TECHNOLOGY GUIDELINES FOR PARCC ASSESSMENTS
VERSION 3.0 – September 2013 Update

Updates and additional information are available at: **http://www.parcconline.org/technology**

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 purchase as they implement the Common Core States Standards, and also evaluate whether they will meet PARCC's 2014-15 minimum requirements for computer-based assessment administration.

PLEASE NOTE: Technology Guidelines for PARCC Assessments Version 3.0 updates, and therefore supersedes, the Version 2.1 document previously released in February 2013.

Updates in Version 3.0 include:
- Information Regarding Minimum Technology Specifications for the PARCC Field Test
- Updated Bandwidth Specifications
- Browser Specifications for the PARCC Field Test and 2014-2015 operational assessments

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 2014-2015.
- Minimum Specifications apply to existing school technology inventories.
- Computers meeting the Minimum Specifications can be considered as satisfying PARCC guidelines for **2014-2015**.

Considerations regarding computers meeting, but not exceeding, minimum specifications:
- Computers with these minimum specifications may *not* be adequate beyond the second year of PARCC assessments in **2015-2016**. 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.

TECHNOLOGY GUIDANCE FOR DECISION MAKING

While PARCC's ongoing processes for assessment and technical platform design continue, *Technology Guidelines for PARCC Assessments Version 3.0*, **is intended to help states and districts inform their own readiness preparations and decision-making.** As test components are piloted through the PARCC Field Test in Spring 2014, 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.

INFORMATION REGARDING MINIMUM TECHNOLOGY SPECIFICATIONS FOR THE SPRING 2014 FIELD TEST

In spring 2014, the PARCC Field Test will be administered to over one million students across PARCC states. The minimum technology requirements for the Field Test are a subset of PARCC's overall technology guidelines. However, some parts of the PARCC assessment delivery system will be in development during the PARCC Field Test year; as a result, a few operating systems and accessibility features that will *not* be supported during the PARCC Field Test will still ultimately be supported for the 2014-2015 operational assessments. To best communicate the distinct elements of the technology guidance that apply during field testing, PARCC is maintaining a specific set of documentation, training, and support materials for the field test.

Schools participating in the PARCC Spring 2014 Field Test should refer to the ***Technology Guidance for 2014 PARCC Field Test Participation*** for field test specific information that will help them determine their capacity to administer PARCC's computer-based field tests in Spring 2014.

Key components of this document include:
- A detailed list of devices students can use to participate in the Field Test
- Bandwidth specifications required to support computer-based testing for the Field Test
- Information about setting up proctor caching as a low-bandwidth option for testing

More detailed systems check tools, training sessions, and other technology implementation guidance for the PARCC Field Test will be released in October 2013.

In addition, to assist schools in preparing for 2014-2015 operational assessments, PARCC will release a practice test in Spring 2014, which will include all accessibility features and be compatible with all the operating systems that will be supported during the full operational assessment. Through the practice test, schools will be able to test their local systems with compatible PARCC assessment items and administrative tools. All devices and accessibility features will be available for all operating systems defined in the Device Specifications section of this document.

For the full list of device specifications, accessibility features and accommodations available during the PARCC Field Test, please see ***Full Technology Specifications for PARCC Field Test Version 1.0***.

BANDWIDTH RECOMMENDATIONS FOR PARCC FIELD TEST AND OPERATIONAL ASSESSMENT

PARCC has developed a tiered bandwidth recommendation that provides schools with guidance around different uses of school networks during assessments. These tiers include a very low bandwidth level that requires local caching of test content ahead of test day, a minimum level for networks that do not pre-load test content, and a bandwidth level that will support simultaneous network uses for testing, instruction, and other required day-to-day school operations.

Minimum bandwidth requirements account for the level of connectivity needed to administer next generation PARCC assessment items that include complex student interactions, extended constructed responses, and embedded multimedia – although individual sessions of the Math and English Language Arts/Literacy assessments may require less than the published minimum bandwidth. 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, a strategy that will significantly reduce bandwidth demand for testing. Similarly, test forms including computer-delivered accommodations and accessibility features are anticipated to require more bandwidth and therefore caching for accommodated forms is strongly encouraged. PARCC's assessment delivery platform provider for both the PARCC Field Test and the first PARCC operational administration in 2014-2015, Pearson, has created the document Proctor Caching: Using Caching Strategies to Better Manage Network Traffic Demand During Online High-stakes Assessments as a guide to assist schools in whether to implement caching for PARCC assessments.

	Minimum With Caching	Minimum Without Caching	Recommended for Assessment + Instruction
External Connection to the Internet	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 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. The Proctor Caching guide, (http://www.parcconline.org/field-test-technology) will help schools or districts configure caching to maximize bandwidth where local network variations exist.

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
PARCC recognizes that school networks must support a wide range of services and technology-rich educational offerings both during and outside of PARCC assessment windows. In response to these realities, PARCC is modeling the higher recommended bandwidth guidance 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). These higher bandwidth recommendations ensure schools have the adequate bandwidth needed to support instruction, assessment, professional development, and administrative processes.

Proctor Caching as a Low Bandwidth Solution
In schools and districts with very limited Internet bandwidth conditions or internal network limitations, caching provides a secure option for delivering interactive computer-based assessments. 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 from large-scale assessment traffic.

PARCC is making available to schools and districts a caching option known as "Proctor Caching" as part of the Pearson TestNav 8 delivery platform that PARCC will use for the Field Test and the first PARCC operational administration in 2014-2015. With proctor caching, a test administrator downloads test content 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.

For the both the PARCC Field Test and the first PARCC operational administration in 2014-2015, schools should plan on bandwidth capacity equivalent to 5 kbps per simultaneous test-taker to implement proctor caching.

SECURITY REQUIREMENTS

Eligible devices of any type (desktop, laptop, netbook, tablet, thin client) or operating system (Windows, Mac, Linux, iOS, Android, Chrome) 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 to be determined from entering the computer into lock down mode. Features that will need to be controlled during test administration include, but are not limited to, unrestricted Internet access, cameras (still and video), screen capture (live and recorded), email, instant messaging, Bluetooth connections, application switching, and printing.

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.

Schools will be able to test the security lock down settings of their systems as part of the Systems Check Tools that PARCC will make available to schools by December 2013 for the PARCC Field Test and by August 2014 for the Year One Operational Assessment.

WEB BROWSER REQUIREMENTS

Web browser requirements for the PARCC Field Test and the 2014-2015 operational assessments are driven by browser compatibility with the Pearson TestNav 8 assessment delivery platform. Compatible browsers and versions are maintained at:
www.PearsonOnlineTesting.com/TN8requirements.

DEVICE SPECIFICATIONS

Desktops, laptops, netbooks (Windows, Mac, Chrome, Linux), thin client, and tablets (iPad, Windows, and Android) will be compatible devices provided they meet the established hardware, operating system, and networking specifications—and are able to address the security requirements described in the Security Considerations section of the Guidelines.

Desktop, Laptop, Netbook, and Thin Client[1]/VDI Computers		
Operating System	**Minimum Specifications[2]**	**Recommended Specifications**
Windows	[3,4]Windows XP – Service Pack 3	Windows 7 or newer
Mac OS	Mac OS 10.5	Mac OS 10.7 or newer
Linux *Linux operating systems will not be supported for the PARCC Field Test.*	Ubuntu 9-10, Fedora 6	Linux: Ubuntu 11.10, Fedora 16 or newer
Chrome OS	Chrome OS 19	Chrome OS 19 or newer

Tablets		
Operating System	**Minimum Specifications**	**Recommended Specifications**
Android *Android operating systems will not be supported for the PARCC Field Test.*	Android 4.0 (with 512 MB RAM or greater)	Android 4.0 or newer (with 1GB RAM or greater)
Apple iOS	iPad 2 running iOS 6 (with 512 MB RAM or greater)	iPad 2 or newer running iOS6 or newer (with 512 MB RAM or greater)
Windows	[6]Windows 8 (with 512 MB RAM or greater)	[6]Windows 8 or newer (with 1GB RAM or greater)

Additional Specifications for Desktop, Laptop, Netbook, and Thin Client[1]/VDI Computers

	Minimum Specifications[2]	Recommended Specifications
Memory	512 MB of RAM	1 GB RAM or greater
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 resolution[5] or better	1024 x 768 resolution[5] or better
Input Device Requirements	Keyboard - wired or wireless/Bluetooth Mouse or Touchpad or Touchscreen	Keyboard - wired or wireless/Bluetooth Mouse or Touchpad or Touchscreen
	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 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. Other assistive technologies may be needed for students requiring accommodations. PARCC will release additional guidance for the use of assistive technology devices for field testing by November 2013. PARCC has released the PARCC Accessibility Features and Accommodations, which is available at: http://www.parcconline.org/parcc-accessibility-features-and-accommodations-manual	
Headphone/Earphone/Earbud and Microphone Requirements	Headphones/Earphones/Earbuds Microphone	Headphones/Earphones/Earbuds Microphone
	Headphones/earphones/earbuds are only required for English Language Arts/Literacy testing sessions, not mathematics testing sessions (except for students who need them for accommodations purposes such as text to speech). Microphones are required for all students taking the Speaking and Listening Assessment. Some student accommodations may also require microphones (e.g., speech to text, voice controls) for other parts of the PARCC assessments.	
Additional Guidance	[1] Each computer operating in a thin client environment must meet or exceed minimum hardware specifications, as well as bandwidth and security requirements. [2] Computers meeting only the minimum specifications for the 2014-2015 assessment are not likely to be compatible beyond the 2015-2016 assessment. PARCC recommends that schools upgrade from the oldest operating systems and lowest memory levels as soon as possible. [3] Windows XP will no longer be supported by Microsoft after April 8, 2014, presenting security and support risks for schools. (http://windows.microsoft.com/en-US/windows/end-support-help) [4] Computers running Windows XP-Service Pack 3 may require a web browser other than Internet Explorer due to HTML5 compatibility limitations. PARCC will issue specific web browser guidance by October 2013.	

	[5] Computers must accommodate the 1024 x 768 screen resolution minimum without panning. PARCC recognizes that some netbook computers may have screen resolutions slightly less than the 1024 x 768 minimum, yet may meet all other minimum requirements. Depending on netbook model specifics, school technology administrators may be able to reset screen resolution to meet PARCC guidelines. By October 2013, following final test design, PARCC will establish a means for schools to evaluate if particular netbook devices are able to display PARCC assessment items without requiring students to scroll or pan.

Additional Specifications for Tablets

	Minimum Specifications	Recommended Specifications
Memory	By operating system	By operating system
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[7]	9.5 inch screen size or larger[7]
Screen Resolution	1024 x 768 resolution[5] or better	1024 x 768 resolution[5] or better
Input Device Requirements	Keyboard - wired or wireless/Bluetooth Touchscreen or Mouse	Keyboard - wired or wireless/Bluetooth Touchscreen or Mouse
	Due to the onscreen space occupied by a tablet's virtual keyboard, PARCC assessments will require external keyboards for test takers using tablets so as not to limit or obscure the view of test item content and related functionalities when text input is required. Research studies to be conducted by PARCC in Spring 2013 are intended to yield data on students' use of virtual versus external keyboards. PARCC will refine this guidance as needed based on these results. External keyboards must allow students to enter letters, numbers, and symbols and 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. To meet security guidelines, each Bluetooth/wireless keyboard must be configured to pair with only a single computer during assessment administration. Other assistive technologies may be needed for students requiring accommodations. PARCC will release additional guidance for the use of assistive technology devices for field testing by November 2013. PARCC has released the PARCC Accessibility Features and Accommodations, which is available at: http://www.parcconline.org/parcc-accessibility-features-and-accommodations-manual	
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	Microphones are required for all students taking the Speaking and Listening Assessment. Some student accommodations may also require microphones (e.g., speech to text, voice controls) for other parts of the PARCC assessments.
Additional Guidance	[6]PARCC has not yet evaluated the compatibility of Windows RT for 2014-2015. Further information will be issued on Windows RT in Version 3.0 of the PARCC Guidelines. [7]Smaller tablets (screen size less than 9.5”), e-readers, and smart phones will not be supported and will not be compatible with PARCC assessments for 2014-2015.