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# MINIMUM INTEROPERABILITY SOFTWARE SUITE

## NASA TECHNICAL STANDARD

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effective date July 11, 2006

## FOREWORD

This standard is approved for use by NASA Headquarters and all NASA Centers and is intended to provide a common framework for consistent practices across NASA programs.

The material covered in this standard is based on the consensus judgment of the NASA Chief Information Officers (CIO) Board and the NASA IT Investment Council. The purpose of this standard is to establish the minimum workstation software suite required to support interoperability, establish interface and product standards for components of the software suite operating on PC, Macintosh, and Unix systems, and establish reporting metrics for determining overall NASA interoperability.

Requests for information, corrections, or additions to this standard should be directed to the John H. Glenn Research Center at Lewis Field (GRC), Basic Interoperability and Desktop Standards Group, MS 142-5, Cleveland, OH, 44135 or to [desktop-standards@lists.nasa.gov](mailto:desktop-standards@lists.nasa.gov). Requests for general information concerning standards should be sent to NASA Technical Standards Program Office, ED41, MSFC, AL, 35812 (telephone 256-544-2448). This and other NASA standards may be viewed and downloaded, free of charge, from our NASA Standards web page: <http://standards.nasa.gov/>.

(signature on file)

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## 1 SCOPE

### 1.1 Purpose and Scope

This standard establishes the minimum software suite required to support interoperability; establishes interface and product standards for components of the software suite operating on PC, Macintosh, and Unix systems; and establishes reporting metrics for determining overall NASA interoperability.

### 1.2 Applicability

Center CIO's will ensure that all NASA employees at their respective centers have access to an interoperable workstation that is equipped with a minimum software suite that meets the standards listed in Section 3 below.

For the functions (components) identified with standard products, future procurements to support interoperability are restricted to these products and enterprise applications. Licenses for other products may not be renewed. Additional products will be added as required.

### 1.3 Waivers

The waiver process set forth in NPR 2800.1, paragraph 2.2.4, applies to this standard. The desktop standards group, in cooperation with the Chief Technical Officer, will continue to process waivers on behalf of the Principal Center for Workgroup Hardware and Software.

## 2 ACRONYMS AND DEFINITIONS

### 2.1 Acronyms

<u>CIO</u>	Chief Information Officer
<u>FTP</u>	File Transfer Protocol
<u>GIF</u>	Graphics Interchange Format
<u>HTML</u>	HyperText Markup Language
<u>ICA</u>	Independent Computing Architecture
<u>ICE</u>	Integrated Cryptographic Engine
<u>IMAP</u>	Internet Message Access Protocol
<u>JPEG</u>	Joint Photographic Experts Group
<u>JRE</u>	Java Runtime Environment
<u>MIME</u>	Multipurpose Internet Mail Extension
<u>PDF</u>	Portable Document Format
<u>PKI</u>	Public Key Infrastructure
<u>SMTP</u>	Simple Mail Transport Protocol
<u>SSL</u>	Secure Sockets Layer
<u>TCP/IP</u>	Transmission Control Protocol/Internet Protocol
<u>TLS</u>	Transport Layer Security

### 2.2 Definitions

#### 2.2.1 Minimum Workstation to Support Basic Interoperability

Workstations that support basic interoperability are defined by being networked, and by having users who exchange information electronically, including those users that perform any or all of the activities encompassed in the minimum office automation software suite defined below.

### 3 DETAILED REQUIREMENTS

#### 3.1 Architectural Compliance Requirements

NASA has baselined and approved an initial NASA Integrated Information Technology Architecture<sup>1</sup>. The architecture is predicated on:

- the selection of standards for a broad and cost-effective infrastructure using commercial off-the-shelf and well-supported open source products as much as possible
- interoperability both within and external to NASA
- flexibility for future growth
- consistency with generally accepted consensus standards as much as feasible.

Among these objectives, interoperability is one of NASA’s most critical issues related to information technology.

At times, it is in NASA’s best interest to specify commercial products as standards for an interoperable implementation of a particular set of related and integrated functions. In those instances, there are often other embedded functions or proprietary extensions within those products whose use may create higher-level interoperability conflicts when embedded in an application system that transcends basic interoperability. **For that reason, NASA Centers and programs are advised to apply appropriate caution when using proprietary or non-standard extensions, features and functions of hardware or software that go beyond the standard functionality.**

#### 3.2 Interface and Product Standards.

The following standards are established for the components of the minimum interoperability software suite.

##### 3.2.1 Summary table

Function	Interface standard	Product standard	
Word processing	Microsoft Word file	Microsoft Word	
Spreadsheet	Microsoft Excel file	Microsoft Excel	
Presentation	Microsoft PowerPoint file	Microsoft PowerPoint	
Electronic mail	NASA-STD-2815, <i>Electronic messaging architecture, standards and products</i> , which references RFC1939 (POP3) and RFC2060 (IMAP4). Clients must support SMTP and IMAP over SSL/TLS.	Mac OS only	Microsoft Entourage, Apple Mail
		Windows only	Microsoft Outlook
		all platforms	Mozilla Thunderbird 1.5
Web browser	W3C and industry standards, including the following: HTML 4.01 XHTML 1.0 CSS (Cascading Style Sheets) ECMAScript (JavaScript) capability to run Java 2 applets SSL version 2 and 3 using 128 bit	Mac OS only	Apple Safari
		Windows only	Internet Explorer 6

<sup>1</sup> NASA-STD-2814A, *NASA Integrated Information Technology Architecture—Technical Framework*



Function	Interface standard	Product standard	
	RC4 encryption and the MD5 message digest algorithm. See NASA-STD-2820, <i>Encryption and Digital Signature Standards</i> .	all platforms	Mozilla Firefox 1.5
PDF viewer	PDF file	Adobe Reader (7.0 or higher) or other comparable PDF viewer	
Calendar/scheduling	iCalendar (RFC 2445) <sup>2</sup>	none specified <sup>3</sup>	
Access to centrally-served Windows applications	Citrix ICA protocol	Citrix ICA client Windows: 9.x Mac OS X 7.x	
Electronic forms	see section 3.4	FileNet Desktop eForms 4.2	
Patch reporting	PatchLink proprietary	PatchLink Update 6	
Other software components	see tables I and II	see tables I and II	

### 3.2.2 Additional details

#### 3.2.2.1 Office applications

The Microsoft Office file formats are the ones used in Office 97. Office 2000, Office XP, and Office 2003/2004 all use this same format.

Microsoft Office 2003 Standard Edition is required on all interoperable Microsoft Windows systems.

Microsoft Office 2004 Standard Edition is required on all interoperable Mac OS X systems.

On systems for which Microsoft Office is not available, other products, such as StarOffice or OpenOffice.org, are useful interoperability tools, since they are able to read Microsoft Office files, though not perfectly.

#### 3.2.2.2 Electronic mail

Although Eudora is no longer required on interoperable systems, it, as well as other clients that meet the interface standards, may be used at local CIO discretion.

Clients may support additional protocols, such as MAPI, in addition to, but not in lieu of, the standard protocols.

#### 3.2.2.3 Web browser

Microsoft Internet Explorer for Macintosh is no longer available, and is no longer a standard browser.

#### 3.2.2.4 PatchLink

At the time of this writing, the current Windows PatchLink client is at version 6.0.1.97. The Unix and Macintosh clients are at version 6.0067. For the latest information, please refer to the Agency Security Update Service web site at <https://patches.ksc.nasa.gov/>.

<sup>2</sup> Limited interoperability provided by this standard.

<sup>3</sup> All center CIO's are responsible for providing an interoperable calendar/scheduling solution within their centers.

### 3.3 Operating System Standards and Compliance Dates

#### 3.3.1 Microsoft Windows

Windows XP Professional (including service pack 2) is required to be installed on all interoperable Windows systems.

Windows XP Home Edition and Windows XP Media Center Edition shall not be deployed.

#### 3.3.2 Mac OS

Mac OS X 10.4 shall be deployed on all interoperable Macintosh systems by August 1, 2006. As always, the operating system must be kept up-to-date with vendor patches. At the time of this writing, Mac OS X 10.4.6 is the current maintenance release.

#### 3.3.3 Unix

Unix systems with no interoperability requirement do not need to comply with the interoperability requirements in this standard. Such systems would include special-purpose Unix systems such as name servers, compute servers, data acquisition systems, special software development workstations, or other components of the overall computing environment.

Several product standards are not available for any Unix system. In order to comply with this standard, interoperable Unix desktops must have some way to access these products. One way to accomplish this would be to use a Citrix ICA client to connect to a Microsoft Windows application server.

The following Unix systems are supported in the NASA interoperable computing environment. Generally, both the current version and prior version of the operating system are acceptable. However, the older version of the operating system must continue to be supported by the vendor, and like all systems, must be kept up-to-date with security patches.

##### 3.3.3.1 Sun Solaris/SPARC

Solaris is at version 10. Information about supported Solaris releases may be found at:

<http://www.sun.com/software/solaris/faqs/general.jsp#releases>

##### 3.3.3.2 SGI IRIX/MIPS

IRIX 6.5.29 is current. IRIX update releases are made quarterly, and generally IRIX systems should be kept up-to-date with these maintenance updates.

Versions of IRIX prior to 6.5 are not supported in the agency interoperable environment.

SGI provides information about IRIX releases at:

<http://www.sgi.com/software/irix/releases/>

The Itanium-based SGI Prism systems run SGI's version of Linux, not IRIX, and are not supported as interoperable desktop systems.

##### 3.3.3.3 Red Hat Linux/x86

Red Hat Enterprise Linux WS 4 is the current version and is described at:

<https://www.redhat.com/rhel/details/clients/>

Note that prior versions of Red Hat Linux (such as Red Hat 7 through 9) are no longer vendor supported, and should not be installed on interoperable desktop machines.

#### 3.3.3.4 IBM AIX/POWER

AIX 5L 5.2 and 5.3 are current. AIX versions are described at:

<http://www-1.ibm.com/servers/aix/os/index.html>

#### 3.3.3.5 HP HP-UX/PA-RISC

HP-UX 11i v2 is current. The HP-UX 11i web page is at:

<http://www.hp.com/products1/unix/operating/index.html>

### 3.4 Electronic forms

Agency requirements for a forms product include the ability provide access to all NASA employees requiring access (including filler operation across all NASA standard desktop platforms—PC, Mac, and Unix), the capability to enhance NASA business processes through intelligent functionality, ease of use, and an array of functional and operational capabilities.

Since an open application program interface industry standard for data interchange among forms products has not yet been adopted or approved by any acknowledged standards body, a product-level selection is warranted. After an evaluation of commercial products was conducted, the FileNet product was found to comply with all key requirements. Other products which meet the requirements and interoperate with the FileNet product may be used via the waiver process.

Agency-level forms used for data collection with an official assigned number must be FileNet forms. Center unique versions of these agency forms should not be created or used.

### 3.5 Additional X.509 root certificates

On Windows XP and Mac OS (and on other systems where it is feasible to do so), the following X.509 root certificates must be installed as trusted roots in the local certificate store:

- NASA Certificate Authority root certificate, available from <http://london.arc.nasa.gov/>
- NASA Data Center Certificate Authority root certificate

### 3.6 Operating System Configuration Guidelines

The Federal Information Security Management Act (FISMA) requires all Federal agencies to utilize a consistent set of operating system and application configuration guidelines. Agency-wide guidance is provided in the NASA CIO letter, [Center for Internet Security \(CIS\) Consensus Benchmarks](#), dated 02 September 2004 in which Centers are directed to use the Center for Internet Security's (CIS) Consensus Benchmarks. Technical guidance regarding specific levels of CIS Benchmarks for NASA systems is available at:

<http://desktop-standards.nasa.gov/CIS>

### 3.7 Section 508 Compliance Requirements

Software products procured after June 21, 2001 must be in conformance with Section 508 of the

Rehabilitation Act. Complete information and guidance on addressing Section 508 requirements is available at:

<http://www.section508.nasa.gov>

### 3.8 FIPS 140-2 Compliance Requirements

NASA will adhere to the guidelines and recommendations of the National Institute of Standards and Technology as required by the Federal Information Security Management Act, particularly as they apply to computer security and encryption technology for desktop hardware and software. More specifically, NASA will comply with Federal Information Processing Standards (FIPS) 140-1 and 140-2 as applicable, validated encryption modules become available.

NASA application developers and service providers are reminded that whenever cryptographic-based security systems are used to protect sensitive information in computer systems, the cryptographic modules utilized must be FIPS 140-2 compliant as validated by NIST<sup>4</sup>. A current list of validated products can be found at:

<http://csrc.nist.gov/cryptval/>

The following products mentioned in NASA-STD-2804 have been validated by a NIST-accredited testing laboratory and may be appropriate to protect sensitive information with cryptography under specific conditions:

<b>Product</b>	<b>Validation Module</b>	<b>Certification</b>	<b>Comments</b>
Microsoft Internet Explorer	Kernel Mode Cryptographic Module for Windows XP	<a href="#">#241</a>	Single User Mode, FIPS 140-1
Microsoft Outlook	Outlook Cryptographic Provider	<a href="#">#110</a>	Single User Mode, FIPS 140-1, S/MIME
Entrust PKI Software	Entrust Security Kernel Version 7.0	<a href="#">#308</a>	FIPS 140-1, When operated in FIPS Mode
F-Secure SSH	F-Secure® Cryptographic Library™ for Windows	<a href="#">#437</a>	FIPS 140-2, When operated in FIPS Mode, Single User Mode.
Citrix ICA Client for Windows	Kernel Mode Cryptographic Module for Windows XP	Not Validated	Uses MS Windows FIPS Crypto Module

### 3.9 Future Interface and Product Standards.

The NASA desktop standards group is working to ensure interoperability at the highest possible revision of products included in the interoperability software suite. Systems conforming to the interface and product standards defined herein will meet any future interoperability requirements established by the Agency CIO.

## 4 REVIEW AND REPORTING REQUIREMENTS

### 4.1 Interoperability Maintenance Reporting

Each Center CIO will provide the NASA CIO with an annual progress report, outlining the progress in maintaining minimum interoperability access for each NASA employee.

<sup>4</sup> [Federal Information Processing Standards Publication 140-2](#), *Security Requirements for Cryptographic Modules*

#### 4.2 Interoperability Reporting

Each Center CIO will establish the necessary processes and tools, both manual and automated, to report on an annual basis to the NASA CIO the hardware and software configuration of all workstations at their respective Centers. These data will contain sufficient information to ascertain if the workstation supports NASA employees or is Government-furnished equipment to a contractor, whether the equipment is required to be interoperable, and a description of the hardware architecture/environment. The report will specify the number of NASA employees that do not have access to interoperable workstations.

#### 4.3 Interface and Product Standards Review Reporting

This standard will be reviewed and updated on an as-required basis, not to exceed 6-month intervals. Office automation software standards will be updated as required.

### 5 DURATION

#### 5.1 Duration

This standard will remain in effect until canceled or modified by the NASA CIO.

### 6 SUPPORTING DOCUMENTS

#### 6.1 Supporting Documents

Supporting documents and additional information related to this standard may be found at:

<http://desktop-standards.nasa.gov>

**Table I—Other required functionality**

Function		Recommended software, by platform			
		Windows	Mac OS X	Unix	
ftp client		FTP Commander 7.33	Fetch 4.0.3	bundled	
ssh client		F-Secure SSH	bundled	bundled or OpenSSH	
sftp client		FileZilla	Rbrowser	bundled or OpenSSH	
news reader		Mozilla Thunderbird	Mozilla Thunderbird	Mozilla Thunderbird	
viewer for GIF and JPEG images		bundled	bundled	use web browser	
File archive extractor/creator		WinZip 9	bundled	InfoZIP	
anti-virus/anti-spyware software		Symantec Anti-virus	Symantec Anti-virus	F-Prot Antivirus	
Audio/video players	QuickTime	QuickTime 7	bundled QuickTime 7	xanim (limited functionality)	
	Real	RealPlayer 10	RealPlayer 10	RealPlayer Basic	
	Windows Media	Windows Media Player 10	Flip4Mac Windows Media Components for QuickTime	not available	
Macromedia Flash player		Macromedia Flash Player 8	Macromedia Flash Player 8	Macromedia Flash Player 7 (Except Irix, which is still only at version 4)	
Macromedia Shockwave player		Macromedia Shockwave 10	Macromedia Shockwave 10	not available	
Macromedia Authorware player		Macromedia Authorware Web player 7 Full	Macromedia Authorware Web player 7 Complete	not available	
Java run-time environment		Sun JRE 1.4 <sup>5</sup>	Sun JRE 1.4 (bundled)	Sun JRE 1.4	
Web conferencing		WebEx	WebEx	WebEx	
PKI software		see table III, PKI software			

Note that Table I specifies only **functionality**. Software products and versions other than the ones listed in the table may be used to provide the required functionality.

<sup>5</sup> It is acceptable to install Java 1.5 if it can be installed alongside the existing Java 1.4 installation without adversely affecting the earlier version and programs that rely on it. In the next revision of the standard, Java 1.5 will be required.

**Table II—Optional useful functionality not required for interoperability**

Function	Recommended software, by platform		
	Windows	Mac OS X	Unix
3270 client	QWS3270 4.0	tn3270 X 3.1.7	x3270 3.3.2p1
PC emulation	VMware Workstation 5.5	VirtualPC 7	VMware Workstation 5.5
Windows application execution environments			CrossOver Office
X window system server	Exceed 10	Apple X11	bundled
PostScript previewer	Ghostscript	bundled	Ghostscript
PDF writer	Adobe Acrobat 7	bundled	Ghostscript (ps2pdf)
Data conferencing/T.120 client	Microsoft NetMeeting	No recommendation	SunForum (Sun), SGImeeting (SGI)
Business graphics	Visio 2003	OmniGraffle Professional	No recommendation
Project Management	MS Project 2003	FastTrack Schedule 9	No recommendation

**Table III—PKI software**

Component	Version, by platform		
	Windows	Mac OS X	Unix
Entrust Entelligence	7.0	6.2.1 (build 174)	not available
Entrust Express			
for Eudora	Entrust Express 7.0 for Eudora (Eudora 6.0 or higher)	Entrust Express for Eudora (Eudora 6.0 or higher)	not applicable
for Microsoft Outlook	Entrust Express 7.0 for Outlook	not available	not applicable
ICE (with True Delete)	7.0	not available	not available
Entrust Direct <sup>6</sup>	6.1 or TruePass 7.0	TruePass 7.0	not available

Entrust plug-ins are not available for other mail clients. Other mail clients can import and use PKCS#12 format keys exported from Entrust. Refer to <http://pki.nasa.gov/pkcs12.htm>.

<sup>6</sup> Entrust Direct supports only specific versions of Netscape and Internet Explorer. Contact the NASA PKI team for an up-to-date list.