Amendment Approval Form

Contract Between:

Northrop Grumman Systems Corporation
7575 Colshire Drive
McLean, VA 22102-7508

and

The Commonwealth of Virginia
11751 Meadowville Lane
Chester, VA 23836

Contract Number	**VA-051114-NG**
Amendment Number	**112**
Description of Contract Change – Provide a brief description of contract change	Technology Refresh Plan for CY9
Section(s) of CIA Referenced – Identify section(s) of CIA modified, including Attachments and Schedules	• Schedule 3.11 (Technology Refresh Plan) • Appendix 1 to Schedule 3.11 (Technology Refresh Plan Provisioning Levels) (new)

This is Amendment No. 112 to the Comprehensive Infrastructure Agreement between the Commonwealth and Vendor originally dated as of November 14, 2005 and as subsequently amended (hereinafter, "Amendment No. 112"). The Commonwealth and Vendor have agreed to modify the Comprehensive Infrastructure Agreement as set forth below. Except as expressly modified in Amendment No. 112, the terms and conditions of the Agreement shall remain in full force and effect. Capitalized terms used but not defined in Amendment No. 112 shall have the meanings assigned to them in the Agreement.

1. Schedule 3.11 (Technology Refresh Plan) is deleted in its entirety and replaced with the attached Exhibit A.

2. Appendix 1 to Schedule 3.11 (Technology Refresh Plan Provisioning Levels) is added to the Agreement as the attached Exhibit B.

The Parties have executed this Amendment No. 112 on the dates indicated below.

VITA for the Commonwealth of Virginia	**Northrop Grumman Systems Corporation**
By: Francine C. Barnes	By: M L Esch for:
Name: Francine C. Barnes	Name: Roxanne Esch
Contract Manager	Director, Contracts
Date: 5/19/15	Date: 4/20/2015

SCHEDULE 3.11
TO THE
COMPREHENSIVE INFRASTRUCTURE AGREEMENT
TECHNOLOGY REFRESH PLAN

Introduction

This Schedule 3.11 sets forth the hardware and software planned refresh Vendor will complete under the Agreement. The Technology Refresh Plan is designed for hardware and software that have transitioned to Vendor's enterprise-level services, solutions, and support. Non-transitioned or legacy technologies, systems, applications, or services may require a custom solution, which will be in accordance with the Agreement, including paragraphs 3 and 5 of Appendix 12 to Schedule 3.3.

The provisioning levels for End-user Workstations and Eligible Customer requested servers are set forth in Appendix 1 to this Schedule 3.11. These provisioning levels replace and supersede those in Attachment 10.1.13 to Schedule 10.1. These provisioning levels will be reviewed by the Parties on a regular basis. Updates will be made as needed and reviewed through the VITA Architecture Review (VAR) process.

- Vendor has suggested certain technological advancements and improvements (referred to as the Product Roadmap) in accordance with Section 3.5 of the Agreement. Vendor and VITA have collaborated on such Product Roadmap and certain activities have been forecasted to be implemented, which are specified in this plan.
- Prior to performing the Product Roadmap-forecasted hardware and software planned activities listed below, as part of Vendor's Service Change Request (SCR) process, Vendor will perform an impact assessment to qualify the activity requirement and quantify the effect of the activity on existing services, applications, costs, and customer agencies. Vendor will determine whether to recommend proceeding with the activity or to seek exemption from the applicable requirement through established processes.
- Vendor's performance of the Product Roadmap activities in the tables below does not imply nor commit Vendor to refresh all similar platforms or systems in the same or similar manner.
- Timelines in this plan are estimates and are dependent upon VITA and Eligible Customer cooperation and participation.
- Refresh items, quantities, and schedules as noted in this plan are estimates based on data as of May 16, 2014.
- Quantities and schedules associated with planned refresh and Product Roadmap activities as noted in this plan are subject to change due to unexpected failure rates or schedule delays during the projected refresh period.
- Third-party hardware or software providers may "bundle" a new capability or feature with a technology change associated with those as listed in the tables below. Such bundling or other unilateral actions by third-parties do not modify the Agreement, including the Parties' obligations under the Agreement.
- Vendor has the right to perform a component repair by replacing a defective item with a similar item from Vendor-maintained stock. However, any such repair does not alter the planned refresh interval.
- Prior to performing a planned refresh, Vendor has the right to perform a system or asset repair by replacing the defective system or asset with a similar system or asset from Vendor-maintained stock.
    - Such replacement does not obligate Vendor to replace or refresh other similar systems or assets.
    - The refresh timeline, if any, will be based on the replacement system or asset going forward.

- Vendor may not be able to perform a planned refresh if Eligible Customer software or applications have not been properly updated and configured to run on refreshed hardware.

As used in this plan:

Contract Year 9 Quarter	Calendar Equivalent
Q1	Jul-Sep 2014
Q2	Oct-Dec 2014
Q3	Jan-Mar 2015
Q4	Apr-Jun 2015

Planned Periodic Refresh

Desktop Computing Services

Workstation hardware will be eligible for planned refresh once the "install date" field value in Vendor's asset management database equals or exceeds the *hardware age* corresponding to the applicable *hardware type* as listed in the table below.

Workstation Hardware Planned Refresh Intervals	
Hardware Type	**Hardware Age**
Desktop	5 years
Laptop	4 years
Tablet	4 years

The "install date" is the date Vendor first enters the Workstation hardware information into Vendor's asset management database following initial receipt of the asset. The "install date" value does not change over the life of the asset regardless of how many times Vendor removes, reallocates, or reinstalls the asset.

The tables below list the quantities estimated by Vendor as eligible for planned refresh in the specified *contract year*. Vendor will coordinate with the Eligible Customers to develop specific refresh schedule dates.

Annual Workstation Hardware Planned Refresh Quantities	
Contract Year	**Estimated Quantity To Be Refreshed**
09	6,641
10	10,371
11	14,699
12	13,937
13	9,281
Total	**54,929**

Contract Year 9 Workstation Hardware Type Distribution	
Hardware Type	**Estimated Quantity To Be Refreshed**
Desktops	3,490
Laptops	3,111
Tablets	40
Total	**6,641**

The table below shows Workstation hardware planned refresh quantities forecasted for Contract Year 9 distributed by agency:

Contract Year 9 Workstation Hardware Planned Refresh Quantities by Agency			
Agency	**Estimated Quantity**	**Agency**	**Estimated Quantity**
ABC	422	HDMC	1
BOA	2	IEIA	1
CH	2	JYF	4
CSH	34	LVA	4
DARS	18	MRC	3
DBHDS	33	MVDB	1
DBVI	7	NGC	62
DCJS	19	NVTC	10
DCR	20	OSIG	6
DEM	1	PGH	3
DEQ	28	SBE	7
DFS	265	SBVCC	9
DGIF	2	SCHEV	3
DGS	10	SOA	4
DHCD	5	SOC	3
DHRM	7	SWMHI	5
DJJ	141	TAX	8
DMAS	95	TD	2
DMME	6	VBPD	4
DMV	171	VCBR	8
DOC/CA	293	VDACS	31
DOE/ COO	6	VDH	492
DOF	9	VDOT	1477
DOLI	32	VEC	364
DPOR	33	VITA	27
DRPT	2	VMFA	11
DSBSD	3	VMNH	4
DSS	2206	VOF	32
DVS	16	VSP	61

Contract Year 9 Workstation Hardware Planned Refresh Quantities by Agency			
Agency	**Estimated Quantity**	**Agency**	**Estimated Quantity**
ESH	10	VVCC	9
GOV	81	WSH	6

Data Network Services

Hardware will be eligible for planned refresh once the "install date" field value in Vendor's asset management database equals or exceeds the *hardware age* corresponding to the applicable *hardware type* as listed in the table below.

Data Network Services Hardware Planned Refresh Methodology		
Service	**Hardware Component**	**Refresh Timeframe**
Secure Wireless	Wireless LAN Controller, Wireless Access Points	5 Years

The "install date" as the date Vendor first enters the hardware component information into Vendor's asset management database following initial receipt of the asset. The "install date" value does not change over the life of the asset regardless of how many times Vendor removes, reallocates, or reinstalls the asset.

The tables below list the quantities estimated by Vendor as eligible for planned refresh in the specified *contract years*. Vendor will coordinate with the Eligible Customers to develop specific refresh schedule dates.

Annual Planned Refresh Quantities of Secure Wireless Hardware		
Contract Year	**Estimated Quantity of Lightweight Wireless Access Points Being Refreshed**	**Estimated Quantity of Wireless LAN Controllers Being Refreshed**
11	123	3
12	126	2
13	20	1
14	208	1
Total	**477**	**7**

Planned Product Roadmap-Forecasted Activities

Product Roadmap-forecasted hardware and software activities planned as of May 16, 2014 to be underway during contract year 9 (except as otherwise listed) are listed in the following tables:

Planned Product Roadmap-Forecasted Hardware Activities			
Current Product	**Target Product**	**Activity Time frame**	**Estimated Contract Year 9 Quantity**
McAfee M2950 IPS	Juniper JDDoS Secure 1200	Q2	2

Planned Product Roadmap-Forecasted Hardware Activities			
Current Product	**Target Product**	**Activity Time frame**	**Estimated Contract Year 9 Quantity**
Juniper ISG 2000	Juniper SRX 5600 with UTM	Q2	2
BlueCoat ProxySG 8100	Removal (CESC)	Q2	2
BlueCoat ProxySG 8100	BlueCoat ProxySG 300 (SWESC)	Q2	2
Cisco FWSM	Juniper 5800	Q4	2
Cisco Channel Interface Processor (CIP)	IBM Open System Adaptor (OSA)	Q2[1]	1
IBM Front End Processors (FEP)	IBM Open System Adaptor (OSA)	Q2[1]	2
EMC CX-700 (DMV)	EMC VNX-5400	Q2	1
EMC CX3-40 (1) (VDOT) IBM DS4000 (2) (VDOT)	IBM XIV	Q3	1
[1] CIP and FEP retirement based on agency migration to the transformed connectivity method			

Planned Product Roadmap-Forecasted Software Activities			
Current Software	**Target Software**	**Activity Timeframe**	**Estimated Contract Year 9 Quantity**
Windows XP	Windows 7 (64-bit)	Full transition to Win 7 expected by Q3	2,000
Office 2007	Office 2010	Full transition to Office 2010 (for Win 7) expected by Q3 Contract Year 10	20,000
IE 8/IE 9	IE 10	Full transition to IE 10 (for Win 7 and limited deployment of Win 8 tablets) expected by Q1 Contract Year 10	20,000
Symantec Endpoint Encryption 8.x	McAfee Endpoint Encryption 7.x	Full transition off of Symantec expected by Q3	8500
RSA Authentication Manager 7	RSA Authentication Manager 8	Q1	1
ServiceCenter	VMware Service Manager – Phase 1	Ongoing – ECD Q1	1
eSupport / SupportSoft	VMware Service Manager – Phase 2	Ongoing – ECD Q2	1
z/OS 1.13	z/OS 2.1	Q3	1
HP OpenView	EMC/VM SMARTS	Ongoing – ECD Q1	1
Red Hat Linux 4	Red Hat Linux 6	Ongoing	50

Planned Product Roadmap-Forecasted Software Activities			
Current Software	**Target Software**	**Activity Timeframe**	**Estimated Contract Year 9 Quantity**
SQL 2000	SQL 2008/12	Ongoing	70
Oracle 10G	Oracle 11G	Ongoing – ECD Q3	<100
Windows Server 2000 – all versions	Windows Server 2008/12	Ongoing	77
Windows Server 2003	Windows Server 2012	Ongoing – ECD Q1 Contract Year 10	2300
MS OCS 2007	MS Lync	Q2	All IM users
P-Sync Password Management	MS FIM 2010 R2	Q1	All registered P-Sync Users
RightFax 9.4	TBD	Q4	Current Enterprise RightFax agency users
ListServ 15	ListServ 16	Q3	20 agencies with 340 lists

APPENDIX 1 TO SCHEDULE 3.11
TO THE
COMPREHENSIVE INFRASTRUCTURE AGREEMENT
TECHNOLOGY REFRESH PLAN PROVISIONING LEVELS

Provisioning Levels

Beginning on May 16, 2014, the following Workstation standard provisioning levels and server platform preferred provisioning levels apply. The Workstation standard provisioning levels supersede those listed in the *Desktop Assumptions* Section in Attachment 10.1.13 of Schedule 10.1 of the Agreement. Provisioning levels are subject to change as technology improves; such changes are subject to approval through the VITA architectural review process and may require an increase in the Fees. In the event that a provisioning level attribute becomes unavailable or obsolete, Vendor will no longer provide such attribute without any obligation to provide a replacement or credit. Vendor may exhaust its existing inventory prior to purchasing new equipment at the new provisioning levels.

Workstation Provisioning Levels

Standard Provisioning Levels—Desktop	
External Ports:	Front: Audio in/out, 4 USB 2.0 Back: 6 USB 2.0, RJ-45 Ethernet, VGA, DisplayPort, PS2 Keyboard and Mouse ports and Serial ports.
Hard Drive:	250 GB SATA 3.0Gb/s Hard Drive
Keyboard:	Standard Keyboard
Memory:	4 GB RAM PC3-10600 (DDR3 1333) 2 DIMM
Monitor:	20" LED Flat Panel Display (16:9 aspect ratio)
Mouse:	Standard Mouse
Network Adapter:	10/100/1000 Twisted Pair Ethernet
Operating System:	Windows 7 Enterprise (SP1)
Optical Drive:	HP SATA SuperMulti LightScribe DVD Writer Drive
Processor:	Intel Pentium Dual Core G620 Processor (2.6 GHz) 800 MHz FSB and 3 MB L2 Cache (Dual Core)
Sound System:	Integrated Audio
Warranty:	5-year, Onsite Response Next Business Day

Standard Provisioning Levels—Laptop	
Battery:	Lithium ion battery with AC pack and 1 yr. limited battery warranty (or similar)
Carrying Case:	Carrying Case
Hard Drive:	320GB 7200 RPM SATA Hard Drive
Integrated Wireless Networking Adapter:	Intel 802.11 a/b/g/n wireless
Limited Warranty:	4 year, Onsite Response Next Business Day
Memory:	4GB RAM 1333DR3 2 DIMM
Mobile Technology:	Mobile Intel PM45 Express Chipset ICH9M-Enhanced
Multimedia Package:	Integrated sound and stereo speakers, headphone/speaker jack/mic jacks (or similar)
Network Adapter:	10/100/1000 Ethernet Adapter
Operating System:	Windows 7 Enterprise (SP1)

Standard Provisioning Levels—Laptop	
Optical Drive:	COMBO DVD/CDRW Optical Drive
Processor:	Intel Core i3 2310 Processor (2.1 GHz) 3MB Smart Cache (2 Cores 4 Threads)
Screen:	14.0-inch diagonal (1366 x 768) display

Standard Provisioning Levels—Tablet	
Battery:	Lithium ion battery with AC pack and 1 yr. limited battery warranty (or similar)
Carrying Case:	Carrying Case
Hard Drive:	128 GB mSATA Solid State Hard Drive
Integrated Wireless Networking Adapter:	Intel WLAN 802.11a/b/g/n wireless
Limited Warranty:	4 year, Onsite Response Next Business Day
Memory:	8 GB RAM 1600 DDR3 2 DIMM (0 slots open for future upgrade)
Modem:	Integrated V.92 56K modem
Multimedia Package:	Integrated sound and stereo speakers, headphone/speaker jack/mic jacks (or similar)
Network Adapter:	Integrated 10/100/1000 Ethernet adapter
Operating System:	Windows 7 Enterprise (SP1)
Processor:	Intel Core i5 3437U Processor (1.9 GHz up to 2.9 GHz) and 3MB Smart Cache (2 Cores 4 threads)
Screen:	11.6-inch diagonal LED backlit HD Display (1366x768)

Server Platform Provisioning Levels

Vendor provisions server platforms based on Eligible Customer's business and functional requirements. This permits an Eligible Customer to request server platforms based on application and workload requirements.

Virtual Server Platform

Vendor's preferred platform is a virtual machine (VM) with X86-64 (aka x64) processors hosting either Microsoft Windows Server or Red Hat Enterprise Linux distribution. Virtual server platforms are provisioned based on Eligible Customer application and workload requirements.

Maximum Virtual Server Provisioning levels	vCPU Count	Total Cores	vRAM (GB)*
	16	N/A	256
Note: * Memory provisioning greater than 4GB will result in additional one-time fee			

Physical Server Platform

Vendor will provision a physical server platform when justification is provided by the Eligible Customer. Specific configurations are listed in the table below. A server will be subject to a one-time surcharge to recover the cost difference between a custom configuration requested by an Eligible Customer and *Configuration A* of the *Base Provisioning Level* as listed below.

Base Provisioning Level	Configuration A			Configuration B			Configuration C			Configuration D		
	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)
	1	4	4	2	8	8	4	16	16	8	64	32
	CPU: Intel E5-2609			CPU: Intel E5-2609			CPU: Intel E5-2609			CPU: Intel E7-2830		
Optimized Provisioning Example	Configuration A			Configuration B			Configuration C			Configuration D		
	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)
	1	4	16	2	8	32	4	16	64	8	64	128
	CPU: Intel E5-2609			CPU: Intel E5-2609			CPU: Intel E5-2609			CPU: Intel E7-2830		
Maximum Provisioning Example	Configuration A			Configuration B			Configuration C			Configuration D		
	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)	CPU Count	Total Cores	Total RAM (GB)
	1	12	384	2	24	768	4	32	1536	8	80	4096
	CPU: Intel E5-26xx V2			CPU: Intel E5-26xx V2			CPU: Intel E5-46xx			CPU: Intel E7-75xx		
Blade Form Factor	Cisco UCS B200 M3						Cisco UCS B420 M3			Not Available		
Rack Mount Form Factor	Cisco UCS C220 M3						Cisco UCS C420 M3			HP DL-980 Gen8		
	Notes: 1 - Required memory provisioning = 1 DIMM per CPU; Optimized = Populate DIMM slots in multiples of 4 2 - Boot from SAN is standard at sites w/SAN storage; Remote servers requiring DASD base config = 2 x 300GB in RAID1 3 - Storage is priced separately 4 - Memory provisioning or CPU core counts greater than Base Provisioning level Configuration A will result in additional one-time fee											

5 - CPU counts of 3, 5, 6, 7 and >8 are not available

- Small (1-2 CPU) RU is either *Configuration A* or *Configuration B*
- Medium (3-4 CPU) RU is *Configuration C*
- Large (5-6 CPU) RU is no longer available
- Enterprise (6+ CPU) RU is *Configuration D*
- *Base* provisioning is the default level
- *Optimal* provisioning aligns populated memory slots with CPU memory channels to achieve maximum memory throughput
- *Maximum* provisioning describes the physical limits for each available configuration