



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

Technology Standards Directory

**Fall 2017
Adopted 9/5/2017
Update 11/1/2017**

Table of Contents

Table of Contents.....	2	Security Technology Standards	35
Introduction	3	35. Authentication.....	35
Standards	3	36. Encryption.....	35
Exception to Standards.....	3	37. Patch Management	36
Standard Categories.....	5	38. Remote Network Access	36
Support Levels.....	5	39. Storage Services and Devices	36
Energy Efficiency.....	7	40. Virus Protection	36
BTS Standard Owner.....	7	Commodity Hardware and Software... 38	
BTS Standards Setting Process	8	Computer Speakers	38
ADA Accommodation.....	9	Digital Cameras.....	38
Hardware Standards	10	Fax Machines	38
1. Workstation Hardware	10	Flash / Compact Media cards.....	38
2. Laptop Hardware	11	Headphones	38
3. Tablet Hardware	12	Keyboards	38
4. Server Hardware.....	13	Laser Printer Toner Cartridges.....	38
5. Network Protocols.....	13	Locally connected USB Printers.....	38
6. Network Connectivity	14	Mouses / Track-balls	39
7. Network Routers	15	Removable Media (USB Storage devices, CDs, DVDs)	39
8. Network Switches	15	Technology Specifications.....	40
9. Plotters.....	15	Workstation Standard Criteria	40
10. Printers (Network).....	16	Mobile Data Computers (MDC).....	42
11. Scanners.....	16	Network Printer Standard Criteria	43
12. Search Appliance.....	17	Network Printer Specifications (B/W)	44
13. Storage Area Network	17	Network Printer Specifications (B/W Multi- Function)	44
14. Telecommunications.....	18	Network Printer Specifications (Color)	45
15. Tape.....	19	Network Printer Specifications (Color, Multi- Function)	45
16. Video.....	20	Scanner Standard Criteria.....	46
Software and Application Development		Cabling Specification	47
Standards.....	22	Video Projector Criteria	48
17. Application Development Tools	22	Update Log.....	49
18. Application Development Tools – Windows-based.....	22	Index	50
19. Application Server.....	23		
20. Backup / Recovery Software	24		
21. Collaboration Tools.....	24		
22. Database Standards	24		
23. Directory Services.....	25		
24. eMail	25		
25. Geographical Application Tools	26		
26. Graphic Design Software.....	27		
27. Internet Domain Naming.....	28		
28. Miscellaneous Tools	28		
29. Operational Support Tools.....	29		
30. Project Management Tools.....	31		
31. Server Base Software	31		
32. Source Code Control System	32		
33. Web Tools.....	32		
34. Workstation Software.....	33		

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 BTS PortlandOregon.gov web site, updated as necessary and reviewed in accordance with the cycles established herein.

The BTS Technology Standards web page can be found at <http://www.portlandonline.com/omf/index.cfm?c=46940>.

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.

Standard Categories

This document lists Technology Standards in categories as follows.

Category	Description
Standard	This category represents the current accepted technology for general installation within the City technology environment. Technologies in this category are supported in the Enterprise and should be adopted at the earliest opportunity.
Allowed	Not a standard, but allowed in the environment without an exception.
Legacy	This category 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 category requires a clear business justification and may require an Exception.
Exception Required	Technology requests that do not conform to the Technology Standards established in the Standards Directory will require approval as an exception.

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 level.

Support Levels

BTS has established five standardized support levels:

Support Level	Description
Full Support	BTS fully supports the product including ordering, provisioning, installation, information security, configuration, troubleshooting, patching, de-installation and disposal.
Vertical Apps Support	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.
Limited Support	BTS supports the product including ordering, provisioning, installation, information security, de-installation and disposal. All other work is billable.
Bureau / Vendor Support	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.
No Support	BTS will order and/or provision the product, and dispose of it only. Any other BTS activity will be billable.

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

BTS	BTS is responsible for the support service. The service is not billable.
Bureau	The Bureau is responsible for the support service. Supplemental BTS assistance is billable.
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.
N/A	Not applicable.

Energy Efficiency

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

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.

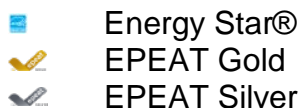
EPEAT

As available, for the following types of technology equipment, the City shall purchase EPEAT products registered at the “Silver” level or higher:

1. Desktop computers
2. Displays (Monitors) – under 60 inch diagonal
3. Laptop computers
4. Tablet computers
5. Printers

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.



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

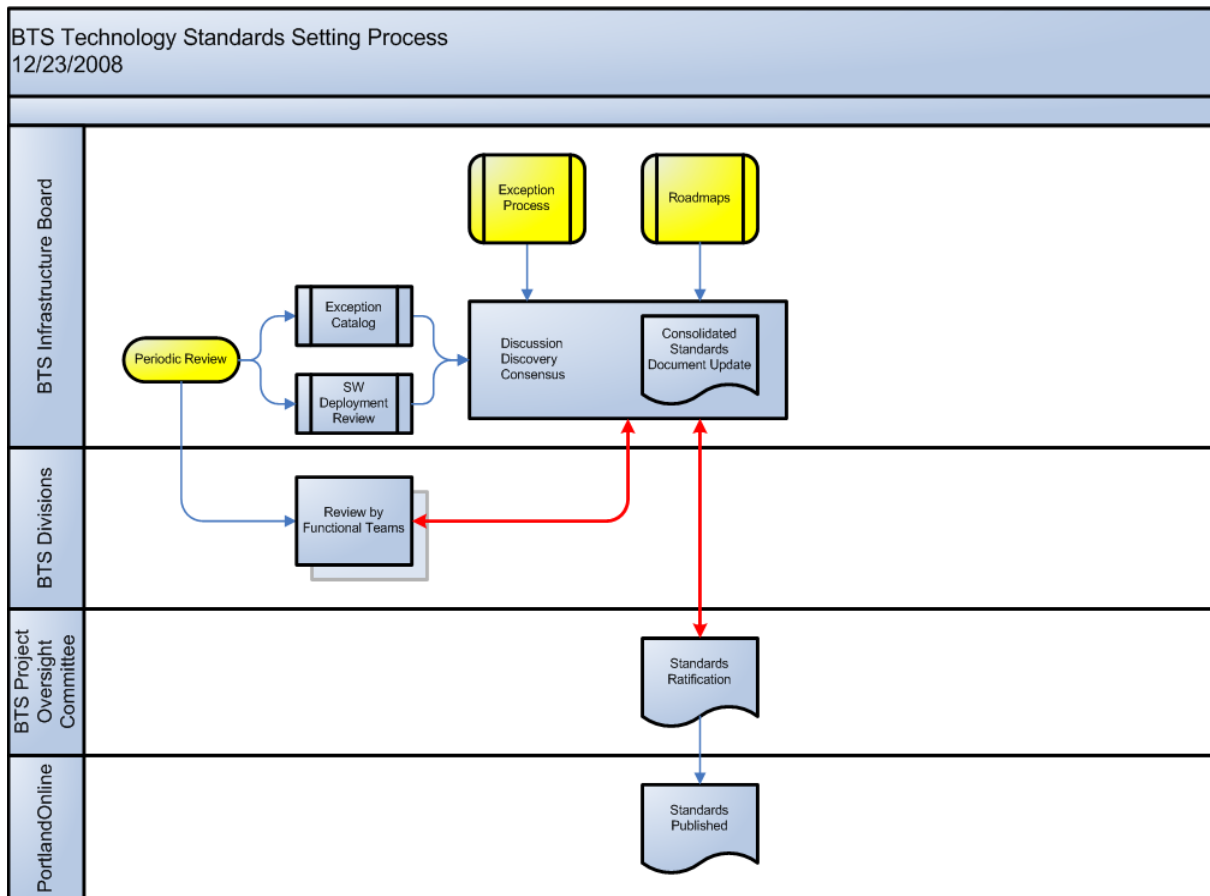
- alerting IB to EOL model changes in order to update this standards document
- working collaboratively within BTS to help establish important lifecycle dates and roadmap strategies.
- identifying when items need to be removed from the Legacy status.
- coordinating testing of products unless otherwise 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 a review of the standards 2 times per year in February and August. 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 Accommodation

Products that are known to be actively in use as ADA accommodations have been identified in the document with the [ADA] icon. These products are also listed in the index under ADA.

Hardware Standards









1. Workstation Hardware

Item	Standard Description	Standard Category	Support Level	BTS Owner
1.1. Desktop	Dell Optiplex 7050 	Standard	Full	Support Center / Hardware Standards Panel
	Dell Optiplex 755, 960, 780, 790, 7010, 7020, 7040	Legacy	Full	
1.2. Monitor	Dell - Flat Panel LCD P1917S 19" standard screen  , P2214H 22" widescreen  , U2412M 24" widescreen  , U2717D 27" widescreen  , UP3017 30" widescreen 	Standard	Full	
	Dell P190S 19" standard screen P1913S 19" standard screen P1914S 19" standard screen P2210 22" widescreen P2212H 22" widescreen U2410 24" widescreen U3014 30" widescreen	Legacy	Full	
1.3. Keyboard	USB, 104-key	Standard	Full	
1.4. Mouse	USB, optical wheel	Standard	Full	


Workstation and Laptop Hardware Notes:

1. The planned lifecycle replacement (LCR) for desktop workstations and laptop computers is 5 years effective July 2013.
2. 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.
3. LCD panel monitors have a longer life cycle are typically run until failure.

2. Laptop Hardware

Item	Standard Description	Standard Category	Support Level	BTS Owner
2.1. Laptop	Dell Latitude 5480 (w/WebCam) 	Standard	Full	Support Center / Hardware Standards Panel
	Dell Latitude E5440, E5450, E5470, E64xx, E65xx, D6xx	Legacy	Full	
Police	Dell Latitude 7480 	Standard	Full	
	Dell Latitude E7440, E7450, E7470	Legacy	Full	
2.2. Laptop – “Lite	Dell Latitude 7280 	Standard	Full	
	Dell Latitude D4xx, E4200, E62xx, E7240, E7250, E7270	Legacy	Full	
2.3. Laptop – Rugged	GETAC B300 	Standard	Full	
	Dell Latitude E64xx XFR, 64xx ATG & XFR, D630 ATG, ATR & XFR	Legacy	Full	
Police, Fire, PBEM Note: Toughbooks have historically been used by BES and Water also.	Panasonic Toughbook 19  Panasonic Toughbook 31  Panasonic Toughbook 53 	Standard	Full	
	Panasonic Toughbook PDRC (dash mounted monitor and wired keyboard)			
	Motorola MW520			
2.4. Mobile Data Computer – Fire	Panasonic Toughbook GETAC B300 	Standard	Full	
	Data 911 M6, M6 II, PM2, PM1, ETX-PM1, 19	Legacy	Full	
2.5. Laptop – Convertible	Dell Latitude XT	Legacy	Full	

3. Tablet Hardware

Item	Standard Description	Standard Category	Support Level	BTS Owner
3.1. iOS ¹	Apple iPad Mini 3, Mini 4, iPad Pro, iPad 9.7 inch with Verizon data plan	Standard	Limited	Communications / Telecom Engineering and Support
	Apple iPad 2, 3, 4, Mini, Mini 2, Air, Air 2	Legacy	Limited	
3.2. Windows 10	Microsoft Surface Pro 4 (WiFi only)	Standard	Limited	Support Center / Hardware Standards panel
Police	Panasonic Toughpad FZ-G1 	Standard	Full	Police

Tablet Hardware Notes:

- iPads may be purchased without a data plan, however BTS requires that both WiFi 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.**

¹ Smartphone and Operating System Limited Support: Ordering, initial device provisioning, setup of synchronization with Exchange, Verizon data and voice service.

4. Server Hardware

Item	Standard Description	Category	Support Level	BTS Owner
4.1. Windows based	Dell, PowerEdge R630, R730	Standard	Full	Production Services / Server Support
	Dell PowerEdge R900, R610, R620, R710, R720, R910, 2950 III, 1950 III, 1950, 2950.	Legacy	Full	
4.2. Red Hat based	Dell PowerEdge R630, R730	Standard	Full	
	Dell PowerEdge R900, R610, R620, R710, R720, R910, 2950 III, 1950 III, 1950, 2950	Legacy	Full	
4.3. AIX based	IBM p-Series/Power 8	Standard	Full	
	IBM p-Series/Power 6, p-Series/Power 7	Legacy	Full	
4.4. Blade Server	IBM Note: Blade servers will be fully retired as part of the 2017 migration of the data center.	Legacy	Full	

Server Hardware Notes:

1. The planned lifecycle for server hardware is 5 years.

5. Network Protocols

Item	Standard Description	Standard Category	Support Level	BTS Owner
5.1. Transport	TCP / IP (IPv4, IPv6)	Standard	Full	Communications / Network Engineering and Support
5.2. Routing	OSPF, BGP4, EIGRP	Standard	Full	
5.3. eMail	SMTP, TLS	Standard	Full	
5.4. Monitoring	SNMP V2c, SNMPv3, WMI	Standard	Full	
5.5. WiFi Radio	802.11ac 802.11n (2.4 GHz / 5 GHz)	Standard	Full	
	802.11b/g	Legacy	Full	
5.6. Line Negotiation – Workstation	Auto / Auto	Standard	Full	
5.7. Line Negotiation – Server	Auto / Auto	Standard	Full	

6. Network Connectivity

Item	Standard Description	Standard Category	Support Level	BTS Owner
<p>6.1. Cabling</p>	<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 Specifications section on page 47.</p> <p>New construction: 2 - Cat 6A. 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
	<p>Horizontal: UTP Cat 5e Patch: UTP Cat 5e</p>	Legacy	Full	
<p>6.2. WAN</p>	<p>T1, IRNE, INET, Freewire wireless, point-to-point fiber (gigabit), Metro Ethernet, DWDM.</p>	Standard	Full	
<p>6.3. SONET</p>	<p>Cisco 15454, 15310</p>	Standard	Full	
<p>6.4. 10 Gigabit Ethernet</p>	<p>ONS 15454 GE-XP/XPE CROSSPONDER, M6</p>	Standard	Full	

7. Network Routers

Item	Standard Description	Standard Category	Support Level	BTS Owner
7.1. Router	Cisco ME-3400e, ME-3600X, 3850, 4321, 4331, Nexus 7000, ASR. Arista 7280	Standard	Full	Communications / Network Engineering and Support
	Cisco 1841, 1921, 1941, 3750, 3750-X, 7206	Legacy	Full	
7.2. Components	Cisco T1 DSU/CSU WICS	Standard	Full	
	4-port Ethernet card	Legacy	Full	

8. Network Switches

Item	Standard Description	Standard Category	Support Level	BTS Owner
8.1. Switch	Cisco 2960C, 2960S, 3560C, ME-3400e, ME-3600X, 3850, 4500-x, Nexus 2000, 5000, 6001. Arista 7050.	Standard	Full	Communications / Network Engineering and Support
	Cisco 2950 (DC), 2960, 3750, 3750-X, 6500	Legacy	Full	
8.2. Components	Cisco SFP connectors	Standard	Full	

9. Plotters

Plotter 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.

10. Printers (Network)

Item	Standard Description	Standard Category	Support Level	BTS Owner
10.1. Laser	Monochrome: HP M402dne HP M506dn HP M604dn HP M605dn/x Color: HP M452dn HP M553dn/x HP M651dn	Standard	Full	Support Center / Hardware Standards Panel
	HP M551, M601, M602, 700, 1320, P2055, P3015, 3505, CP3525, CP3525, M401, M451, 4350, P4015, CP4525, CP6015, 9050	Legacy	Full	
10.2. Large Format Laser – 11 x 17	Monochrome: HP M712dn Color: HP M750dn HP M855xh HP CP5225dn	Standard	Full	
	CP6015, 9050	Legacy	Full	
10.3. Small Multi-function Laser	Monochrome: HP M227dfn HP M426dn HP M725dn Color: HP M47dnf	Standard	Full	
	HP M225, M425, M475, M476, CM1312, M1522, M1536, CM2320, M2727	Legacy	Full	

11. Scanners

Item	Standard Description	Standard Category	Support Level	BTS Owner
11.1. Workstation – flatbed, color	HP ScanJet 7500	Standard	Full	Support Center / Hardware Standards Panel
	HP 8390, HP 8350, HP N8420, HP N8460	Legacy	Full	
	Canon DR-225C Canon DR-M160ii	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
11.2. Workstation – sheet-fed, color	Canon DR-125C, DR-160, DR-2050C, DR-3080CII, DR-2010C, DR-4010C, DR-6010C	Legacy	Full	
11.3. Workgroup – flatbed, color, network attached	HP ScanJet Pro 4500	Standard	Full	
	HP N6350, 7650n	Legacy	Full	
11.4. Large Format – 11 x 17	Canon DR-6030C	Standard	Full	
	HP N9120 Canon DR-7090C	Legacy	Full	

12. Search Appliance

Item	Standard Description	Standard Category	Support Level	BTS Owner
12.1. Search Appliance	SwiftType	Standard	Full	Business Solutions / Web Development

13. Storage Area Network

Item	Standard Description	Standard Category	Support Level	BTS Owner
13.1. Storage Array	Hitachi Gx00	Standard	Full	Production Services / Storage Administration
	Hitachi HUS	Legacy	Full	
13.2. SAN Fabric Network	Fiber Channel Switch: <ul style="list-style-type: none"> • Brocade DCX8510 • Brocade 6520 	Standard	Full	
	Wide Area Mux: Cisco CWDM	Legacy	Full	
13.3. NAS Gateway	Hitachi HNAS	Standard	Full	
13.4. NAS file System Support	CIFS, NFSv3	Standard	Full	
13.5. SAN Replication	FCIP	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
13.6. SAN Routing Protocol	FSPF	Standard	Full	
13.7. SAN Transport Protocol	Fiber Channel	Standard	Full	

14. Telecommunications

Item	Standard Description	Standard Category	Support Level	BTS Owner
14.1. Satellite Phones	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	Communications / Telecom Engineering and Support
14.2. Broadband Wireless	Dell 5600 Gobi Mobile Broadband mini-card Verizon JetPack MiFi 7730L	Standard	Full	Communications / Telecom Engineering and Support (except for Police Specific)
	Verizon USB 760 Verizon Aircard (EVDO) Verizon MiFi 4620LE Verizon MiFi MHS291L VeriZon MiFi 620L	Legacy	Full	
Broadband Wireless Police	Panasonic Sierra Wireless MC 7750 Panasonic Sierra Wireless EM 7355	Standard	Full	
14.3. Pagers: Emergency	1-WayUSA/Mobility, Cook	Standard	Full	
14.4. Pagers: Non-Emergency	1-Way: USA/Mobility, Cook 2-Way: USA/Mobility	Standard	Full	
14.5. Smartphone ²	Motorola Droid 4 Samsung Galaxy S5 Samsung Galaxy S6, S7 (Police)	Exception Required	Limited	
	iPhone 5s, 6, 6 Plus, 6s, 6s Plus, SE, 8, 8 Plus	Standard		

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

Item	Standard Description	Standard Category	Support Level	BTS Owner
	Motorola Droid 3 Motorola Droid X2 Motorola Droid RAZR M iPhone 4s, 5, 5c, 7, 7 Plus Note: 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.	Legacy	Limited	
14.6. Smartphone Operating System	Android 4.0, 5.0 (Galaxy S5 only) Android 6.0, 7.0 (Police)	Exception Required	Limited	
	iOS 11.0.3	Standard		
	Android 2.3 iOS 4, 5, 6, 7, 8, 9, 10, 11.0.2 Windows Mobile 5, 6.0, 6.1, 6.5 Blackberry	Legacy	Limited	
MDC/Cellular Phone (Police Traffic Division)	Trimble Nomad (WIN mobile 6.5 PRO)	Legacy	Full	
14.7. Basic Cellular Phone	LG VN150s Samsung Convoy 3 (Ruggedized) Samsung Intensity III (basic w/slide out keyboard)	Standard	Full	Communications / Telecom Engineering and Support
14.8. USB Wireless Cellular Data Modem	Verizon 730L	Standard	Full	
	Pantech 290, 295, 620L	Legacy	Full	
14.9. Tablet		See Tablet Hardware on page 12.		
14.10. [ADA] Compliant Handset	CapTel 840i	Standard	Full	Communications / Telecom Engineering and Support

15. Tape

Item	Standard Description	Standard Category	Support Level	BTS Owner
15.1. Tape Format	LTO4	Legacy	Full	Production Services / Server Support
15.2. Tape Library	IBM 3494 Library	Legacy	Full	

16. Video

Item	Standard Description	Standard Category	Support Level	BTS Owner
16.1. Desktop USB Camera	Logitech c925-e Microsoft LifeCam Studio 1080p HD	Standard	Full	Support Center / Hardware Standards Panel
	Logitech QuickCam Pro9000, c910, c920	Legacy	Full	
16.2. Projector, Portable	InFocus IN116x, IN2128HDx	Standard	Full	
	Dell M209X, M210X, 1510X, 2400mp InFocus IN116, IN116a, IN3118HD, HD3138HD, IN3138HDa	Legacy	Full	
16.3. Projector, Ceiling mount	No standard specified 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 video specifications on page 48.	N/A		Communications / Radio and Video Shop
16.4. Digital Video Recorder (DVR)	PELCO DSSRV-030-US Note: This is a digital recorder. Additional encoders may be required depending upon the type of cameras used.	Standard	Full	
	PELCO DX8100s, DSSRV-005-US Custom built "white" box supported by BTS Radio and Video Shop.	Legacy	Full	
Digital Video Recorder (DVR) Police	HIKVision DVR	Standard	Full	
16.5. Digital Video Recorder Control Software	PELCO ControlPoint	Standard	Full	
Digital Video Recorder Control Software Police	Interview Tracker	Standard	Full	

Software and Application Development Standards

17. Application Development Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
17.1. Editing/Compiling	PLEdit 5.7 PL/SQL Developer 7.1 Oracle SQL Developer SQL Server Management Studio	Standard	Full	Business Solutions / Vertical Applications
Editing / Compiling Police	SQL Server Management Studio 2014	Standard	Full	
17.2. HTTP Posting Tool	Fiddler 2	Standard	Full	
17.3. Query Tool	Golden 5.7 Toad 12	Standard	Full	
	Toad 9.1	Legacy	Full	
17.4. SQL Server Utilities	Baretail Pro Redgate SQL Compare Utilities 9.0 SQL Server Management Studio 2016	Standard	Full	
	SQL Server Management Studio 2008, 2012, 2014	Legacy	Full	
17.5. XML Editor	Notepad++ 7.x, XML Notepad 2007	Standard	Full	

18. Application Development Tools – Windows-based

Item	Standard Description	Standard Category	Support Level	BTS Owner
18.1. Multi-platform	Visual Studio 2017 ColdFusion Oracle J Developer Eclipse	Standard	Full	Business Solutions
	Visual Studio .NET 2003, 2005 Visual Studio 2008/2010/2012	Legacy	Full	
18.2. Client / Server	Visual Studio 2017	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
	Access XP Developer PowerBuilder Visual Studio 6.0 VS.NET 2003, 2005, 2008, 2010, 2012	Legacy	Full	
18.3. Workstation Based	Access 2016	Standard	Full	
	Access 97, 2000, XP, 2013	Legacy	Full	
Workstation Based Police	Access 2013	Standard	Full	
18.4. Reporting Tool	Cognos Impromptu Actuate Crystal Reports 2013 Business Objects Enterprise 4.3 SQL Server Reporting Services 2008, 2008 R2, 2012, 2014, 2016	Standard	Full	
	Crystal Reports 8, 9, 10, 11, 2008, 2011	Legacy	Full	
18.5. Reporting Tool	Tableau Desktop Tableau Reader Tableau Online	Allowed	Limited	
18.6. OLAP	SQL Server OLAP Service SAP BW 7.40 Cognos	Standard	Full	
18.7. Installer	InstallAware InstallShield Windows Installer	Standard	Full	

19. Application Server

Item	Standard Description	Standard Category	Support Level	BTS Owner
19.1. Application Server (Java)	Tomcat 8.x Oracle WebLogic 12c WebSphere	Standard	Full	Production Services/Business Solutions
	Oracle WebLogic 11g Oracle 10g AS	Legacy	Full	

20. Backup / Recovery Software

Item	Standard Description	Standard Category	Support Level	BTS Owner
20.1. Backup Software	Tivoli – AIX (SAP only) CommVault – Windows / Red Hat Linux / AIXHat/AIX	Standard	Full	Production Services / Server Support
	Quest Litespeed – SQL	Legacy	Full	Business Solutions
Backup Software Police	Symantec Backup Exec 2015	Standard	Full	

21. Collaboration Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
21.1. Online Conferencing	Skype for Business with British Telecom Audio connectivity to the public telephone system	Standard	Full	Support Center / Software Standards Panel
	WebEx Go-To-Meeting (as a participant only)	Allowed	No Support	
21.2. Conference Recording Playback	WebEx Player (ARF format) WebEx Player (WRF format)	Allowed	No Support	

22. Database Standards

Item	Standard Description	Standard Category	Support Level	BTS Owner
22.1. Enterprise Database	Informix 12 Oracle 12c SQL Server 2012 SQL Server 2014 SQL Server 2016 PostgreSQL	Standard	Full	Oracle Production Services SQL: Production Services/Business Solutions
	SQL Server 2008 SQL Server 2008 R2 SQL Server 2005	Legacy	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
	SQL Server 2000 Oracle 11g			
22.2. Enterprise Database Client	Oracle 12c Client Oracle 11g client	Standard Legacy	Full Full	
22.3. Workstation Based	Access 2013 Access 97, 2000, XP	Standard Legacy	Full Full	Business Solutions
Workstation Based Police	Access 2010	Standard	Full	
22.4. Database Connector Protocol	ODBC OLE DB XML JDBC ADO	Standard	Full	

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.

23. Directory Services

Item	Standard Description	Standard Category	Support Level	BTS Owner
23.1. Directory Services	Microsoft Active Directory	Standard	Full	Production Services / Server Support

24. eMail

Item	Standard Description	Standard Category	Support Level	BTS Owner
24.1. Server Software	Microsoft Office 365 Exchange Online Exchange Server 2013 (Police)	Standard	Full	Production Services / Server Support
	Exchange 2007,	Legacy	Full	
24.2. Web Client	Microsoft Office 365 Outlook Web App	Standard	Full	
24.3. eMail Synchronization	Microsoft Office 365 Exchange Online built-in	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
24.4. Mail Client	Outlook 2016	Standard	Full	Support Center / System Engineering
Mail Client Police	Outlook 2013	Standard	Full	
24.5. Address Book	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	
24.6. Bulk Email Service	MailChimp	Allowed	No Support	
24.7. eMail Filing Tool	SimplyFile	Allowed	No Support	

25. Geographical Application Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
25.1. GIS Desktop Applications	ArcGIS 10.3.1 MapWorks 10.3.1	Standard	Full	Business Solutions
	ArcView 3.3/3.4 Microstation (MGE) MapInfo GeoOutlook	Legacy	Full	
25.2. GIS Internet Map Server	ArcGIS Server 10.2.2	Standard	Full	
	GIS/SQL	Legacy	Full	
25.3. GIS Application Development	Visual Studio 2010, 2015, 2017 ArcObjects 10.1, 10.2, 10.3 ArcEngine 10.1, 10.2, 10.3 Eclipse XCode	Standard	Full	
	Visual Studio .NET 2003, 2005, 2008 MapObjects AML Visual Basic 6 Visual Basic for Applications	Legacy	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
25.4. Mapping Software	Google Earth \ Google Earth Pro (free version)	Standard	Limited	Support Center

26. Graphic Design Software

Item	Standard Description	Standard Category	Support Level	BTS Owner
26.1. Visual Diagramming	Microsoft Visio 2013	Standard	Full	Support Center / Software Standards Panel
	Microsoft Visio 2007, 2010 Notes: <ul style="list-style-type: none"> as of 6/11/2013 BTS adopted a policy to allow owners of 2007 or 2010 versions to install and use those versions through their lifecycle. 	Legacy	Full	
26.2. PDF Creation	Adobe Acrobat Standard or Professional DC Adobe LiveCycle Designer PDFCreator 1.7 (open source) Office 2013 built-in	Standard	Full	
	Adobe Acrobat Standard or Professional 9, 10, XI PDF Creator 1.6	Legacy	Full	
26.3. Graphic Design	Adobe Creative Suite 6 (InDesign, Photoshop, Illustrator, Flash, DreamWeaver, Fireworks, Premier Pro) Adobe Photoshop Elements Adobe Premier, Premier Elements Microsoft Publisher 2013 Windows Movie Maker XnView	Allowed	Limited	
	Adobe Creative Suite 1, 2, 3, 4, 5, 5.5, Publisher 2003, 2007, 2010	Legacy	Limited	
Graphic Design police	Microsoft Publisher 2013 Sony Vegas 15 Pro (Police)	?		
26.4. Screen Capture	Camtasia Greenshot Snagit	Allowed	Limited	

Item	Standard Description	Standard Category	Support Level	BTS Owner
26.5. Computer Aided Design	Sketchup Pro Sketchup Make	Allowed	Not Supported	

27. Internet Domain Naming

BTS recommends bureaus use the form *www.portlandoregon.gov/function* when creating internet domain names for specific functions to be exposed to the public. This form 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 form *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.

28. Miscellaneous Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
28.1. Enterprise Fax	AccuRoute FAX	Standard	Full	Production Services / Server Support
28.2. Enterprise Paging	OmniTrend PageMaster	Standard	Full	
28.3. FTP Client	FileZilla (http://filezilla-project.org) Internet Explorer Note: See Storage Services and Devices on page 36.	Standard	Full	Support Center / Software Standards Panel
28.4. Kiosk				
28.5. Online Training Content Editing	Adobe Captivate	Standard	Full	
28.6. Outlook Calendar Publishing	WinCalendar Standard	Allowed	Limited	
28.7. [ADA] Speech to Text	Dragon Naturally Speaking	Standard	Limited	Business Solutions
28.8. Survey Application	Survey Monkey (web application)	Allowed	Limited	Support Center / Software Standards Panel
	Attachmate Extra Extreme	Allowed	No Support	

Item	Standard Description	Standard Category	Support Level	BTS Owner
28.9. Terminal Emulation (3270)	OpenText Exceed OpenText HostExplorer		Limited Limited	Production Services / Data Center
	Reflection 2011	Legacy	No Support	
28.10. Wiki	ScrewTurn Wiki TikiWiki	Standard	Full	Business Solutions Production Services
28.11. SMS Text Message Capture	Macroplant iExplorer SMARSH 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.	Allowed	Limited	Enterprise Architecture

29. Operational Support Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
29.1. Work Order Ticketing	Cherwell	Standard	Full	Support Center / SET
29.2. Software Distribution	Altiris Client Management Suite	Standard	Full	
29.3. Workstation Remote Control	Bomgar	Standard	Full	
29.4. Automated Inventory	Altiris Client Management Suite (desktop) SNOW License Manager 7 (server)	Standard	Full	
29.5. Asset Inventory	Altiris Asset Management	Standard	Full	
29.6. Server Remote Control	Microsoft Remote Desktop Services (RDS)	Standard	Full	Production Services / Server Support
29.7. Monitoring	Toad for Oracle DBA V11	Standard	Full	Production Services / Database Administration
	Microsoft SCOM Oracle OEM/Grid Control OpManager Server Studio SQL Server Management Studio 2008, 2008 R2, 2012, 2014, 2016	Standard	Full	Production Services / Server Support & Database Administration

Item	Standard Description	Standard Category	Support Level	BTS Owner
	VMware vROPs Brocade Network Advisor Hitachi Tuning Manager HVSR	Standard	Full	Production Services / Storage Administration
	Cacti NetDisco OpenNMS PAESSLER PRTG Network Monitoring (Police) 17.1 Sitescope SolarWinds GrayLog (syslog) WMI	Standard	Full	Communications / Network Engineering and Support

30. Project Management Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
30.1. Project Management Software	Microsoft Project 2016 Notes: <ul style="list-style-type: none"> With Office 365 2016, Microsoft blocks installation of Office 365 2016 simultaneous with the shrink-wrap version of Project 2016. If Project 2016 is to be used, the subscription version must be installed. Project 2013 or 2010 may be installed simultaneously. 	Standard	Full	Project Management Office
	Microsoft Project 2010, 2013 Notes: <ul style="list-style-type: none"> as of 6/11/2013 BTS adopted a policy to allow owners of 2010 or 2013 versions to install and use those versions through their lifecycle. 	Legacy	Full	
30.2. Project Portfolio Management (PPM) Software	Innotas PPM	Standard	Full	

31. Server Base Software

Item	Standard Description	Standard Category	Support Level	BTS Owner
31.1. Operating System	Windows Server 2012 R2 64-bit	Standard	Full	Production Services / Server Support
	Windows Server 2008, 2008R2, 2012	Legacy	Full	
	Red Hat Enterprise 7.x	Standard	Full	
	Red Hat Enterprise 6.x;	Legacy	Full	
	AIX 8.x AIX 7.x	Standard	Full	
	AIX 6.x	Legacy	Full	
	MS IE 11	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
31.2. Base Software (Windows)	Windows Remote Desktop McAfee Snow			
	MS IE 8, 9, 10	Legacy		
31.3. Virtualization Hypervisor	VMWare VSphere 6 IBM VIO	Standard	Full	

32. Source Code Control System

Item	Standard Description	Standard Category	Support Level	BTS Owner
32.1. Source Control	Subversion/VisualSVN 2.1.10 TortoiseSVN 1.6.16 AnkhSVN 2.1 Visual SourceSafe 2005 git	Standard	Full	Business Solutions
	Visual SourceSafe 6.0	Legacy	No Support	

33. Web Tools

Item	Standard Description	Standard Category	Support Level	BTS Owner
33.1. Content Management and Page Development Tools	DreamWeaver City Site / Content Management Tool (Portland Online) Eclipse	Standard	Full	Business Solutions
	Cold Fusion Studio	Legacy	Full	
33.2. Site Management Tools	DreamWeaver	Standard	Full	
33.3. Runtime Environment Tools	ColdFusion Server MX Java SQL Server Reporting Services 2008, 2008 R2	Standard	Full	
33.4. Web Application Development	Visual Studio 2017 Cold Fusion Studio Oracle J Developer Eclipse	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
33.5. HTML Version	HTML 4.0	Standard	Full	
33.6. Scripting Languages	PERLVBScript.NetJavaScriptColdFusion ScriptPython 2.5	Standard	Full	
33.7. Video Encoding	Real Producer	Legacy	Full	
33.8. Web Server	Microsoft IIS 7.0Apache 2.2	Standard	Full	
	Microsoft IIS 5.0, 6.0Apache 1.x	Legacy	Full	
33.9. Web Browser	Microsoft Internet Explorer	Standard	Full	Support Center
	Chrome (with current update)	Allowed	Limited	

34. Workstation Software

Item	Standard Description	Standard Category	Support Level	BTS Owner
34.1. Operating System	Windows 7 SP1 Windows 10 Versions 1511, 1603, 1607	Standard	Full	Support Center / Software Standards Panel
34.2. Base Software	Adobe Reader DC Windows Media Player 11 McAfee VirusScan 8 (with current update) Adobe Flash Player 12 (with current update) Microsoft DirectX 11 Internet Explorer 11 .Net framework 1.1, 2.0 SP2, 3.0 SP2, 3.5 SP1, 4.0 Java 8 (with current update) SAP GUI 7.4 Silverlight	Standard	Full	
	Adobe Reader X, XI Cyberlink Power DVD (OEM) Internet Explorer 9 Java 6, 7 Nero Express (OEM)	Legacy	Full	
34.3. MS Office Suite	MS Office 365 ProPlus 2016 / 32-bit via Office 365 subscription (Word, Excel, PowerPoint, Access, OneNote, Publisher, Skype for Business, OneDrive for Business)	Standard	Full	

Item	Standard Description	Standard Category	Support Level	BTS Owner
	MS Office 2007, 2013	Legacy	Full	
Police	MS Office 2013	Standard	Full	
34.4. eMail Client	MS Outlook 2016	Standard	Full	
	MS Outlook 2007, 2013	Legacy	Full	
Police	MS Outlook 2013	Standard	Full	
34.5. Media Player	Windows Media Player 11 VLC Client	Allowed	Full	
34.6. CD/DVD Creation	Windows built-in	Standard	Full	
	Roxio Creator (OEM)	Legacy	Full	
34.7. Workstation Database	See Database Standards, page 24.			
34.8. Firewall	Windows Firewall	Standard	Full	Information Security
34.9. Password Safe	KeepPass	Allowed	No Support	Information Security
34.10. ZIP File Compression	Windows 7 built-in Zip utility 7-Zip	Allowed	No Support	Support Center / Software Standards Panel

Security Technology Standards

35. Authentication

Item	Standard Description	Standard Category	Support Level	BTS Owner
35.1. Windows	Kerberos	Standard	Full	Information Security
35.2. Two-Factor	RSA Secure ID	Standard	Full	
35.3. Single Sign On (Police)	Imprivata OneSign	Standard	Full	
35.4. WiFi	Authentication Protocols EAP-TLS , PEAP Certificate provisioning: Autoenrollment via AD	Standard	Full	
35.5. RADIUS	Cisco ISE	Standard	Full	Communications / Network Engineering and Support

36. Encryption

Item	Standard Description	Standard Category	Support Level	BTS Owner
36.1. Data Storage	AES	Standard	Full	Information Security
	3DES	Legacy	Full	
36.2. Web Traffic	TLS 1.2	Standard	Full	
	External facing certificates: Verisign Secure Site, Secure Site Pro	Standard	Full	
	Internal facing certificates only: Internal Certificate Authority, Verisign	Standard	Full	
	Secure Sockets Layer (SSL v3), TLS 1.0	Legacy	Full	
36.3. Secure FTP	SFTP (FTP over SSH)	Standard	Full	
36.4. WiFi Networks (transport)	WPA2 802.11i	Standard	Full	

37. Patch Management

Item	Standard Description	Standard Category	Support Level	BTS Owner
37.1. Workstation	Altiris Patch Management Windows Update for Business	Standard	Full	Support Center / SET
37.2. Server	Shavlik Protect	Standard	Full	Production Services / Server Support
	Windows Software Update Service (WSUS, Police)	Standard	Full	Police IT

38. Remote Network Access

Item	Standard Description	Standard Category	Support Level	BTS Owner
38.1. VPN Appliance	Pulse SA (PSA) RadiolP (Fire, Comm)	Standard	Full	Information Security
	NetMotion (Police)	Standard	Full	Police IT
38.2. Client VPN Software (IPSec)	NetMotion Client (Police)	Standard	Full	Police IT

39. Storage Services and Devices

Storage Services 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.

40. Virus Protection

Item	Standard Description	Standard Category	Support Level	BTS Owner
40.1. Workstation	McAfee VirusScan Enterprise 8 (with current update)	Standard	Full	Support Center
40.2. Server	McAfee	Standard	Full	Production Services
40.3. External Mail				
40.4. Internal Mail	McAfee	Standard	Full	
40.5. Console	McAfee ePO	Standard	Full	

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.

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.

Computer Speakers

Digital Cameras

- Minimal technical support is provided by BTS.
- USB interface required. Minimum USB 2.0. USB cables may not be provided by the vendor and need to be purchased separately.
- Support from BTS is not part of the SLA and will be billable.
- Any bundled software must be Windows 7 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.

Fax Machines

Flash / Compact Media cards

Headphones

Keyboards

- USB Interface required. Minimum USB 2.0.

Laser Printer Toner Cartridges

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. The OfficeJet 7000 series offers color, large format (11x17) capability. The OfficeJet Pro 8100 series offers color, standard format capability (letter, legal), is expandable for scanning, copying and faxing, and is supported by the City's standard Universal Print Driver from HP.
- USB interface required. Minimum USB 2.0. USB cables may not be provided by the vendor and need to be purchased separately.
- Support from BTS is not part of the SLA and will be billable. **Note: Installations on Windows 7 requiring BTS assistance and will be billable.**

- For locally attached use to a single computer only. BTS will not network these devices.

Mouses / Track-balls

- This includes Optical, multi-button with scroll wheels, track balls.
- USB interface required. Minimum USB 2.0.

Removable 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.
- 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.
 - [ADM-8.12 - Management, Preservation and Storage of Electronic Records and Electronic Mail Correspondence \(E-Mail\)](#).
- This category is 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](#).
- Devices chosen should operate with standard built-in operating system (Windows) drivers and not require customized drivers.
- Minimum version of USB is 2.0.
- 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.

Workstation Standard Criteria

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

Preferred Desktop

- Intel® processor, 64-bit (i5).
- 8 GB RAM memory (Dual DIMM).
- Small to moderately sized hard drive used primarily for Operating System and application programs and associated configuration files. (500 GB)
- 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 Gold compliant.
- Intel Standard Management with Active Management Technology (AMT)
- 3 year warranty.

Laptop criteria match desktop workstation criteria as close as possible with the following additions.

- Preferred
 - 256MB Solid State Drive (SSD)
 - On-board Intel HD Graphics 4400 video.
 - 14" LED HD display.
 - WiFi 802.11 ac/a/b/g/n 2x2 Wireless LAN + Bluetooth 4.0, supporting EAP-TLS and WAP2.
 - Docking bay.
 - Built-in camera and microphone.
 - Fingerprint reader.
 - Backlit Keyboard
- Ruggedized
 - weather proof, shock resistant.
- Ultra-lite
 - Intel® processor, 64-bit
 - 8 GB RAM
 - 256 GB Solid State hard drive.
 - WiFi 802.11 b/g/n supporting EAP-TLS and WAP2.

- WiMax support (optional).
- Bluetooth support (optional).
- Docking bay.

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:

Representative Mfg. / Model	Any Intel Pentium-based Windows workstation such as: Panasonic, Data911, L3, etc.
Display	Minimum resolution: 800x600 with 1024x768 preferred
Processor Type / Speed	Intel Pentium / 1 .6 GHz Intel Pentium 2.6 GHz
Main Memory	1 GB recommended 8 GB recommended
Disk Storage	80 GB. Mapping may require more disk space, depending upon the layers.
Operating System Software	Windows 7 Enterprise SP1.

The Versadex MDC application is adapted for touchscreen use, so a touch-sensitive display was suggested, but not required.

It is commonly seen in two primary forms

- A ruggedized notebook
- A component-based, permanently mounted PC.

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

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/s, IPv4		
Page Size	Letter 8.5 x 11 Legal 8.5 x 14 No 10 Envelope	Letter 8.5 x 11 Legal 8.5 x 14 No. 10 Envelope	Letter 8.5 x 11 Legal 8.5 x 14 Tabloid 11x 17 No. 10 Envelope
Page definition language	PCL 5 Postscript		
Memory	32 MB	96 MB	128 MB
Display	LCD Panel for on-site configuration		
Driver	Microsoft certified for installation on Windows 2008 Server by listing at http://www.windowsservercatalog.com/ready.aspx . Supported device for HP Universal Print Driver.		
Duplexing	Yes		
Trays	1 trays plus multipurpose tray.	2 trays plus multipurpose tray.	2 trays plus multipurpose tray.
Envelope Feeder	Optional	Optional	
Compatible with 100% Recycled paper	Yes		
Color	Option for Black and White or Color models		
Energy Star	Yes		

Network Printer Specifications (B/W)

Feature	M402dne	M506dn	M604	M605	M712dn High Volume Large Format
Print Speed-Black (ppm: pages / minute)	40	45	52	58	40
Print Resolution (dpi: dots per inch)	1200 x 1200	1200 x 1200	1200 x 1200	1200 x 1200	1,200 x 1,200
Monthly duty cycle (pages)	80,000	150,000	175,000	225,000	200,000
Recommended monthly duty cycle	750-4,000	2,000-7,500	5,000-13,000	5,000-16,000	15,000-50,000
Memory: Standard	256 MB	512 MB	512 MB	512 MB	128 MB
Memory: Max	256 MB	1.5 GB	1.5 GB	1.5 GB	512 MB
Paper Trays: Std	2	2	2	2	3
Paper Trays: Max	2	5	6	6	4
Duplex Printing	Auto/Std	Auto/Std	Auto/Std	Auto/Std	Auto/Opt
11 x 17 (Large Format)	No	No	No	No	Yes
Energy Star	Yes	Yes	Yes	Yes	Yes
HP ePrint	Yes	Yes	Yes	Yes	

Network Printer Specifications (B/W Multi-Function)

Feature	M225dn	M426fdn	M725dn Large Format
Print Speed-Black (ppm: pages / minute)	26	40	40
Print Resolution (dpi: dots per inch)	1200 x 1200	600 x 600	1200 x 1200
Monthly duty cycle (pages)	15,000	80,000	200,000
Recommended monthly duty cycle	500 -2,000	750-4,000	5,000-20,000
Memory: Standard	256 MB	256 MB	1 GB
Memory: Max	256 MB	256 MB	1 GB
Paper Trays: Std	2	2	3
Paper Trays: Max	2	3	4
Duplex Printing	Auto/Std	Auto/Std	Auto/Std
11 x 17 (Large Format)	No	No	Yes
Energy Star/EPEAT	Yes/Silver	Yes/Silver	Yes
HP ePrint	Yes	Yes	Yes
Scanner Type	Flatbed with Auto Doc Feed	Flatbed with Auto Doc Feed	Flatbed with Auto Doc Feed
Max Scan Resolution (dpi)	1,200	1,200	600
Scan Speed (ppm)	6 color 15 B/W	21 color 26 B/W	30 color 43 B/W
Scan size	8.5x11 flat 8.5x14 doc feed	8.5x11 flat 8.5x14 doc feed	11 x 17
Copy Resolution	600 x 600	600 x 600	600 x 600
Copy reduce/enlarge	25-400%	25-400%	25-400%
Fax Resolution	300 x 300	300 x 300	600 x 600

Network Printer Specifications (Color)

Feature	M452	CP5225 Large Format	M553	M651	M750 Large Format	M855 Large Format
Print Speed-Black / color (ppm:pages / minute, normal quality)	28 / 27	20 / 20	40 / 40	42 / 42	30 / 30	45 / 45
Resolution (dots per inch)	600 x 600	1200 x 1200	HP ImageREt 3600	1200 x 1200	600 x 600	1200 x 1200
Monthly duty cycle (pages)	50,000	75,000	80,000	120,000	120,000	175,000
Recommended monthly duty cycle	750-4,000	1,500-5,000	6,000	2,000-17,000	2,500-10,000	4,000-17,000
Memory: Standard	128 MB	192 MB	1 GB	1.5 GB	1 GB	1 GB
Memory: Max	128 MB	448 MB	2 GB	1.5GB	1 GB	1 GB
Paper Trays: Std	2	2	2	2	3	5
Paper Trays: Max	3	3	5	5	6	5
Duplex Printing	Auto/Std	Auto/Std	Auto/Std	Auto/Std	Auto/Std	Auto/Std
11 x 17 (Large Format)	No	Yes	No	No	Yes	Yes
Energy Star / EPEAT	Yes	Yes	Yes/Silver	Yes	Yes	Yes

Network Printer Specifications (Color, Multi-Function)

Feature	M477fdn
Print Speed-Black / color (ppm:pages / minute, normal quality)	28 / 28
Resolution (dots per inch)	600 x 600
Monthly duty cycle (pages)	50,000
Recommended monthly duty cycle	750-4,000
Memory: Standard	256 MB
Memory: Max	256 MB
Paper Trays: Std	2
Paper Trays: Max	3
Duplex Printing	Auto/Std
11 x 17 (Large Format)	No
Energy Star / EPEAT	Yes
Scanner Type	Flatbed with Auto Doc Feed (ADF)
Max Scan Resolution (dpi)	1200 x 1200
Scan Speed (ppm)	B/W: 26 ppm / 47 ipm Color: 21 pm / 30 ipm
Scan size	Flatbed: 8.5x11 ADF: 8.5x14
Copy Resolution	600 x 600
Copy reduce/enlarge	25-400%
Fax Resolution	300 x 300

Scanner Standard Criteria

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

Type	Native Resolution	Speed (BW)	Max scan size	Connectivity	Type	Doc Feed
Low Volume	300 x 300 dpi	10 ppm	8 ½ x 14	USB 2.0	Flatbed or Sheet fed	Std 50 sheet.
Medium Volume	300 x 300 dpi	20 ppm, 40 ipm dup	8 ½ x 14	USB 2.0	Flatbed or Sheet fed	Std 50 sheet.

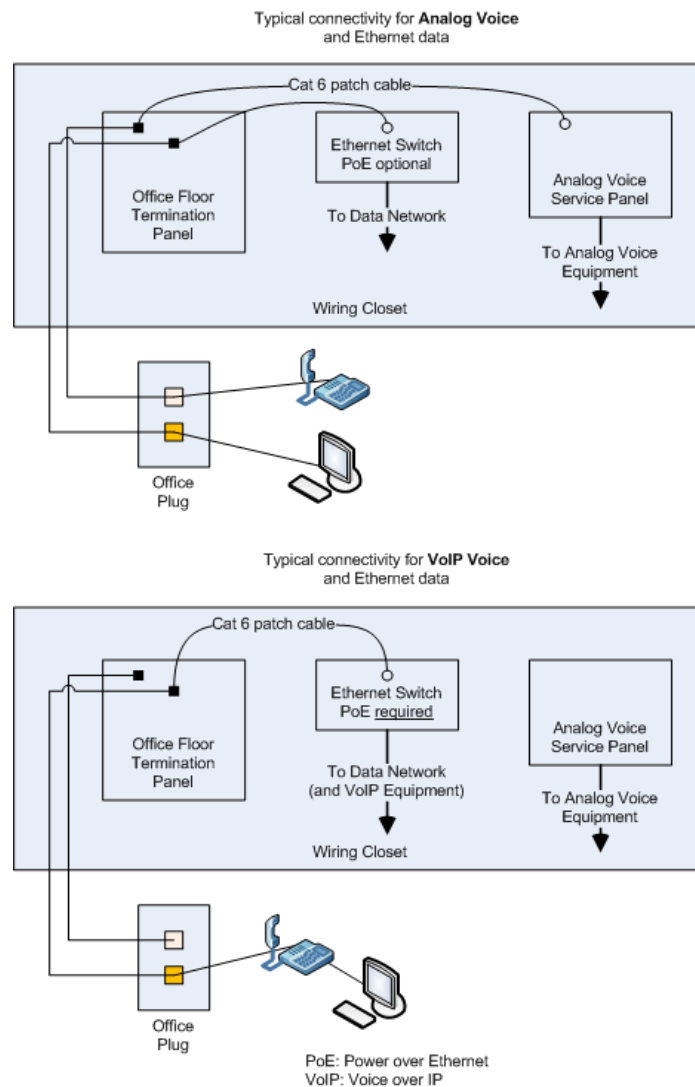
Cabling Specification

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.



Video Projector Criteria

Attribute	Ultra Portable	Portable	Ceiling Mounted
Resolution	1024 x 768 (XGA/HDMI)	1024 x 768 (XGA/HDMI)	1024 x 768 (XGA/HDMI)
Brightness	Minimum 2500 Lumens	Minimum 2500 Lumens	Minimum 100 Lumens / sq ft of Screen
Remote Control	Optional	Optional	Yes
Zoom Lens	Yes	Yes	Yes
Focus	Manual	Manual	Powered via Remote Control
Video Input	VGA	VGA	VGA
Color	16.7 million	16.7 million	16.7 million
Weight	≤ 4 lbs ("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.

Update Log

Changes to the document since adoption.

Date	Item	Standard Description	Category / Support Level
9/12/17	15.8 USB Wireless Cellular Data Modem	730L 620L	Standard / Full Legacy / Full
10/10/17	15.6 Smartphone Operating System	11.0.3 10.x, 11.0.2	Standard / Full Legacy / Full
	26.5 Computer Aided Design	Sketchup Pro Sketchup Make	Allowed / Not Supported
10/24/17	14.5 Smartphone	iPhone 8, 8 Plus iPhone 5, 5c	Standard / Limited Legacy / Limited
11/1/2017	40.3 External Mail Virus Protection	Kaspersky	Removed
	28.4 Kiosk Miscellaneous Tools	Microsoft Steady State	Removed
	14.5 Smartphone	iPhone 7, 7 Plus	Legacy / Limited

Index

7-Zip	34	Windows	35
802.11	13	Backup	24
Access.....	23	Baretail	22
Active Directory	25	BGP4.....	13
ADA		Blade Server	13
phone handset.....	19	Blank Media	39
voice recognition.....	28	Broadband Wireless.....	18
Adobe		Bulk eMail Service.....	26
Acrobat	27	Cabling.....	14
Captivate	28	Cacti	29
Creative Suite	27	CAD.....	See Computer Aided Design
DreamWeaver	27, 32	Calendar Publishing	28
Fireworks	27	Camera	
Flash.....	27, 33	desktop	20
Illustrator	27	digital	38
InDesign	27	Logitech	20
Photoshop	27	Microsoft	20
Premier / Premier Pro	27	Camtasia	27
Reader.....	33	Canon	
AIX	31	scanner.....	16
AIX Server.....	13	CapTel phone.....	19
Altiris	29	Captivate	28
patch management.....	36	CD.....	39
Android.....	19	CD Creation	34
AnkhSVN.....	32	Cellular	
Apache.....	33	phone.....	19
Apple		USB cellular data modem	19
Air	12	wireless.....	18
dictation feature	12	Chrome	33
iOS.....	12, 19	CIFS	17
iPad	12	Cisco	
iPhone	18	10 Gigabit Ethernet.....	14
Mini	12	DSU/CSU	15
Application Server	23	fabric switch.....	17
ArcEngine.....	26	Nexus	15
ArcGIS.....	26	RADIUS	35
ArcObjects.....	26	router	15
Attachmate		SFP connector	15
Extra Extreme	28	SONET	14
Reflection.....	28	switch.....	15
Authentication		Client	
single sign-on	35	eMail	34
WiFi	35	FTP	28

NetMotion	36	Eclipse.....	22, 26, 32
VLC.....	34	EIGRP	13
VPN	36	eMail	
Client/Server	22	bulk service.....	26
Cognos.....	23	client	26, 34
ColdFusion	22, 32, 33	filing tool	26
Collaboration	24	server.....	25
CommVault	24	synchronization.....	25
Computer		Encryption protocols	
desktop	10	AES	35
laptop.....	11	FTP.....	35
Computer Aided Design	28	SSL.....	35
Conferencing.....	24	TLS	35
ControlPoint	20	WiFi	35
Cook pager.....	18	Energy Efficiency	
Creative Suite.....	27	Energy Star®.....	7
Crystal Reports	23	EPEAT	7
Database		Ethernet.....	14
client	25	10 gigabit	14
connector protocol	25	EWS	See eMail Synchronization
enterprise.....	24	Exceptions.....	3
Informix.....	24	Extra Extreme	28
Microsoft Access.....	25	FAX	28
Oracle	24	Fax Machine.....	38
SQL	24	Fiber Channel.....	18
workstation	25	Fiddler	22
DCNM	29	Firewall	
Dell		desktop	34
desktop	10	Fireworks.....	27
laptop.....	11	Flash	27
Latitude.....	11	Flash Media cards.....	38
monitor.....	10	Flat Panel Monitor	10
Optiplex	10	FTP	
PowerEdge	13	client	28
XFR	11	GETAC.....	11
Desktop Computer	10	GIS	
Dictation	12	application development	26
Digital Video Recorder	20	ArcEngine	26
Directory Services	25	ArcGIS	26
Display Monitor	10	ArcObjects.....	26
Dragon Naturally Speaking	28	desktop	26
DreamWeaver	27, 32	mapping server	26
DSU/CSU	15	MapWorks	26
DVD.....	39	Gobi.....	18
DVD Creation	34	Golden.....	22
DVR.....	20	Google	

Chrome	33	Juniper	
Google Earth	27	VPN	36
Go-To-Meeting	24	KeePass	34
Graphic Design	27	Keyboard	10, 38
GrayLog	29	Kiosk	28
Hardware		Laptop Computer	11
standards	10	Latitude	11
Headphones	38	LCD Monitor	10
Hitachi	17	LCR	10
HP		Lifecycle	
printer	16	desktop computer	10
scanner	16	laptop computer	10
Universal Print Driver (UPD)	43	server	13
HTML	33	tablet device	12
HVSR	29	Linux	31
IBM		Linux Server	13
server	13	Litespeed	24
tape library	20	Locally connected printer	38
Tivoli	24	Logitech camera	20
VIO	32	Macroplant	29
IE33		MapWorks	26
IIS	33	McAfee	31, 33, 36
Illustrator	27	MDC	11, 42
Imprivata	35	Microsoft	
InDesign	27	Access	23, 25
INET	14	Active Directory	25
InFocus		camera	20
projector	20	DirectX	33
Informix	24	IIS	33
Innotas	31	Internet Explorer	31, 33
Installers		Movie Maker	27
InstallAware	23	Office	33
InstallShield	23	Outlook	26, 33
Windows Installer	23	Project	31
Internet Domain Naming	28	Publisher	27
Internet Explorer	33	SCOM	29
iOS	12, 19	Silverlight	33
dictation feature	12	SQL Server	24
iPad	12	SQL Server Reporting Services	32
iPhone	18	SSRS	32
Iridium	18	Surface Pro	12
IRNE	14	Visio	27
J Developer	22, 32	Visual Studio	22, 26, 32
Java	22, 32, 33	Windows Media Player	34
application server	23	Windows Update for Business	36
JavaScript	33	WSUS	36

MiFi	18	OSPF	13
Mobile Data Computer	11	Outlook.....	26
Mobile Data Computers.....	42	OWA.....	25
Monitor	10	Web Access.....	25
Monitoring	29	Pager.....	18
Mouse	10, 39	server.....	28
NAS.....	17	Panasonic Toughbook.....	11, 12
NetDisco.....	29	Password	34
NetMotion.....	36	Patch Management	36
Network		PC Anywhere	29
cabling	14	PDF Creation	27
connectivity.....	14	PDFCreator	27
DSU/CSU	15	PELCO.....	20
INET	14	PERL.....	33
IRNE.....	14	Phones	
routers	15	ADA compliant.....	19
SONET	14	basic cellular phone.....	19
switch.....	15	satellite	18
T1	14	smartphone.....	18
Network Attached Storage	17	Photoshop	27
Nexus	15	PL/SQL.....	22
NFS.....	17	PLEdit.....	22
Notepad++	22	Plotter.....	15
OLAP.....	23	PowerEdge.....	13
Online Conferencing.....	24	Premier.....	27
Online Training Content Editor	28	Printer.....	16
OpenNMS	29	11 x 17.....	16
Operating System		color.....	16
AIX.....	31	large format	16
Android	19	laser.....	16
iOS.....	19	locally connected	38
Linux.....	31	multi-function laser.....	16
Red Hat	31	Project Management Tools	31
server.....	31	Projector.....	20
smartphone.....	19	Protocol	
VMWare.....	32	database connector	25
Windows	31, 33	SAN routing	18
workstation	33	SAN transport	18
Oracle		Protocols	
application server.....	23	802.11.....	13
client	25	BGP4.....	13
database.....	24	EIGRP	13
Grid Control	29	eMail	13
J Developer	22, 32	monitoring.....	13
SQL Developer	22	OSPF.....	13
WebLogic.....	23	routing.....	13

SMTP.....	13	Windows	13
TCP / IP	13	Server Hardware	13
transport	13	SFP connectors.....	15
WiFi	13	Shavlik.....	36
p-Series server.....	13	SimplyFile.....	26
Python	33	Single sign-on	35
Quest Litespeed	24	Sitescope	29
RadiolP	36	Sketchup	28
Red Hat Linux	31	SMARSH.....	29
Redgate.....	22	Smartphone.....	18
Reflection	28	SMS Text Message Capture	29
Remote Control	29	SMTP	13
Remote Network Access.....	36	Snagit.....	27
Removable Media	39	SNOW	29
Reporting Tools		SolarWinds.....	29
Cognos	23	SONET.....	14
Crystal Reports.....	23	Sony Vegas.....	27
OLAP	23	Source Code Control System.....	32
Router	15	Speakers	38
Roxio	34	Specifications	
SAN..... See Storage Area Network		cabling	47
SAP GUI.....	33	laptop.....	40
Satellite Phone	18	MDC	42
Scanner.....	16	printers.....	43
11 x 17.....	17	scanners	46
flatbed.....	16	video projector	48
large format	17	workstation	40
network attached	17	Speech to Text	28
sheetfed.....	16	SQL	
workgroup.....	17	backup	24
Screen Capture	27	database.....	24
Search Appliance	17	utilities.....	22
Security certificates	35	SQL Server Reporting Services	32
Server		SSRS	32
AIX.....	13	Standards	
application	23	categories defined	5
base software	31	exceptions to	3
blade.....	13	owner.....	7
Dell	13	process	8
eMail	25	rationale.....	3
GIS Mapping.....	26	support levels	5
IBM	13	Storage Area Network	
linux	13	NAS Gateway	17
p-Series	13	replication	17
web	33	routing protocol.....	18
wiki.....	29	SAN fabric	17

storage array	17	DVR control software.....	20
transport protocol.....	18	encoding	33
Subversion/Visual SVN	32	projector.....	20
Support Levels	5	USB camera	20
Surface Pro	12	Virus Protection	36
Survey Monkey	28	Visio	27
Surveys	28	Visual SourceSafe.....	32
SwiftType	17	Visual Studio	22, 32
Switch.....	15	VLC Client	34
Syslog	29	VMWare	32
T1	14	Voice Recognition	28
Tablet	12	VPN.....	36
Tape	19	Web	
format	20	browser.....	33
library.....	20	content management.....	32
TCP / IP.....	13	tools	32
Terminal Emulation	28	WebEx.....	24
Thumb Drive.....	39	player.....	24
Tivoli.....	24	WebLogic	23
Toad	22, 29	WebSphere	23
Tomcat	23	Widescreen Monitor	10
Toner Cartridges	38	Wiki	29
TortoiseSVN.....	32	WinCalendar	28
Toughbook	11	Windows.....	33
Track-ball	39	Remote Desktop.....	31
Training Content Editor	28	Server	31
Two Factor Authentication.....	35	Windows Installer	23
USA/Mobility pager.....	18	Wireless	
USB		broadband data	18
camera.....	20	pager	18
printer	38	USB cellular data modem	19
storage device	39	WMI.....	29
USB cellular data modem.....	19	Workstation hardware	10
VBScript	33	WSUS	36
Verizon.....	12	XCode	26
USB cellular data modem	19	XFR	11
Video	48	XML Editor	22
desktop camera	20	XnView.....	27
Digital Video Recorder (DVR).....	20	ZIP Files	34