



TECHNOLOGY GUIDELINES FOR PARCC ASSESSMENTS VERSION 6.1 – 2016-2017

Updates and additional technology resources are available at: <http://www.parcconline.org/technology>

PLEASE NOTE: Technology Guidelines for PARCC Assessments v6.1 are based on TestNav v8.8 specifications. TestNav v8.8 is the final release for the 2016-2017 school year, and will be used for Spring testing.

The Partnership for Assessment of Readiness for College and Careers (PARCC) has assembled these technology guidelines to inform schools and districts as they make technology decisions to best meet the instructional and assessment needs of their students. The information in this document is intended to help schools, districts, and states determine the level of readiness of their existing computer inventories and the new instructional hardware they may need to purchase as they implement the Common Core State Standards; and to evaluate whether they will meet PARCC's 2016-17 minimum requirements for computer-based assessment administration.

This document provides two sets of guidance regarding technical specifications:

Minimum Specifications

Minimum Specifications address the oldest operating systems and lowest levels of hardware capacity that can reasonably be compatible with PARCC computer-based assessments in 2016-2017.

- Minimum Specifications apply to existing school technology inventories.
- Computers meeting the Minimum Specifications can be considered as satisfying PARCC guidelines for **2016-2017**.

Considerations regarding computers meeting, but not exceeding, minimum specifications:

- PARCC recommends that schools upgrade or replace computers that have older operating systems and lower memory to raise their capacity to Recommended Specifications levels as soon as possible.
- Computers that meet only the Minimum Specifications will be compatible with the PARCC assessment delivery platform, but may be more likely to experience slower performance than higher capacity computers.

Recommended Specifications

Recommended Specifications outline the levels of computer and network capacity that are more likely to meet growing demands for school technology that supports learning, assessment, and administrative uses simultaneously across classrooms.

- Recommended Specifications apply to both existing inventory and new hardware purchases.
- Computers meeting the Recommended Specifications can be expected to satisfy PARCC guidelines through the **2018-2019** school year.

Updates in this version (6.1) include:

- Added support for iOS 10.2+
- Added support for MacOS 10.12 Sierra using the Firefox browser
- Added support for Android 7.0 Nougat

Updates from the previous version (6.0):

- Added support for Firefox 45 Extended Support Release (ESR) 32-bit browser
- Added support for Windows touchscreen devices on the TestNav Desktop app
- Updated Content Filter/Firewall Requirements. Additional white-list URL's:
 - *.usertrust.com
 - *.comodoca.com
- Updated iPad 2 recommendations
- Updated device readiness recommendations – No longer using SystemCheck
- Updated Assistive Technology requirements
 - The Firefox 45 ESR 32-bit browser is required for assistive technologies
- Updated ProctorCache software
- ChromeOS requirements updated to versions 50+
- iOS requirements updated to iOS versions 9.3+
- Linux requirements updated to Fedora 24 and Ubuntu 16.04
- Removed operating system support for Mac OS X 10.8 and below
- Removed operating system support for Windows 8.0
- Removed browser support for Internet Explorer 11
- Removed browser support for Safari
- Removed browser support for non-ESR versions of Firefox

NOTE: The following operating systems, browser versions, and Java versions are no longer supported.

- Operating systems: Windows Vista, Windows XP, Windows 8.0, Mac OS 10.6, Mac OS 10.7, Mac OS 10.8, iOS 7, iOS 8
- Browser versions: Internet Explorer (all versions), Safari (all versions), Google Chrome (all versions)
- Java versions: 1.6 and 1.7

The sections in this document include:

- [TECHNOLOGY GUIDANCE FOR DECISION MAKING](#)
- [DEVICE AND BROWSER SPECIFICATIONS FOR PARCC ASSESSMENTS](#)
- [BANDWIDTH RECOMMENDATIONS](#)
- [PROCTOR CACHING REQUIREMENTS](#)
- [COMPUTER-BASED ACCESSIBILITY FEATURES AND EMBEDDED ACCOMMODATIONS AVAILABLE FOR PARCC ASSESSMENTS](#)

TECHNOLOGY GUIDANCE FOR DECISION MAKING

While PARCC's ongoing processes for assessment and technical platform design continue, *Technology Guidelines for PARCC Assessments Version 6.1*, **is intended to help states and districts inform their own readiness preparations and decision-making**. PARCC will continue to supplement the guidance in this document to reflect current knowledge about what states will need to administer PARCC's computer based assessment components. The most current version of this document and most up-to-date information is maintained at <http://www.parcconline.org/technology>.

DEVICE AND BROWSER SPECIFICATIONS FOR PARCC ASSESSMENTS

Devices that will be supported for the **PARCC Assessments** include selected desktops, laptops, netbooks, thin client/VDI systems (Windows, Mac, Chromebook), and tablets (iPad, Windows and Android). These devices will be compatible provided they meet the established hardware, operating system, browser and networking specifications; and, are able to address the security requirements described in the following sections.

Browsers and installable TestNav applications that will be supported for the **PARCC Assessments** are detailed below based on operating system. Schools using Chromebooks, iPads or Android tablets, or Linux OS will need to download the TestNav 8 app and therefore do not have specific web browser requirements. *TestNav Desktop* is available for Windows, Mac and Linux. *TestNav Desktop* is an installable TestNav client designed to reduce dependency on the Java plug-in used by Internet browsers and simplify device readiness.

Multiple new Operating Systems are scheduled for release this year. Pearson is working closely with our partners at Apple, Google, and Microsoft to determine if, and when, any of those new Operating Systems will be supported by the PARCC online testing platform (TestNav). Additional information will be communicated as new releases are supported.

This section of the Technology Guidelines includes the following:

- [PARCC ASSESSMENT SPECIFICATIONS FOR WINDOWS DESKTOP, LAPTOP AND TABLET USERS](#)
- [PARCC ASSESSMENT SPECIFICATIONS FOR MAC DESKTOP AND LAPTOP USERS](#)
- [PARCC ASSESSMENT SPECIFICATIONS FOR CHROMEBOOK USERS](#)
- [PARCC ASSESSMENT SPECIFICATIONS FOR LINUX USERS](#)
- [PARCC ASSESSMENT SPECIFICATIONS FOR IPAD USERS](#)
- [PARCC ASSESSMENT SPECIFICATIONS FOR ANDROID TABLET USERS](#)

WINDOWS: PARCC ASSESSMENT SPECIFICATIONS FOR WINDOWS DESKTOP, LAPTOP AND TABLET USERS

Operating Systems Supported for PARCC Assessments ¹	Platform Specifications for Windows Operating Systems	
	<i>Firefox ESR Version 45 (32-bit)</i>	<i>TestNav Desktop²</i>
Windows 7 <i>Recommended Specification</i>	Yes	Yes
Windows 8.1 <i>Recommended Specification</i>	Yes	Yes
Windows 10 <i>Recommended Specification</i>	Yes	Yes
Additional Specifications for Windows Desktop, Laptop, Netbook, and Thin Client ³ /VDI Computers		
	<i>Minimum Specifications</i>	<i>Recommended Specifications</i>
Memory	1 GB RAM or greater	2 GB RAM or greater
Processor	Any Processor	Any Processor
Connectivity	Computers must be able to connect to the Internet via wired or wireless networks.	Computers must be able to connect to the Internet via wired or wireless networks.
Screen Size	9.5 inch screen size or larger	9.5 inch screen size or larger
Screen Resolution	1024 x 768	1024 x 768
Input Device Requirements for All Desktops, Laptops, and Tablets	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad
	<p>The input device must allow students to select/deselect, drag, and highlight text, objects, and areas. The input device must allow students to enter letters, numbers, and symbols and to shift, tab, return, delete, and backspace. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single computer during assessment administration.</p> <p>Windows Tablet: PARCC highly recommends using external keyboards for tablet devices during PARCC testing to ensure equitable access to test content due to the screen area consumed by the virtual keyboard. Local education agencies (LEAs)/districts are responsible for determining whether external keyboards will be used for tablet devices for use within schools during PARCC testing, and this decision should be consistent with what is used during instruction. Tablet touchscreen interfaces can be used for student interactions with the assessments other than text input, including to select/deselect, drag, and highlight text, objects, and areas.</p> <p>Schools and LEAs/districts must ensure that students have sufficient opportunity for practice prior to testing (i.e., if a school is using external keyboards for PARCC testing, ensure students have ample opportunity to practice with the external keyboard prior to testing).</p>	
Assistive Technologies	<p>Assistive technologies, in addition to the input devices listed in these guidelines, may be needed for students requiring accommodations. Refer to the PARCC Assistive Technology Guidelines document for guidance on use of other devices.</p> <p>Please note: Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: http://download.testnav.com/.</p>	

<p>Headphone/Earphone/ Ear bud Requirements</p>	<p>Headphones/Earphones/Ear buds</p>	<p>Headphones/Earphones/Ear buds</p>			
<p>Browser Dependencies Including Java runtime Plugin</p> <p>(Browser-based TestNav only; not applicable for TestNav Desktop implementations.)</p>	<p>For proper functioning of browser-based TestNav, the following must be enabled:</p> <ul style="list-style-type: none"> • Java runtime plugin version based on operating system <table border="1" data-bbox="513 554 1507 905"> <tr> <td data-bbox="513 554 1507 602" style="text-align: center;"><i>Firefox ESR Version 45 (32-bit)</i></td> </tr> <tr> <td data-bbox="513 602 1507 651" style="text-align: center;">Java Version 1.8 and higher</td> </tr> <tr> <td data-bbox="513 651 1507 905"> <p>Note: Oracle Corporation has posted notice that Java updates are scheduled on the following dates:</p> <ul style="list-style-type: none"> • January 17, 2017 • April 18, 2017 <p>PARCC will share additional information as it becomes available, but Technology Coordinators should prepare for the possibility of updating their school or district’s online testing devices when Java updates are released.</p> </td> </tr> </table> <ul style="list-style-type: none"> • Windows firewall configured to allow javaw.exe to communicate • Allow Pop-ups for Pearson sites • Allow local file access to home directory 		<i>Firefox ESR Version 45 (32-bit)</i>	Java Version 1.8 and higher	<p>Note: Oracle Corporation has posted notice that Java updates are scheduled on the following dates:</p> <ul style="list-style-type: none"> • January 17, 2017 • April 18, 2017 <p>PARCC will share additional information as it becomes available, but Technology Coordinators should prepare for the possibility of updating their school or district’s online testing devices when Java updates are released.</p>
<i>Firefox ESR Version 45 (32-bit)</i>					
Java Version 1.8 and higher					
<p>Note: Oracle Corporation has posted notice that Java updates are scheduled on the following dates:</p> <ul style="list-style-type: none"> • January 17, 2017 • April 18, 2017 <p>PARCC will share additional information as it becomes available, but Technology Coordinators should prepare for the possibility of updating their school or district’s online testing devices when Java updates are released.</p>					
<p>Firewalls, Content, and Spam Filters</p>	<p>Firewalls, content, and spam filters must be set to allow access to Pearson domains.</p> <p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsoncontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481 				
<p>Security</p>	<p>For the PARCC test, eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating systems (Windows, Mac, Linux, iOS, Chrome OS, Android) must have the administrative tools and capabilities to “lock down” the device to temporarily disable features, functionalities, and applications that could present a security risk during test administration and should not prevent a PARCC secure browser or other test software from entering the computer into lock down mode. The operating systems listed here as approved for PARCC assessments meet this security requirement, but provide different mechanisms for managing user security settings at the individual device and/or enterprise levels. School technology administrators should be familiar with the particular requirements of the systems they will be using for PARCC assessments to ensure test security is maintained.</p>				

	<p>Schools can test the security lock down settings of their Windows systems by:</p> <ol style="list-style-type: none"> 1. If using the Installable TestNav Desktop app, open TestNav and navigate to your state sign in page, then click the user icon in the top right and choose “App Check” from the menu. <ol style="list-style-type: none"> a. A success message should display within a few seconds. b. If an error message is received please review the device setup instructions for Installable TestNav at https://support.assessment.pearson.com/x/HgACAQ or contact PARCC Support. 2. If using browser-based TestNav, navigate to your state TestNav URL, then sign in to TestNav on a student-testing device with the following credentials. <ul style="list-style-type: none"> • Username = username • Password = password <ol style="list-style-type: none"> a. A secure form with one item should load successfully. b. If the form does not launch or an error is received please review the setup instructions for Browser-Based TestNav at https://support.assessment.pearson.com/x/HwACAQ or contact PARCC Support. <p>Please note: The PARCC SystemCheck tool is being decommissioned, and should no longer be used to assist with device readiness.</p> <p>As you prepare your student test taking devices for the test, please be sure to take the following steps to ensure test security.</p> <ul style="list-style-type: none"> • Check every device, to ensure that all software applications, including Internet browsers, cameras (still and video), screen-capture programs (live and recorded such as Skype), email, instant messaging, application switching, media players (such as iTunes) and printing are closed on all student testing devices before the test begins. Work with your local technology staff as they may have procedures in place that provide a "clean" desktop and they will be able to provide you with easy ways to determine what applications or programs may be running on your devices. • Turn off or disable any management software that would allow secure test content on student testing devices to be viewed on any other device; e.g., LanSchool, NetopVision, or similar applications. • In addition, schools should work with their technology staff to configure the common applications listed below to NOT launch on any student test taking devices during testing sessions: <ul style="list-style-type: none"> ○ Anti-virus software performing automatic updates ○ Power management software on laptops warning of low battery levels ○ Screen savers and sleep mode ○ E-mail with auto message notification ○ Calendar applications with notifications, such as Google Calendar ○ Pop-up blockers
<p>Additional Guidance</p>	<p>¹ Windows 8 RT (Runtime) is not supported.</p> <p>² <i>TestNav Desktop</i> can be downloaded here: http://download.testnav.com/</p> <p>³ Each computer operating in a thin client environment must meet or exceed minimum hardware specifications, as well as bandwidth and security requirements. Schools utilizing virtual solutions are strongly encouraged to complete the Infrastructure Trial process prior to online testing windows to verify successful test delivery. More information and configuration instructions for the qualified virtual vendors can be found at www.testnavqualified.com.</p>

MAC OS: PARCC ASSESSMENT SPECIFICATIONS FOR MAC DESKTOP AND LAPTOP USERS

Operating Systems Supported for PARCC Assessments	Platform Specifications for Mac Operating Systems	
	Firefox ESR Version 45 (32-bit)	TestNav Desktop ¹
OS 10.9 <i>Minimum Specification</i>	Yes	Yes
OS 10.10 <i>Recommended Specification</i>	Yes	Yes
OS 10.11 <i>Recommended Specification</i>	Yes	Yes
OS 10.12 <i>Recommended Specification</i>	Yes	No
<p>MacOS 10.12 Sierra Limited Support:</p> <p>The TestNav Desktop App <u>will not</u> be supported on MacOS 10.12 Sierra; however, browser-based testing using the Firefox 45 Extended Support Release (ESR) browser <u>will</u> be supported. The Firefox 45 ESR browser can be downloaded at http://download.testnav.com.</p>		
Additional Specifications for Mac Desktop, Laptop, and Thin Client ² /VDI Computers		
	Minimum Specifications	Recommended Specifications
Memory	1GB RAM or greater	2GB RAM or greater
Processor	Any Processor	Any Processor
Connectivity	Computers must be able to connect to the Internet via wired or wireless networks.	Computers must be able to connect to the Internet via wired or wireless networks.
Screen Size	9.5 inch screen size or larger	9.5 inch screen size or larger
Screen Resolution	1024 x 768	1024 x 768
Input Device Requirements for All Desktops and Laptops	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad
	The input device must allow students to select/deselect, drag, and highlight text, objects, and areas. The input device must allow students to enter letters, numbers, and symbols and to shift, tab, return, delete, and backspace. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single computer during assessment administration.	
Assistive Technologies	<p>Assistive technologies, in addition to the input devices listed in these guidelines, may be needed for students requiring accommodations. Refer to the PARCC Assistive Technology Guidelines document for guidance on use of other devices.</p> <p>Please note: Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: http://download.testnav.com/.</p>	
Headphone/Earphone/	Headphones/Earphones/Ear buds	Headphones/Earphones/Ear buds

<p>Ear bud Requirements</p>	<p>Headphones are needed for all ELA/L units, and for students who receive the text-to-speech accommodation for the ELA/L assessments or the accessibility feature for the Mathematics assessments.</p> <p>Stand-alone headphones (i.e., headphones not connected to a device) are also an accessibility feature; therefore, some students may use headphones as noise buffers to minimize distractions or filter external noise during testing.</p>			
<p>Browser Dependencies Including Java runtime Plugin</p> <p>(Browser-based TestNav only; not applicable for TestNav Desktop implementations.)</p>	<p>For proper functioning of browser-based TestNav, the following must be enabled:</p> <ul style="list-style-type: none"> • Java runtime plugin version based on operating system <table border="1" data-bbox="500 520 1507 861"> <tr> <td style="text-align: center;"><i>Firefox ESR Version 45 (32-bit)</i></td> </tr> <tr> <td style="text-align: center;">Java Version 1.8 and higher</td> </tr> <tr> <td> <p>Note: Oracle Corporation has posted notice that Java updates are scheduled on the following dates:</p> <ul style="list-style-type: none"> • January 17, 2017 • April 18, 2017 <p>PARCC will share additional information as it becomes available, but Technology Coordinators should prepare for the possibility of updating their school or district’s online testing devices when Java updates are released.</p> </td> </tr> </table> <ul style="list-style-type: none"> • Allow Pop-ups for Pearson sites • Allow local file access to home directory 	<i>Firefox ESR Version 45 (32-bit)</i>	Java Version 1.8 and higher	<p>Note: Oracle Corporation has posted notice that Java updates are scheduled on the following dates:</p> <ul style="list-style-type: none"> • January 17, 2017 • April 18, 2017 <p>PARCC will share additional information as it becomes available, but Technology Coordinators should prepare for the possibility of updating their school or district’s online testing devices when Java updates are released.</p>
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<p>Note: Oracle Corporation has posted notice that Java updates are scheduled on the following dates:</p> <ul style="list-style-type: none"> • January 17, 2017 • April 18, 2017 <p>PARCC will share additional information as it becomes available, but Technology Coordinators should prepare for the possibility of updating their school or district’s online testing devices when Java updates are released.</p>				
<p>Firewalls, Content, and Spam Filters</p>	<p>Firewalls, content, and spam filters must be set to allow access to Pearson domains.</p> <p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsoncontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481 			
<p>Security</p>	<p>For the PARCC test, eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating systems (Windows, Mac, Linux, iOS, Chrome OS, Android) must have the administrative tools and capabilities to “lock down” the device to temporarily disable features, functionalities, and applications that could present a security risk during test administration and should not prevent a PARCC secure browser or other test software from entering the computer into lock down mode. The operating systems listed here as approved for PARCC assessments meet this security requirement, but provide different mechanisms for managing user security settings at the individual device and/or enterprise levels. School technology administrators should be familiar with the particular requirements of the systems they will be using for PARCC assessments to ensure test security is maintained.</p>			

	<p>Schools can test the security lock down settings of their Mac systems by:</p> <ol style="list-style-type: none"> 1. If using the Installable TestNav Desktop app, open TestNav and navigate to your state sign in page, then click the user icon in the top right and choose “App Check” from the menu. <ol style="list-style-type: none"> a. A success message should display within a few seconds. b. If an error message is received please review the device setup instructions for Installable TestNav at https://support.assessment.pearson.com/x/HgACAQ or contact PARCC Support. 2. If using browser-based TestNav, navigate to your state TestNav URL, then sign in to TestNav on a student testing device with the following credentials. <ul style="list-style-type: none"> • Username = username • Password = password <ol style="list-style-type: none"> a. A secure form with one item should load successfully. b. If the form does not launch or an error is received please review the setup instructions for Browser-Based TestNav at https://support.assessment.pearson.com/x/HwACAQ or contact PARCC Support. <p>Please note: The PARCC SystemCheck tool is being decommissioned, and should no longer be used to assist with device readiness.</p> <p>As you prepare your student test taking devices for the test, please be sure to take the following steps to ensure test security.</p> <ul style="list-style-type: none"> • Check every device, to ensure that all software applications, including Internet browsers, cameras (still and video), screen-capture programs (live and recorded such as Skype), email, instant messaging, application switching, media players (such as iTunes) and printing are closed on all student testing devices before the test begins. Work with your local technology staff as they may have procedures in place that provide a "clean" desktop and they will be able to provide you with easy ways to determine what applications or programs may be running on your devices. • Turn off or disable any management software that would allow secure test content on student testing devices to be viewed on any other device; e.g., LanSchool, NetopVision, or similar applications. • In addition, schools should work with their technology staff to configure the common applications listed below to NOT launch on any student test taking devices during testing sessions: <ul style="list-style-type: none"> ○ Anti-virus software performing automatic updates ○ Power management software on laptops warning of low battery levels ○ Screen savers and sleep mode ○ E-mail with auto message notification ○ Calendar applications with notifications, such as Google Calendar ○ Pop-up blockers • Mac OS 10.9 and later allows users to use a three-finger tap to access a dictionary definition of the word clicked. To disable the three-finger tap word look-up feature, go to System Preferences>Track Pad>Point & Click and uncheck Look up.
<p>Additional Guidance</p>	<p>¹<i>TestNav Desktop</i> can be downloaded here: http://download.testnav.com/</p> <p>²Each computer operating in a thin client environment must meet or exceed minimum hardware specifications, as well as bandwidth and security requirements. Schools utilizing virtual solutions are strongly encouraged to complete the Infrastructure Trial process prior to online testing windows to verify successful test delivery. More information and configuration instructions for the qualified virtual vendors can be found at www.testnavqualified.com.</p>

CHROME OS: PARCC ASSESSMENT SPECIFICATIONS FOR CHROMEBOOKS USERS

Operating Systems Supported for PARCC Assessments	Platform Specifications for Chromebook Operating Systems	
Chrome OS 50+ <i>Required Specification</i>	No Browser Requirement. The installation of a Chromebook-specific TestNav App is required.	
<p>Chromebooks cannot run Java therefore TestNav cannot lock down the device via a standard web browser. A secure Chromebook-specific application is utilized instead. The free Chromebook-specific TestNav app is available in the Chrome Store. We recommend that all Chromebook users use the Chrome Admin console to manage devices in order to ensure that the app is always refreshed and up to date. Schools should check to make sure they have the latest version of the app prior to the start of their test window. To download the app, go to the Chrome store and search for ‘TestNav’ or use the following direct link: https://chrome.google.com/webstore/detail/testnav/mdmkkicfmmkgmpkmdikhlggogpicma</p> <p>Encrypted Student Response Files (SRFs) will be saved locally through this application. Follow these steps to ensure SRF and log files aren’t deleted.</p> <ul style="list-style-type: none"> • From the Admin console, select Device Management > Chrome > Device settings • In the User Data section, ensure that Do not erase all local user data is selected 		
Additional Specifications for Chromebooks		
	<i>Minimum Specifications</i>	<i>Recommended Specifications</i>
Memory	2GB RAM or greater	4GB RAM or greater
Processor	Any Processor	Any Processor
Connectivity	Computers must be able to connect to the Internet via wired or wireless networks.	Computers must be able to connect to the Internet via wired or wireless networks.
Screen Size	9.5 inch screen size or larger	9.5 inch screen size or larger
Screen Resolution	1024 x 768	1024 x 768
Input Device Requirements	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad
	The input device must allow students to select/deselect, drag, and highlight text, objects, and areas. The input device must allow students to enter letters, numbers, and symbols and to shift, tab, return, delete, and backspace. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single computer during assessment administration.	
Assistive Technologies	Assistive technologies, in addition to the input devices listed in these guidelines, may be needed for students requiring accommodations. Refer to the PARCC Assistive Technology Guidelines document for guidance on use of other devices. Please note: Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: http://download.testnav.com/ .	
Headphone/Earphone/ Ear bud Requirements	Headphones/Earphones/Ear buds	Headphones/Earphones/Ear buds
	Headphones are needed for all ELA/Literacy units , and for students who receive the text-to-speech accommodation for the ELA/Literacy assessments or the accessibility feature for the Mathematics assessments.	

	<p>Stand-alone headphones (i.e., headphones not connected to a device) are also an accessibility feature; therefore, some students may use headphones as noise buffers to minimize distractions or filter external noise during testing.</p>
<p>Firewalls, Content, and Spam Filters</p>	<p>Firewalls, content, and spam filters must be set to allow access to Pearson domains.</p> <p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsonusercontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481
<p>Security</p>	<p>For the PARCC test, eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating systems (Windows, Mac, Linux, iOS, Chrome OS, Android) must have the administrative tools and capabilities to “lock down” the device to temporarily disable features, functionalities, and applications that could present a security risk during test administration and should not prevent a PARCC secure browser or other test software from entering the computer into lock down mode. The operating systems listed here as approved for PARCC assessments meet this security requirement, but provide different mechanisms for managing user security settings at the individual device and/or enterprise levels. School technology administrators should be familiar with the particular requirements of the systems they will be using for PARCC assessments to ensure test security is maintained.</p> <p>Districts must configure Chromebooks for kiosk mode whenever TestNav is launched to deliver tests securely. Configuration can be completed through the Chrome Admin console or by adjusting settings on individual devices. Google charges a cost of \$30 per Chromebook to allow group administration via the Chrome Admin console. To use Chromebooks as a testing platform, districts will need to confirm their devices are enrolled into their Google Apps domain. For more information, visit: https://support.google.com/chrome/a/answer/1360534?hl=en .</p> <p>Schools can test the security lock down settings of their Chromebooks by:</p> <ol style="list-style-type: none"> 1. Open the TestNav app in kiosk mode and navigate to your state login page, then click the user icon in the top right and choose “App Check” from the menu. <ol style="list-style-type: none"> a. A success message should display within a few seconds. b. If an error message is received please review the device setup instructions for Installable TestNav at https://support.assessment.pearson.com/x/HgACAO or contact PARCC Support. <p>Please note: The PARCC SystemCheck tool is being decommissioned, and should no longer be used to assist with device readiness.</p> <p>As you prepare your student test taking devices for the test, please turn off or disable any management software that would allow secure test content on student testing devices to be viewed on any other device; e.g., LanSchool, NetopVision, or similar applications.</p>

LINUX: PARCC ASSESSMENT SPECIFICATIONS FOR LINUX DESKTOP AND LAPTOP USERS

Operating Systems Supported for PARCC Assessments	Platform Specifications for Linux Operating Systems	
Fedora 24 (64-bit) <i>Recommended Specification</i>	No Browser Requirement. The installation of <i>TestNav Desktop</i> is required. ¹	
Ubuntu 16.04 (64-bit) <i>Recommended Specification</i>	No Browser Requirement. The installation of <i>TestNav Desktop</i> is required. ¹	
Additional Specifications for Linux Desktop, Laptop, Netbook, and Thin Client ² /VDI Computers		
	<i>Minimum Specifications</i>	<i>Recommended Specifications</i>
Memory	1GB RAM or greater	2GB RAM or greater
Processor	Any Processor	Any Processor
Connectivity	Computers must be able to connect to the Internet via wired or wireless networks.	Computers must be able to connect to the Internet via wired or wireless networks.
Screen Size	9.5 inch screen size or larger/ “10-inch class” tablets or larger	9.5 inch screen size or larger/ “10-inch class” tablets or larger
Screen Resolution	1024 x 768	1024 x 768
Input Device Requirements for All Desktops and Laptops	Keyboard – wired or wireless/Bluetooth Mouse or Touchpad	Keyboard– wired or wireless/Bluetooth Mouse or Touchpad
	The input device must allow students to select/deselect, drag, and highlight text, objects, and areas. The input device must allow students to enter letters, numbers, and symbols and to shift, tab, return, delete, and backspace. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single computer during assessment administration.	
Assistive Technologies	Assistive technologies, in addition to the input devices listed in these guidelines, may be needed for students requiring accommodations. Refer to the PARCC Assistive Technology Guidelines document for guidance on use of other devices. Please note: Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: http://download.testnav.com/ .	
Headphone/Earphone/ Ear bud Requirements	Headphones/Earphones/Ear buds	Headphones/Earphones/Ear buds
	Headphones are needed for all ELA/L units , and for students who receive the text-to-speech accommodation for the ELA/L assessments or the accessibility feature for the Mathematics assessments. Stand-alone headphones (i.e., headphones not connected to a device) are also an accessibility feature; therefore, some students may use headphones as noise buffers to minimize distractions or filter external noise during testing.	
Firewalls, Content, and Spam Filters	Firewalls, content, and spam filters must be set to allow access to Pearson domains.	

	<p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsonusercontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481
<p>Security</p>	<p>For the PARCC test, eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating systems (Windows, Mac, Linux, iOS, Chrome OS, Android) must have the administrative tools and capabilities to “lock down” the device to temporarily disable features, functionalities, and applications that could present a security risk during test administration and should not prevent a PARCC secure browser or other test software from entering the computer into lock down mode. The operating systems listed here as approved for PARCC assessments meet this security requirement, but provide different mechanisms for managing user security settings at the individual device and/or enterprise levels. School technology administrators should be familiar with the particular requirements of the systems they will be using for PARCC assessments to ensure test security is maintained.</p> <p>Schools can test the security lock down settings of their Linux systems by:</p> <ol style="list-style-type: none"> 1. Open the Installable TestNav Desktop app and navigate to your state sign in page, then click the user icon in the top right and choose “App Check” from the menu. <ol style="list-style-type: none"> a. A success message should display within a few seconds. b. If an error message is received please review the device setup instructions for Installable TestNav at https://support.assessment.pearson.com/x/HgACAQ or contact PARCC Support. <p>Please note: The PARCC SystemCheck tool is being decommissioned, and should no longer be used to assist with device readiness.</p> <p>As you prepare your student test taking devices for the test, please be sure to take the following steps to ensure test security.</p> <ul style="list-style-type: none"> • Check every device, to ensure that all software applications, including Internet browsers, cameras (still and video), screen-capture programs (live and recorded such as Skype), email, instant messaging, application switching, media players (such as iTunes) and printing are closed on all student testing devices before the test begins. Work with your local technology staff as they may have procedures in place that provide a "clean" desktop and they will be able to provide you with easy ways to determine what applications or programs may be running on your devices. • Turn off or disable any software that would allow secure test content on student testing devices to be viewed on any other device; e.g, LanSchool, NetopVision, or similar applications.

	<ul style="list-style-type: none"> • In addition, schools should work with their technology staff to configure the common applications listed below to NOT launch on any student test taking devices during testing sessions: <ul style="list-style-type: none"> ○ Anti-virus software performing automatic updates ○ Power management software on laptops warning of low battery levels ○ Screen savers and sleep mode ○ E-mail with auto message notification ○ Calendar applications with notifications, such as Google Calendar ○ Pop-up blockers
<p>Additional Guidance</p>	<p>¹<i>TestNav Desktop</i> can be downloaded here: http://download.testnav.com/</p> <p>²Each computer operating in a thin client environment must meet or exceed minimum hardware specifications, as well as bandwidth and security requirements. Schools utilizing virtual solutions are strongly encouraged to complete the Infrastructure Trial process prior to online testing windows to verify successful test delivery. More information and configuration instructions for the qualified virtual vendors can be found at www.testnavqualified.com.</p>

iOS: PARCC ASSESSMENT SPECIFICATIONS FOR iPad USERS

iPad Operating Systems Supported for PARCC Assessments	Platform Specifications for iOS Operating Systems	
iOS 9.3+ <i>Recommended Specification</i>	No Browser Requirement. The installation of an iPad-specific TestNav App is required. ¹	
iOS 10.2+ <i>Recommended Specification</i>	No Browser Requirement. The installation of an iPad-specific TestNav App is required. ¹	
<p>iPad 2 Support:</p> <ul style="list-style-type: none"> 2016-2017 Administration - PARCC will continue to support the use of iPad 2 devices for the 2016-2017 administration cycle. These devices do have memory limitations (512MB), which fall below the standard recommended memory for testing devices. PARCC urges schools to conduct infrastructure trials in advance of testing to ensure a smooth and uninterrupted experience for students during testing. The following tests have large, media rich content, so special attention and preparation should be conducted if iPad 2's must be used for the administration of these tests: High school tests, and text-to-speech or American Sign-Language tests. 2017-2018 Administration - PARCC recommends discontinuing use of the iPad 2 for PARCC testing for the 2017-2018 administration cycle due to device memory limitations. In the cases where an iPad 2 is the only option for computer-based testing, local education agencies (LEAs)/districts are responsible for performing robust infrastructure trials to assess the device's ability to meet testing needs during the assessment administration. High school tests, and text-to-speech or American Sign-Language tests, require more memory and should be administered on other devices when possible. 		
Additional Specifications for iPads		
	<i>Minimum Specifications</i>	<i>Recommended Specifications</i>
Memory	512MB RAM or greater	1GB RAM or greater
Processor	Any Processor	Any Processor
Connectivity	Tablets must be able to connect to the Internet via wired or wireless networks.	Tablets must be able to connect to the Internet via wired or wireless networks.
Screen Size	9.5 inch screen size or larger ² / "10-inch class" tablets or larger	9.5 inch screen size or larger ² / "10-inch class" tablets or larger
Screen Resolution	1024 x 768	1024 x 768
Input Device Requirements	Touchscreen or Mouse	Keyboard – wired or wireless/Bluetooth Touchscreen or Mouse
	PARCC highly recommends using external keyboards for tablet devices during PARCC testing to ensure equitable access to test content due to the location of the virtual keyboard. Local education agencies (LEAs)/districts are responsible for determining whether external keyboards will be used for tablet devices for use within schools during PARCC testing, and this decision should be consistent with what is used during instruction. Schools and LEAs/districts must ensure that students have sufficient opportunity for practice prior to testing (i.e., if a school is using external keyboards for PARCC testing, ensure students have ample opportunity to practice with the external keyboard prior to testing).	

	<p>External keyboards must allow students to enter letters, numbers, and symbols and to shift, tab, return, delete, and backspace. Tablet touchscreen interfaces can be used for student interactions with the assessments other than text input, including to select/deselect, drag, and highlight text, objects, and areas. Keyboards may be wired or wireless. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single device during assessment administration.</p>	
<p>Assistive Technologies</p>	<p>Assistive technologies, in addition to the input devices listed in these guidelines, may be needed for students requiring accommodations. Refer to the PARCC Assistive Technology Guidelines document for guidance on use of other devices.</p> <p>Please note: Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: http://download.testnav.com/.</p>	
<p>Headphone/Earphone/ Ear bud Requirements</p>	<p>Headphones/Earphones/Ear buds</p>	<p>Headphones/Earphones/Ear buds</p> <p>Headphones are needed for all ELA/L units, and for students who receive the text-to-speech accommodation for the ELA/L assessments or the accessibility feature for the Mathematics assessments.</p> <p>Stand-alone headphones (i.e., headphones not connected to a device) are also an accessibility feature; therefore, some students may use headphones as noise buffers to minimize distractions or filter external noise during testing.</p>
<p>Firewalls, Content, and Spam Filters</p>	<p>Firewalls, content, and spam filters must be set to allow access to Pearson domains.</p> <p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsonusercontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481 	
<p>Security</p>	<p>For the PARCC test, eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating systems (Windows, Mac, Linux, iOS, Chrome OS, Android) must have the administrative tools and capabilities to “lock down” the device to temporarily disable features, functionalities, and applications that could present a security risk during test administration and should not prevent a PARCC secure browser or other test software from entering the computer into lock down mode. The operating systems listed here as approved for PARCC assessments meet this security requirement, but provide different mechanisms for managing user security settings at the individual device and/or enterprise levels. School technology administrators should be familiar with the particular requirements of the systems they will be using for PARCC assessments to ensure test security is maintained.</p> <p>Important Note: Apple recently introduced Automatic Assessment Configuration, which will be used by the TestNav app on iPads starting in Fall 2016. As a result, iPads no longer need to be</p>	

	<p>configured for guided access mode or single app mode whenever TestNav is launched. Students will enable the device lock feature by clicking “Yes” on a prompt when they sign in to their test. The device will unlock automatically after logging out or submitting final answers. For more information, review the Pearson Technical Bulletin at: https://support.assessment.pearson.com/x/ewpgAQ</p> <p>Schools can verify the security lock down settings of their iPads by:</p> <ol style="list-style-type: none"> 1. Open the TestNav app and navigate to your state login page, then click the user icon in the top right and choose “App Check” from the menu. <ol style="list-style-type: none"> a. A success message should display within a few seconds. b. If an error message is received please review the device setup instructions for Installable TestNav at https://support.assessment.pearson.com/x/HgACAQ or contact PARCC Support. <p>Please note: The PARCC SystemCheck tool is being decommissioned, and should no longer be used to assist with device readiness.</p> <p>As you prepare your student test taking devices for the test, please turn off or disable any management software that would allow secure test content on student testing devices to be viewed on any other device; e.g., LanSchool, NetopVision, or similar applications.</p>
<p>Additional Guidance</p>	<p>¹Tablets running iOS cannot run Java so TestNav cannot lock down the device via the browser. The iPad TestNav app is now available in the Apple App store. To download the app, go to the App Store and search for ‘TestNav’. Student Response Files (SRFs) will be saved locally through the application.</p> <p>²Smaller tablets (screen size less than 9.5 inches), e-readers, and smart phones will <u>not be supported</u> and will <u>not be compatible</u> with PARCC assessments.</p>

ANDROID: PARCC ASSESSMENT SPECIFICATIONS FOR ANDROID TABLETS

Operating Systems Supported for PARCC Assessments	Platform Specifications for Android Tablets	
Android 5.0 Lollipop <i>Required Specification</i>	No Browser Requirement. The installation of an Android-specific TestNav App is required.	
Android 6.0 Marshmallow <i>Required Specification</i>	No Browser Requirement. The installation of an Android-specific TestNav App is required.	
Android 7.0 Nougat <i>Required Specification</i>	No Browser Requirement. The installation of an Android-specific TestNav App is required.	
Additional Specifications for Android Tablet		
	<i>Minimum Specifications</i>	<i>Recommended Specifications</i>
Memory	1GB RAM or greater	2GB RAM or greater
Processor	Any Processor	Any Processor
Connectivity	Computers must be able to connect to the Internet via wired or wireless networks.	Computers must be able to connect to the Internet via wired or wireless networks.
Screen Size	9.5 inch screen size or larger ¹ / “10-inch class” tablets or larger	9.5 inch screen size or larger ¹ / “10-inch class” tablets or larger
Screen Resolution	1024 x 768	1024 x 768
Input Device Requirements	<p>Mouse, Touchpad or Touchscreen</p> <p>Keyboard – wired or wireless/Bluetooth</p> <p>Mouse, Touchpad or Touchscreen</p> <p>PARCC highly recommends using external keyboards for tablet devices during PARCC testing to ensure equitable access to test content due to the screen area consumed by the virtual keyboard. Local education agencies (LEAs)/districts are responsible for determining whether external keyboards will be used for tablet devices for use within schools during PARCC testing, and this decision should be consistent with what is used during instruction. Schools and LEAs/districts must ensure that students have sufficient opportunity for practice prior to testing (i.e., if a school is using external keyboards for PARCC testing, ensure students have ample opportunity to practice with the external keyboard prior to testing).</p> <p>External keyboards must allow students to enter letters, numbers, and symbols and to shift, tab, return, delete, and backspace. Tablet touchscreen interfaces can be used for student interactions with the assessments other than text input, including to select/deselect, drag, and highlight text, objects, and areas. Keyboards may be wired or wireless. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single device during assessment administration.</p>	
Assistive Technologies	<p>Assistive technologies, in addition to the input devices listed in these guidelines, may be needed for students requiring accommodations. Refer to the PARCC Assistive Technology Guidelines document for guidance on use of other devices.</p> <p>Please note: Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: http://download.testnav.com/.</p>	

<p>Headphone/Earphone/ Ear bud Requirements</p>	<p>Headphones/Earphones/Ear buds</p>	<p>Headphones/Earphones/Ear buds</p>
<p>Firewalls, Content, and Spam Filters</p>	<p>Headphones are needed for all ELA/L units, and for students who receive the text-to-speech accommodation for the ELA/L assessments or the accessibility feature for the Mathematics assessments.</p> <p>Stand-alone headphones (i.e., headphones not connected to a device) are also an accessibility feature; therefore, some students may use headphones as noise buffers to minimize distractions or filter external noise during testing.</p> <p>Firewalls, content, and spam filters must be set to allow access to Pearson domains.</p> <p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsonusercontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481 	
<p>Security</p>	<p>For the PARCC test, eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating systems (Windows, Mac, Linux, iOS, Chrome OS, Android) must have the administrative tools and capabilities to “lock down” the device to temporarily disable features, functionalities, and applications that could present a security risk during test administration and should not prevent a PARCC secure browser or other test software from entering the computer into lock down mode. The operating systems listed here as approved for PARCC assessments meet this security requirement, but provide different mechanisms for managing user security settings at the individual device and/or enterprise levels. School technology administrators should be familiar with the particular requirements of the systems they will be using for PARCC assessments to ensure test security is maintained.</p> <p>Schools can verify the security lock down settings of their Android tablets by:</p> <ol style="list-style-type: none"> 1. Open the TestNav app and navigate to your state login page, then click the user icon in the top right and choose “App Check” from the menu. <ol style="list-style-type: none"> a. A success message should display within a few seconds. b. If an error message is received please review the device setup instructions for Installable TestNav at https://support.assessment.pearson.com/x/HgACAQ or contact PARCC Support. <p>Please note: The PARCC SystemCheck tool is being decommissioned, and should no longer be used to assist with device readiness.</p> <p>As you prepare your student test taking devices for the test, please turn off or disable any management software that would allow secure test content on student testing devices to be viewed on any other device; e.g., LanSchool, NetopVision, or similar applications.</p>	

Additional Guidance	¹ Smaller tablets (screen size less than 9.5 inches), e-readers, and smart phones will <u>not be supported</u> and will <u>not be compatible</u> with PARCC assessments.

BANDWIDTH RECOMMENDATIONS

Minimum bandwidth requirements are based on the needs for the PARCC assessment, and account for the maximum level of connectivity needed to administer test content for any one portion of the assessments for Mathematics and ELA/L, recognizing that some sessions may require less than the published minimum bandwidth. Due to the heavy bandwidth burden of certain test forms and/or accommodations, **proctor caching is very strongly encouraged for the administration of the following tests and/or accommodations.**

- ELA/L
- Text-to-speech (Mathematics, ELA/L, and Mathematics Spanish)
- ASL (ELA/L and Mathematics)

If this content is not cached, it may prevent students from testing.

In addition, schools with low bandwidth and/or large numbers of simultaneous users, including instructional and other non-assessment uses taking place concurrent with testing, are **strongly encouraged** to utilize PARCC’s options for proctor caching for all PARCC tests, a strategy that will significantly reduce bandwidth demand for testing.

Note: Because certain accommodations (including text-to-speech and ASL) are form-specific, the Personal Needs Profile information must be uploaded or updated prior to proctor caching. If a change is made to a student’s SR/PNP after proctor caching, you are strongly urged to follow best practice and re-cache to ensure that the appropriate form is assigned to the student.

External Connection to the Internet		
Minimum With Caching	Minimum Without Caching	Recommended for Assessment + Instruction
5 kilobits per second (kbps)/student	50 kilobits per second (kbps)/student	100 kilobits per second (kbps)/student or faster

Minimum Bandwidth - With Caching

Schools that wish to implement **Proctor Caching as a low-bandwidth solution for assessment administration should plan to have 5 kilobits per second (kbps) of available bandwidth in their external connection to the Internet for each simultaneous test-taker.** With proctor caching, a school’s or district’s internal wired or wireless networks will distribute test content to student computers, but local internal network connection speeds may vary based on wireless network configurations or other factors. [Proctor Caching software](#) is available to all PARCC schools as part of the Pearson TestNav 8 delivery platform. PARCC strongly recommends proctor caching to increase the number of simultaneous testers that can be supported and to ensure a seamless test experience. The [Proctor Caching User Guide](#) contains step-by step instructions for using the Proctor Cache system to increase the number of simultaneous testers that can be supported.

Minimum Bandwidth - Without Caching

Schools that will have students connecting directly to the Internet during test administration should plan to have **50 kilobits per second (kbps) of available bandwidth for each simultaneous test-taker**. The fewer students that are testing at the same time, the lower the bandwidth demand will be.

Recommended Bandwidth for Assessment + Instruction

As schools plan for PARCC assessments concurrent with their efforts to enhance bandwidth capacity that can support technology-rich learning environments, PARCC recognizes that schools are evaluating simultaneous uses of their networks that include instruction, assessment, professional development, and administrative processes. In response, PARCC is modeling the higher recommended bandwidth level on the recommendations of the State Educational Technology Directors Association in its May 2012 publication *The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs* (<http://www.setda.org>).

PROCTOR CACHING REQUIREMENTS

Caching is a secure option that will enable schools and districts to deliver interactive computer-based tests even in very limited Internet bandwidth conditions. Caching involves pre-downloading as much of the encrypted test content prior to testing as possible, staging it on a computer (or multiple computers) in a district network location(s), and distributing it to student test-taking computers from the caching server. These procedures will help to avoid potential bottlenecks from testing traffic due to slower network switches, a shared Internet connection, or any other constraint on large-scale assessment traffic.

PARCC’s test delivery platform provider, Pearson, is making available to schools and districts a caching option known as “Proctor Caching” as part of the Pearson TestNav 8 delivery platform. With proctor caching, test content is downloaded only once from the Pearson server to the district or school. Encrypted assessment content resides on a computer within the school network, and is delivered during testing to each student's computer, where TestNav 8 then decrypts and displays the test content for students. Only the local network is used for delivering test content while the student is testing to help protect from Internet delays or other networking bottlenecks. Schools should plan on a **minimum bandwidth capacity equivalent to 5 kbps per simultaneous test-taker to implement proctor caching**.

PARCC recommends the following for optimal performance.

- Utilize dedicated computer(s) for proctor caching. Performance may be impacted by multiple services running on the same computer. This is more prevalent on virtual machines.
- To help reduce the risk of network lag, it is recommended that the computer(s) running proctor caching should be located as close as possible on the network to the student testing devices.
- Anti-virus scanning may cause network lag on proctor caching. It is recommended that an anti-virus scanning exemption is allowed on the cache folder.
- Verify that test content from previous testing administrations has been purged from proctor caching computer(s).

NOTE: A new Proctor Cache tool has been released for use during the 2016-2017 testing year. The install file and process documentation can be found on the [TestNav Downloads](#) page. This new version (2016.9) of Proctor Caching software is required for 2016-2017 testing. For schools with existing Pearson Proctor Cache software already installed, it is recommended that you uninstall the old Proctor Cache software before installing the new version. After completing the upgrade, school administrators will be able to precache test content without the Java plug-in. This means that the Google Chrome browser can be used for precaching test content.

Specifications for Proctor Caching ¹		
	Windows	Mac ²
Operating System	<ul style="list-style-type: none"> • Windows Server 2008 • Windows Server 2012 • Windows 7 • Windows 8 • Windows 8.1 • Windows 10 	<ul style="list-style-type: none"> • Macintosh OS 10.7 • Macintosh OS 10.8 • Macintosh OS 10.9 • Macintosh OS 10.10 • Macintosh OS 10.11
Memory	1GB RAM or greater	1GB RAM or greater

Disk Space	20 GB or greater	20GB or greater
Processor	1.6 GHz x86-compatible	Intel Core™ Duo 2.0GHz Only Intel-based Macs are supported
Firewalls, Content, and Spam Filters	<p>Firewalls, content, and spam filters must be set to allow access to Pearson domains.</p> <p>The following must be opened in any firewalls, proxy servers, or software that is used for Internet content filtering:</p> <ul style="list-style-type: none"> • *.testnav.com:80 • *.testnav.com:443 • *.pearsonusercontent.com • *.thawte.com • *.usertrust.com (<i>new</i>) • *.comodoca.com (<i>new</i>) • *.google-analytics.com (recommended, but not required) <p>In addition, when using Pearson-supplied proctor caching you must configure the local area network firewall software and content filters to allow traffic on both of the posted listed below:</p> <ul style="list-style-type: none"> • port 4480 • port 4481 	
Additional Guidance	<p>¹ If you are using firewall software on the Proctor Caching computer, you must configure the firewall software to open ports 4480 and 4481 for TCP/IP on the local network.</p> <p>² In certain situations when the parental control is on and the user attempts to connect to SSL sites, the automatic Internet content filter on Mac OS X workstations may block your test delivery domain, for example, testnav.com. To resolve this, set the parental control to “Always Allow” your test delivery domain, for example, testnav.com.</p>	

COMPUTER-BASED ACCESSIBILITY FEATURES AND EMBEDDED ACCOMMODATIONS AVAILABLE FOR PARCC ASSESSMENTS

The chart on the following page summarizes which accessibility features and computer-based accommodations will be supported for the 2016-2017 assessment. Please note, this document only addresses computer-based accessibility features and accommodations.

More detailed information about PARCC accessibility including accommodations for paper pencil forms can be found in the PARCC Accessibility Features and Accommodations Guidelines, Fifth Edition (<http://www.parcconline.org/parcc-accessibility-features-and-accommodations-manual>).

	Windows	Mac	iOS	Chromebook	Android	Linux
Tools and Accessibility Features Available for All Students						
Always available						
Flag Items for Review	Yes	Yes	Yes	Yes	Yes	Yes
Notepad	Yes	Yes	Yes	Yes	Yes	Yes
Line Reader Mask	Yes	Yes	Yes	Yes	Yes	Yes
Enlargement Device (Magnifier)	Yes	Yes	Yes	Yes	Yes	Yes
Zoom/Magnify ¹	Yes	Yes	Yes	Yes	Yes	Yes
Turned on/off at form/section level by Test						
Calculator – Scientific	Yes	Yes	Yes	Yes	Yes	Yes
Calculator – Five Function w/sq. root	Yes	Yes	Yes	Yes	Yes	Yes
Eliminate Answer Choice	Yes	Yes	Yes	Yes	Yes	Yes
Text Highlighter tool	Yes	Yes	Yes	Yes	Yes	Yes
Protractor	Yes	Yes	Yes	Yes	Yes	Yes
Ruler (Inches/Centimeters)	Yes	Yes	Yes	Yes	Yes	Yes
TI Graphing Calculator	Yes	Yes	Yes	Yes	Yes	No
Item/Passage-level feature						
Audio with Volume Control	Yes	Yes	Yes	Yes	Yes	Yes
Cut/Copy/Paste (Writing Tools)	Yes	Yes	Yes	Yes	Yes	Yes
Exhibits	Yes	Yes	Yes	Yes	Yes	Yes
Passage Paging	Yes	Yes	Yes	Yes	Yes	Yes
Pop-up Glossary (above grade-level vocab)	Yes	Yes	Yes	Yes	Yes	Yes
Spell Check (ELA/L only)	Yes	Yes	Yes	Yes	Yes	Yes
Video Playback	Yes	Yes	Yes	Yes	Yes	Yes

	Windows	Mac	iOS	Chromebook	Android	Linux
Accessibility Features and Accommodations Available for Students With a Personal Needs Profile						
PNP invoked						
Answer Masking	Yes	Yes	Yes	Yes	Yes	Yes
Assistive Technology ^{2,3}	Yes ²					
Closed Captioning	Yes	Yes	Yes	Yes	Yes	Yes
Background/Font Color (Color Contrast) Settings	Yes	Yes	Yes	Yes	Yes	Yes
Refreshable Braille displays (ELA/L only)⁴	Yes ²	No	No	No	No	No
Transadaptation of the Mathematics Assessment in Spanish	Yes	Yes	Yes	Yes	Yes	Yes
Text-to-Speech ⁵ (for Mathematics)	Yes	Yes	Yes	Yes	Yes	Yes
Text-to-Speech ⁵ (for ELA/L)	Yes	Yes	Yes	Yes	Yes	Yes
Spanish Text-to-Speech ⁵ (for Mathematics)	Yes	Yes	Yes	Yes	Yes	Yes
American Sign Language ⁵ (ASL)	Yes	Yes	Yes	Yes	Yes	Yes

¹Pearson discovered inconsistency among browsers when using browser-based magnification (Safari = 200%, Firefox = 300%, IE = 1000%). Pearson recommends limiting the browser magnification setting to 300% or less.

²TestNav is developed according to WCAG 2.0, Level AA standards. Browsers and assistive technologies that comply with the W3C's User Agent Accessibility Guidelines (UAAG) and support WCAG 2.0, Level AA and the ARIA specification form from the W3C should be compatible with TestNav. If the assistive technology used does not support these standards, there may be compatibility issues.

³Assistive technology is not supported for use with *TestNav Desktop*. Students using assistive technologies must test with the Firefox 45 Extended Support Release (ESR) 32-bit browser, which is only available on Windows and Mac operating systems, and can be found here: <http://download.testnav.com/>.

⁴Devices used for a Refreshable Braille display also require the use of an Assistive Technology screen reader.

⁵Proctor caching is strongly encouraged. If this content is not cached, it may present challenges for students during testing.