

#### 4.0 COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

**4.5 Telecommunications (S):** Students will understand the telecommunications concepts, systems, and business models necessary to install, create, and manage diverse types of communication technologies and networking systems. They will demonstrate competency by performing tasks related to the creation, installation, management, and security of a chosen networking system.

#### Link to Content Standards for California Public Schools

Benchmarks	English Standards	Math Standards	Science Standards	Social Science/ History Standards
4.5.1 Business Decisions—analyze the factors affecting the selection of appropriate communications services; for example, cost, ease of use, and timelines	<b>(9-10)R2.1-2.7</b> <b>(9-10)W1.3-1.8;</b> <b>(9-10)W2.3;</b> (9-10)W2.6; (9-10)LS1.2-1.9; (11-12)W1.3, 1.6-1.8; (11-12)LS1.3	<b>(6)SDP1.1;</b> <b>(6)SDP2.5;</b> <b>(6)SDP3.1, 3.5;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF3.3;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)SDP1.1-1.3;</b> <b>(7)MR1.1, 1.2;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3;</b> AI-13.0; <b>AI-15.0;</b> P&S4.0-8.0	(9-12)I&E1 a, d	(11)USH11.8.7
4.5.2 Business Models—examine various types of telecommunications models including products and services provided, identification of market spaces, resources needed to create, deliver, and support products and revenue models essential for company growth	<b>(8)R2.1;</b> <b>(9-10)R2.3-2.7</b> <b>(9-10)W1.3-1.8;</b> <b>(9-10)W2.3;</b> (9-10)W2.6; (9-10)LS1.2-1.3, 1.6-1.8; (11-12)W1.3-1.9; (11-12)LS1.3; (11-12)LS2.4	<b>(6)SDP1.1;</b> <b>(6)SDP2.5;</b> <b>(6)SDP3.1, 3.5;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF3.3;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)SDP1.1-1.3;</b> <b>(7)MR1.1, 1.2;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3</b>	(9-12)I&E1 a, d, g	

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Benchmarks	English Standards	Math Standards	Science Standards	Social Science/ History Standards
4.5.3 Customer Support– create a plan that includes customer policies and procedures including incident management and escalation; select help desk tools and resources such as incident tracking, knowledge database, and staffing	<b>(9-10)W1.3-1.5;</b> (9-10)W2.6; (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8	<b>(6)SDP1.1;</b> <b>(6)SDP2.5;</b> <b>(7)NS1.1-1.3;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)MR1.1;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3</b>	(9-12)I&E1 a, d	
4.5.4 Emerging Technology and Trends– discuss emerging products, services, and business models in relation to the creation, setup, and management of networking and telecommunication products and services	<b>(9-10)R2.1;</b> <b>(9-10)R2.5-2.6;</b> <b>(9-10)W1.3-1.8;</b> <b>(9-10)W2.3;</b> (9-10)W2.6; (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8; (11-12)LS1.1	<b>(7)MR3.3</b>	(9-12)I&E1 a, d	(11)USH11.7.6; (11)USH11.8.7
4.5.5 Media Types– identify, evaluate, create, and process voice and data transmissions	(9-10)R2.6; (9-10)W1.8; (9-10)W2.3d; (11-12)W1.8; (11-12)W2.6	<b>(6)SDP1.1;</b> <b>(6)SDP2.5;</b> <b>(7)NS1.1-1.3;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)MR1.1, 3.1, 3.3</b>	(9-12)I&E1 a	

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Benchmarks	English Standards	Math Standards	Science Standards	Social Science/ History Standards
4.5.6 Network and Systems Administration—analyze, manage, and maintain various types of electronic networks	<b>(8)R2.1;</b> <b>(9-10)R2.1-2.7</b>	<b>(6)SDP1.1; (6)SDP2.5;</b> <b>(7)NS1.1-1.3;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)MR1.1, 1.2;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3;</b> AI-5.0; AI-10.0; AI-13.0; AI-15.0; P&S4.0-8.0	(9-12)I&E1 a, d	
4.5.7 Networking and Communication Applications—describe and illustrate appropriate use of communication services, products, and applications	<b>(8)R2.1;</b> <b>(9-10)R2.1;</b> <b>(9-10)R2.4-2.6;</b> <b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.3-1.8; (11-12)W1.3, 1.6-1.8		(9-12)I&E1 a	
4.5.8 Networking and Communications Infrastructure—evaluate, select, and configure compatible systems across various platforms and media types	<b>(9-10)R2.1-2.7</b>	<b>(6)SDP1.1; (6)SDP2.5;</b> <b>(6)SDP3.1, 3.5;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF3.3; (7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)SDP1.1-1.3;</b> <b>(7)MR1.1, 1.2;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3;</b> <b>AI-5.0; AI-10.0;</b> <b>AI-13.0; AI-15.0;</b> P&S4.0-8.0	(9-12)I&E1 a, d	

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Benchmarks	English Standards	Math Standards	Science Standards	Social Science/ History Standards
4.5.9 Resource Management—discuss the effective management of human, financial, and telecommunications resources from the standpoint of both a user and a provider	<b>(8)R2.1;</b> <b>(9-10)R2.1;</b> <b>(9-10)R2.4-2.6;</b> <b>(9-10)W1.3-1.8;</b> <b>(9-10)W2.3;</b> (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8	<b>(7)NS1.1-1.3;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MR1.1, 3.1, 3.3</b>	(9-12)I&E1 a, m	
4.5.10 Security Monitoring and Investigation—classify appropriate monitoring devices and procedures for quick identification, and prevention of security violations; describe investigative procedures to follow	<b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.3-1.8; (11-12)W1.3, 1.6-1.9	<b>(7)NS1.1-1.3;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MR1.1, 3.1, 3.3</b>	(9-12)I&E1 a, d	
4.5.11 Security Program—develop policies and procedures including user agreements, incident reporting, and recovery for company employees; design orientation and training programs to educate technicians and end-users	<b>(8)R2.1;</b> <b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8; (11-12)LS2.4	<b>(7)NS1.1-1.3;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MR1.1, 3.1, 3.3</b>	(9-12)I&E1 a, d	

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Benchmarks	English Standards	Math Standards	Science Standards	Social Science/ History Standards
4.5.12 Security Risk Assessment—identify potential risks and entrance points including intentional, non-intentional, internal and external risks, and select appropriate hardware and software including firewalls, monitoring, and antivirus protection	<b>(9-10)R2.1;</b> <b>(9-10)R2.4-2.6;</b> <b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8	<b>(6)SDP1.1;</b> <b>(6)SDP2.5;</b> <b>(7)NS1.1-1.3;</b> <b>(7)NS1.6, 1.7;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MG1.1-1.3;</b> <b>(7)MR1.1, 1.2;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3</b>	(9-12)I&E1 a, d	
4.5.13 Standards and Protocol—analyze implications of protocols and international standards and discuss their impact on data transmission	<b>(9-10)R2.5-2.6;</b> <b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.1; (9-10)LS1.1, 1.3-1.8; (11-12)W1.3, 1.6-1.8;	<b>(7)NS1.1-1.3;</b> <b>(7)NS2.1-2.3;</b> <b>(7)AF1.1, 1.2, 1.5;</b> <b>(7)AF4.1, 4.2;</b> <b>(7)MR1.1, 1.2;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3</b>	(9-12)I&E1 a, d	
4.5.14 Topology—diagram physical and logical layouts of telecommunications systems	<b>(9-10)R2.3-2.6</b> (9-10)LS1.1	<b>(7)MG1.2;</b> <b>(7)MR1.1, 3.1, 3.3;</b> <b>AI-5.0;</b> <b>AI-10.0;</b> AI-13.0; <b>AI-15.0;</b> AI-24.0; AI-25.0; G11.0	(9-12)I&E1 a, d	

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Benchmarks	English Standards	Math Standards	Science Standards	Social Science/ History Standards
4.5.15 Training—provide information and instruction to users that will enable them to operate telecommunications systems	<b>(8)R2.1;</b> <b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8; (11-12)W2.6; (11-12)LS2.4	<b>(7)MR1.1, 3.1, 3.3</b>	(9-12)I&E1 m	
4.5.16 Troubleshooting—identify problems, develop appropriate methods and tools for resolving problems, and implement solutions	<b>(9-10)W1.3-1.8;</b> (9-10)W2.6; (9-10)LS1.3-1.9; (11-12)W1.3, 1.6-1.8	<b>(7)MR1.1;</b> <b>(7)MR2.1, 2.3, 2.4, 3.1, 3.3;</b> <b>AI-5.0;</b> <b>AI-10.0;</b> AI-13.0; <b>AI-15.0;</b> AI-24.0; AI-25.0	(9-12)I&E1 a, d	

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