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State Capitol North, 325 Don Gaspar, Suite 200
Santa Fe, New Mexico 87501
Phone: (505) 986-4591 Fax: (505) 986-4338
<http://www.nmlegis.gov/lcs/lesc/lescdefault.aspx>



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August 19, 2013

MEMORANDUM

TO: Legislative Education Study Committee

FR: Ian Kleats and Travis Dulany

RE: STAFF REPORT: PARTNERSHIP FOR ASSESSMENT OF READINESS FOR COLLEGE AND CAREERS (PARCC): IDENTIFYING BROADBAND CONNECTIVITY

INTRODUCTION

At its November 2012 interim meeting, the Legislative Education Study Committee (LESC) received a staff report regarding computer-based testing (CBT) for assessments based on the Common Core State Standards (CCSS) that will commence in school year 2014-2015 through the Partnership for Assessment of Readiness for College and Careers (PARCC), of which New Mexico is a member state.

This staff report discusses:

- the state's PARCC readiness based on published minimum technology requirements;
- comprehensive technology plans for public schools, including recent legislative efforts;
- policy options the committee may wish to consider; and
- background information relating to:
 - the implementation of the PARCC assessments for school year 2014-2015;
 - an overview of the Information Technology Advisory Group (ITAG) of the Public School Facilities Authority (PSFA);
 - the federal E-Rate program; and
 - 2012 interim testimony to the LESL.

Presenters

In anticipation of the transition from paper-based testing to CBT, LESC staff have arranged for the following presenters who will discuss future information technology needs, focused specifically on broadband connectivity:

- Gar Clark, IT Advisory Group/Program Manager, Department of Information Technology (DoIT);
- Tom Bush, IT Advisory Group;
- Buddy Vaughn, Chief Technology Officer, ENMR Plateau; and
- Gayle Nelson, Vice President of Customer Services, Education Networks of America (ENA).

PARCC READINESS

PARCC Minimum Technology Requirements

PARCC, one of two assessment consortia that receive federal funds to design tests aligned to the CCSS, issued the consortium's latest technology guidelines (see Attachment) in February 2013. According to that document, by October 2013, PARCC will issue additional technical guidance including the minimum external and internal bandwidth required per test-taker.

Among the guidance in the document, the consortium advises the following:

- A variety of operating systems will be supported, including Windows, Mac OS, Linux, third and fourth generation iPads, and certain Android tablets. Windows XP – Service Pack 3 will be supported for at least school year 2013-2014, but security issues may arise after Microsoft discontinues support for that operating system after April 8, 2014.
- Thin clients, a computing option that could allow the use of older computers that would not otherwise meet minimum operating specifications, will be supported. Thin client computers will still be required to meet minimum hardware specifications, such as RAM, screen size and resolution, input devices, and network connectivity.
- Initially, tablets will require the use of external physical keyboards instead of software-based keyboards on the device “so as not to limit or obscure the view of test item content and related functionalities when text input is required.” Further studies by PARCC will inform use of virtual keyboards in the future.
- Headphones/earphones will be required at each testing computer. Microphones will be required for the Speaking and Listening Assessment and for students who require special accommodations.
- All devices must be able to connect to the internet via either wired or wireless networking, with recommended internal and external bandwidths per test-taker of 1,000 kbps and 100 kbps, respectively. Minimum bandwidth requirements should become available in October 2013.

According to PARCC, these most recent minimum specifications should remain sufficient through school year 2015-2016, and the recommended specifications should not change before school year 2018-2019. It is unclear whether the recommended technology levels will satisfy minimum requirements after school year 2018-2019.

Broadband Capacity of New Mexico's Public Schools

Broadband capacity of a school is only one of three main variables that define whether the school is able to provide the PARCC assessment as a CBT, rather than paper-based test. Those three variables are: testing days, testing computers, and available bandwidth (both internal and external).

- the number of available testing days will determine how many students the school will need to test per day;
- the number of tests per day will define how many testing computers are necessary; and
- the number of testing computers running simultaneously will determine the minimum total amount of internal and external bandwidth required.

PARCC has imposed restrictions on the testing window, which ranges from a maximum of 20 administration days (four school weeks) to a minimum of five administration days (one school week). The Public Education Department (PED) has indicated that it is working toward a two-week administration period with one additional week period for make-up assessments per school.

In March 2013, PARCC released the PARCC Capacity Planning Tool, an Excel spreadsheet designed to assist district and school leaders in identifying gaps in assessment administration capacity, including computer-based test taking devices and bandwidth, and exploring possible scenarios for addressing those gaps. This tool could aid schools in determining whether PED's proposed testing window would be feasible under existing resources.

PED also notes that it will be doing another round of technology and device readiness surveys from mid-August into September which will provide PED a more current device-to-student ratio. According to PED, they have preliminary data that indicates the current¹ device-to-student ratio can support the proposed two-week window of administration.

If, as the preliminary data from PED suggests, the device to student ratio can support the proposed testing window, the outstanding question would be whether available bandwidth can currently support that device-to-student ratio. Although the answer to this question is currently unknown, the PED survey along with surveys conducted by the ITAG and DoIT might provide the answer.

Paper-based Tests

According to PARCC, paper-and-pencil tests will be available in at least the first year, school year 2014-2015. The paper tests are projected to cost \$3.00 to \$4.00 more per student than the regular computer-based PARCC tests because of "additional costs required for shipping and receiving; printing, scanning, scoring, and distributing the paper-and-pencil tests; and keeping them secure."

¹ It is unclear whether PED's projection of "current" device-to-student ratios includes any devices purchased with the \$5.2 million special appropriation within the *General Appropriation Act of 2013* (Laws 2013, Ch. 227).

Depending on the severity of any technological shortfalls, it could possibly be more cost-effective to use paper tests for at least a portion of the state's public schools in the first year. Until the level of necessary technological upgrades is defined, however, it is difficult to perform a precise cost analysis. The tight timeline, under which those upgrades, including possible capital improvement projects, must occur, might necessitate the use of paper tests in some schools anyway.

It is unclear whether issues might arise about the comparability of PARCC assessments between computer- and paper-based tests. Academic research appears to be inconclusive as to whether scores between paper-based, linear computer-based, and computer adaptive tests are comparable. If the scores are not comparable, this could have implications for both the A-F school grades and teacher/principal evaluations that rely heavily on those test scores.

COMPREHENSIVE TECHNOLOGY PLANS FOR SCHOOLS

An important distinction can be drawn between legislative actions to ensure PARCC readiness and actions that promote comprehensive technology plans for schools. Although requirements for PARCC assessments may be incorporated into strategic technology plans, it is uncertain whether the results of such comprehensive planning will come to fruition before testing must begin. However, this should not discount the importance of engaging in this long-term strategic planning.

One group at the forefront of those efforts is PSFA's Information Technology Advisory Group (ITAG), which includes members from numerous stakeholder groups. Among its other goals, ITAG seeks to identify and define the appropriate technologies needed by New Mexico schools, while encouraging the integration of technology plans into districts' Facilities Master Plans. Many of ITAG's goals are complementary to the DoIT's New Mexico Broadband Program, which focuses on broadband connectivity across multiple sectors within the state.

In addition to those initiatives, several pieces of proposed legislation in the 2013 legislative session sought to further information technology goals for schools, such as:

- **S 569a, *School District Telecommunication Access*, Sen. Sapien** – would have created a new section for the *Public School Finance Act* requiring the Public Education Department to: provide telecommunications access for all school districts and charter schools; coordinate with the DoIT, the Public School Capital Outlay Oversight Task Force, the Legislative Finance Committee (LFC), and the LESC to study the educational opportunity and economic development potential of access; and present a report to the LFC and the LESC by July 31 of each year. **(Did not pass)**

The following three bills proposed to amend the *Public School Code* and the *Public School Capital Outlay Act* to allocate capital outlay funds to purchase educational technology equipment, which could have also addressed equipment needs for the PARCC assessment, specifically:

- **CS/S 620, *Education Technology Equipment*, Sen. Sapien** – would have amended the *Public School Capital Outlay Act* to provide for allocations from the Public School Capital Outlay Fund for education technology equipment; and required the Public School Capital Outlay Council to prepare and submit a report on the progress of all funded projects to the Public Education Commission, the Governor, the LESC, and the

Legislative Finance Committee, no later than December 15 of each year. [Identical to CS/H 660] **(Did not pass)**

- **CS/H 660, *Education Technology Equipment*, Rep. Stewart** – would have amended the *Public School Capital Outlay Act* to provide for allocations from the Public School Capital Outlay Fund for education technology equipment; and required the Public School Capital Outlay Council to prepare and submit a report on the progress of all funded projects to the Public Education Commission, the Governor, the LESC, and the Legislative Finance Committee, no later than December 15 of each year. [Identical to CS/S 620] **(Did not pass)**
- **CS/S 147a, *Education Technology Definitions*, Sen. Candelaria** – would have amended the definitions of “education technology” and “education technology equipment” as those terms are used in the *Public School Code* and set a cap on educational technology expenditures. **(Vetoed)**

POLICY OPTIONS

For the committee’s consideration, the following policy considerations are provided:

(1) Form a 2014 interim Education Technology Subcommittee.

The committee may wish to consider forming an Education Technology Subcommittee during the next interim. In addition to studying the technology needs of schools, the subcommittee could work with stakeholder groups, such as ITAG, in the formation of proposed legislation for possible committee endorsement.

(2) Explore the use of paper-based assessments.

The committee may wish to consider exploring the use of paper-based PARCC assessments as a stopgap measure for certain schools until broader technology plans can be implemented to address computer-based testing requirements.

(3) Request that PED provide PARCC-readiness status reports.

The committee may wish to consider requesting that PED present information from its planned technology surveys at a future interim meeting in advance of the FY 15 budget-making process. Such a presentation could inform the Legislature in its allocation of resources to address this near-term problem.

BACKGROUND

PARCC

In 1967, legislation was enacted requiring the State Board of Education (now PED) to prescribe standards for all public schools in the state, including curriculum, academic content, and performance standards.

In 2001, in order to receive Title I funds, each state was required to:

- adopt rigorous content and academic achievement standards; and
- implement an accountability system based on a system of annual assessments aligned with those standards and approved by the US Department of Education for all students in grades 3 through 8 and once in high school in reading/language arts and mathematics.

In 2007 and 2008, in connection with the LESC's study of high school redesign, and supported by an appropriation to the LESC, New Mexico joined the American Diploma Project. This effort spearheaded by Achieve, Inc., provided states with a formal process to revise their mathematics and English/language arts (ELA) standards so they are aligned with the expectations of college and careers. A state team that included staff from the LESC, PED, and the Higher Education Department, as well as faculty from state public secondary and postsecondary institutions, spent 18 months reviewing and revising the state standards. The revised math standards were adopted in PED rule in June 2009, and the ELA standards in September 2009.

Meanwhile, in June 2009, the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO) announced the launch of the nationwide, state-led CCSS initiative to give educators direction about what all children need to succeed in college and the workplace, and to allow states to share best practices that, it is hoped, will dramatically improve teaching and learning.

In June 2010, LESC staff reported to the committee that the Governor and the Secretary-designate of Public Education had signed a memorandum of agreement in May 2009 with the NGA and the CCSSO, along with other states and the District of Columbia, to develop common standards in ELA and mathematics for grades K-12.

According to the NGA, the standards were designed to be:

- aligned with college and work expectations;
- clear, understandable, and consistent;
- based on rigorous content and application of knowledge through high-order skills;
- built upon strengths and lessons of current state standards;
- internationally benchmarked; that is, informed by other top-performing countries, so that all students are prepared to succeed in our global economy and society; and
- evidence-based.

School year 2012-2013 was the first year the new standards were implemented in New Mexico, starting with grades K-3. Full implementation is expected during school year 2014-2015, with the full rollout of the PARCC exam to replace the New Mexico Standards-based Assessment.

ITAG

According to the PSFA, New Mexico Public School Capital Outlay Council funding for renovation and new school construction projects provides for basic technology infrastructure within the facility. While the amount of internal infrastructure is based on the aggregate of needs as defined by the district and school's educational technology plan, the addition of requirements for online testing of students has created a need to elevate functional ability of schools to handle an increasing load on internet bandwidth and internal infrastructure.

The PSFA has created an advisory group – ITAG – in preparation for the increased information technology needs for New Mexico public schools. According to ITAG, the group is recommending the funding and authorization of a comprehensive evaluation of bandwidth capacity and technology infrastructure requirements for public schools statewide for the first half of school year 2013-2014.

According to PSFA, ITAG is an inter-disciplinary body set up by the PSFA as a forum for issues and discussion related to the provision of educational technology infrastructure in New Mexico public school buildings.

Federal E-Rate Program

“E-Rate” is a common term used in place of the “Schools and Libraries Program” administered by the Universal Service Administrative Company (USAC) under the direction of the Federal Communication Corporation (FCC). E-Rate provides discounts to schools and libraries for eligible telecommunications products and services.

As reported during a 2012 LESC interim meeting:

- the E-Rate program is administered by the USAC under the direction of the FCC;
- the E-Rate program supports connectivity for communications using telecommunications services and/or the Internet;
- schools and districts that wish to receive E-Rate funding must prepare a technology plan, which delineates how information technology and telecommunications infrastructure will be used to achieve educational goals, specific curriculum reforms, or library service improvements;
- eligible schools must also provide additional resources, including end-user equipment such as computers or telephones, software, professional development, and other elements that are necessary to utilize the connectivity funded by the E-Rate program;
- discounts for support, ranging from 20 percent to 90 percent of the costs of eligible services, depend on the level of poverty (free- and reduced-fee lunch program status by school) and the urban/rural status of the population served; and
- service providers bill the E-Rate program for the discount portion of the services they provide schools and districts, and are **required** to bill schools and districts for the non-discount portion.

Recent changes have been proposed to the E-Rate program by the White House to meet the federal ConnectED initiative. According to a White House fact sheet, the ConnectEd initiative has the following focus areas:

- connecting America’s schools;
- improving teaching; and
- unleashing private-sector innovation.

In the fact sheet, the White House indicates that the ConnectED initiative will, within five year, connect 99 percent of America’s students through next-generation broad band and high-speed wireless in their schools and libraries.

As a first step in the Connect ED initiative, the FCC has issued a notice of proposed rule changes, colloquially referred to as “E-Rate 2.0.” According to a July 19, 2013 press release, the FCC initiated a thorough review and modernization of the E-rate program built around three goals:

- increased broadband capacity;
- cost-effective purchasing; and
- streamlined program administration.

Comments on the FCC’s notice of proposed rule-making are to be submitted to the FCC is September 16, 2013.

2012 LESC Interim Testimony

At its November 2012 interim meeting, the LESC heard testimony from several sources regarding computer-based testing for the PARCC assessment.

The Chief Information Officer and Director of Business Systems, Albuquerque Public Schools (APS), testified that the assessment being developed by PARCC is based on newer technology than the school districts are currently using. While the specifications are being rolled out in three phases, the first phase had already shown that more than half of the APS computers do not meet the PARCC minimum technical standards. This testimony further noted that APS intended to roll out an information technology improvement plan in two phases, the second of which was pending additional PARCC specifications.

Testimony by CenturyLink provided an overview of the company and its plan to invest \$60.0 million in New Mexico over the next several years, in addition to the \$400 million that the company invested in the last five years. This testimony also noted that the company had added fiber Internet speeds to 100,000 customers in the last year; that it has ensured that high-speed Internet is available to at least 75 percent of households in rural New Mexico; and that CenturyLink had been planning to deploy high-speed Internet to areas currently without service via the Connect America Fund.

Testimony by the Chief Information Officer, Public School Facilities Authority, described the work of the ITAG, which had been recently focusing on three particular areas:

- technology plans and their relationship to facilities master plans;
- technology adequacy standards; and
- broadband needs that are required to support the educational program delivery.

This testimony also addressed the information technology challenges that public schools face, among them:

- the ability to meet technology requirements for the CCSS;
- the need for groups to meet the needs and requirements of their respective programs;
- the lack of a clear understanding of all technology requirements and needs; and
- the absence of standards or guidelines to define adequate broadband service to support education programs and facilities.

A representative of the E-Rate Division of the International Computer Corporation testified that the E-Rate program is funded through a tax on each phone and Internet connection, the revenue of which is provided for schools and libraries to fund Internet and phone connections through a reimbursement process. Through this program, libraries and schools in New Mexico collected \$36.0 million in 2012 and \$31.0 million in 2011.

Finally, the Chief Information Officer, Information Technology Division, PED, testified that the department has been working with ITAG and with school districts; and had recently completed a technology survey of school districts.



TECHNOLOGY GUIDELINES FOR PARCC ASSESSMENTS VERSION 2.1 – February 2013 Update

Current updates and additional information are available at:
<http://www.parcconline.org/technology>

The Partnership for the Assessment of Readiness for College and Careers (PARCC) is pleased to provide these technology guidelines to inform schools and districts as they make technology decisions to best meet the instructional needs of their students. The information in this document is intended to answer questions about whether existing computer inventories and new instructional hardware that schools may purchase as they implement the Common Core States Standards, will also meet PARCC's 2014-15 minimum requirements for computer-based assessment administration.

PLEASE NOTE: Technology Guidelines for PARCC Assessments Version 2.1 updates, and therefore supersedes, the Version 2.0 document previously released in December 2012.

Updates in this version include:

- Clarification about the minimum RAM for iPads running iOS 6.
- Clarifications about the requirements for input devices including touchscreens and Bluetooth/wireless keyboards.
- Clarification about screen resolution requirements.

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 the ongoing processes for assessment and technical platform design continues, *Technology Guidelines for PARCC Assessments Version 2.1* **is intended to help states and districts inform their own readiness preparations and decision-making.** As test components are piloted through Item Tryouts in 2013 and Field Testing 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>.

BANDWIDTH RECOMMENDATIONS

Minimum bandwidth requirements will be determined based on the final specifications of the PARCC assessment delivery platform and the level of multimedia and technology enhanced items in the final assessment design. PARCC will provide minimum specifications by October 2013.

As schools plan for PARCC assessments concurrent with enhancing bandwidth to support instructional needs, PARCC is modeling recommended specifications on those advanced by 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>).

	Minimum Specifications	Recommended Specifications
External Connection to the Internet	To be determined by October 2013	100 kbps per student or faster
Internal School Network	To be determined by October 2013	1000 kbps per student or faster

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.

TESTING PLATFORM SOFTWARE / WEB BROWSER REQUIREMENTS

Software and/or browser requirements will be defined by October 2013, driven by the design choices for test items and the assessment delivery platform.

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 Client¹/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	Ubuntu 9-10, Fedora 6	Linux: Ubuntu 11.10, Fedora 16 or newer
Chrome OS	Chrome OS 19	Chrome OS 19 or newer
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	Keyboard
	Mouse or Touchpad or Touchscreen	Mouse or Touchpad or Touchscreen
	<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 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>Other assistive technologies may be needed for students requiring accommodations. PARCC will release Accessibility Guidelines and Accommodations Guidelines in June 2013.</p>	
Headphone/Earphone and Microphone Requirements	Headphones/Earphones	Headphones/Earphones
	Microphone	Microphone
	<p>Headphones/earphones are required for all students for all PARCC assessments. Some student accommodations may also require headphones/ earphones (e.g., text to speech).</p> <p>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.</p>	
Additional Guidance	<p>¹ Each computer operating in a thin client environment must meet or exceed minimum hardware specifications, as well as bandwidth and security requirements.</p> <p>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.</p> <p>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)</p> <p>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.</p> <p>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.</p>	

Tablets

Operating System	Minimum Specifications	Recommended Specifications
Android	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)
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	Keyboard
	Touchscreen or Mouse	Touchscreen or Mouse
	<p>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.</p> <p>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.</p> <p>Other assistive technologies may be needed for students requiring accommodations. PARCC will release Accessibility Guidelines and Accommodations Guidelines in June 2013.</p>	
Headphone/Earphone and Microphone Requirements	Headphones/Earphones	Headphones/Earphones
	Microphone	Microphone
	<p>Headphones/earphones are required for all students for all PARCC assessments. Some student accommodations may also require headphones/ earphones (e.g., text to speech).</p> <p>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.</p>	
Additional Guidance	<p>⁶PARCC 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.</p> <p>⁷Smaller tablets (screen size less than 9.5"), e-readers, and smart phones will <u>not be supported</u> and will <u>not be compatible</u> with PARCC assessments for 2014-2015.</p>	