

# Technology Standards Directory



**City of Portland, Oregon  
Bureau of Technology Services**

**Winter 2019  
Adopted June 16, 2020**

**Updated August 4, 2020**

# Table of Contents

<b>Introduction</b> .....	<b>3</b>	37. Source Code Control System .....	42
Standards .....	3	38. Telecommunications .....	42
Security .....	3	39. Web Tools .....	43
Exception to Standards.....	4	40. Workstation Software.....	44
Standard Classification .....	4	<b>Security Technology Standards.....</b>	<b>47</b>
Support Model .....	4	41. Authentication .....	47
Energy Efficiency .....	7	42. Encryption .....	47
BTS Standard Owner.....	7	43. Patch Management.....	48
BTS Standards Setting Process .....	8	44. Remote Network Access.....	48
ADA Assistive Technologies.....	9	45. Storage Services and Devices.....	49
<b>Hardware Standards</b> .....	<b>10</b>	46. Virus Protection.....	49
1. Workstation Hardware.....	10	<b>Meeting Space Audio Visual Standards</b>	<b>50</b>
2. Laptop Hardware .....	11	<b>Commodity Hardware and Software</b> .....	<b>51</b>
3. Tablet Hardware.....	12	47. General USB Device Guidance .....	51
4. Server Hardware .....	13	48. General Bluetooth Device Guidance .....	51
5. Backup Appliance .....	14	49. Computer Speakers .....	51
6. Data Center Infrastructure.....	14	50. Digital Cameras .....	51
7. Network Protocols .....	15	51. Fax Machines.....	51
8. Network Connectivity .....	16	52. Flash / Compact Media Cards .....	51
9. Network Routers .....	16	53. Headphones.....	51
10. Network Switches.....	17	54. Keyboards .....	52
11. Plotters .....	17	55. Laser Printer Toner Cartridges .....	52
12. Printers (Network) .....	18	56. Locally Connected USB Printers .....	52
13. Radio .....	19	57. Mice / Track-balls.....	52
14. Scanners .....	19	58. Removeable Media (USB storage devices, CDs, DVDs) .....	52
15. Search Appliance .....	20	<b>Technology Specifications</b> .....	<b>54</b>
16. Storage Area Network.....	20	59. Workstation Standard Criteria.....	54
17. Telecommunications .....	21	60. Mobile Data Computers (MDC) .....	55
18. Video .....	23	61. Network Printer Standard Criteria .....	56
<b>Software and Application Development Standards</b> .....	<b>25</b>	62. Network Printer Specifications (Black and White).....	57
19. Application Development Tools – Windows Based .....	25	63. Network Printer Specifications (Black and White Multi-Function).....	57
20. Application Server .....	26	64. Network Printer Specifications (Color)..	58
21. Backup / Recovery Software.....	27	65. Network Printer Specifications (Color, Multi-Function) .....	59
22. Collaboration Tools .....	27	66. Scanner Standard Criteria .....	59
23. Database Development Tools.....	28	67. Cabling Specification .....	60
24. Database Standards .....	28	68. Video Projector Criteria.....	61
25. Directory Services .....	29	<b>Appendix A</b> .....	<b>62</b>
26. eMail.....	29	Web Site References .....	62
27. Fonts .....	30	<b>Appendix B</b> .....	<b>63</b>
28. Geographical Application Tools .....	31	Change Log .....	63
29. Graphic Design Software .....	32	<b>Index</b> .....	<b>65</b>
30. Internet Domain Naming .....	33		
31. Miscellaneous Tools.....	34		
32. Office 365 Components .....	36		
33. Operational Support Tools .....	39		
34. Project Management Tools .....	41		
35. Radio .....	41		
36. Server Base Software .....	42		

# Introduction

## Standards

Standards provide a consistent set of tools for the development and efficient maintenance of the City of Portland's Information Technology infrastructure.

A well-defined set of standards can reduce support costs and provide economies of scale while at the same time allowing the needed level of flexibility. Support costs can be minimized by setting standards for hardware, software, networks and backup technologies. Training costs can be reduced substantially by standardizing on certain applications that will have widespread use. Security risks can be reduced by ensuring products remain supported by the manufacturer for security related patches and fixes.

Technology Standards are maintained by the BTS Infrastructure Board with input from content experts in other BTS divisions and City bureaus. These standards reflect industry best practices as applicable to the requirements of the City of Portland. Minimum configurations reflect the hardware requirements necessary to easily use the applications included in the standard productivity suite. Bureaus may exceed the minimum configuration as specific work requirements dictate upon BTS review.

Standards related to certain Information Security services and capabilities are not publicly listed as a precaution against malicious use of, or exploitations against, City systems and networks.

These standards shall be posted on the [City of Portland's web site](#), on the [BTS Technology Standards page](#), updated as necessary and reviewed in accordance with the cycles established herein.

## Security

In addition to providing a reliable and manageable set of tools, software standards meet base protections for City data. Each technology presents opportunities to provide services, as well as risks, based on those services. City technologies must meet or align with National Institute of Standards and Technology (NIST) federal best practice requirements. The City is accountable for several federal standards depending on in-scope systems and data. Examples include: Protected Healthcare Information (PHI) as part of HIPAA, Cardholder data defined by the Payment Cardholder Institute (PCI), Criminal Justice data in the Criminal Justice Information System (CJIS), and IRS tax data as part of Federal Tax Information (FTI). Applicable laws for Personally Identifiable Information (PII), data retention, and data disclosure also introduce State-level requirements for our technology selection and use.

When leveraging a technology, there are also requirements in how we use the tools and protect data. Not following security requirements increases City cyber and liability risk and can cause significant monetary loss and legal issues. These requirements must be understood and managed by the Bureaus utilizing each technology. Compliance and legal examples above are not inclusive of all requirements. In addition, all City workers have a responsibility to keep the City network, assets and data safe. The software standards meet a common, understandable base level of security controls.

## Exception to Standards

All technology requests that do not conform to the technology standards established in this document will require approval as an exception. BTS customers must work with their [BTS Technology Business Consultant](#) to submit an exception request. Business Consultant involvement is important to assist the customer in considering standard alternatives.

The exception review process consists of validation of compatibility with the existing City standard infrastructure. Exception requests are reviewed by the BTS Infrastructure Board. BTS will work to process 80% of the exception requests within 2 weeks of the exception being entered into the exception tracking system. Some exceptions will take longer depending on the complexity and compatibility.

Products allowed via the exception process are generally not supported by BTS. BTS may bill for installation and configuration work on a Time and Materials basis. They require security reviews which may lead to additional security controls to fulfill the original intent within the standard. Utilizing standard technologies ensures easier and less expensive maintenance of City requirements. City Code requires review of software license and/or terms of service documents by the Attorney’s Office prior to approval of the exception.

## Standard Classification

This document classifies Technology Standards as follows.

Classification	Description
<b>Standard</b>	This classification represents the current accepted technology for general installation within the City technology environment. Technologies in this classification are supported in the Enterprise and should be adopted at the earliest opportunity.
<b>Allowed</b>	Not a standard, but allowed in the environment without an exception.
<b>Legacy</b>	This classification represents technologies that are legacy standards, previous releases or versions. These are typically outdated technologies that are approaching or at end of life, but are still in active use within the City’s technology environment. These technologies will be eliminated from the environment through attrition or specific projects. New installation using a technology in this classification requires a clear business justification and may require an Exception.
<b>Exception Required</b>	Technology requests that do not conform to the Technology Standards established in the Standards Directory will require approval as an exception. Some are listed in this document for clarity.

**Note:** Definition as a standard does not guarantee that BTS is providing technical support (via rates, time and materials or best effort) for the technology unless specifically noted in the support model.

## Support Model

BTS has established five standardized support models:

<b>Support Model</b>	<b>Description</b>
<b>Full Support</b>	BTS fully supports the product including ordering, provisioning, installation, information security, configuration, troubleshooting, patching, de-installation and disposal.
<b>Vertical Apps Support</b>	BTS Vertical Applications team supports the product including installation, configuration, troubleshooting, patching (as requested by the customer bureau), bug fixes for in-house developed software, and disposal.
<b>Limited Support</b>	BTS supports the product including ordering, provisioning, installation, information security, de-installation and disposal. All other work is billable.
<b>Bureau / Vendor Support</b>	BTS does not support the product. Support is the responsibility of the customer bureau and/or the vendor. All work by BTS is billable with the exception of disposal.
<b>User Support</b>	BTS will order and/or provision the product and dispose of it only. All other support activity will be the responsibility of the user.

<b>BTS Support Model</b>	<b>Full Support</b>	<b>Vertical Apps Support</b>	<b>Limited Support</b>	<b>Bureau / Vendor Support</b>	<b>User Supported</b>
<b>Support Model Code (used in the tables)</b>	<b>Full</b>	<b>V.Apps</b>	<b>Limited</b>	<b>Bureau</b>	<b>User</b>
<b>Support Services</b>					
<b>Order / provision product</b> – Order the product. In the case of cellular equipment, perform the initial setup (provisioning) of the device.	BTS	No	BTS	BTS	BTS
<b>Install the product</b> (hardware and software) – Install the product on a server or workstation.	BTS	BTS	BTS	Bureau	User
					No
<b>Security Standards</b> – Evaluate, implement, and periodically review related security standards.	BTS	BTS	BTS	BTS	BTS
<b>Software Install Point</b> – Create a network location to house the software installation package.	BTS	BTS	Negotiated	Negotiated	No
<b>Configure features</b> of the product – Perform standard product configuration steps that are required.	BTS	BTS	Bureau	Bureau	User
			Billable		No
<b>De-install the product</b> – De-install the product, ensuring that remaining interfaces, security, configuration, etc. are intact.	BTS	Bureau	BTS	Bureau	User
					No
<b>Dispose of the product</b> – Dispose of the product according to approved disposal protocol.	BTS	BTS	BTS	BTS	BTS
<b>Troubleshoot problems</b> – Working with the customer and/or vendor as needed, resolve issues with the product working in the environment.	BTS	BTS	Bureau	Bureau	User
			Billable		No
<b>Track updates and patches</b> to the product – Periodically check for updates and patches, and alert customers about availability.	BTS	Bureau	Bureau	Bureau	User
<b>Facilitate testing of updates and patches</b> – Manage the testing process of updates and patches.	BTS	BTS	Bureau	Bureau	User
<b>Apply updates and patches</b> – Periodically package, distribute and/or implement updates and patches.	BTS	BTS	Bureau	Bureau	User
			Billable		
<b>Lifecycle Management</b> – Manage lifecycle upgrades to the product.	BTS	Bureau	Bureau	Bureau	User
<b>Fix bugs for in-house developed software</b> – BTS will track and fix SW bugs.	N/A	BTS	N/A	Bureau	N/A
<b>Develop software enhancements</b> for in-house SW – BTS will develop and implement new functionality as authorized and funded by the customer.	N/A	BTS	N/A	Bureau	N/A

**Key to Support Model table entries:**

- BTS** BTS is responsible for the support service. The service is not billable.
- Bureau** The Bureau is responsible or may opt for the support service. Supplemental BTS assistance is billable or not available as indicated.
- Negotiated** The Bureau negotiates with BTS for the support service. The service is billable.
- Billable** BTS bills for the support service.
- No** BTS does not provide the service.
- User** BTS orders and provisions the item. All other support is the responsibility of the user.
- N/A** Not Applicable

## Energy Efficiency

Energy efficiency is a criterion considered when selecting standards. As standards are selected, energy efficient products that meet the business needs and integrate with other established standards and infrastructure are selected when available.

### Energy Star®

“As available, the City shall procure products that meet or exceed Energy Star® criteria for energy efficiency.” ([City Code 5.33.080 G](#))

Energy Star® applicable products that are included in these Technology Standards shall meet the most current version of the Energy Star® program requirements in effect at the time the product is added to these Technology Standards. Those Bureaus that pursue and are granted an exception to these standards shall continue to seek Energy Star® qualified products.





### EPEAT

As available, for the following types of technology equipment, the City shall purchase EPEAT<sup>1</sup> products registered at the “Bronze” level or higher:

1. Desktop computers
2. Displays (Monitors) – under 60-inch diagonal
3. Laptop computers
4. Tablet computers
5. Servers
6. Mobile Phones
7. Printers
8. Scanners

Any products from the above list that are included in these Technology Standards shall meet the most current version of the EPEAT standard in effect at the time the product is added to these Technology Standards. Those Bureaus that pursue and are granted an exception to these standards shall continue to seek EPEAT compliant products.

Energy Efficiency certification has been added where the information is available. Certified products are indicated by the following icons next to the product name.

	Energy Star®
	EPEAT Gold
	EPEAT Silver
	EPEAT Bronze

## BTS Standard Owner

Each defined standard has an assigned BTS Standard Owner. The owner is responsible for:

- evaluating the products supporting a standard
- monitoring for patches, updates and end-of-life (EOL) model changes
- bringing patch and update projects forward to the IB and BTS management for action and scheduling
- alerting IB to EOL model changes in order to update this standards document

---

<sup>1</sup> For reference see <https://greenelectronicscouncil.org/epeat/epeat-overview/>.

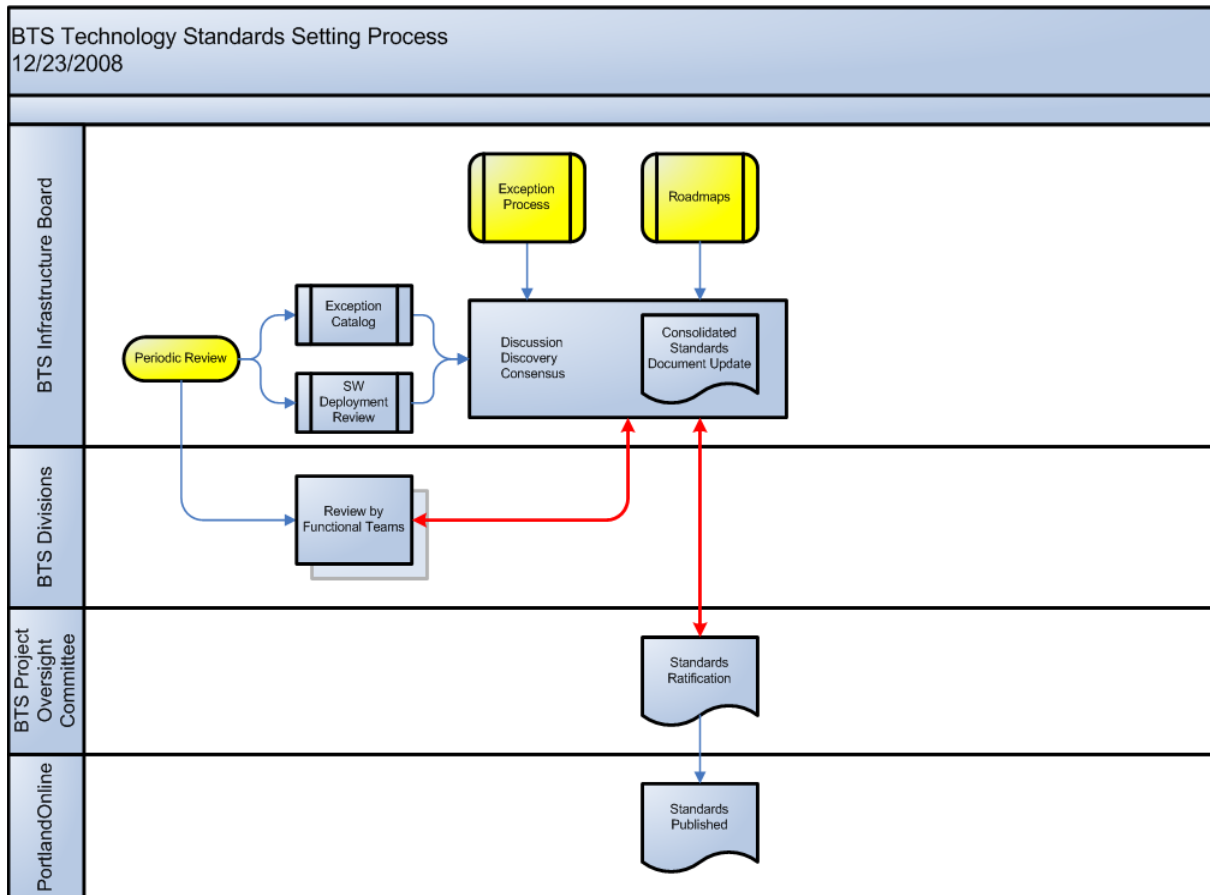
- working collaboratively within BTS to help establish important lifecycle dates and roadmap strategies.
- identifying when items need to be removed from the Legacy status.
- coordinating testing of products unless otherwise designated through a larger project.

The BTS Owner is not necessarily the group within BTS that provides technical support for the standard.

## BTS Standards Setting Process

The following diagram illustrates the BTS standard setting and review process at a high level.

BTS will conduct an annual review of the standards in January/February to capture new releases of hardware and software during the Fall and holiday seasons. During the review, the Exception Catalog will be reviewed for any exceptions that should be included as standards; deployments of standard software will be reviewed; and standards that are prescribed from technology roadmaps will also be reviewed and incorporated as appropriate.





## **ADA Assistive Technologies**















Several products have been included for use as ADA assistive technologies. These products have been identified in the document with the [ADA] tag. These products are also listed under the ADA index entry.

BTS worked with BHR to develop the list. The products were identified through discussion with external agencies such as Oregon Commission for the Blind, and review of products currently in use within the City infrastructure. While not an exhaustive list, it represents products thought to be most commonly used.

By including these products in the BTS Standards Directory, the need to submit an exception is eliminated, thereby streamlining the processes for acquisition.

# Hardware Standards

## 1. Workstation Hardware

Item	Standard Description	Standard Classification	Support Model	BTS Owner
1.1. Desktop	Dell OptiPlex 7070  	Standard	Full	Support Center / Hardware Standards Panel
	Dell OptiPlex 755, 960, 780, 790, 7010, 7020, 7040, 7050, 7060	Legacy	Full	Support Center / Hardware Standards Panel
	Apple iMac   Note: Will not be approved as primary workstation. See the <a href="#">City of Portland Apple Computer Compliance</a> document for detailed information.	Exception Required	See referenced document	Support Center
1.2. Monitor	Dell - Flat Panel LCD P1917S 19" standard screen   P2214H 22" widescreen   U2415 24" widescreen   U2717D 27" widescreen   UP3017 30" widescreen  	Standard	Full	Support Center / Hardware Standards Panel
	Dell P190S 19" standard screen P1913S 19" standard screen P1914S 19" standard screen P2210 22" widescreen P2212H 22" widescreen U2410 24" widescreen U2412M 24" widescreen U3014 30" widescreen	Legacy	Full	Support Center / Hardware Standards Panel
1.3. Keyboard	USB, 104-key	Standard	Full	Support Center / Hardware Standards Panel
1.4. Mouse	USB, optical wheel	Standard	Full	Support Center / Hardware Standards Panel
1.5. [ADA] Braille Display / Terminal	Freedom Scientific (Focus Blue) HumanWare (Brilliant)	Allowed	Limited	Enterprise Architecture

## Workstation and Laptop Hardware Notes:









### Life Cycle Notes:









- The planned lifecycle replacement (LCR) for desktop workstations and laptop computers is 5 years effective July 2013 through 2019. The LCR cycle will reduce to 4 years beginning in 2020.
- BTS does not recommend cascading workstations where a workstation that has been in use for its lifetime is moved to another desktop for continued use beyond the planned lifecycle. Any such request must be submitted as an exception request.
- LCD panel monitors have a longer life cycle are typically run until failure.

### Portland Building Expectations:




- For Portland Building Occupants, please note that there are restrictions on allowed monitors.
- Please submit questions and comments regarding the Portland Building via the [Project's TrackIT form](#).

## 2. Laptop Hardware

Item	Standard Description	Standard Classification	Support Model	BTS Owner
2.1. Laptop	Dell Latitude 5400 (w/WebCam)  	Standard	Full	Support Center Hardware Standards Panel
	Dell Latitude 5490, 5480, D6xx, E5440, E5450, E5470, E64xx, E65xx	Legacy	Full	Support Center Hardware Standards Panel
	Apple Macbook    <b>Note: Will not be approved as primary workstation. See the <a href="#">City of Portland Apple Computer Compliance</a> document for detailed information.</b>	Exception Required	See referenced document	Support Center
Police	Dell Latitude 5400  	Standard	Full	Support Center Hardware Standards Panel
	Dell Latitude 7490, 7480, E7440, E7450, E7470	Legacy	Full	Support Center Hardware Standards Panel
2.2. Laptop – “Lite”	Dell Latitude 5300  	Standard	Full	Support Center Hardware Standards Panel
	Dell Latitude 7390, D4xx, 7280, E4200, E62xx, E7240, E7250, E7270	Legacy	Full	Support Center Hardware Standards Panel

Item	Standard Description	Standard Classification	Support Model	BTS Owner
2.3. Laptop – “Rugged”	GETAC B300  	Standard	Full	Support Center Hardware Standards Panel
	Dell Latitude E64xx XFR, 64xx ATG & XFR, D630 ATG, ATR & XFR	Legacy	Full	Support Center Hardware Standards Panel
Police Fire PBEM	GETAC V100   GETAC S400   Panasonic Toughbook PDRC (dash mounted monitor and wired keyboard)	Standard	Full	Support Center Hardware Standards Panel
	Motorola MW520, Panasonic Toughbook (19,32, 53)	Legacy	Full	Support Center Hardware Standards Panel
2.4. Mobile Data Computer – Fire	Panasonic Toughbook GETAC B300  	Standard	Full	Support Center Hardware Standards Panel
	Data 911 M6, M6 II, PM2, PM1, ETX-PM1, 19	Legacy	Full	Support Center Hardware Standards Panel

### 3. Tablet Hardware

Item	Standard Description	Standard Classification	Support Model	BTS Owner
3.1. iOS Based <sup>2</sup>	Apple iPad 12.9” Gen 3  , iPad Air 3 (10.5”)  , Mini 5  , with Verizon data plan	Standard	Full	Communications Telcom Engineering and Support
	Apple iPad 2, 3, 4, 6, 10.5”, iPad Pro 11, iPad Pro 12.9” Gen 2, Mini, Mini 2, 3, 4 Air, Air 2	Legacy	Limited	Communications Telcom Engineering and Support
3.2. Windows 10	Microsoft Surface Pro 4 (Wi-Fi only)	Standard	Limited	Support Center Hardware Stds. Panel
Police	Panasonic Toughpad FZ-G1	Legacy	Full	Police

#### Tablet Hardware Notes:

<sup>2</sup> Smartphone and Operating System Limited Support: Ordering, initial device provisioning, setup of synchronization with Exchange, Verizon data and voice service.

- iPads may be purchased without a data plan, however BTS requires that both Wi-Fi and Cellular radios be purchased in the device. This configuration does not require an exception. If a data plan is added at a future date, it must be through cellular services managed by BTS.
- The End User License Agreement (EULA) for the Dictation feature of the iPad states that all dictation content is sent to Apple for processing to text. This content may be stored as audio files. Additionally, your first name and nickname, and similar information including relationship with you (e.g., “my dad”) from your address book contents are also sent to Apple. This information is retained and used by Apple as part of the service and may be retained by Apple even if Dictation is returned to an “Off” setting. This content is subject to Oregon Public Records law and City record retention requirements. See State and City Rules Related to Public Recordkeeping Requirements (<https://www.portlandoregon.gov/archives/70031>) on the Auditor’s PortlandOregon.gov website. **BTS STRONGLY ADVISES AGAINST USING THIS FEATURE. DICTATION MUST NOT BE USED AS A DATA ENTRY METHOD FOR CONFIDENTIAL OR SENSITIVE DATA.**
- iPads are provisioned from BTS with the Dictation feature turned Off.
- **Tablets are not covered by life cycle replacement funding because of the expectation of a relatively short lifecycle.**
- **Please see the document [Apple Device Support Dates](#) on PortlandOregon.gov for iPhone and iPad devices that are no longer able to receive iOS updates.**

#### 4. Server Hardware

Item	Standard Description	Standard Classification	Support Model	BTS Owner
4.1. Windows based	Dell, PowerEdge R740, R940 📝	Standard	Full	Production Services / Server Support
	Dell PowerEdge R620, R630 R720, R730	Legacy	Full	Production Services / Server Support
4.2. Red Hat based	Dell PowerEdge R740, R940 📝	Standard	Full	Production Services / Server Support
	Dell PowerEdge R620, R630, R720, R730	Legacy	Full	Production Services / Server Support
4.3. AIX based	IBM p-Series / Power 9	Standard	Full	Production Services / Server Support
	IBM p-Series / Power 8	Legacy	Full	Production Services / Server Support

#### Server Hardware Notes:

- The planned lifecycle for server hardware is 5 years.

## 5. Backup Appliance

Item	Standard Description	Standard Classification	Support Model	BTS Owner
5.1. Backup Appliance (Police)	Dell DP 4400	Standard	Full	<del>Production Services / Server Support</del> Public Safety Technology Division

## 6. Data Center Infrastructure

Item	Standard Description	Standard Classification	Support Model	BTS Owner
6.1. Environmental Monitors	Raritan	Standard	Full	<del>Production Support</del> Production Services / Data Center
	APC	Legacy	Full	Production Services / Data Center
6.2. Infrastructure Management Software	Raritan Sunbird PowerIQ, DCIM Raritan Command Console (KVM) Raritan dcTrack	Standard	Full	Production Services / Data Center
	APC StruXureware	Legacy	Full	Production Services / Data Center
6.3. Rack Power Distribution Unit (PDU)	Raritan	Standard	Full	Production Services / Data Center
	APC	Legacy	Full	Production Services / Data Center
6.4. Remote Keyboard Video, Mouse (KVM)	Raritan KVM over IP	Standard	Full	Production Services / Data Center
6.5. Uninterruptible Power Supply (UPS)	APC	Standard	Full	Production Services / Data Center

## 7. Network Protocols

Item	Standard Description	Standard Classification	Support Model	BTS Owner
7.1. eMail	SMTP, TLS	Standard	Full	Communications / Network Engineering and Support
7.2. Line Negotiation Server	Auto / Auto	Standard	Full	Communications / Network Engineering and Support
7.3. Line Negotiation Workstations	Auto / Auto	Standard	Full	Communications / Network Engineering and Support
7.4. Monitoring	SNMP V2c, SNMP v3, VMI	Standard	Full	Communications / Network Engineering and Support
7.5. Power Over Ethernet (POE)	802.3af, 802.3at	Standard	Full	Communications / Network Engineering and Support
7.6. Routing	OSPF, BGP4	Standard	Full	Communications / Network Engineering and Support
7.7. Transport	TCP / IP (IPv4, IPv6), DWDM, SONET	Standard	Full	Communications / Network Engineering and Support
7.8. Wide Area Network (WAN)	TDM, ISDN, DSL, IEEE802.3, Licensed wireless, Verizon APN, LTE WAN, Metro Ethernet (MOE)	Standard	Full	Communications / Network Engineering and Support
7.9. Wi-Fi Radio	802.11ac 802.11n (2.4 GHz / 5 GHz)	Standard	Full	Communications / Network Engineering and Support
	802.11b/g	Legacy	Full	Communications / Network Engineering and Support

## 8. Network Connectivity

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>8.1. Cabling</b>	<p>Horizontal: UTP Cat 6, Cat 6a, Cat 7                      Vertical: Fiber – Single or Multimode OM3                      Patch: UTP Cat 6, Cat 6a, Cat 7, Fiber                      Copper patch cables should be hoodless.</p> <p>Office or Cubicle                      See additional notes in the <a href="#">Specifications section</a>.</p> <p>New construction: – two Cat 6A or better cables per cubicle. May be used for either voice or data as needed.</p> <p>Remodel – Will be evaluated case by case due to other constraints.</p>	Standard	Full	Communications / Network Engineering and Support
<b>8.2. Optical Network</b>	SONET (STS), DWDM (ITU-T, G.709 & G.975), Cisco 15454, 15310	Standard	Full	Communications / Network Engineering and Support

## 9. Network Routers

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>9.1. Router – Layer 3 Switch</b>	Cisco ME-3400eg, ME-3600X, ISR4321, ISR4331, cat9300, cat9500k, ASR920, ASR1002. Arista 7050, 7280	Standard	Full	Communications / Network Engineering and Support
	Cisco 1841, 1921, 1941, ME-3400e, 3750, 3750-X, 3850, 7206	Legacy	Full	Communications / Network Engineering and Support
<b>9.2. Components</b>	Cisco T1 DSU/CSU WICS, Cisco 9300 and 9500 Uplink Modules	Standard	Full	Communications / Network Engineering and Support



Item	Standard Description	Standard Classification	Support Model	BTS Owner
	4-port Ethernet Card	Legacy	Full	Communications / Network Engineering and Support

## 10. Network Switches

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>10.1. Layer 2 Switch</b>	Arista 7150 Cisco 2960, 3560, 4500-x, cat9200 HPE Aruba 8400, 2530 series Juniper ACX & MX Switch Router Ciena 3916, 3928, 3926m, 5170, 5171	Standard	Full	Communications / Network Engineering and Support
	Cisco 2950 (DC), 2960, 2960C, 3750, 3750-X, ME-3400e	Legacy	Full	Communications / Network Engineering and Support
<b>10.2. Components</b>	SFP connectors, SFP+, QSFP	Standard	Full	Communications / Network Engineering and Support

## 11. Plotters

### Plotter Support Notes:

































BTS has not established standard plotter models due to the diverse needs of the individual uses in each bureau. All plotter orders must go through the exception process. Please contact the Technology Business Consultant for the requesting bureau.

#### Portland Building Expectations:

- For Portland Building Occupants, Bureau-owned plotters can only be placed in the Large Print Room on a bureau's floor. Plotter requirements:
  - Inkjet or toner
  - Up to 7 feet long and 3 feet, 2 inches deep
  - Access on front side only
  - Will replace a multi-function device (copier) in the print room
  - Will not be connected to the enterprise print management system

- Note that no space is available for a separate free-standing paper cutter
- Please submit questions and comments regarding the Portland Building via the [Project's TrackIT form](#).

## 12. Printers (Network)

Item	Standard Description	Standard Classification	Support Model	BTS Owner
12.1. Laser	<u>Monochrome:</u> HP M404dn   HP M507dn   HP M607dn   HP M608dn   HP M608x   <u>Color:</u> HP M454dn   HP M553dn/x   HP M653dn  	Standard	Full	Support Center Hardware Stds. Panel
	HP 700, 1320, 3505, 4350, 9050, CP3525, CP4525, CP6015, M401, M451, M506dn, M551, M601, M602, M604, M605, M651, P2055, P3015, P4015, M452dn, M402dne	Legacy	Full	Support Center Hardware Stds. Panel
12.2. Large Format Laser – 11x17	<u>Monochrome:</u> HP M712dn   <u>Color:</u> HP M751dn   HP M855xh   HP CP5225dn  	Standard	Full	Support Center Hardware Stds. Panel
	CP6015, 9050, HPM750dn	Legacy	Full	Support Center Hardware Stds. Panel
12.3. Small Multi-Function Laser	<u>Monochrome:</u> HP M227fdn   HP M426fdn   HP M725dn   <u>Color:</u> HP M479fdn  	Standard	Full	Support Center Hardware Stds. Panel
	HP M225, M425, M475, M476, CM1312, M1522, M1536, CM2320, M2727, M477fdn	Legacy	Full	Support Center Hardware Stds. Panel

## Printer Support Notes

### Portland Building Expectations:









- For Portland Building Occupants, please note that desktop printers are not allowed and there are limitations on supported network printers.
- Please submit questions and comments regarding the Portland Building via the [Project's TrackIT form](#).

Printer maintenance support for network laser printers is provided by contract with Pacific Office Automation. The bureau contacts POA directly.

## 13. Radio

Item	Standard Description	Standard Classification	Support Model	BTS Owner
13.1.				

## 14. Scanners

Item	Standard Description	Standard Classification	Support Model	BTS Owner
14.1. Workstation – Flatbed, Color	HP ScanJet 7500 	Standard	Full	Support Center Hardware Stds. Panel
	HP 8390, HP 8350, HP N8420, HP N8460	Legacy	Full	Support Center Hardware Stds. Panel
14.2. Workstation – Sheet-fed, Color	Canon DR-225C   Canon DR-M160ii  	Standard	Full	Support Center Hardware Stds. Panel
	Canon DR-125C, DR-160, DR-2050C, DR-3080CII, DR-2010C, DR-4010C, DR-6010C	Legacy	Full	Support Center Hardware Stds. Panel
14.3. Workgroup – Flatbed, Color, Network Attached	HP ScanJet Pro 4500  	Standard	Full	Support Center Hardware Stds. Panel
	HP N6350, 7650n	Legacy	Full	Support Center Hardware Stds. Panel
14.4. Large Format – 11x17	Canon DR-6030C 	Standard	Full	Support Center Hardware Stds. Panel
	HP N9120 Canon DR-7090C	Legacy	Full	Support Center Hardware Stds. Panel







## 15. Search Appliance

Item	Standard Description	Standard Classification	Support Model	BTS Owner
15.1. Search Appliance	SwiftType SOLR	Standard	Full	Business Solutions / Web Development

## 16. Storage Area Network

Item	Standard Description	Standard Classification	Support Model	BTS Owner
16.1. Storage Array	Hitachi Gx00 Hitachi HCP for Object Storage	Standard	Full	Production Services / Storage Administration
16.2. SAN Fabric Network	Fiber Channel Switch: Brocade DCX8510 Brocade 6520 Brocade 7840	Standard	Full	Production Services / Storage Administration
16.3. NAS Gateway	Hitachi HNAS	Standard	Full	Production Services / Storage Administration
16.4. NAS file System	CIFS, NFSv3	Standard	Full	Production Services / Storage Administration
16.5. SAN Replication	FCIP IPEX	Standard	Full	Production Services / Storage Administration
16.6. SAN Routing Protocol	FSPF	Standard	Full	Production Services / Storage Administration
16.7. SAN Transport Protocol	Fiber Channel	Standard	Full	Production Services / Storage Administration
16.8. File Sharing	HCP Anywhere – for two specific use cases Files larger than 15 GB Elevated security protocols	Standard	Full	Production Services / Storage Administration

## 17. Telecommunications

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>17.1. [ADA] Compliant Handset</b>	Cap Tel 840i	Standard	Full	Communication / Telecom Engineering and Support
<b>17.2. Broadband Wireless</b>	Del 5600 Gobi Mobile Broadband mini-card Verizon JetPack MiFi 8800L	Standard	Full	Communication / Telecom Engineering and Support
	Verizon USB 760 Verizon Aircard (EVDO) Verizon MiFi 4620LE Verizon MiFi MHS291L Verizon MiFi 620L Verizon MiFi 7730L	Legacy	Full	Communication / Telecom Engineering and Support
<b>Police</b>	Panasonic Sierra Wireless MC 7750 Panasonic Sierra Wireless EM 7355	Standard	Full	Communication / Telecom Engineering and Support
<b>17.3. Cellular Micro Cell</b>	Verizon Network Extender Application	Standard	Full	Communication / Telecom Engineering and Support
<b>17.4. Pagers: Emergency</b>	1-Way: USA/Mobility, Cook	Standard	Full	Communication / Telecom Engineering and Support
<b>17.5. Pagers: Non-Emergency</b>	1-Way: USA/Mobility, Cook 2-Way: USA/Mobility	Standard	Full	Communication / Telecom Engineering and Support
<b>17.6. Satellite Phones</b>	Iridium 9555 Associated address book SW will likely be installed on 1 or 2 workstations in a bureau to manage bureau's sat phone fleet	Standard	Full	Communication / Telecom Engineering and Support
<b>17.7. Smartphone <sup>3</sup></b>	iPhone SE 2 <sup>nd</sup> Gen  , X  , XR  , 11  , 11 Pro  , 11 Pro Max 	Standard	Full	Communication / Telecom Engineering and Support

<sup>3</sup> Smartphone and Operating System Limited Support: Ordering, initial provisioning, setup of synchronization with Exchange, Verizon data and voice service

Item	Standard Description	Standard Classification	Support Model	BTS Owner
	Samsung Galaxy S7  Motorola Droid 3, 4 Motorola Droid X2 Motorola Droid RAZR M Motorola Galaxy S5 iPhone 6, 6 Plus, 6s, 6s Plus, 7, 7 Plus, 8, 8 Plus, SE 1 <sup>st</sup> Gen  Note: Please see the document <a href="#">Apple Device Support Dates</a> on <a href="#">PortlandOregon.gov</a> for iPhone and iPad devices that are no longer able to receive iOS updates	Exception Required	Limited	Communication / Telecom Engineering and Support
<b>17.8. Mobile Operating System</b>	iOS 13.5.1 iPadOS 13.5.1  Android 7.0, 8.0, 9.0  Android 2.3, 4, 5 iOS 4, 5, 6, 7, 8, 9, 10, 11, 12, , 13.0-13.4 Windows Mobile 5, 6.0, 6.1, 6.5 Blackberry	Standard	Limited	Communication / Telecom Engineering and Support
<b>17.9. Basic Cellular Phone</b>	Kyocera Dura LTE	Standard	Full	Communication / Telecom Engineering and Support
	LG VN150s Samsung Convoy 3 (Ruggedized) Samsung Intensity III (basic w/slide out keyboard)	Legacy	Full	Communication / Telecom Engineering and Support
<b>17.10. USB Wireless Cellular Data Modem</b>	Verizon 730L	Standard	Full	Communication / Telecom Engineering and Support
	Pantech 290, 295, 620L	Legacy	Full	Communication / Telecom Engineering and Support
<b>17.11. Tablet</b>	See <a href="#">Tablet Hardware</a>			

## 18. Video

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>18.1. Desktop USB Camera</b>	Logitech c925-e Microsoft LifeCam Studio 1080p HD	Standard	Full	Support Center / Hardware Standards Panel
	Logitech QuickCam Pro9000, c910, c920	Legacy	Full	Support Center / Hardware Standards Panel
<b>18.2. Projector: Portable</b>	InFocus IN116xa, IN2128HDx	Standard	Full	Support Center / Hardware Standards Panel
	Dell M209X, M210X, 1510X, 2400mp InFocus IN116, IN116a, IN116x, IN3118HD, HD3138HD, IN3138HDa	Legacy	Full	Support Center / Hardware Standards Panel
<b>18.3. Projector: Ceiling Mount</b>	No standard specified  <b>Note: Specific characteristics of the room must be taken into account. Ambient light, screen size, and projector brightness (lumens) must be matched to provide acceptable image quality. See the <a href="#">Video Projector Criteria section</a></b>	N/A		Communications / Radio and Video Shop  Police (for all Police Systems)
<b>18.4. Digital Video Recorder (DVR)</b>	PELCO ControlPoint	Standard	Full	Communications / Radio and Video Shop
	PELCO DX8100s, DSSRV-005-US Custom built "white" box supported by BTS Radio and Video Shop.	Legacy	Full	Communications / Radio and Video Shop
<b>Police</b>	HIKVision DVR	Standard	Full	Police
<b>18.5. Digital Video Recorder Control Software</b>	PELCO ControlPoint	Standard	Full	Communications / Radio and Video Shop
<b>Police</b>	Interview Tracker	Standard	Full	Police

### Projector Support Notes

**Portland Building Expectations:**

- For Portland Building Occupants, please note that there are restrictions on allowed projectors and room configurations.
- Please submit questions and comments regarding the Portland Building via the [Project's TrackIT form](#).



# Software and Application Development Standards

## 19. Application Development Tools – Windows Based

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>19.1. Multi-platform</b>	Eclipse IntelliJ Idea Oracle J Developer Visual Studio 2017 Visual Studio Code Visual Studio for Mac	Standard	Full	Business Solutions
	Visual Studio .NET 2003, 2005 Visual Studio 2008/2010/2012	Legacy	Full	Business Solutions
<b>19.2. Mobile</b>	Microsoft PowerApps Objective C Swift Visual Studio 2017 (Xamarin) Xcode	Standard	Full	Business Solutions
<b>19.3. Client / Server</b>	Visual Studio 2017	Standard	Full	Business Solutions
	Access XP Developer PowerBuilder Visual Studio 6.0 VS.NET 2003, 2005, 2008, 2010, 2012	Legacy	Full	Business Solutions
<b>19.4. Workstation Based</b>	Access 2016	Legacy	Full	Business Solutions
<b>Police</b>	Access 2016	Standard	Full	Business Solutions
	Access 2013	Legacy	Full	Business Solutions
<b>19.5. Reporting Tools</b>	Actuate Business Objects Enterprise 4.3 Cognos Impromptu Crystal Reports 2013, 2016 ESRI Insights Microsoft Power BI Plotly SQL Server Reporting Services 2008, 2008 R2, 2012, 2014, 2016	Standard	Full	Business Solutions
	Crystal Reports 8, 9, 10, 11, 2008, 2011	Legacy	Full	Business Solutions

Item	Standard Description	Standard Classification	Support Model	BTS Owner
	Tableau Creator which includes Tableau Desktop and Tableau Prep Tableau Explorer Tableau Viewer Tableau Reader – <b>Note: Reader cannot access information on Tableau Server, Online or Public.</b> Tableau Online	Allowed	Limited	Enterprise Business Solutions
	Tableau Public	Exception Required	No Support	Enterprise Business Solutions
<b>19.6. OLAP</b>	Cognos SAP BW 7.40 SQL Server OLAP Service	Standard	Full	Business Solutions
<b>19.7. Installer</b>	InstallAware InstallShield Windows Installer	Standard	Full	Business Solutions
<b>19.8. Application Testing</b>	Azure DevOps CircleCI Composer JMeter JUnit New Relic LoadUI Resharper SOAPUI	Standard	Full	Business Solutions

## 20. Application Server

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>20.1. Application Server (Java)</b>	Oracle WebLogic 12c Tomcat 8.x, 9x WebSphere	Standard	Full	Production Services / Business Solutions
	ColdFusion Oracle WebLogic 11g Oracle 10g AS	Legacy	Full	Production Services / Business Solutions

## 21. Backup / Recovery Software

Item	Standard Description	Standard Classification	Support Model	BTS Owner
21.1. Backup Software	CommVault – Windows / Red Hat Linux / AIX	Standard	Full	Production Services / Server Support

## 22. Collaboration Tools

Item	Standard Description	Standard Classification	Support Model	BTS Owner
22.1. Online Conferencing	Skype for Business with Microsoft Audio connectivity to the public telephone system  Optionally may use a Meet-Me bridge provided by BTS for audio.	Standard	Full	Support Center / Software Standards Panel
	WebEx Go-To-Meeting (only as a participant)	Allowed	Limited	Support Center / Software Standards Panel
	Microsoft Teams – See <a href="#">Office 365 Components</a> Section			
	[ADA] Zoom Conferencing	Allowed	Bureau	Support Center / Software Standards Panel
22.2. Conference Recording Playback	WebEx Player (ARF formal) WebEx Player (WRF formal)	Allowed	Limited	Support Center / Software Standards Panel
	Microsoft Stream – See <a href="#">Office 365 Components</a> Section			
22.3. Group Collaboration	Microsoft Teams, See <a href="#">Office 365 Components</a> Section			
	Figma Jira Slack	Allowed	Limited	Support Center / Software Standards Panel
22.4. Wireless Audience Polling	KeyPoint Interactive (PowerPoint plug-in)	Allowed	Limited	Support Center / Software Standards Panel

### 23. Database Development Tools

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>23.1. Editing/Compiling</b>	Oracle SQL Developer PgAdmin (PostGres Mgt Tools) PLEdit 5.7 PL/SQL Developer 7.1 RazorSQL SQL Server Management Studio 2014, 2016, 2017	Standard	Full	Business Solutions / Vertical Applications
<b>23.2. Query Tool</b>	Golden 5.7 Toad 12	Standard	Full	Business Solutions / Vertical Applications
	Toad 9.1	Legacy	Full	Business Solutions / Vertical Applications
<b>23.3. SQL Server Utilities</b>	Redgate SQL Compare Utilities 9.0 SQL Server Management Studio 2016	Standard	Full	Business Solutions / Vertical Applications
	SQL Server Management Studio 2008, 2012, 2014	Legacy	Full	Business Solutions / Vertical Applications

### 24. Database Standards

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>24.1. Enterprise Database</b>	Informix 12 Oracle 12c SQL Server 2014 SQL Server 2016 PostgreSQL MySQL	Standard	Full	<b>Oracle</b> Production Services  <b>SQL</b> Production Services / Business Solutions  <b>MySQL</b> Business Solutions
	SQL Server 2008 SQL Server 2008 R2 SQL Server 2012 Oracle 11g	Legacy	Full	Oracle Production Services  SQL Production Services / Business Solutions

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>24.2. Enterprise Database Client</b>	Oracle 12c Client	Standard	Full	Production Services
	Oracle 11g client	Legacy	Full	Production Services
<b>24.3. Workstation Based</b>	Access for Office 365 (see <a href="#">Office 365 Components</a> ) SQL Server Express SQL Lite	Standard	Full	Business Solutions
<b>Police</b>	Access 2016	Standard	Full	Business Solutions
	Access 2013	Legacy	Full	Business Solutions
<b>24.4. Database Connector Protocol</b>	ODBC OLE DB XML JDBC ADO	Standard	Full	Business Solutions

**Database Operation Notes:**

The BTS Infrastructure Board recommends that primary and shadow copies of databases in production operate on the same version of the database engine. All copies in the production environment should be updated as part of a planned migration when non-production development and testing validate that the application works correctly in the new database version.

**25. Directory Services**

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>25.1. Directory Services</b>	Microsoft Active Directory	Standard	Full	Production Services / Server Support

**26. eMail**

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>26.1. Server Software</b>	See <a href="#">Office 365 Components</a>			
<b>Police</b>	Microsoft Exchange Server 2013	Standard	Full	Production Services / Server Support

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>26.2. Web Client</b>	Microsoft Office 365 Outlook Web App	Standard	Full	Production Services / Server Support
<b>26.3. eMail: Synchronization</b>	Microsoft Office 365 Exchange Online built-in	Standard	Full	Production Services / Server Support
<b>26.4. eMail Client</b>	See <a href="#">Workstation eMail Client</a>			
<b>26.5. Address Book</b>	Global Address Book – Required field: last name, first name, alias, internal and external SMTP address, phone, company, department, office, display name, name (last, first), fax #	Standard	Full	Production Services / Server Support
<b>26.6. Bulk eMail Service</b>	MailChimp MyEmma	Allowed	Vendor	Support Center / Software Standards Panel
<b>26.7. eMail Filing Tool</b>	SimplyFile	Allowed	Limited	Support Center

## 27. Fonts

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>27.1. Standard Fonts</b>	Windows built-in Microsoft Office and Office 365 built-in Open Sans	Standard	Full	Support Center
<b>27.2. Allowed Fonts</b>	Adobe Creative Cloud built-in  Note that fonts available in the Adobe Creative Cloud subscription require the Adobe Cloud Storage feature in order to synchronize with the local workstation.	Allowed	Limited	Support Center
<b>27.3. Non-Standard Fonts</b>	Any font not included in the above sub sections	Exception Required	No Support	

### Non-Standard Font Guidance:

- All non-standard fonts require an exception.
- **Discuss any non-standard font use case with your BTS Technology Business Consultant.**
- Restrict contractors performing graphic design work to the City standard fonts if possible.

- Check for font availability with publishing services such as the City’s PnD or external publishing services.

**Non-Standard Font Impact:**

- Using non-standard fonts can affect the printed or viewed content depending on the availability of the font on the viewers workstation, and how the font is used in the content.
- Non-Standard font use as native text in documents or email will not display correctly if the viewer does not also have the font installed. It is possible that some applications, such as Microsoft Word, can embed the font in the document making it available for the viewer **of that document only**.
- Non-Standard font use in documents converted to PDF documents will generally appear as intended to the viewer.
- Non-Standard font use in a graphic image, such as a JPG file, will generally appear as intended to the viewer.
- Non-Standard font use on web pages requires the font to be “known” to the web server.
  - Creating native text content using the web content editor requires the font to be installed on the web server.
  - Files attached to web pages will behave as native documents or PDF files accordingly.
- Fonts may be free or may have a licensing fee. Fonts may be licensed by individual user, or site licensed. There may also be specific licensing rules for the use of the font. Check the licensing terms and allowable uses for any font being considered.
- Fonts may not be automatically installed during a life-cycle replacement of the workstation.

**28. Geographical Application Tools**

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>28.1. GIS Application Development</b>	Visual Studio 2010, 2015, 2017 ArcObjects 10.1, 10.2, 10.3 ArcEngine 10.1, 10.2, 10.3 ArcGIS Runtime 10.2 Eclipse XCode ESRI JavaScript API	Standard	Full	Business Solutions
	Visual Studio .NET 2003, 2005, 2008 MapObjects Visual Basic 6 Visual Basic for Applications	Legacy	Full	Business Solutions
<b>28.2. GIS Desktop Applications</b>	ArcGIS 10.3.1 MapWorks 10.3.1	Standard	Full	Business Solutions

Item	Standard Description	Standard Classification	Support Model	BTS Owner
	ArcView 3.3/3.4 Microstation (MGE) MapInfo GeoOutlook	Legacy	Full	Business Solutions
<b>28.3. GIS Internet Map Server</b>	ArcGIS Server 10.5.1	Standard	Full	Business Solutions
<b>28.4. Mapping Software</b>	Google Earth Pro (free version)	Standard	Limited	Support Center

## 29. Graphic Design Software

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>29.1. Visual Diagramming</b>	Microsoft Visio 2019 Click-to-Run and Perpetual License	Standard	Full	Support Center / Software Standards Panel
	Microsoft Visio 2010, 2013 Microsoft Visio 2016 Click-to-Run and Perpetual License  Note: As of 6/11/2013, BTS adopted a policy to allow owners of 2010 software versions to install and use those versions through their lifecycle	Legacy	Full	Support Center / Software Standards Panel
<b>29.2. PDF Creation</b>	Adobe Acrobat Standard or Professional DC Adobe LiveCycle Designer Microsoft Print to PDF (Windows built-in)  Note: Microsoft Print to PDF does not create accessible output. Use Adobe if the PDF content will be consumed using a screen reader.	Standard	Full	Support Center / Software Standards Panel
	Adobe Acrobat Standard or Professional 9, 10, XI PDFCreator	Legacy	Full	Support Center / Software Standards Panel



Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>29.3. Graphic Design</b>	Adobe Creative Cloud (InDesign, Photoshop, Illustrator, Flash, DreamWeaver, Fireworks, Premier Pro, and more) Adobe Photoshop Elements Adobe Premier, Premier Elements Microsoft Publisher 2016 XnView	Allowed	Limited	Support Center / Software Standards Panel
	Adobe Creative Suite 1, 2, 3, 4, 5, 5.5, 6 Publisher 2003, 2007, 2010, 2013	Legacy	Full	Support Center / Software Standards Panel
<b>Police</b>	Microsoft Publisher 2016 Sony Vegas 15 Pro	Standard	Full	Public Safety Technology
	Microsoft Publisher 2013	Legacy	Full	Public Safety Technology
<b>29.4. Screen Capture</b>	Camtasia Greenshot Snagit	Allowed	Limited	Support Center / Software Standards Panel
<b>29.5. Computer Aided Design</b>	Bluebeam Revu	Standard	Limited	Support Center / Software Standards Panel
	Sketchup Pro Sketchup Viewer	Allowed	Limited	Support Center / Software Standards Panel

**Graphic Design Software Note:**

Codecs are required to view and edit the Apple’s High Efficiency File Formats. These are covered in the Workstation Software section using a [table entry specifically for Codecs](#). Refer there for guidance.

**30. Internet Domain Naming**

BTS recommends bureaus use the format **www.portlandoregon.gov/function** when creating internet domain names for specific functions to be exposed to the public. This format maintains city branding (portlandoregon.gov) and does not incur any additional domain registrar costs provided a security certificate is not required.

Bureaus may also use the format **function.org** or **function.com** as business reasons dictate. If this option is chosen, these new domain names must be created, registered, and maintained by BTS. Bureaus must always consult with and acquire domain names through BTS to ensure the domain name is known and cataloged centrally. This reduces the chance that a domain name will expire without the City’s knowledge.

### 31. Miscellaneous Tools

Item	Standard Description	Standard Classification	Support Model	BTS Owner
31.1. Clipboard Manager	Ditto	Allowed	No Support	Business Solutions
31.2. Enterprise Fax	AccuRoute Fax  <b>Note: Current capability does not encrypt/decrypt Fax transmissions</b>	Standard	Full	Production Services / Server Support
31.3. Enterprise Paging	OmniTrend PageMaster	Standard	Full	Production Services / Server Support
31.4. FTP Client	<a href="#">FileZilla</a> Microsoft Internet Explorer  <b>Note: See <a href="#">Storage Services and Devices</a></b>	Standard	Full	Support Center / Software Standards Panel
31.5. Log Viewers	Baretail Pro Glogg LogFusion Pro Note the free version <b>IS NOT</b> licensed for government use. LogJoint	Allowed	No Support	Business Solutions
31.6. Online Training Content Editors  Learning Management System Content Editor	Adobe Captivate uPerform	Standard	Full	Support Center / Software Standards Panel / Enterprise Business Solutions
31.7. Outlook Calendar Publishing	WinCalendar Standard	Allowed	Limited	Support Center / Software Standards Panel
31.8. <b>[ADA]</b> Screen Magnifier	ZoomText MAGic	Allowed	Limited	Enterprise Architecture
31.9. <b>[ADA]</b> Speech-to-Text	Dragon Naturally Speaking	Standard	Limited	Business Solutions

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>31.10. Statistical Analysis</b>	R R Studio	Allowed	Limited	Support Center / Software Standards Panel
<b>31.11. Survey Applications</b>	Survey Monkey (web application)	Allowed	Vendor	Support Center / Software Standards Panel
<b>31.12. Terminal Emulation</b>	Micro Focus Reflection Desktop 2016 OpenText HostExplorer OpenText Exceed	Allowed	No Support	Production Services / Data Center
	Reflection 2011 Attachmate Extra Extreme	Legacy	No Support	Production Services / Data Center
<b>31.13. Text Message Capture</b>	Macroplant iExplorer SMARSH  <b>Note: iMessage must be disabled on iPhones to force text messaging via SMS through the Verizon carrier. Text messaging in iPads via iMessage is not to be used.</b>	Allowed	Limited	Enterprise Architecture
<b>31.14. [ADA] Text-to-Speech (Screen-reader)</b>	JAWS NVDA	Allowed	Limited	Enterprise Architecture
<b>31.15. [ADA] Video Remote (Language) Interpreter</b>	LanguageLine	Allowed	No Support	Enterprise Architecture
<b>31.16. [ADA] Video Relay Service</b>	Convo ZVRS SVRS (Sorenson)	Allowed	Limited	Enterprise Architecture
<b>31.17. Wiki</b>	ScrewTurn Wiki TikiWiki	Standard	Full	Business Solutions / Production Services
<b>31.18. XML Editor</b>	NotePad++ 7.x XML Notepad 2007 Oxygen	Standard	Full	Business Solutions / Vertical Applications
<b>31.19. Meeting Scheduler</b>	FindTime plug-in for Outlook	Allowed	Limited	Support Center / Software Standards Panel
<b>31.20. [ADA] Video Caption</b>	Caption and Description Editing Tool (CADET)	Standard	Limited	Support Center / Software Standards Panel

### 32. Office 365 Components

The City licenses use of Office 365 using a unique and secure Microsoft internet location called GCC, or Government Cloud Computing. This environment is specifically configured to handle many types of government data that have strict regulatory requirements. Because of this, some features of Office 365 in the consumer or commercial tenant may not be available or may operate differently in the GCC.

Base Application	Standard Classification	Support Model	Platform Notes (see legend)				BTS Owner
			PC	Web	Mobile	Other	
<b>Exchange Online Plan 2</b> (Email only)	Standard	Full				2	Production Services / Server Support
<b>Office 365 G3 Plan</b>	Standard	Full				3	Support Center / Software Standards Panel
<b>Access</b>	Standard	Full	3				Business Solutions
<b>Calendar</b>	Standard	Full	1	2,3			Support Center / Software Standards Panel
<b>Delve</b>	Allowed	Limited		3			Support Center / Software Standards Panel
<b>Excel</b>	Standard	Full	3	3	3		Support Center / Software Standards Panel
<b>Forms</b>	Allowed	Limited		3			Support Center / Software Standards Panel
<b>Groups</b>	Standard	Full	App Deprecated			7	Support Center / Software Standards Panel
<b>My Analytics</b>	Allowed	Limited		3			Support Center / Software Standards Panel
<b>OneDrive</b>	Standard	Full	3	3	3		Support Center / Software Standards Panel
<b>OneNote</b>	Standard	Full	1,3	3	3		Support Center / Software Standards Panel
<b>Outlook</b>	Standard	Full	3	2,3	2,3		Support Center / Software Standards Panel
<b>People</b>	Standard	Full	1	2,3			Support Center / Software Standards Panel

Base Application	Standard Classification	Support Model	Platform Notes (see legend)				BTS Owner
			PC	Web	Mobile	Other	
<b>Planner</b>	Allowed	Limited		3	3		Support Center / Software Standards Panel
<b>PowerPoint</b>	Standard	Full	3	3	3		Support Center / Software Standards Panel
<b>Publisher</b>	Standard	Full	3				Support Center / Software Standards Panel
<b>SharePoint Online</b>	Exception Required	No Support					
<b>Skype for Business</b>	Standard	Full	3	3	3		Support Center / Software Standards Panel
<b>Stream</b> For <b>Teams</b> recordings	Allowed	Limited		3			Support Center / Software Standards Panel
All other use cases	Exception Required	Limited		3			Support Center / Software Standards Panel
<b>Tasks</b>	Standard	Full		3			Support Center / Software Standards Panel
<b>Teams</b>	Standard	Limited	3	3	3		Support Center / Software Standards Panel
<b>Word</b>	Standard	Full	3	3	3		Support Center / Software Standards Panel
<b>3<sup>rd</sup> Party Connectors and Plug-ins</b>	Exception Required					4,6	
<b>FindTime</b> (Outlook Plug-in)	Allowed	Limited					Support Center / Software Standards Panel
<b>Microsoft 365 Audio Conferencing</b> (add-on for Skype and Teams)	Standard	Full				6	Support Center / Software Standards Panel
<b>Power BI Pro</b>	Standard	Full				6	Business Solutions
<b>Power BI Premium</b>	Exception Required					5,6	
<b>Project Standard/Pro</b>	Standard	Full				6	Support Center / Software Standards Panel

Base Application	Standard Classification	Support Model	Platform Notes (see legend)				BTS Owner
			PC	Web	Mobile	Other	
<b>Project Online Essentials</b> <b>Project Online Plan 1</b> (Team member add-on to Project Online Pro/Premium)	Exception Required					6	
<b>Project Online Pro</b> <b>Project Online Plan 3</b>	Exception Required					6	
<b>Project Online Premium</b> <b>Project Online Plan 5</b>	Exception Required					6	
<b>Visio Standard</b> <b>Visio Pro</b>	Standard	Full				6	Support Center / Software Standards Panel
<b>Visio Viewer</b>	Allowed	No Support					
<b>Visio Plan 2</b>	Standard	Full				6	Support Center / Software Standards Panel
<b>PowerApps Platform</b>	Exception Required					4,6	
<b>Dynamics 365 Platform</b>	Exception Required					4,6	
<b>Power Automate Platform</b> (Formerly Flow)	Exception Required			3		4,6	
<b>SharePoint Designer</b>	Not Allowed		Deprecated				
<b>Sway</b>	Not Allowed		Not available in the GCC				
<b>Bookings</b>	Not Allowed		Not available in the GCC				
<b>Staff Hub</b>	Not Allowed		Not available in the GCC				
<b>ToDo</b>	Not Allowed		Not available in the GCC				
<b>Whiteboard</b>	Not Allowed		Not available in the GCC				

Base Application	Standard Classification	Support Model	Platform Notes (see legend)				BTS Owner
			PC	Web	Mobile	Other	
Yammer	Not Allowed		Not available in the GCC				

### Notes Legend

Cell color denotes that product is available on this platform

1. Included in Windows 10 base installation
2. BTS Standard Email only plan – Exchange Online Plan 2 and components
3. BTS Standard Office 365 G3 plan and components
4. Connector or plug-in may be free, but an additional subscription to the connected 3<sup>rd</sup> party service may be needed. Licensing, Terms of Service, Privacy, and Acceptable Use policies will also need to be reviewed by BTS and the City’s Attorney’s Office.
5. Power BI Premium requires substantial additional licensing over Power BI Pro
6. Additional subscription or license required
7. Office 365 Groups remains an important structure within the Office 365 environment. However, there is no single application for access to a group’s components such as email, calendar, files, Planner and OneNote notebooks. These components of a Group are accessed from other applications in the Office 365 suite. Some components can be accessed from multiple applications.

### 33. Operational Support Tools

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>33.1. Asset Inventory</b>	Altiris Asset Management	Standard	Full	Support Center / SET
<b>33.2. Automated Inventory</b>	Altiris Client Management Suite (desktop)	Standard	Full	Support Center / SET
	SNOW License Manager 7 (server)	Standard	Full	Production Services / Server Support
<b>33.3. Monitoring</b>	Toad for Oracle DBA V11	Standard	Full	Production Services / Database Administration

Item	Standard Description	Standard Classification	Support Model	BTS Owner
	Oracle OEM/Grid Control ManageEngine OpManager Redgate SQL Monitor Server Studio SQL Server Management Studio 2008, 2008 R2, 2012, 2014, 2016 VMware vROPs	Standard	Full	Production Services / Server Support / Database Administration
	Brocade Network Advisor Hitachi Tuning Manager HVSR	Standard	Full	Production Services / Storage Administration
	Grafana NetDisco OpenNMS Riverbed SteelCentral Sitescope SolarWinds GrayLog (syslog)	Standard	Full	Communications / Network Engineering and Support
<b>Police</b>	PAESSLER PRTG Network Monitoring 20.1	Standard	Full	Public Safety Technology
<b>33.4. Software Distribution</b>	Altiris Client Management Suite	Standard	Full	Support Center / SET
<b>33.5. Work Order Ticketing</b>	Cherwell	Standard	Full	Support Center / SET
	Redmine (software development issue tracking)	Legacy	Vendor	Support Center / SET
<b>33.6. Workstation Remote Control</b>	Bomgar	Standard	Full	Support Center / SET
<b>33.7. Server Remote Control</b>	Microsoft Remote Desktop Service (RDP)	Standard	Full	Production Services / Server Support
<b>33.8. Printer Management</b>	PaperCut Pro	Standard	Full	Production Services / Server Support / Support Center



### 34. Project Management Tools

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>34.1. Project Management Software</b>	Microsoft Project 2019  <i>Note: With Office 365 2016, Microsoft blocks installation of Office 365 2016 simultaneous with the perpetual version of Project 2016 and 2019. If Project 2019 is to be used, the subscription version must be installed. Perpetual licensed versions of Project 2013 may be installed simultaneously.</i>	Standard	Full	Project Management Office
	SmartSheet	Standard	Vendor	Support Center / Software Standards Panel
	Microsoft Project 2013, 2016  <i>Note: as of 6/11/2013 BTS adopted a policy to allow owners of 2013 versions to install and use those versions through their lifecycle.</i>	Legacy	Full	Project Management Office
<b>34.2. Project Portfolio Management (PPM) Software</b>	Plainview PPM Pro (formerly Innotas)	Standard	Full	Project Management Office

### 35. Radio

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>35.1.</b>				

### 36. Server Base Software

Item	Standard Description	Standard Classification	Support Model	BTS Owner
36.1. Operating System	Windows Server 2019 64-bit Red Hat Enterprise 7.x	Standard	Full	Production Services / Server Support
	Windows Server 64-bit 2012 R2, 2016 Red Hat Enterprise 6.x 8.x	Legacy	Full	Production Services / Server Support
36.2. Vizualization Hypervision	VMWare VSphere 6.x IBM VIO 3.x	Standard	Full	Production Services / Server Support

### 37. Source Code Control System

Item	Standard Description	Standard Classification	Support Model	BTS Owner
37.1. Source Control	Subversion/VisualSVN 2.1.10 TortoiseSVN 1.6.16 AnkhSVN 2.1 Visual SourceSafe Git / GitHub Microsoft Team Foundation Server (TFS)	Standard	Full	Business Solutions
	Visual SourceSafe 6.0	Legacy	No Support	Business Solutions

### 38. Telecommunications

Item	Standard Description	Standard Classification	Support Model	BTS Owner
38.1.				

### 39. Web Tools

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>39.1. Content Management and Page Development Tools</b>	DreamWeaver City Site / Content Management Tool Eclipse Drupal	Standard	Full	Business Solutions
	Cold Fusion Studio	Legacy	Full	Business Solutions
<b>39.2. Site Management Tools</b>	DreamWeaver	Standard	Full	Business Solutions
<b>39.3. Runtime Environment Tools</b>	.NET Core .NET Framework Bootstrap	Standard	Full	Business Solutions
	ColdFusion Server MX	Legacy	Full	Business Solutions
<b>39.4. Web Application Development</b>	Visual Studio 2017 Docker / Lando Eclipse Figma Oracle J Developer	Standard	Full	Business Solutions
	WAVE [ADA] Web Accessibility tool	Standard	Limited	Business Solutions
	Cold Fusion Studio	Legacy	Limited	Business Solutions
<b>39.5. HTML Version</b>	HTML 5.x	Standard	Full	Business Solutions
<b>39.6. HTTP Inspectors</b>	Fiddler Postman	Standard	Full	Business Solutions
<b>39.7. Scripting Language</b>	.NET JavaScript Perl PHP PowerShell Python VBScript	Standard	Full	Business Solutions
	ColdFusion	Legacy	Full	Business Solutions
<b>39.8. Video Encoding</b>	Real Producer	Legacy	Full	Business Solutions
<b>39.9. Web Server</b>	Microsoft IIS 10.x Apache/Tomcat 9.x	Standard	Full	Business Solutions

Item	Standard Description	Standard Classification	Support Model	BTS Owner
	Microsoft IIS 5.0, 6.0, 7.x, 8.x Apache 7.x, 8.x	Legacy	Full	Business Solutions
<b>39.10. Web Browser</b>	Microsoft Internet Explorer 11 Legacy Edge Modern (Chromium) Edge – <b>Note: This is the preferred browser and the only standard browser suited for editing content on portland.gov</b>	Standard	Full	Support Center
	Chrome (with current updates)	Allowed	Limited	Support Center
	Firefox Safari (Windows version)	Exception Required	Limited	Support Center

#### 40. Workstation Software

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>40.1. Operating System</b>	Windows 10 Version 1909 Windows 10 Long-Term Servicing Branch (LTSM) version 1809 – vCAD computers only	Standard	Full	Support Center / Software Standards Panel
	Windows 7 SP1	Exception Required	Limited	Support Center
	MacOS <b>Note: Will not be approved as primary workstation. See the <a href="#">City of Portland Apple Computer Compliance</a> document for detailed information.</b>	Exception Required	See referenced document	Support Center

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>40.2. Base Software</b>	Adobe Reader DC Windows Media Player McAfee Endpoint Security 10 (with current update) Adobe Flash Player 12 (with current update) Microsoft DirectX Internet Explorer 11 .NET Framework 3.5 SP1, 4.5.2 or greater depending on the Windows Operating System. Java 8 (with current update) Silverlight	Standard	Full	Support Center / Software Standards Panel
	SAP GUI 7.4	Standard	Full	Enterprise Business Solutions
	Adobe Reader X, XI Cyberlink Power DVD (OEM)	Legacy	Full	Support Center / Software Standards Panel
	Java 7	Exception Required	No Support	Support Center / Software Standards Panel
<b>40.3. Microsoft Office Suite</b>	See <a href="#">Office 365 Components</a>			
	MS Office 365 ProPlus / 64-bit via Office 365 subscription (Note that the 32-bit Office suite is the default standard)	Allowed	Full	Support Center / Software Standards Panel
	MS Office 2013	Legacy	Full	Support Center / Software Standards Panel
<b>Police</b>	MS Office 2016 / 64 bit	Standard	Full	Support Center / Software Standards Panel
	MS Office 2013 / 64 bit	Legacy	Full	Support Center / Software Standards Panel
<b>40.4. eMail Client</b>	MS Outlook 2016	Standard	Full	Support Center / Software Standards Panel
	MS Outlook 2013	Legacy	Full	Support Center / Software Standards Panel
<b>Police</b>	MS Outlook 2016	Standard	Full	Support Center / Software Standards Panel
	MS Outlook 2013	Legacy	Full	Support Center / Software Standards Panel
<b>40.5. Media Player</b>	Windows Media Player	Standard	Full	Support Center / Software Standards Panel

Item	Standard Description	Standard Classification	Support Model	BTS Owner
	VLC Client	Allowed	Full	Support Center / Software Standards Panel
<b>40.6. CD/DVD Creation</b>	Windows built-in	Standard	Full	Support Center / Software Standards Panel
<b>40.7. Workstation Database</b>	See <a href="#">Database Standards</a>			
<b>40.8. Firewall</b>	Windows Firewall	Standard	Full	Information Security
<b>40.9. Password Safe</b>	KeyPass	Allowed	No Support	Information Security
<b>40.10. Zip File Compression</b>	Built-in Windows Zip Utility 7-Zip	Allowed	Limited	Support Center / Software Standards Panel
<b>40.11. Codecs</b>	High Efficiency Image File (HEIF) <ul style="list-style-type: none"> <li>• iMazing .heic converter</li> </ul> High Efficiency Video Coding (HEVC) <ul style="list-style-type: none"> <li>• Device Manufacturer .hevc converter</li> </ul>	Allowed	Limited	Support Center / Software Standards Panel

# Security Technology Standards

## 41. Authentication

Item	Standard Description	Standard Classification	Support Model	BTS Owner
41.1. Windows	Kerberos	Standard	Full	Information Security
41.2. Multi-Factor	RSA Secure ID Digital Certificate Azure MFA	Standard	Full	Information Security
41.3. Single Sign-On	Active Directory Federated Services (ADFS) Azure Active Directory	Standard	Full	Information Security
Police	Impivata OneSign	Standard	Full	Information Security
41.4. Wi-Fi	Authentication Protocols EAP-TLS , PEAP Certificate provisioning: Autoenrollment via AD	Standard	Full	Information Security
41.5. RADIUS	Cisco ISE	Standard	Full	Communications / Network Engineering and Support
41.6. Firewall Rules Management	FortiClient – Workstation deployment	Standard	Full	Networking

## 42. Encryption

Item	Standard Description	Standard Classification	Support Model	BTS Owner
42.1. Data Storage	AES	Standard	Full	Information Security
	3DES	Legacy	Full	Information Security
42.2. Web Traffic	TLS 1.2, 1.3 External facing certificates: Verisign, Secure Site, Secure Site Pro Internal facing certificates: Internal Certificate Authority, Verisign	Standard	Full	Information Security

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>42.3. Secure FTP</b>	SFTP (FTP over SSH)	Standard	Full	Information Security
<b>42.4. Wi-Fi Networks (transport)</b>	WPA2 802.11	Standard	Full	Information Security
<b>42.5. Endpoint Device Storage</b>	BitLocker	Standard	Full	Information Security

### 43. Patch Management

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>43.1. Workstation</b>	Altiris Patch Management Windows Update for Business	Standard	Full	Support Center / SET
<b>43.2. Server</b>	Ivanti Protect	Standard	Full	Production Services / Server Support
	Microsoft System Center Configuration Manager (SCCM)	Standard	Full	Public Safety Technology
<b>43.3. Network</b>	Ansible CATTools	Standard	Full	Communications / Network Engineering and Support

### 44. Remote Network Access

Item	Standard Description	Standard Classification	Support Model	BTS Owner
<b>44.1. VPN Appliance</b>	Pulse SA (PSA) RadiolP (Fire, Comm)	Standard	Full	Information Security
<b>Police BOEC</b>	NetMotion	Standard	Full	Public Safety Technology
<b>44.2. Client VPN Software (IPSec)</b>	Pulse Secure Client	Standard	Full	Information Security



Item	Standard Description	Standard Classification	Support Model	BTS Owner
Police BOEC	NetMotion Client	Standard	Full	Public Safety Technology

## 45. Storage Services and Devices

### Storage Service Note:

City restricted and confidential information is strictly forbidden from unsecured storage sites. All City confidential information must be encrypted during collection, transfer, distribution, storage, and disposal

## 46. Virus Protection

Item	Standard Description	Standard Classification	Support Model	BTS Owner
46.1. Workstation	McAfee Endpoint Security 10 (with current update) McAfee Advanced Threat Protection (ATP)	Standard	Full	Support Center
46.2. Server	McAfee Security for Email Servers	Standard	Full	Production Services
46.3. Internal Mail	McAfee SonicWall Email Security	Standard	Full	Production Services
46.4. Console	McAfee ePO	Standard	Full	Production Services
46.5. Web Filtering	Web Security Appliance (WSA) Sophos Webroot	Standard	Full	Communications / Network Engineering and Support

# Meeting Space Audio Visual Standards

Information to be added based on The Portland Building standards

# Commodity Hardware and Software

This section describes hardware and software that may be purchased directly by City staff from the City's recommended suppliers without intervention from BTS. The exception is purchases made for ADA accommodation. These purchases must be coordinated through the Bureau of Human Resources for proper oversight and funding. Bureaus should contact their [Human Resources Business Partner \(HRBP\)](#) for guidance.

Some items have conditions attached in order for them to function more effectively within the City's infrastructure. While BTS is not strictly enforcing the conditions, it is highly recommended that the conditions be adhered to.

## 47. General USB Device Guidance

- Minimum USB 2.0
- USB cables may not be provided by the vendor and need to be purchased separately.
- See comments related to storage in the [Removable Media](#) section below.

## 48. General Bluetooth Device Guidance

- Bluetooth devices should use native Windows device drivers.
- Bluetooth is not encrypted by default and should not be used to interface with devices that transmit protected information. Examples include keyboards (they transmit user credentials) and storage.
- Headphone / microphone pairings may be an issue if confidential information is shared via a softphone or collaboration application.
- Use of Bluetooth devices in a public setting (e.g. a coffee house, classroom, or convention room) is discouraged.

## 49. Computer Speakers

## 50. Digital Cameras

- Minimal technical support is provided by BTS.
- USB interface required. See General USB Device Guidance above.
- Support from BTS is not part of the SLA and will be billable.
- Any bundled software must be Windows 7 and 10 compatible. There is no support from BTS for bundled software.
- Be careful about what bundled software is loaded by default. Load only what is needed.

## 51. Fax Machines

## 52. Flash / Compact Media Cards

## 53. Headphones

- See security concerns listed in [General Bluetooth Device Guidance](#) above

## 54. Keyboards

- USB Interface. See [General USB Device Guidance](#) above.
- See security concerns listed in [General Bluetooth Device Guidance](#) above

## 55. Laser Printer Toner Cartridges

## 56. Locally Connected USB Printers

- **BTS encourages the use of standard network attached printers rather than locally attached InkJet or Laser printers.**
- BTS has evaluated two different USB connected HP OfficeJet printers for different business needs:
  - OfficeJet 7000 series – Offers color, large format (11x17) capability.
  - OfficeJet Pro 8100 series offers color, standard format (letter / legal) capability, is expandable for scanning, copying, and faxing, and is supported by the City's standard Universal Print Driver from HP.
- USB Interface required. See [General USB Device Guidance](#) above.
- Support from BTS is not part of the service level agreement (SLA) and will be billable. **Note: Installations on Windows 7 or Windows 10 requires BTS assistance and is billable.**
- This is for locally attached use to a single computer only. BTS will not network these devices.
- **Portland Building Expectations:**
  - Please note that desktop printers are not allowed and there are limitations on supported network printers.
  - Please submit questions and comments regarding the Portland Building via the [Project's TrackIT form](#).

## 57. Mice / Track-balls

- This includes optical, multi-button with scroll wheels, and track balls.
- USB interface. See [General USB Device Guidance](#) above.

## 58. Removeable Media (USB storage devices, CDs, DVDs)

- USB Storage Devices should be used for temporary storage or file transfer and not for long term offline file storage.
- Storage of files on removable media is not compatible with the City's effort to encourage collaboration. Use of Microsoft OneDrive and Teams is more appropriate for these situations.
- USB storage devices can carry computer viruses and cannot be easily scanned or cleaned since they are offline most of the time.
- Removable media are not appropriate for storing record copies of City records.
- Bureaus are responsible to follow established Administrative Rules regarding the use of removable media. See [ADM-8.12 - Management, Preservation and Storage of Electronic Records and Electronic Mail Correspondence \(E-Mail\)](#).
- Removable storage does not have any standard City protection such as backup and data protection. The media associated with this type of storage is fragile and susceptible to failure.
- This category is generally for devices used with non-sensitive data.

- Encryption strategies for sensitive data requirements must be discussed with BTS Information Security and adhere to Administrative Rule [BTS-2.15 - Encryption](#).
- Encryption on USB storage devices, small “thumb” or “jump” drives in particular, is allowed and accomplished using the SanDisk SecureAccess encrypted vault. Additional information is available on [SanDisk’s web site](#).
- Devices chosen should operate with standard built-in operating system (Windows) drivers and not require customized drivers.
- USB Interface required. See [General USB Device Guidance](#) above.
- Be aware of potential compatibility problems between CD and DVD media formats.

# Technology Specifications

This section documents the minimum specification used to select the approved standards. Not all standards have associated specifications. This is because some listed standards are documentation of best practice.

## 59. Workstation Standard Criteria

The base component criteria for standard desktop and laptop workstations is as follows.

### 59.1. Standard Desktop Workstation:

- Intel ® 8<sup>th</sup> generation processors(i5), 64-bit
- Memory
  - Police Bureau: 16 GB Optane memory
  - All other bureaus: 8 GB RAM memory
- Local storage
  - Police Bureau: 500 GB HD
  - All other bureaus: 256 GB Solid-State Drive (SSD)
- DVD +/- RW Optical single layer drive
- On-board video card, dual monitor capable
- 104 key keyboard
- Optical wheel mouse
- Minimum 100 Mb/s network interface card
- Mid tower case
- Energy Star 6.0 and EPEAT Bronze compliant
- Intel Standard Management with Active Management Technology (AMT)
- 3 year warranty
- See [current desktop hardware specification](#) on the City website

### 59.2. Standard Laptop Criteria:

Matches desktop workstation criteria as close as possible with the following additions:

- Standard:
  - 14-inch LED HD display
  - WiFi 802.11 ac/a/b/g/n 2x2 Wireless LAN + Bluetooth 4.2, supporting EAP-TLS and WAP2
  - Docking bay
  - Built-in camera and microphone
  - Backlit keyboard
- Lite – Same as the standard laptop with the following modifications:
  - 13.3-inch LED display
- Police Bureau – Same as standard laptop with the following modifications:
  - Built-in LTE
  - Keyboard with integrated fingerprint reader and smartcard reader
- Ruggedized:
  - Weatherproof and shock resistant casing
- Options:
  - Touch screen
  - Built-in 4G LTE
  - Intel i7 processor
  - Additional RAM memory

- Larger hard drive

## **60. Mobile Data Computers (MDC)**

The MDC is a PC that has been physically adapted to a mobile, public safety environment. The recommended minimum hardware specifications are:

- Intel ® processor (i5) 64-bit
- 8 GB DDR3 RAM memory
- Intel ® HD graphics 4600
- 256 GB solid-state drive (SSD)
- DVD +/- RW optical single layer drive
- 13-inch LED display (1024 x 768 minimum) with touch screen
- Fingerprint reader
- Intel ® dual-band AC 7260+ Bluetooth
- Energy Star 6.0 and EPEAT Bronze compliant
- 5-year warranty

Network connectivity is achieved through carrier supplied 3G/4G cellular data networks.

## 61. Network Printer Standard Criteria

Attribute	Small / Medium Workgroup	Larger Workgroup	Large Format
Pages per minute	25 – 30	25 – 50	25 – 50
Minimum duty cycle per month	3,000	15,000	10,000
Network interface	Internal 10/100 MB/sec	Internal 10/100 MB/sec	Internal 10/100 MB/sec
Network address	IPv4	IPv4	IPv4
Page size	Letter 8.5 x 11 Legal 8.5 x 14 #10 Envelope	Letter 8.5 x 11 Legal 8.5 x 14 #10 Envelope	Letter 8.5 x 11 Legal 8.5 x 14 Tabloid 11 x 17 #10 Envelope
Page definition language	PCL 5 / Postscript	PCL 5 / Postscript	PCL 5 / Postscript
Memory	32 MB	96 MB	128 MB
Display	LCD for on-site config	LCD for on-site config	LCD for on-site config
Duplexing	Yes	Yes	Yes
Trays	1 tray 1 Multi-purpose tray	2 trays 1 Multi-purpose tray	2 trays 1 Multi-purpose tray
Envelope Feeder	Optional	Optional	
Compatible with 100% recycled paper	Yes	Yes	Yes
Black and White	Default	Default	Default
Color	Optional	Optional	Optional
Energy Star	Yes	Yes	Yes

**Universal print driver** All printers must be certified to operate with the HP universal print driver. Microsoft certified for installation on Windows 2008 Server are found on the [Windows Server Certification Catalog](#).



## 62. Network Printer Specifications (Black and White)

Feature	M404dn	M507dn	M607dn	M608dn/x	M712dn High volume Large Format
Print Speed Black (ppm pages / min)	40	45	55	65	40
Resolution (dpi: dots per inch)	1200 x 1200	1200 x 1200	1200 x 1200	1200 x 1200	1200 x 1200
Monthly duty cycle (pages)	80,000	150,000	250,000	275,000	100,000
Recommended monthly duty cycle (pages)	750-4,000	2,000-7,500	5,000-20,000	5,000-25,000	5,000-20,000
Memory: Standard	256 MB	512 MB	512 MB	512 MB	512 MB
Memory: Max	256 MB	1.5 GB	1.5 GB	1.5 GB	1 GB
Paper trays: Std	2	2	2	dn:2 x:3	3
Paper trays: Max	3	5	6	6	6
Duplex printing	Auto / Std	Auto / Std	Auto / Std	Auto / Std	Auto / Std
11x17 (Large Format)	No	No	No	No	Yes
Energy Star / EPEAT	Yes / Silver	Yes / Silver	Yes / Silver	Yes / Silver	Yes / Silver
HP ePrint	Yes	Yes	Yes	Yes	Yes

## 63. Network Printer Specifications (Black and White Multi-Function)

Feature	M227fdn	M426fdn	M725dn Large Format		
Print Speed Black (ppm pages / min)	40	45	55		
Resolution (dpi: dots per inch)	1200 x 1200	1200 x 1200	1200 x 1200		
Monthly duty cycle (pages)	80,000	150,000	250,000		
Recommended monthly duty cycle (pages)	750-4,000	2,000-7,500	5,000-20,000		
Memory: Standard	256 MB	512 MB	512 MB		
Memory: Max	256 MB	1.5 GB	1.5 GB		
Paper trays: Std	2	2	2		
Paper trays: Max	3	5	6		
Duplex printing	Auto / Std	Auto / Std	Auto / Std		
11x17 (Large Format)	No	No	No		
Energy Star / EPEAT	Yes / Silver	Yes / Silver	Yes / Silver		
HP ePrint	Yes	Yes	Yes		
Scanner Type	Flatbed with auto doc feed	Flatbed with auto doc feed	Flatbed with auto doc feed		
Scan Resolution (dpi): Max	1,200	1,200	600		
Scan speed: black and white (ppm)	12	26 ppm / 47 ipmr	49 ppm / 19 ipm		
Scan speed: color (ppm)	n/a	21 ppm / 30 ipm	30 ppm / 14 ipm		
Scan size	8.5 x 11.7 flat 8.5 x 14 ADF	8.5 x 11.7 flat 8.5 x 14 ADF	11 x 17		
Copy speed (cpm)	30	40			
Copy resolution	600 x 600	600 x 600	600 x 600		
Copy reduction / enlargement	25 – 400%	25 – 400%	25 – 400%		
Fax resolution	300 x 300	300 x 300	300 x 300		

## 64. Network Printer Specifications (Color)

Feature	M454dn	CP5225dn Large Format	M553dn/x	M653dn	M751dn Large Format
Print Speed Black / color (ppm pages / min normal quality)	28 / 28	20 / 20	40 / 40	60 / 60	30 / 30
Resolution (dpi: dots per inch)	600 x 600	HP ImageREt – 3600	HP ImageREt – 3600	HP ImageREt – 3600	600 x 600
Monthly duty cycle (pages)	50,000	75,000	80,000	120,000	120,000
Recommended monthly duty cycle (pages)	750 – 4,000	1,500 – 5,000	2,000 – 6,000	2,000 – 17,000	2,500 – 13,000
Memory: Standard	256 MB	192 MB	1 GB	1 GB	1 GB
Memory: Max	512 MB	448 MB	2 GB	2 GB	1 GB
Paper trays: Std	2	2	dn: 22 x:3	2	3
Paper trays: Max	3	3	5	5	6
Duplex printing	Auto / Std	Auto / Std	Auto / Std	Auto / Std	Auto / Std
11x17 (Large Format)	No	Yes	No	No	Yes
Energy Star / EPEAT	Yes / Silver	Yes / Silver	Yes / Silver	Yes / Silver	Yes / Silver
HP ePrint	Yes	No	Yes	Yes	Yes

Feature	M855xh Large Format				
Print Speed Black / color (ppm pages / min normal quality)	45 / 45				
Resolution (dpi: dots per inch)	1200 x 1200				
Monthly duty cycle (pages)	175,000				
Recommended monthly duty cycle (pages)	4,000 – 17,000				
Memory: Standard	1 GB				
Memory: Max	1 GB				
Paper trays: Std	5				
Paper trays: Max	5				
Duplex printing	Auto / Std				
11x17 (Large Format)	Yes				
Energy Star / EPEAT	Yes /				
HP ePrint					

## 65. Network Printer Specifications (Color, Multi-Function)

Feature	M479fdn				
Print Speed Black / color (ppm pages / min normal quality)	28 / 28				
Resolution (dpi: dots per inch)	600 / 600 HP ImageREt – 3600				
Monthly duty cycle (pages)	50,000				
Recommended monthly duty cycle (pages)	750-4,000				
Memory: Standard	512 MB				
Memory: Max	512 MB				
Paper trays: Std	2				
Paper trays: Max	3				
Duplex printing	Auto / Std				
11x17 (Large Format)	No				
Energy Star / EPEAT	Yes / No				
HP ePrint	Yes				
Scanner Type	Flatbed with auto doc feed				
Scan Resolution (dpi): Max	1,200				
Scan speed: black and white (ppm)	26 ppm / 47 ipm				
Scan speed: color (ppm)	21 ppm / 30 ipm				
Scan size	8.5 x 11.7 flat 8.5 x 14 ADF				
Copy speed (cpm)	28				
Copy resolution	600 x 600				
Copy reduction / enlargement	25 – 400%				
Fax resolution	300 x 300				

## 66. Scanner Standard Criteria

Scanner criteria are based on the needs of image scanning as specified by the SAP implementation project.

Type	Native Resolution	Speed (B & W)	Max Scan Size	Connectivity	Type	Doc Feed
Low Volume	300 x 300 dpi	10 ppm	8.5 x 14	USB 2.0	Flatbed or ADF	Std 50 sheet
Medium Volume	300 x 300 dpi	20 ppm 40 ipm duplex	8.5 x 14	USB 2.0	Flatbed or ADF	Std 50 sheet

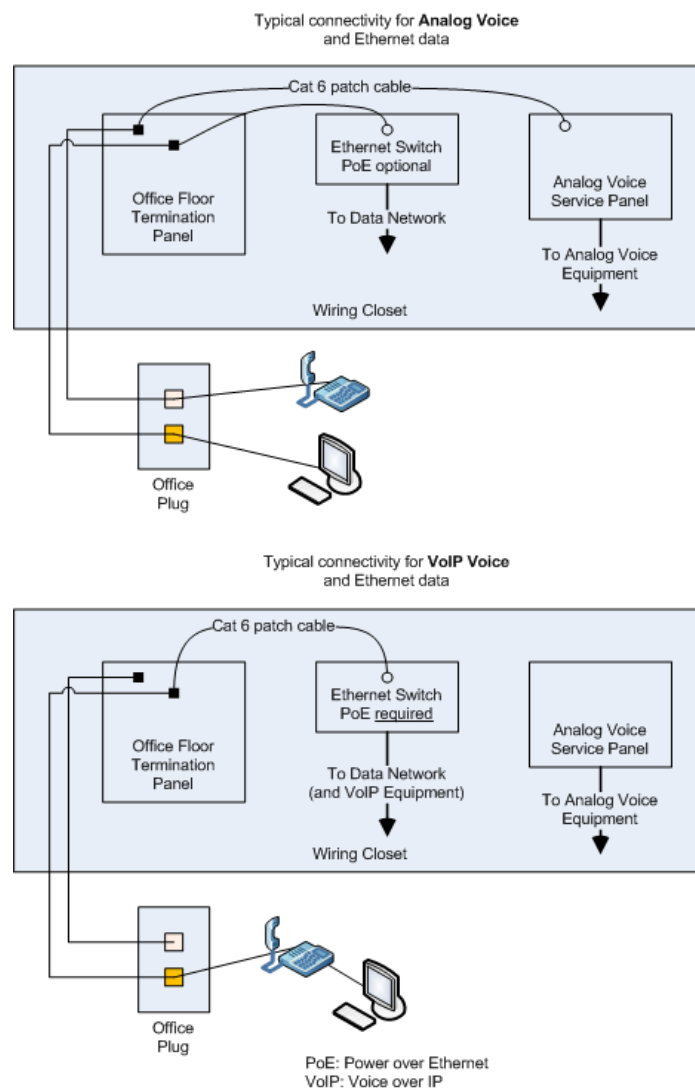
## 67. Cabling Specification

### New Construction

In new construction scenarios, BTS has determined that installing two (2) Category 6 cables are generally sufficient to connect typical computer and telephone equipment found in an office or cubicle. Wiring closet configuration will generally conform to the following block diagram.

### Remodel

In remodel scenarios, BTS will evaluate the existing cabling and wiring closets in order to determine and recommend the most cost-effective method of cabling the remodeled space that meets the customer business need while preserving maintainability of the underlying infrastructure in the wiring closet. This may not always result in a reduced cable count to the office or cubicle.



## 68. Video Projector Criteria

Attribute	Ultra Portable	Portable	Ceiling Mount
Resolution	1024 x 768 (XGA / HDMI)	1024 x 768 (XGA / HDMI)	1024 x 768 (XGA / HDMI)
Brightness	2,500 lumens minimum	2,500 lumens minimum	100 lumens / sq. foot of screen minimum
Remote Control	Optional	Optional	Required
Zoom Lens	Yes	Yes	Yes
Focus Control	Manual	Manual	Remote Control
Video Input	VGA	VGA	VGA
Color Spread	16.7 million	16.7 million	16.7 million
Weight	4 pounds or less (light as possible)		

### Considerations for Ceiling Mounted Projectors

When mounting a projector to the ceiling, the projector, screen size and ambient room light must be considered together. The Brightness for a Ceiling Mounted projector is expressed as a minimum lumens per square foot of screen area, where lumens is the rated lumen output of the projector. The higher the value, the easier the image will be to see. On a reflective screen, 100 lumens / sq ft will yield an image that is visible in standard windowless conference room lighting. Uncovered windows or projecting on other surfaces such as a wall may require a higher value of lumens per square foot. A value of 125 lumens / sq ft should be considered.

Care must also be taken with the placement of the screen in relationship to ceiling lights and windows. A ceiling light directly over the screen will wash out the image regardless of its brightness. Electrical modifications may be necessary in order to turn “problematic” lights off when projecting. Similarly, window light can also wash out the screen image and blinds may be necessary to achieve acceptable viewing.

# Appendix A

## Web Site References

City of Portland web site

<https://PortlandOregon.gov>

BTS Technology Standards page

<http://www.portlandonline.com/omf/index.cfm?c=46940>

BTS Technology Business Consultant

<https://www.portlandoregon.gov/bts/index.cfm?&a=53999>

Portland Building Project's TrackIT form

<https://www.portlandoregon.gov/omf/index.cfm?&c=70798>

State and City Rules Related to Public Recordkeeping Requirements

<https://www.portlandoregon.gov/archives/70031>

Apple Device Support Dates

<https://www.portlandoregon.gov/bts/article/660950>

ADM-8.12 - Management, Preservation and Storage of Electronic Records and Electronic Mail Correspondence (E-Mail)

<https://www.portlandoregon.gov/citycode/article/262374>

SanDisk's web site

[https://kb.sandisk.com/app/answers/detail/a\\_id/2399/~/\\_sandisk-secureaccess-3.02-support-information-and-download-page](https://kb.sandisk.com/app/answers/detail/a_id/2399/~/_sandisk-secureaccess-3.02-support-information-and-download-page)

Current desktop hardware specification

<https://www.portlandoregon.gov/bts/60679>

Windows Server Certification Catalog

<http://www.windowsservercatalog.com/ready.aspx>

City Code 5.33.080 Environmentally Preferable Procurement

<https://www.portlandoregon.gov/citycode/article/552961>

# Appendix B

## Change Log

Changes to the document since last adoption.

Date	Item	Standard Description	Standard Classification / Support Model
2/25/2020		Begin editing and review of Winter 2020 changes by IB.  Summary of changes to the combined documents was tracked in a separate document titled Technology Standards Directory Changes.	
6/9/2020		Adoption ratified by IB at bi-weekly meeting.	
7/7/2020	17.8 <a href="#">Mobile Operating System</a>	iOS version from 13.5.0 to 13.5.1  iPadOS version from 13.5.0 to 13.5.1	Standard / Limited
7/7/2020	40.1 <a href="#">Operating System</a>	Windows 10 Version from 1903 to 1909	Standard / Full
7/7/2020	39.10 <a href="#">Web Browser</a>	Added "Preferred browser" designation to Modern Edge	Standard / Full
8/4/2020	1.1 <a href="#">Desktop Computers</a>	Added Apple iMac as available by exception with link to the <a href="#">City of Portland Apple Computer Compliance</a> document	Exception / User
8/4/2020	2.1 <a href="#">Laptop Computers</a>	Added Apple MacBook as available by exception with link to the <a href="#">City of Portland Apple Computer Compliance</a> document	Exception / User
8/4/2020	40.1 <a href="#">Operating System</a>	Added MacOS as available by exception with link to the <a href="#">City of Portland Apple Computer Compliance</a> document	Exception / User
8/4/2020	40.11 <a href="#">Codecs</a>	Added new sub-section	

<b>Date</b>	<b>Item</b>	<b>Standard Description</b>	<b>Standard Classification / Support Model</b>
8/4/2020	40.11 <a href="#">Codecs</a>	Added HEIF codecs to handle images (.heic) and videos (.hevc)	Allowed / Limited





**B**

- Backup .....27
- Backup / Recovery Software.....27
- Backup Appliance .....14
- Baretail .....34
- BGP4 .....15
- BitLocker .....48
- Blank Media .....52
- Bluebeam .....33
- Bluetooth general guidance .....51
- Bomgar .....40
- Bookings.....38
- Bootstrap .....43
- Braille Display / Terminal [ADA] .....10
- Broadband Wireless.....21
- Brocade .....20
- Brocade Network Advisor.....40
- Bulk eMail Service.....30
- Business Objects Enterprise .....25

**C**

- Cabling .....16
- Cacti .....39
- CAD..... See Computer Aided Design
- CADET [ADA].....35
- Calendar .....36
- Calendar Publishing .....34
- Camera
  - Desktop .....23
  - digital .....51
  - Logitech.....23
  - Microsoft.....23
- Camtasia .....33
- Cannon Scanner .....19
- CapTel phone [ADA] .....21
- Caption and Description Editing Tool [ADA] ....35
- Captive .....34
- CATTtools .....48
- CD .....52
- CD Creation .....46
- Cellular
  - micro cell .....21
  - MiFi .....21
  - phone .....22
  - USB cellular data modem.....22
  - wireless .....21
- Cherwell .....40
- Chrome.....44
- Ciena Switch .....17
- CIFS .....20
- CircleCI.....26
- Cisco
  - DSU/CSU .....16
  - fabric switch .....20
  - Nexus .....16
  - router.....16

- SFP connectors.....17
- SONET .....16
- Switch.....17
- Cisco RADIUS .....47
- Client
  - eMail.....45
  - FTP .....34
  - NetMotion.....49
  - Pulse Secure.....48
  - VPN.....48
- Client / Server .....25
- Clipboard Manager .....34
- Codecs .....46
- Cognos..... 25, 26
- ColdFusion.....43
- Collaboration.....27
- Commodity Hardware and Software.....51
- CommVault .....27
- Composer .....26
- Computer
  - desktop.....10
  - laptop .....11
- Computer Aided Design.....33
- Computer Speakers.....51
- Conferencing.....27
- ControlPoint .....23
- Convo [ADA] .....35
- Cook pager .....21
- Creative Suite .....33
- Crystal Reports .....25

**D**

- Data Center Infrastructure .....14
- Database
  - client.....29
  - connector protocol.....29
  - enterprise .....28
  - Microsoft Access .....29
  - workstation .....29
- Database Development Tools .....28
- Database Standards .....28
- DCNM .....39
- Dell
  - desktop.....10
  - DP 4400 .....14
  - laptop .....11
  - Latitude .....11
  - Optiplex.....10
  - PowerEdge.....13
  - XFR.....12
- Delve .....36
- Desktop
  - computer .....10
  - firewall.....46
- Desktop Workstation.....54
- Developer Tools
  - applications .....25
  - Database.....28

Device Manufacturer .....46  
 Dictation .....12  
 Digital Certificate .....47  
 Digital Video Recorder .....23  
 Directory Services .....29  
 Ditto .....34  
 Docker .....43  
 DP 4400 .....14  
 Dragon Naturally Speaking [ADA] .....34  
 DreamWeaver .....33, 43  
 Drupal .....43  
 DSU/CSU .....16  
 DVD .....52  
 DVD Creation .....46  
 DVR .....23  
 Dynamics 365 Platform .....38

**E**

Eclipse .....31, 43  
 Edge .....44, 45  
 EIGRP .....15  
 eMail .....29  
     bulk service .....30  
     client .....30, 45  
     filing tool .....30  
     server .....29  
     synchronization .....30  
 Encryption .....53  
 Encryption protocols  
     802.11 .....48  
     AES .....47  
     FTP .....48  
     SSH .....48  
     TLS .....47  
     WiFi .....48  
     WPA2 .....48  
 Encryption Protocols .....47  
 Endpoint Device Storage .....48  
 Endpoint Security .....49  
 Energy Efficiency  
     Energy Star® .....7  
     EPEAT .....7  
 Environmental Monitors .....14  
 ESRI  
     Insights .....25  
     JavaScript API .....31  
 EWS ..... See eMail Synchronization  
 Excel .....36  
 Exceptions .....4  
 Exchange Online Plan .....36  
 Extra Extreme .....35

**F**

FAX .....34  
 Fax Machine .....51  
 Fiber Channel .....20

Fiddler .....43  
 Figma .....27, 43  
 File Sharing .....20  
 FileZilla .....34  
 FindTime .....35, 37  
 Firefox .....44  
 Firewall .....47  
 Firewall desktop .....46  
 Firewall Rules Management .....47  
 Fireworks .....33  
 Flash .....33  
 Flash Media cards .....51  
 Flow .....38  
 Fonts .....30  
     Guidance .....30  
     Impact .....31  
     Standard .....30  
 Forms .....36  
 FortiClient .....47  
 Freedom Scientific (Focus Blue) [ADA] .....10  
 FTP client .....34

**G**

Galaxy .....21  
 GCC .....36  
 General Guidance  
     Bluetooth .....51  
     USB .....51  
 GETAC .....12  
 GIS  
     application development .....31  
     Application Tools .....31  
     ArcEngine .....31  
     ArcGIS .....31  
     ArcObjects .....31  
     desktop applications .....31  
     mapping server .....32  
     MapWorks .....31  
 GIS Application Tools ..... See Geographical  
     Application Tools  
 Git / GitHub .....42  
 Glogg .....34  
 Gobi .....21  
 Golden .....28  
 Google  
     Chrome .....44  
     Earth Pro .....32  
 Go-To-Meeting .....27  
 Government Cloud Computing .....36  
 Grafana .....40  
 Graphic Design Software .....32  
 GrayLog .....40  
 Greenshot .....33  
 Grid Control .....40  
 Groups .....36

**H**

Hardware  
     Standards..... 10  
 HCP Anywhere.....20  
 Headphones..... 51  
 HEIC.....46  
 HEIF.....46  
 HEVC.....46  
 High Efficiency Video Coding.....46  
 High Efficiency Image File.....46  
 Hitachi.....20  
     HCP.....20  
     HCP Anywhere.....20  
     NAS.....20  
     SAN.....20  
 Hitachi Tuning Manager.....40  
 HP  
     printer..... 18  
     Universal Print Driver (UPD).....56  
 HP Scanner.....19  
 HPE Aruba Switch.....17  
 HTML.....43  
 HumanWare Brailliant [ADA].....10  
 HVSR.....40

**I**

IBM  
     server..... 13  
     VIO.....42  
 IE.....45  
 IIS.....43  
 Illustrator.....33  
 iMac.....10  
 iMazing.....46  
 Imprivata.....47  
 InDesign.....33  
 INET.....15  
 InFocus Projector.....23  
 Informix.....28  
 Infrastructure Management Software.....14  
 Innotas.....41  
 InstallAware.....26  
 Installers.....26  
 InstallShield.....26  
 Internet Domain Naming.....33  
 Internet Explorer.....34, 44, 45  
 Interview Tracker.....23  
 iOS.....12, 22  
     dictation feature.....12  
 iPad.....12  
 iPhone.....21  
 Iridium.....21  
 IRNE.....15

**J**

J Developer.....43  
 Java.....45  
 JavaScript.....43  
 JAWS [ADA].....35  
 Jira.....27  
 JMeter.....26  
 Juniper  
     Pulse.....48  
     Switch.....17  
     VPN.....48

**K**

KeePass.....46  
 Kerberos.....47  
 Keyboard.....10, 52  
 KeyPoint Interactive.....27  
 KVM.....14  
     Raritan Command Console.....14  
 Kyocera.....22

**L**

Lando.....43  
 Language Interpretation [ADA].....35  
 LanguageLine [ADA].....35  
 Laptop Computer.....11  
 Laptop Hardware.....11  
 Laptop Workstation.....54  
 Latitude.....11  
 LCR.....11  
 Learning Management System Content Editor 34  
 Legacy Edge.....44  
 Lifecycle  
     desktop computer.....11  
     laptop computer.....11  
     server.....13  
     tablet device.....12  
 Linux.....42  
 Linux Server.....13  
 LiveCycle Designer.....32  
 LMS Content Editor.....34  
 LoadUI.....26  
 Locally Connected Printer.....52  
 Log viewer.....34  
 LogFusion.....34  
 LogJoint.....34

**M**

Macbook.....11  
 MacOS.....44  
 Macroplant iExplorer.....35  
 MAGic [ADA].....34  
 Manage Engine OpManager.....40  
 MapWorks.....31

McAfee ..... 45, 49  
 Advanced Threat Protection..... 49  
 Endpoint Security ..... 49  
 ePO ..... 49  
 Security for Email Servers..... 49  
 MDC ..... 12, 55  
 Meeting Scheduler ..... 35  
 Meeting Space Audio Visual Standards..... 50  
 Micro Cell ..... 21  
 Micro Focus Reflection..... 35  
 Microsoft  
 .NET Framework ..... 45  
 Access..... 25, 29, 36  
 Active Directory ..... 29  
 Audio Conferencing..... 37  
 Delve..... 36  
 DirectX ..... 45  
 Dynamics 365 Platform ..... 38  
 Edge..... 44, 45  
 Excel ..... 36  
 Exchange Online Plan..... 36  
 FindTime ..... 37  
 Forms ..... 36  
 Groups ..... 36  
 IIS43  
 Internet Explorer..... 34, 44, 45  
 Microsoft Print to PDF ..... 32  
 Office..... 45  
 Office 365..... 45  
 Office 365 G3 Plan..... 36  
 OneDrive..... 36  
 OneNote..... 36  
 Outlook..... 36, 45  
 Outlook Web App..... 30  
 People..... 36  
 Planner..... 37  
 Power Apps Platform..... 38  
 Power Automate Platform ..... 38  
 Power BI..... 25, 37  
 Power BI Pro..... 37  
 PowerPoint..... 37  
 Project..... 37, 38, 41  
 Publisher ..... 33, 37  
 RDS..... 40  
 Remote Desktop Services..... 40  
 SCCM..... 48  
 SharePoint Designer ..... 38  
 SharePoint Online ..... 37  
 Silverlight..... 45  
 Skype ..... 37  
 SQL Server ..... 28  
 Stream..... 27, 37  
 Surface Pro ..... 12  
 Tasks..... 37  
 Team Foundation Server..... 42  
 Teams ..... 27, 37  
 TFS ..... 42  
 Visio ..... 32, 38  
 Visual Studio ..... 25, 31, 43  
 Windows..... 44  
 Windows Media Player..... 45

Windows Server ..... 42  
 Windows Update for Business ..... 48  
 Windows Zip Utility..... 46  
 Word..... 37  
 Microsoft Camera..... 23  
 Microsoft Exchange ..... 29  
 MiFi ..... 21  
 Miscellaneous Tools ..... 34  
 Mobile Data Computer ..... 12, 55  
 Modern Edge ..... 44  
 Monitor ..... 10  
 Monitoring ..... 39  
 Mouse ..... 10, 52  
 Multi Factor Authentication ..... 47  
 My Analytics..... 36  
 MySQL ..... 28

**N**

NAS  
 gateway..... 20  
 replication..... 20  
 NCAM [ADA]..... 35  
 NetDisco ..... 40  
 NetMotion..... 48, 49  
 Network  
 cabling..... 16  
 Connectivity..... 16  
 DSU/CSU ..... 16  
 INET ..... 15  
 IRNE ..... 15  
 optical..... 16  
 protocols..... 15  
 Routers..... 16  
 SONET ..... 16  
 Switch..... 17  
 T1 15  
 Network Advisor ..... 40  
 Network Attached Storage ..... 20  
 New Relic..... 26  
 Nexus ..... 16  
 NFS ..... 20  
 Notepad++ ..... 35  
 NVDA [ADA]..... 35

**O**

Object Storage ..... 20  
 Office 365..... 45  
 Office 365 Components ..... 36  
 Office 365 G3 Plan..... 36  
 OLAP ..... 26  
 OneDrive..... 36  
 OneNote..... 36  
 OneSign ..... 47  
 Online Conferencing ..... 27  
 Online Training Content Editor ..... 34  
 OpenNMS ..... 40

OpenText  
 Exceed ..... 35  
 HostExplorer ..... 35  
 Operating System  
 AIX ..... 42  
 Android ..... 22  
 iOS ..... 22  
 Linux..... 42  
 Red Hat..... 42  
 server ..... 42  
 smartphone ..... 22  
 Virtualization..... 42  
 VMWare ..... 42  
 Windows..... 44  
 Windows Server ..... 42  
 workstation ..... 44  
 Operational Support Tools ..... 39  
 OpManager ..... 39, 40  
 Oracle  
 Application Server ..... 26  
 client..... 29  
 database ..... 28  
 Grid Control..... 40  
 J Developer ..... 43  
 SQL Developer..... 28  
 WebLogic ..... 26  
 OSPF..... 15  
 Outlook ..... 36  
 Outlook Web Access ..... 30  
 Oxygen ..... 35

**P**

PAESSLER PRTG Network Monitoring ..... 40  
 PageMaster ..... 34  
 Pager..... 21  
 Cook..... 21  
 server ..... 34  
 USA Mobility..... 21  
 Panasonic  
 Toughbook ..... 12  
 Toughpad ..... 12  
 Panasonic Sierra ..... 21  
 PaperCut Pro ..... 40  
 Password safe..... 46  
 Patch Management ..... 48  
 PDF Creation ..... 32  
 Adobe Acrobat ..... 32  
 Adobe LiveCycle Designer ..... 32  
 Microsoft Print to PDF ..... 32  
 PDF Creator..... 32  
 PDFCreator ..... 32  
 PDU ..... 14  
 PELCO ..... 23  
 People ..... 36  
 PERL ..... 43  
 Phones  
 [ADA] compliant ..... 21  
 Basic cellular phone ..... 22

cellular data modem ..... 22  
 Operating System..... 22  
 Satellite ..... 21  
 Smartphone..... 21  
 Photoshop..... 33  
 PHP ..... 43  
 PL/SQL ..... 28  
 Plainview PPM Pro ..... 41  
 Planner ..... 37  
 PLEdit ..... 28  
 Plotly ..... 25  
 Plotter..... 17  
 Portland Building Expectations  
 Monitors ..... 11  
 Plotters ..... 17  
 Printers..... 19, 52  
 Projectors ..... 23  
 PostgreSQL ..... 28  
 Postman ..... 43  
 Power Apps Platform ..... 38  
 Power Automate Platform..... 38  
 Power BI  
 Premium..... 37  
 Pro..... 37  
 Power BI Premium ..... 37  
 Power BI Pro ..... 37  
 Power Distribution Unit ..... 14  
 Power over Ethernet (PoE)..... 15  
 PowerEdge ..... 13  
 PowerPoint..... 37  
 PowerPoint Plug-in ..... 27  
 PowerShell..... 43  
 Premier / Premier Pro ..... 33  
 Printer ..... 18  
 11 x 17 ..... 18  
 color ..... 18  
 large format ..... 18  
 laser ..... 18  
 Locally Connected..... 52  
 multi-function laser ..... 18  
 printer management ..... 40  
 Proejct Online Plan 3 ..... 38  
 Proejct Online Plan 5 ..... 38  
 Proejct Online Pro..... 38  
 Project Management Tools..... 41  
 Project Online Plan 1 ..... 38  
 Project Online Premium..... 38  
 Project Pro ..... 37  
 Project Standard ..... 37  
 Projector  
 Ceiling Mount ..... 23  
 Projector..... 23  
 Portable..... 23  
 Protocols  
 802.11 ..... 15  
 802.3 ..... 15  
 BGP4..... 15  
 database connector..... 29

EIGRP ..... 15  
 eMail..... 15  
 monitoring ..... 15  
 Network..... 15  
 OSPF ..... 15  
 power over ethernet (PoE) ..... 15  
 routing ..... 15  
 SAN routing..... 20  
 SAN transport..... 20  
 SMTP ..... 15  
 SNMP..... 15  
 TCP / IP..... 15  
 transport ..... 15  
 WAN..... 15  
 Wide Area Network ..... 15  
 WiFi..... 15  
 WMI..... 15  
 p-Series server ..... 13  
 Publisher ..... 37  
 Pulse Secure..... 48  
 Python ..... 43

**R**

R..... 35  
 R Studio..... 35  
 Rack PDU..... 14  
 Radio Hardware ..... 19  
 Radio Software..... 41  
 RadiolP ..... 48  
 Raritan..... 14  
     Command Console..... 14  
     KVM ..... 14  
 RazorSQL..... 28  
 Real Producer ..... 43  
 Red Hat Linux ..... 42  
 Redgate..... 28, 40  
 Redmine ..... 40  
 Reflection ..... 35  
 Remote Control  
     server ..... 40  
     workstation ..... 40  
 Remote KVM..... 14  
 Remote Network Access..... 48  
 Removable Media ..... 52  
 Reporting Tools..... 25  
     OLAP..... 26  
 Resharper..... 26  
 Revu ..... 33  
 Router..... 16  
     Components..... 16  
 RSA ..... 47

**S**

Safari ..... 44  
 Samsung  
     Galaxy..... 21  
 SAN ..... See Storage Area Network

SAP BW ..... 26  
 SAP GUI ..... 45  
 Satellite Phone ..... 21  
 Scanner  
     11 x 17 ..... 19  
     Flatbed ..... 19  
     Large Format..... 19  
     Network Attached..... 19  
     Sheet-fed..... 19  
     Workgroup..... 19  
 Scanners ..... 19  
 SCCM ..... 48  
 Screen Capture..... 33  
 ScrewTurn Wiki..... 35  
 Search Appliance..... 20  
 Security  
     Standards..... 47  
 Security certificates..... 47  
 Security certificates-Verisign ..... 47  
 Server  
     AIX ..... 13  
     Application..... 26  
     Base Software..... 42  
     Dell ..... 13  
     eMail..... 29  
     GIS mapping ..... 32  
     IBM..... 13  
     linux ..... 13  
     paging ..... 34  
     p-Series..... 13  
     web..... 43  
     wiki ..... 35  
     Windows..... 13  
 Server Hardware..... 13  
 Server Studio ..... 40  
 SFP connectors ..... 17  
 SharePoint Designer..... 38  
 SharePoint Online..... 37  
 Sierra ..... 21  
 Silverlight ..... 45  
 SimplyFile ..... 30  
 Single sign-on ..... 47  
 Sitescope ..... 40  
 Sketchup ..... 33  
 Skype ..... 37  
 Skype for Business ..... 27  
 Skype for Business [ADA]..... 45  
 Slack ..... 27  
 SMARSH..... 35  
 Smartphone ..... 21  
 SmartSheet..... 41  
 SMTP ..... 15  
 Snagit..... 33  
 SNMP..... 15  
 SNOW ..... 39  
 SOAPUI ..... 26  
 Software  
     Standards..... 25

Software Distribution ..... 40

SolarWinds ..... 40

SOLR ..... 20

SONET ..... 16

SonicWall ..... 49

    Email Security ..... 49

Sony Vegas ..... 33

Sophos ..... 49

Source Code Control System ..... 42

Specifications

    cabling ..... 60

    MDC ..... 55

    Printers ..... 56

    scanners ..... 59

    video projector ..... 61

    workstation ..... 54

Speech to Text ..... 34

SQL Server ..... 28

SQL Server Management Studio ..... 28, 40

SQL Server OLAP Service ..... 26

SQL utilities ..... 28

SSRS ..... 25

Staff Hub ..... 38

Standards

    classifications defined ..... 4

    exceptions to ..... 4

    owner ..... 7

    process ..... 8

    rationale ..... 3

    support models ..... 4

Statistical Analysis Tools ..... 35

Storage Area Network

    NAS gateway ..... 20

    NAS replication ..... 20

    routing protocol ..... 20

    SAN fabric ..... 20

    SAN replication ..... 20

    storage array ..... 20

    transport protocol ..... 20

Storage Services and Devices ..... 49

Stream ..... 27, 37

Subversion/Visual SVN ..... 42

Support Models ..... 4

    Bureau Support ..... 5

    Full Support ..... 5

    Limited Support ..... 5

    No Support ..... 5

    Vendor Support ..... 5

    Vertical Apps Support ..... 5

Surface Pro ..... 12

Survey Monkey ..... 35

Surveys ..... 35

SVRS [ADA] ..... 35

Sway ..... 38

SwiftType ..... 20

Switch

    Arista ..... 16, 17

    Aruba ..... 17

    Ciena ..... 17

Cisco ..... 16, 17

    Components ..... 17

    HPE Aruba ..... 17

    Juniper ..... 17

    Layer 2 ..... 17

    layer 3 ..... 16

Syslog ..... 39

**T**

T1 ..... 15

Tableau ..... 25

Tablet ..... 12

Tablet Hardware ..... 12

Tasks ..... 37

TCP / IP ..... 15

Team Foundation Server ..... 42

Teams ..... 27, 37

Telecommunications Hardware ..... 21

Telecommunications Software ..... 42

Terminal Emulation ..... 35

Text Message Capture ..... 35

TFS ..... 42

Thumb Drive ..... 52

TikiWiki ..... 35

Toad ..... 28, 39

ToDo ..... 38

Tomcat ..... 26, 43

Toner Cartridges ..... 52

TortoiseSVN ..... 42

Toughbook ..... 12

Track-ball ..... 52

Training Content Editor ..... 34

Tuning Manager ..... 40

**U**

Uninterruptible Power Supply ..... 14

Universal Print Driver (UPD) ..... 56

uPerform ..... 34

UPS ..... 14

USA/Mobility pager ..... 21

USB

    Canera ..... 23

    cellular data modem ..... 22

    General Guidance ..... 51

    Printer ..... 52

    storage device ..... 52

**V**

VBScript ..... 43

Verizon ..... 12

    USB cellular data modem ..... 22

Verizon MiFi ..... 21

Video ..... 23, 61

    Digital Video Recorder (DVR) ..... 23

    encoding ..... 43



USB camera.....23  
 Video Caption [ADA] .....35  
 Video Desktop Camera .....23  
 Video DVR Control Software.....23  
 Video Projector.....23  
 Video Relay Service [ADA] .....35  
 Video Remote Interpreting (VRI) [ADA] .....35  
 Virus Protection .....49  
 Visio.....32  
 Visio Plan 2 .....38  
 Visio Pro .....38  
 Visio Standard.....38  
 Visio Viewer .....38  
 Visual Diagramming.....32  
 Visual SourceSafe.....42  
 Visual Studio .....25, 43  
 VLC Client .....45  
 VMWare .....42  
     vROPs.....40  
 Voice Recognition .....34  
 VPN .....48  
     Appliance .....48  
     Client.....48  
 vROP.....40

**W**

WAVE [ADA] .....43  
 Web  
     browser .....44  
     content management.....43  
     tools.....43  
 Web accessibility tool [ADA] .....43  
 Web Security Appliance .....49  
 WebEx.....27  
     player .....27  
 WebLogic .....26  
 Webroot.....49  
 WebSphere .....26

Whiteboard.....38  
 Widescreen Monitor .....10  
 Wiki .....35  
 WinCalendar .....34  
 Windows .....44  
     Server.....13, 42  
 Windows Installer.....26  
 Wireless  
     broadband data .....21  
     pager.....21  
     USB cellular data modem.....22  
 Wireless Audience Polling .....27  
 WMI.....15, 39  
 Word .....37  
 Work Order Ticketing .....40  
 Workstation Hardware .....10  
 Workstation Remote Control.....40  
 Workstation Software.....44  
 Workstation Standard Criteria.....54  
 WSA.....49

**X**

XCode .....31  
 XFR.....12  
 XML Editor .....35  
 XnView .....33

**Y**

Yammer .....39

**Z**

ZIP Files.....46  
 Zoom Conferencing [ADA].....27  
 ZoomText [ADA] .....34  
 ZVRS [ADA] .....35