**28**	**63**

Source: Data Mart

Note: The annual average for awards is 2015-16 to 2017-18.

Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 5,957 annual openings for the Networking occupational cluster and 226 annual (3-year average) awards for an annual undersupply of 5,731 students. In the Mid-Peninsula Sub-Region, there is also a gap with 2,381 annual openings and 63 annual (3-year average) awards for an annual undersupply of 2,318 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0708.10 - Computer Networking

2015-16	Bay (All CTE Programs)	City College of San Francisco (All CTE Programs)	State (07081.0)	Bay (0708.10)	Mid-Peninsula (0708.10)	City College of San Francisco (0708.10)
% Employed Four Quarters After Exit	74%	72%	72%	74%	73%	74%
Median Quarterly Earnings Two Quarters After Exit	$10,550	$10,170	$26,672	$28,862	$12,411	$12,482
Median % Change in Earnings	46%	31%	40%	45%	38%	38%
% of Students Earning a Living Wage	63%	65%	70%	74%	70%	70%

Source: Launchboard Pipeline (version available on 12/2/19)

Skills, Certifications and Education

Table 9. Top Skills for Networking Occupations in Bay Region (December 2018 - November 2019)

Skill	Postings	Skill	Postings	Skill	Postings
Python	23,727	UNIX	7,076	Machine Learning	5,276
SQL	18,973	Scheduling	6,959	Big Data	5,228
Project Management	18,826	JavaScript	6,887	Tableau	5,203
Linux	16,161	Cisco	6,767	Product Management	5,086
Java	15,402	Systems Engineering	6,760	Network Engineering	5,002
Quality Assurance and Control	13,860	Atlassian JIRA	6,671	Project Planning and Development Skills	4,949
Software Development	13,575	System Administration	6,479	Software as a Service (SaaS)	4,874
Data Analysis	9,965	Business Process	6,443	Data Warehousing	4,826
Software Engineering	9,449	DevOps	6,204	Product Development	4,790
Customer Service	8,496	Information Systems	5,927	PERL Scripting Language	4,744
Oracle	8,117	Information Security	5,910	Extraction Transformation and Loading (ETL)	4,689
Budgeting	7,680	Debugging	5,895	Git	4,634
Scrum	7,429	VMware	5,881	Salesforce	4,615
C++	7,240	Virtualization	5,719	Transmission Control Protocol / Internet Protocol (TCP / IP)	4,418
SAP	7,142	Technical Support	5,326	Apache Hadoop	4,412

Source: Burning Glass

Table 10. Certifications for Networking Occupations in Bay Region (December 2018 - November 2019)

Note: 84% 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
Project Management Certification	3,509	Certified ScrumMaster (CSM)	1,065
Certified Information Systems Security Professional (CISSP)	3,067	CompTIA Security+	862
Project Management Professional (PMP)	2,272	ITIL Certification	645
IT Infrastructure Library (ITIL) Certification	2,231	Microsoft Certified Solutions Expert (MCSE)	607
Cisco Certified Network Associate (CCNA)	1,674	Microsoft Certified Solutions Associate (MCSA)	593

Certified Information Systems Auditor (CISA)	1,527	Information Systems Certification	563
Cisco Certified Network Professional (CCNP)	1,519	Certified in Risk and Information Systems Control	508
SANS/GIAC Certification	1,382	GIAC Certified Incident Handler (GCIH)	355
Security Clearance	1,346	Certified A+ Technician	340
Cisco Certified Internetwork Expert (CCIE)	1,237	Cisco Certified Security Professional	323
Driver's License	1,226	GIAC Security Essentials (GSEC)	290
Certified Information Security Manager (CISM)	1,210	Certified Scrum Professional (CSP)	289

Source: Burning Glass

Table 11. Education Requirements for Microsoft Windows Networking Occupations in Bay Region

Note: 44% 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	Percent 12 Mos. Postings
High school or vocational training	2,180	4%
Associate Degree	1,203	2%
Bachelor's Degree or Higher	53,486	94%

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

Contacts

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