Online Assessments: Be Prepared!

March 12, 2014

Revised Slides

Management Council • Ohio Education Computer Network

Ohio Department of Education

State PARCC Implementation Team

Goals For This Presentation

- **Increase awareness** about the myriad considerations associated with going from a pencil-paper assessment system to a computer-based assessment system, including **PARCC-** & **Ohio-developed** assessments

- **Share** the **PARCC** & **Ohio** assessment overview

- **Engage** in an open discussion about topics related to preparing for a computer-based assessment system

Outline

1. Goals of the Presentation & Disclaimer
2. Setting the Stage
3. Timeline
4. 3 Key On-Line Assessment Technology Components
5. Readiness Steps / Deployment Models / Rotation Cycles
6. Client Computing Assets
7. Local Area Network
8. Wide Area Network
9. Client Configuration Mgt
10. Special Needs Considerations
11. Student Assessment Registration
12. Questions/Discussion

Disclaimer: AKA Subject to change without notice

1. The *presentation* considers various technology and human components necessary to implement on-line assessments using various deployment models.
2. Ohio and PARCC standards and implementation policies have not been finalized and are subject to change.
3. Conclusions contained herein are derived from various direct and indirect sources available to the author and public, and are therefore subject to interpretation.
4. Budgetary estimates are for *illustrative* purposes only – actual costs may vary based on vendor selection and other factors. This presentation *does not consider* additional investments likely to be needed in software, staff support, management tools, or training.
5. All information, analysis, conclusions and data provided herein is subject to interpretation and may change with or without the user's knowledge.

Why computer-based assessment?

Why Computer-based Assessment?

- Teachers are utilizing **new standards** (Ohio's New Learning Standards) to teach their students, and these standards either **implicitly** (through model curricula) or **explicitly** (through standards/claims) address the use of **technology** during **instruction**.
  - **Assessment** must be closely **aligned** to the standards.

- Many teachers **incorporate** a multitude of technology-based **instructional practices** into their day-to-day teaching.
  - **Assessment** should also make use of the knowledge, skills, & abilities developed through the use of **instructional technology**.

- Many teachers deliver **innovative**, **real-world lessons** during their day-to-day instruction.
  - **Assessment** should also provide more innovative, real-world **opportunities** for students to show what they know and can do when it comes to pursuing **college** and **career readiness**.

- In addition, other **benefits** associated with computer-based assessments (over pencil-paper assessments) are: lower **cost; ease of delivery; & ease** of **scoring.**

PARCC Priorities

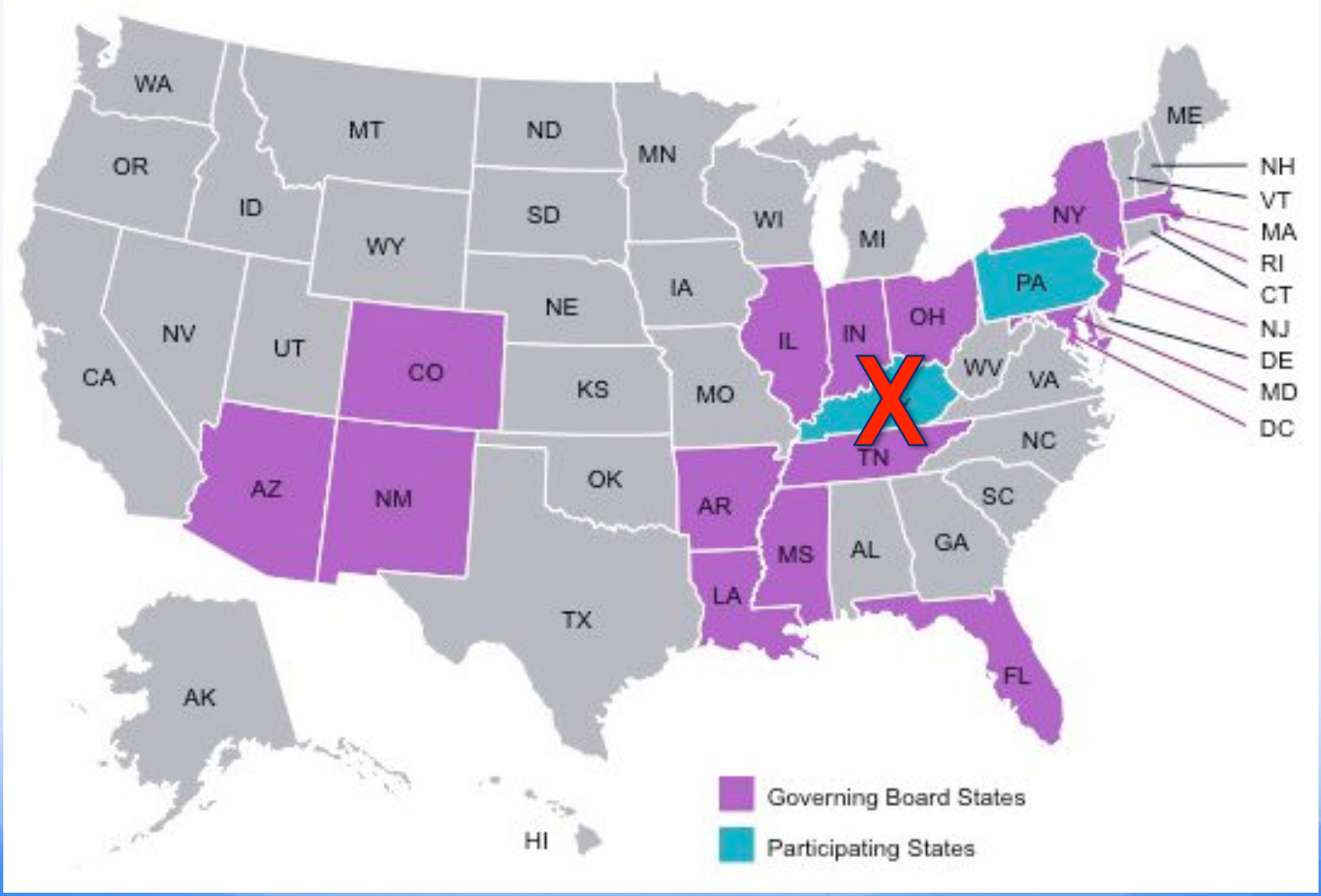
1. Determine whether students are **college and career ready or on track**
2. Measure the full range of the **Common Core State Standards**
3. Measure the **full range of student performance,** including that of high- and low-achieving students
4. Provide educators **data throughout the year** to inform instruction
5. Create innovative **21st century, technology-based assessments**
6. Be **affordable** and **sustainable**

What Is PARCC?

The Partnership for Assessment of Readiness for College and Careers:

- Made up of **18 states/territories**
- Developing common, high-quality **math** and **English language arts (ELA) tests** for **grades 3–11**
  - Computer-based and linked to what students need to know for college and careers
  - For use starting in the 2014–15 school year

PARCC participating states/territories



Legislation To Watch

HB 237- Common Core Initiative

- Republican sponsor & 13 Republican co-sponsors
- Bill says state board "shall not adopt" and ODE shall not implement academic content standards for English language arts or mathematics
- Also says that state board cannot use the PARCC or any assessments "related to or based on the Common Core standards"
- Limits on sharing individual student data
- Hearings in every Congressional district before state board can adopt any academic content changes
- Status: In Education Committee as of 1/6/14

Legislation To Watch

HB 193- Reassess Use of PARCC, Design of End-of-Course Exams

- Republican sponsor & co-sponsor
- Delays administration of Online assessments till 2015-2016 school year
- Allows ODE to conduct field tests for new assessments in 2014-2015 school year
- Requires ODE to complete a comprehensive survey of the capacity and readiness for the administration of assessments online. The survey must include recommended specifications for hardware, software, bandwidth, technical support, security requirements, training of teachers to administer assessments online and training of students with regard to taking assessments online.
- Requires ODE to report the results of the Ohio Achievement Assessments, field testing of assessments provided by a multi-state consortium and the assessments provided by the nonprofit organization and compare the ease of administration, content, format, overall quality, performance benchmarks and cost.
- Prohibits the release of students' names and addresses to any multi-state assessment consortium.
- Status: Out of Education Committee as of 1/6/14

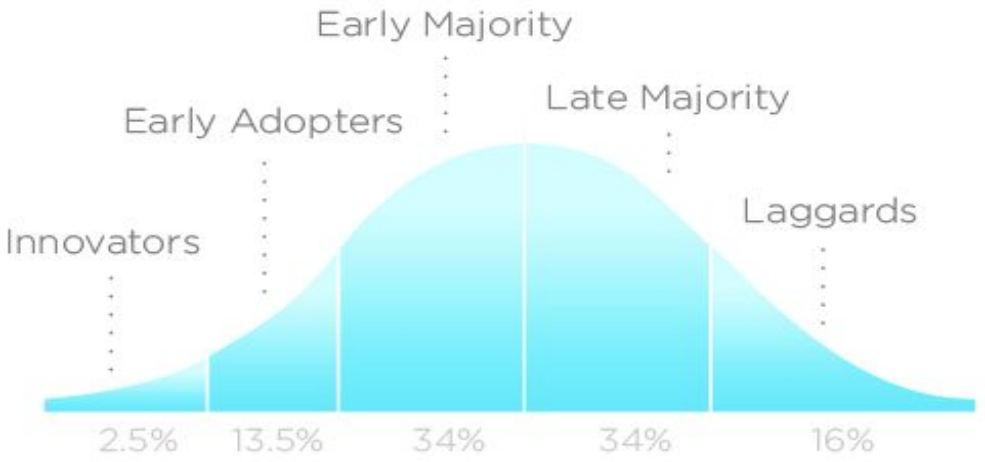
Legislation To Watch

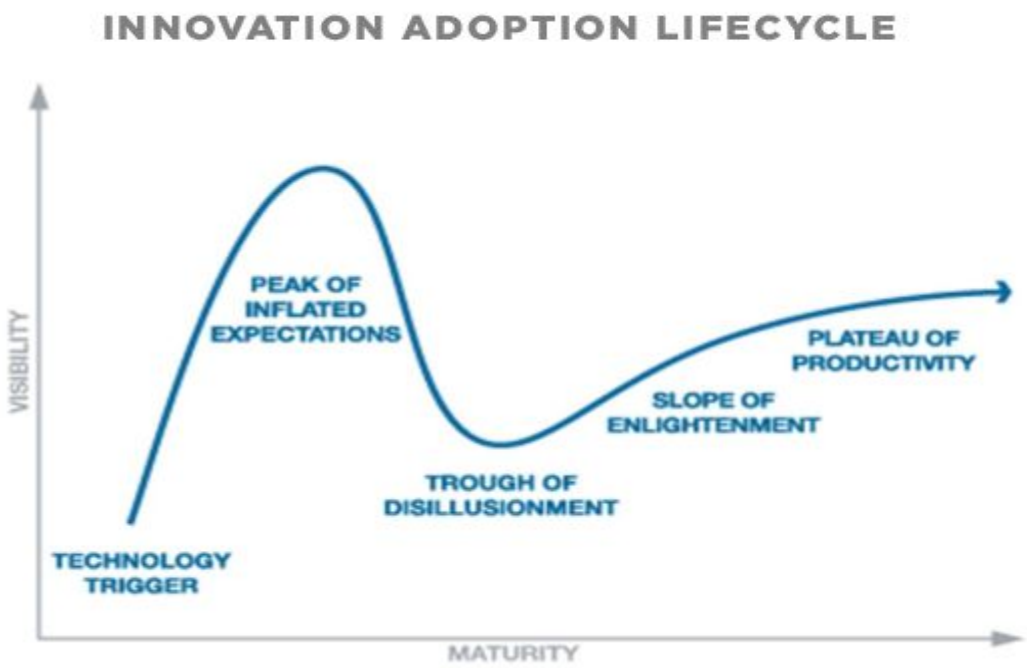
HB 413- Reassess Use of PARCC, Design of End-of-Course Exams

- Republican sponsor & co-sponsor
- Directs the SBOE, State Superintendent, ODE, and public and private school districts not to administer any PARCC assessments in the 2014-2015 school year
- Requires ODE to provide alternative assessments for each grade and subject level by November 15, 2014 to the General Assembly and Controlling Board
- Requires the state's existing memorandum of understanding with PARCC to lapse when it expires at the end of calendar year 2015
- Declares the act an emergency measure – if the bill were to pass and be signed into law, it would go into immediate effect
- Status: Introduced 1/21/14, House Education Comittee

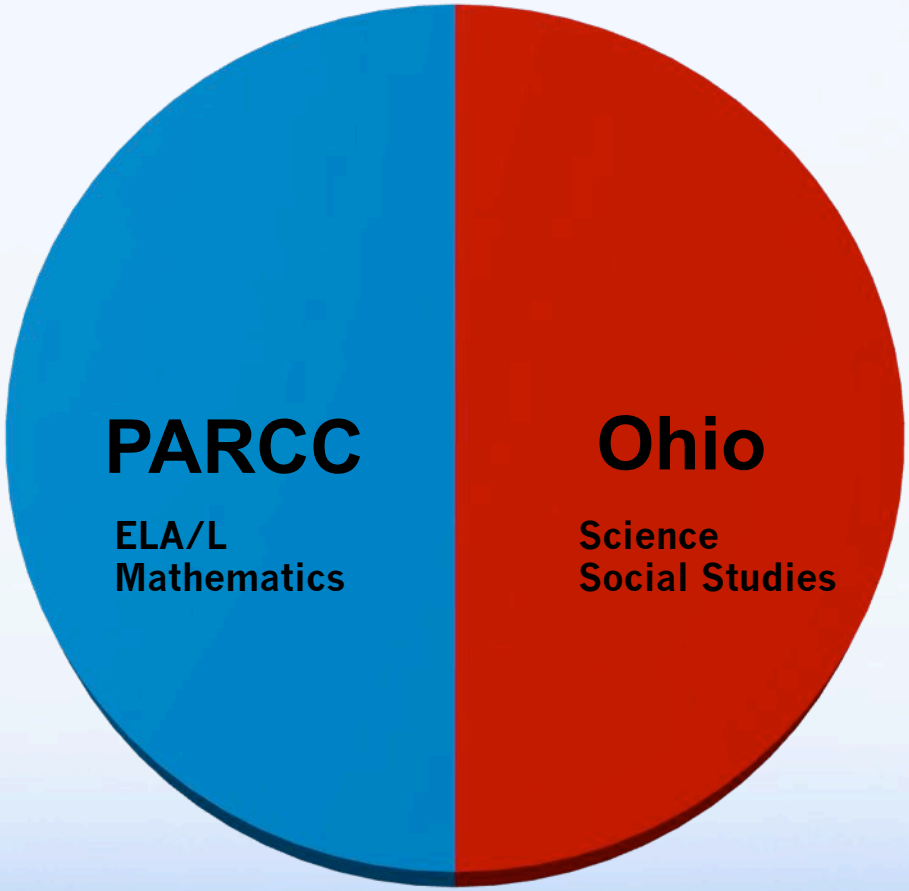
On-Line Assessment Adoption

- What was the "Trigger?"
- What is the overall adoption stage of the On-Line Assessment Industry?
- What is the time horizon to market saturation?
- What are the implications for school districts?



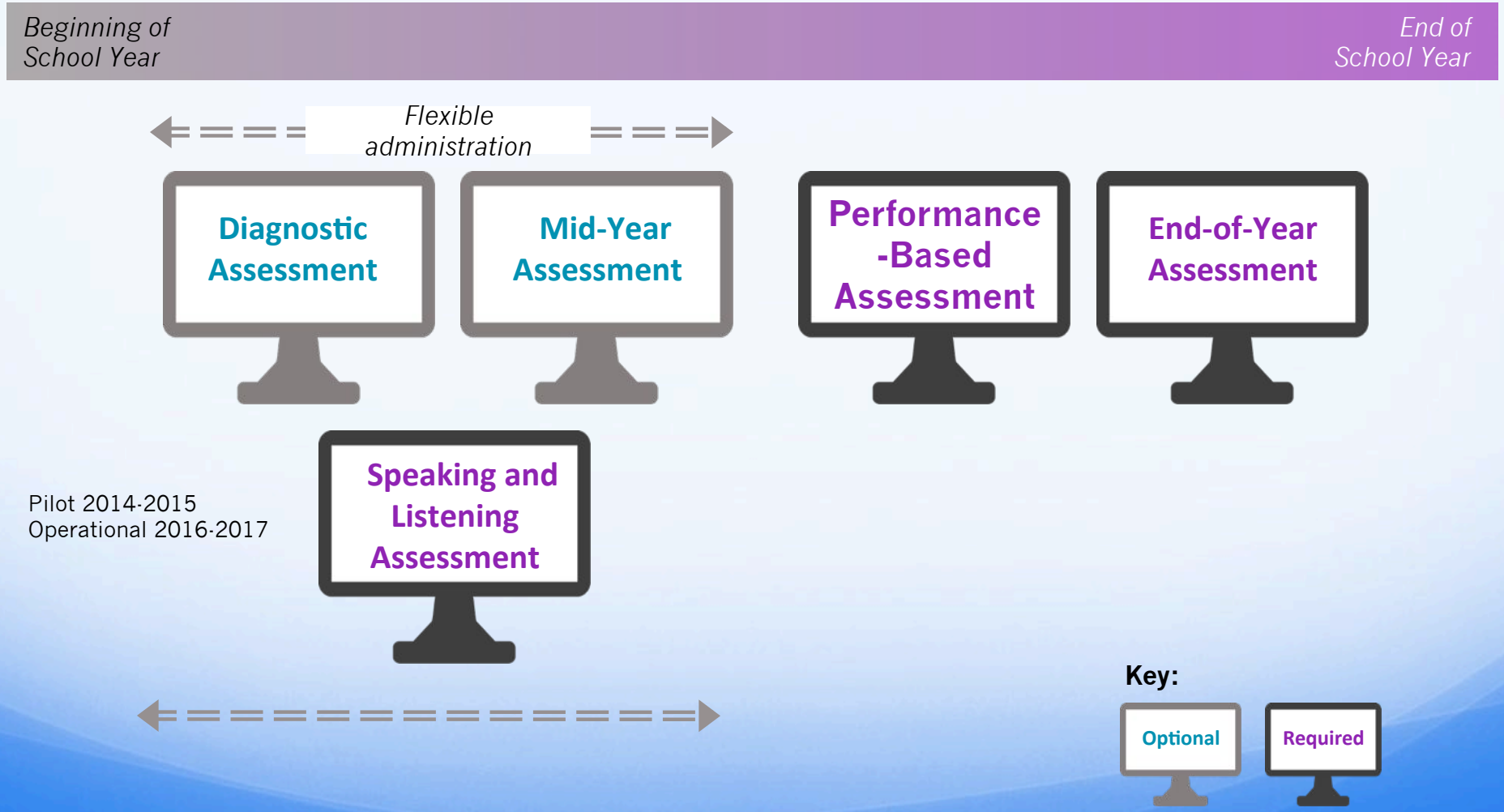


Overall assessment design



Assessments

ELA/Literacy and Mathematics, Grades 3–11



PARCC assessment design

Two Required Assessments Yield Overall Score

Beginning of School Year/Course — *End of School Year/Course*

Each assessment component will be administered in a 20-day window.

- After 75 percent of the school year
- Extended tasks, applications of concepts and skills
  - **ELA/literacy:** Writing effectively when analyzing text, research simulation
  - **Math:** Solving multistep problems requiring abstract reasoning, precision, perseverance and strategic use of tools

- After 90 percent of the school year
- Innovative, short-answer items
  - **ELA/literacy:** Reading comprehension
  - **Math**: Short items that address both concepts and skills

Ohio assessment design

- Science & mathematics assessments based on **Ohio's New Learning Standards**
  - 2013-2014 **Field Tests**
  - 2014-2015 **Implementation** & **Standard Setting**
- Including **Grades 3 – 12**
- Intending to **mirror** the PARCC assessment design
  - PBAs/EOYs
    - Not all grades; some will do **learning** tasks & **assessment tasks**
  - Similar **item types**
    - Samples on the ODE website
      - **http://demo.tds.airast.org/Ohio/**
      - Must use **Firefox** Web Browser
  - Same **assessment window**
    - At least at this point
- See Appendices 6a & 6b for Ohio assessment design by grade level.

Readiness Steps

Don't Wait To Begin Planning	•Create a Team – Assessment, Administrative, Teaching & Technology Staff •Decide how you will implement – choose a deployment model (technology) and rotational/groups •Write a Plan and… •Communicate Roles & Responsibilities to District, Building and Classroom Staff
Choose A Deployment & Rotation Model	•Whole building 1:1 •Classroom •Lab •Rotational Model 1 to 10
Estimate your required client computing needs	•Create or Update your computer replacement roadmap •Immediate Replacement (Now) •Short-Term Replacement (24 months) •Long-Term Replacement (48 months)
Review LAN Requirements	•Determine LAN requirements •Location and type of connections •Required bandwidth • Plan and Acquire LAN components
Review Broadband Requirements	•Required Bandwidth •Review with ITC or tech department options for bandwidth increases
Implement A Security Model	•Manage Client OS •Client Management Tools •Hosted Virtual Desktop

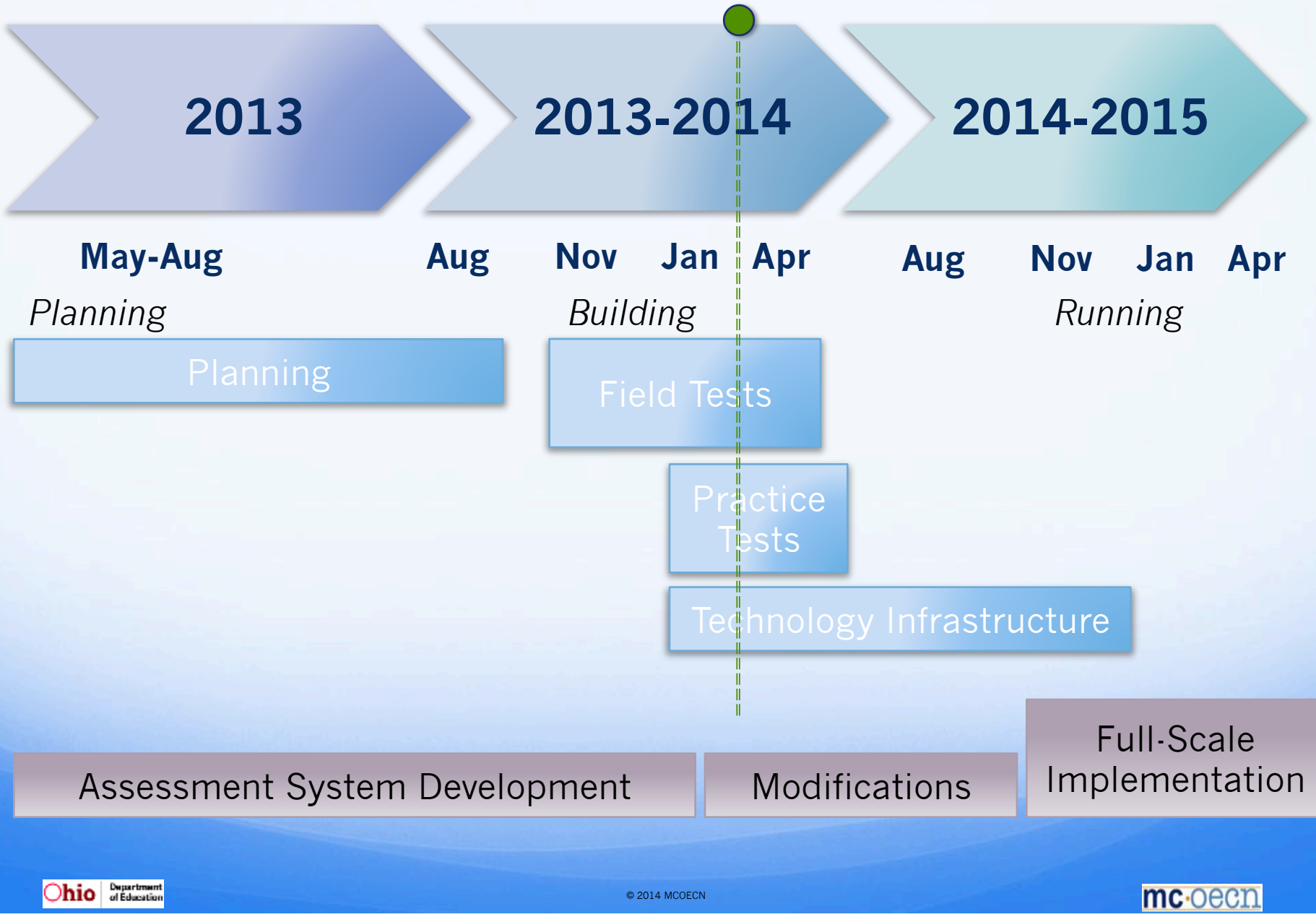
Don't Wait To Begin Planning

- Create a Team – Assessment, Administrative, Teaching & Technology Staff
  - District Office
    - Superintendent, Treasurer or Business Manager
    - Curriculum and Assessment Staff
  - Principals
  - Teachers – especially those in OPAP
  - Technology Coordinator
  - ITC Staff
- Decide how you will implement – choose a deployment model (technology) and rotational/groups
- Plan components should include: integration with the district's instructional technology plan, professional development, assessment management, and technology infrastructure
- Commit your plan to writing
- Make On-Line Assessments a component of your learning and technology plan!

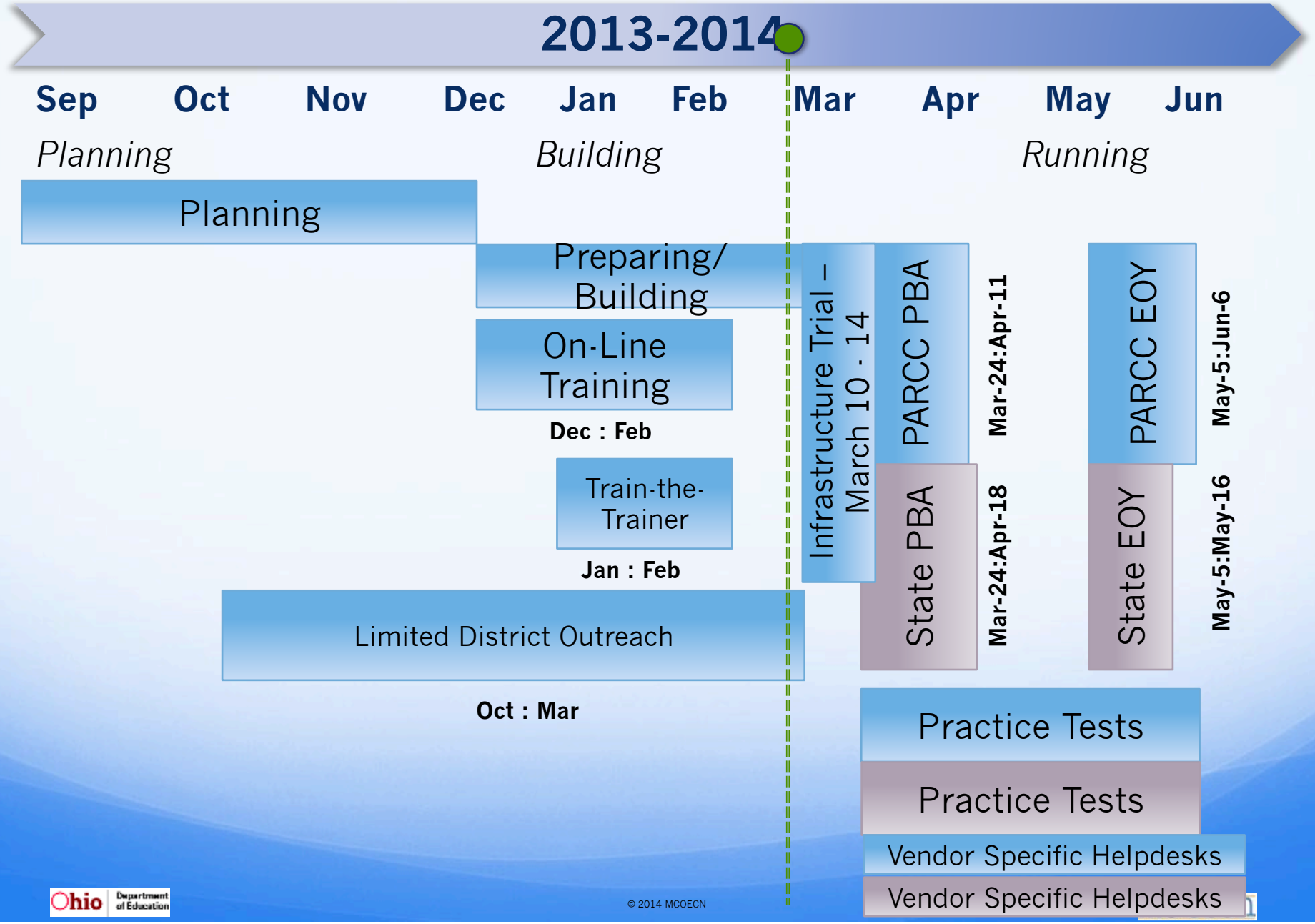
Don't Wait To Begin Planning

- Communicate Roles & Responsibilities to District, Building and Classroom Staff
- A understanding of your district's **current technology asset inventory will be required on an on-going basis** to effectuate planning
- Technology Infrastructure planning, operation and support is **one component** of the overall on-assessment plan – include facilities, management, professional development and support in your plan
- Don't make buying new technology the **first thing** on your to-do list
- On-Line Assessment Planning **is not** a one-time event

Approximate Planning Horizon ELA/Math/SS/S



Field Test Timeline



2015 Operational Calendar *Draft*

http://education.ohio.gov/Topics/Testing/Testing-Materials/2014-2015-Testing-Dates

February-2015

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	**17**	**18**	**19**	**20**	21	22
23	**24**	**25**	**26**	**27**	28	

March-2015

M	T	W	T	F	S	S
						1
2	**3**	**4**	**5**	**6**	7	8
9	**10**	**11**	**12**	**13**	14	15
16	**17**	**18**	**19**	**20**	21	22
23	24	25	26	27	28	29
30	31					

April-2015

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	**14**	**15**	**16**	**17**	18	19
20	**21**	**22**	**23**	**24**	25	26
27	**28**	**29**	**30**			

May-2015

M	T	W	T	F	S	S
				1	2	3
4	**5**	**6**	**7**	**8**	9	10
11	**12**	**13**	**14**	**15**	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

3	PBA ELA/Math		PBA Science/SS
8	EOY ELA/Math		EOY Science/SS

For PARCC Math & ELA assessments, districts will choose their 20-day assessment window

16 Spring OGT March 16 to March 29

23 Spring OAA Grade 3 Only Reading

Ohio Department of Education

mc·oecn

On-Line Assessment 2013-2014 Field Tests

PARCC ELA and/or Math G3-11 Field Test (statistical sample)

Most Students will take only one content area and either the PBA or EOY as determined by PARCC, Few will take one content area for both PBA and EOY

1M students

Random PARCC selection
Random Classrooms selected by LEA

ODE Science and/or Social Studies Field Test (statistical sample)

TBD

- Examine the quality of assessment items to build 2014-2015 assessments
- Test assessment administration procedures
- Provide schools an opportunity to experience the administration of assessments
- LEAs decide by 9/18/13

PARCC ELA and/or Math Practice Test (non-statistical sample)

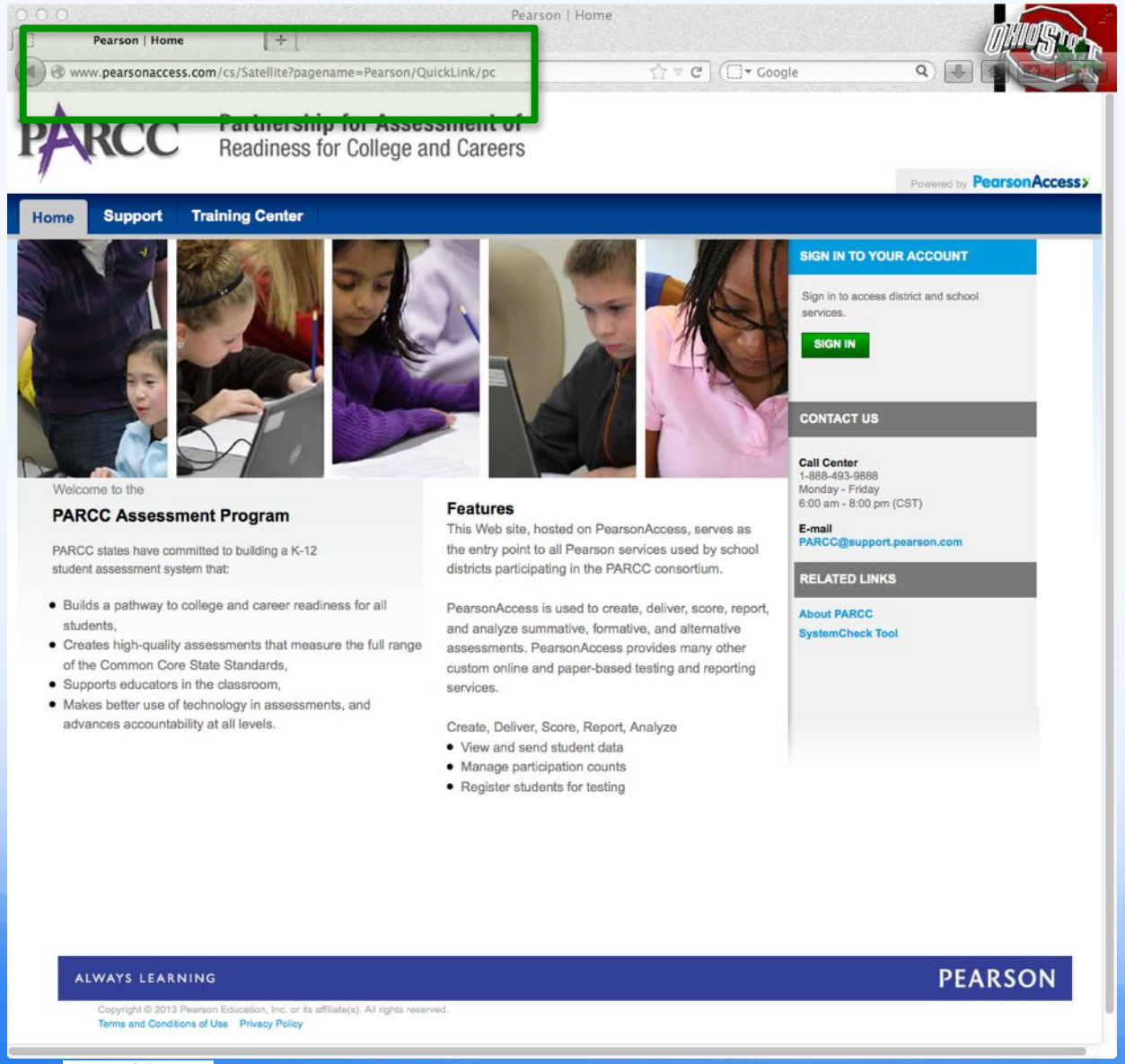
Content areas and test components (ELA PBA or Math EoY or both)

ODE Science and/or Social Studies Practice Test (non-statistical sample)

Grades 4 & 6 social studies PBAs/ EOYs/EOCs, Grades 5 & 8 science PBAs/EOYs/EOCs, & high school science & social studies PBAs/EOYs

- Provides schools, teachers and students an opportunity to become familiar with PARCC or state on-line assessments using various types of technology
- Districts will not be receiving results of the field or practice tests

PARCC/Pearson ELA & Math



Portal established for PARCC on-line assessments

Entry point for school districts participating in PARCC field tests

Used to Create, Deliver, Score, Report & Analyze

Provides Access to Pearson Support Documents & Readiness Tools

ODE/AIR Science & Social Studies Portal

- Portal established for ODE on-line assessments
- Four user types: Students/Families, Teachers/Test Administrators, Test Coordinators, Technology Coordinators
- Content Evolving for Most User Types
  - FAQs
- Most populated for Technology Coordinators
  - Device Specifications
  - System Requirements

Ohio's Next Generation Assessment Resources

Pearson contact information:
E-mail: PARCC@support.pearson.com
Phone: 1-888-493-9888
Office Hours: 6am to 8pm, Monday - Friday.

PARCC Partnership for Assessment of Readiness for College and Careers

PARCC's next-generation assessment system will provide students, educators, policymakers and the public with the tools needed to identify whether students—from grade 3 through high school—are on track for postsecondary success. The tools also help identify where gaps may exist and how they can be addressed well before students enter college or the workforce.

PARCC Home Page: http://PARCCOnline.org
PARCC Field Test: http://PARCCOnline.org/field-test
System Check: http://PARCC.Pearson.com/SystemCheck
Support/Resources: http://PARCC.Pearson.com/Support
PearsonAccess: www.PARCC.Pearson.com
TestNav 8 Requirements: http://PARCC.Pearson.com/TN8Requirements
PARCC Field Test Training site: https://parcc.tms.pearson.com/

Upcoming Field Tech Webinars

- To register for upcoming weekly webinars, please register at the following links:
  - **Feb 27th**
    https://pearsononline.webex.com/pearsononline/j.php?ED=295590822&RG=1&UID=0&RT=MiM3
  - **March 6th**
    https://pearsononline.webex.com/pearsononline/j.php?ED=295781672&RG=1&UID=1771779127&RT=MiM3
  - **March 13th**
    https://pearsononline.webex.com/pearsononline/j.php?ED=295783112&RG=1&UID=1771789522&RT=MiM3
  - **March 20th**
    https://pearsononline.webex.com/pearsononline/j.php?ED=295785157&RG=1&UID=1771798177&RT=MiM3

AIR contact information:
E-mail: ohhelpdesk@air.org
Phone: 1-877-231-7809
Office Hours: 7am – 5pm, Monday – Friday

The Ohio Department of Education will conduct the Online Science and Social Studies Field Tests in spring of 2014. These field tests are an integral part of Ohio's commitment to developing the next generation assessment program and serve as an important opportunity for districts and schools to assess preparedness for future testing.

Ohio Field Test Portal: http://OH.portal.airast.org
Use this portal to access
Student and family information
- Item tutorials
- Student training site
- Family resources
  - Accessibility and accommodations
  - Training test answer keys

Test administration systems
- Tide
- Test administrator interface
- Test administrator training
- Online Reporting System
- Teacher/Test administrator resources
- Item tutorials

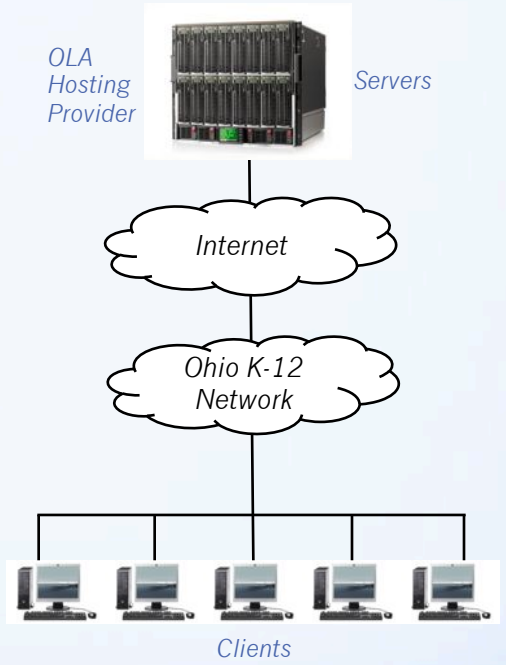
Technology resources and secure browsers

3 Key On-line Assessment Technology Components

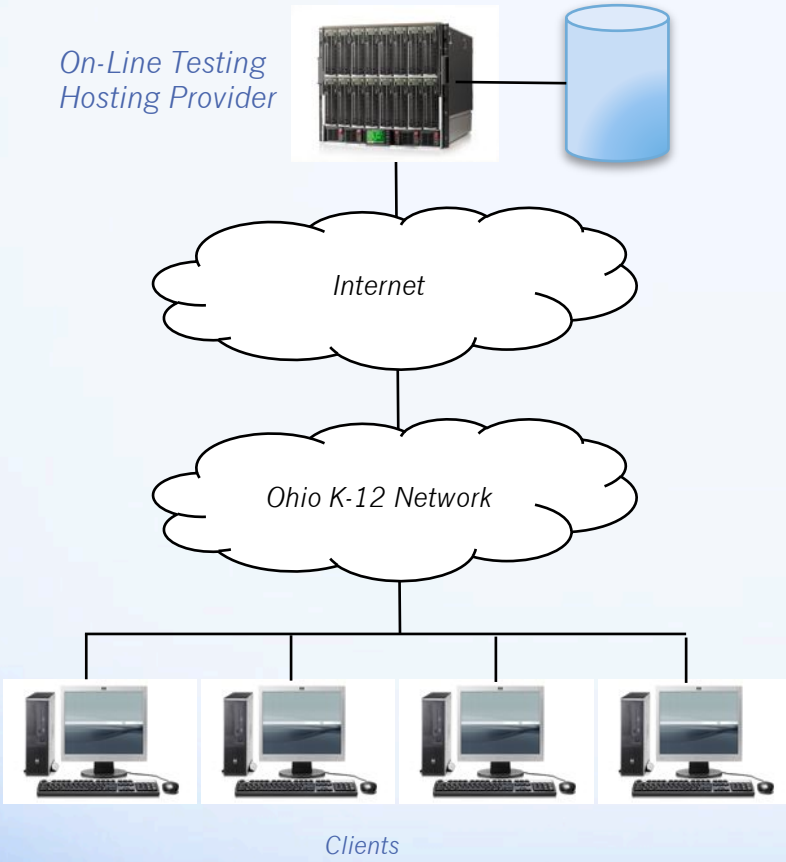
While the final form of the on-line assessments' software architecture has not yet been fully decided by PARCC, it is clear that the on-line assessments will be delivered over the Internet from a centrally hosted provider serving all PARCC consortia member states. In this delivery model it is likely that the PARCC assessment developer will implement a *client-server* architecture using either purpose-built client applications that are designed and compiled for individual computing device operating systems such as Windows, OS-X, Android or iOS; or designed for contemporary web browsers such as Internet Explorer, Safari, Chrome or Firefox.

Given the complexity and cost of developing unique software clients for the various and multiple operating systems types and versions, we conclude that is highly probable that web-browser enabled client delivery is the likely choice of PARCC's assessment developer. This architecture is likely to use web browsers with various cross-platform *rich internet applications and markup languages* such as Adobe Flash, HTML5 or other such tools needed to deliver multi-media assessment content that includes full-motion video, audio, and animation. Note that existing tools written primarily for personal computers such as Flash are unsupported on newer Tablet devices. In this regard, expect assessment vendors to re-write their existing platforms using tools such as HTML5 that support a broader number of personal computer and tablet devices. With assessment delivery expected over the Internet, the following primary technology system components are required for on-line assessment delivery:

- **Client Computing Devices**
- **Local Area Networks**
- **Broadband Building Connectivity**



On-line Assessment System Components



- Assessment Registration
- Testing Item-Bank
- Individual Student Results

- Client Software
- Secure Browser Shell (J2E) or Proprietary Client
- Browser (Firefox)

PARCC's Goal:
"Open-Source" assessment delivery system – client/server architecture that is vendor-neutral

2013-2014 – (field-test) Proprietary Solution

2014-2015
Open Source If Ready

Student Identity must be associated and valid with Assessment content

Summary Technology Readiness Steps For Each Assessment Vendor

- Choose a testing deployment model – either 1:1 , Classroom or Lab
- For lab models, determine the number of computer labs needed to assess students within the 20-day testing window – make sure you factor in any planned make-up time
- Based on the number of computers required to complete your planned assessment rotations – determine whether your existing inventory meets the assessment vendor's *minimum* hardware and operating system requirements
  - Use consortia or vendor provided tools to self-diagnose system readiness

Summary Technology Readiness Steps For Each Assessment Vendor

- Determine whether your existing local area network and wide area networks are sufficient to handle the number of simultaneously connected computers used for assessment
  - Use vendor suggested network tools to understand bandwidth utilization
- Configure your school building's network based on the number of computers required to complete your planned assessment rotations
- Make changes to the school building's network settings to support each vendor's network requirements (e.g. DNS, Firewall, QoS, Traffic Shaping, Certificate Authority)

Summary Technology Readiness Steps For Each Assessment Vendor

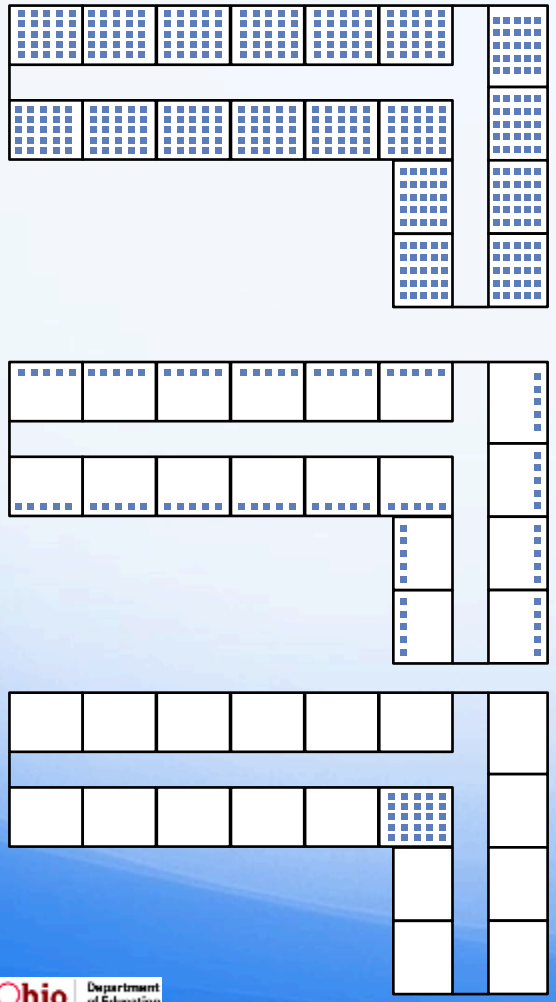
- Install each vendor's secure browser for Windows and Macintosh personal computers, and install each vendor's secure testing application for tablets (iOS, Android and ChromeOS)
- Make vendor specific configuration changes to browsers or tablet applications (e.g. disable pop-up blockers, disable java automatic updates, or enable tablet application automatic updates)
- For each vendor's software, make operating system platform configuration changes (e.g. disable fast user switching for Windows, Spaces in Mission Control for Macintosh, enable Guided Access for iPad).

Summary Technology Readiness Steps For Each Assessment Vendor

- Test client devices and vendor software configurations prior to assessment
  - Reduce or eliminate potential conflicts prior to testing
  - Download non-secure test content prior to testing
- Establish a process for identifying and escalating assessment related helpdesk requests from the student to teacher or testing administrator, building and district technology staff, ITC and ESC staff, ODE and the assessment vendors
- Identify and assign staff resources to monitor assessment operational progress during building and district assessment windows

On-line Assessment Deployment Models

The availability, age and location of existing technology assets in Ohio's schools will influence what on-line assessment model school districts implement.



Deployment Model 1: Whole Building: The Whole Building deployment model utilizes a 1:1 computing model – 1 computer per student – to enable on-line assessments for all students concurrently. The primary benefit of this model is that it provides for a shorter testing lifecycle of approximately one week. This model requires the most technology, and therefore capital to implement. In addition to higher quantities of computing devices, concurrent use increases both local area network and broadband connectivity costs.

Deployment Model 2: Classroom Rotation: The Classroom Rotation model utilizes computing devices within school classrooms to conduct on-line assessments. While the number of computers per classroom varies by district and building, many classrooms have five computers. These tend to be desktop computers connected to wired local area networks. The primary benefit of this model is leveraging current and past district and state investments in technology, and a medium-length testing lifecycle of approximately five weeks. This model results in lower capital costs for devices, networks and broadband connectivity than DM1, as fewer devices are needed.

Deployment Model 3: Lab Rotation: The Lab Rotation model utilizes computing devices in fixed computing lab locations or mobile carts that can be moved from classroom to classroom. These labs typically include 25 to 30 computing devices that would support a single class taking an on-line assessment concurrently. Fixed lab locations are typically desktop computers connected to wired local area networks. Mobile labs are typically laptop computers temporarily connected to the buildings wired LAN via a wireless access point inserted in the classroom. The primary benefit of this model is the ability to provide whole-class testing without investing in a 1:1 initiative. This model has the lowest capital outlay, due to reduced computing devices, and lower bandwidth consumption of local area networks and building broadband connections. However, while this model is the lowest cost to implement, it also has the longest testing lifecycle which results from rotating students a classroom at a time through the lab. Finally, it should be noted that the majority of schools that have labs also have classroom-based technologies. A combination of deployment models could be combined.

The majority of schools that have implemented computer labs also have classroom-based technologies. Therefore, a combination of deployment models utilizing both a Classroom and Lab Rotation Model are possible. This *Presentation* does not consider this fourth deployment option.

Choose A Deployment Model

Model	Number of Testing Rotations	Enhancement to Student Assessment Experience	Blended or Hybrid Learning Value	Impact on Classroom Instruction	Management Complexity	TCO
Whole Building or 1:1	**Shortest** – 1 rotation	**Highest** –students have personal experience with devices assigned or owned by them	**Highest** – students have access to portable learning environments 24x7x365	**Minimal** – whole buildings or classes take assessments when scheduled and ready – no building scheduling required	**Highest** – more devices, operating systems, configurations, and networks to manage for all students	**Highest**
Classroom	**Dependent on the number of classrooms, students per classroom, and computers per classroom – shorter rotations require more computers per classroom and approach "lab-like or 1:1 environments"**	**Higher**– students have familiarity with devices used in their classrooms	**Medium** – students have access to limited devices throughout the school day	**Disruptive** – teachers must manage multiple groups of students each focused on assessment or instruction. Non-assessment activities may disrupt assessment	**Medium** – Approximately 20% of the devices in the whole building, 1:1 model	**Medium**
Lab	**Shorter rotations cycles can be achieved buy purchasing more labs**	**Lowest** – students have limited experiences with devices that may or may not be similar to classroom or personally owned devices	**Lowest** – students have access at limited times based on whole building use	**Minor** – classes schedule in "linear" fashion use of of the lab for assessment purposes on a classroom b classroom basis	**Lowest** – Approximately 5% of the devices in the whole building, 1:1 model	**Low to Medium** – depending on the number of required labs to achieve rotation

Technology Readiness for Field Test: Quick Start Checklist

1.	**NUMBER OF TEST TAKERS:** *Estimate the maximum number of students that will be testing at one time.* Consider how the school might schedule classes of students for field testing. This may be multiple classrooms at a time over a shorter period, or only one class at a time — or even half a class at a time—over the course of the full testing window. Districts/schools will have flexibility to match their schedule to their computer capacity as long as they can complete the field tests within the testing window.	
2.	**AVAILABLE DEVICES:** *Identify the school computers that will be available for testing.* Review the PARCC Technology Guidelines and verify that there will be an adequate number of school computers that meet PARCC minimum specifications to cover the largest number of students that will be testing at one time. If there seems to be a gap, schools can consider dividing classes into smaller groups to test at different times using the available computers throughout the testing window.	
3.	**BANDWIDTH:** Plan to use Proctor Caching and have *at least 5 kbps of bandwidth* for each student testing at the same time. *OR* Plan for *at least 50 kbps of bandwidth* for each student connecting to the Internet for testing at the same time.	

Understand Test Rotations and Groups!

- A test rotation is the number of students taking an on-line assessment concurrently
- A testing block in the amount of time to complete an individual session or component of the on-line test
- Testing blocks include expected **time-on-task, additional time, and extended time**
- How many students will be taking a test at one time?
- Identify the computers that the school has – that meet the PARCC and ODE technology guidelines – that can be used for on-line testing

- **Time-on-Task:** the expected time a student will need to complete a testing session
- **Additional Time**: Is a set amount of additional time for *all* students to complete a testing session
- **Extended Time**: additional time allowed beyond additional time that is *specified* in an IEP.
- **Testing Block =** Time-on-Task + Additional Time

Computer-Based Administration	Paper-Based Administration
• Reading instructions to students • Responding to student questions • Conducting any additional end of session activities (e.g., closing testing sessions)	• Reading instructions to students • Responding to student questions • Distributing materials to students • Collecting materials

PARCC recommends the following guidelines for testing blocks:

Content Area	Grades	PBA	EoY
Math	3-11	1.25 to 1.5 Hour Blocks	1.42 to 1.75 Hour Blocks
ELA Analysis	3-5	1.5 to 1.75 Hour Blocks	1.75 Hour Blocks
ELA Analysis	6-11	2.0 Hour Blocks	1.75 Hour Blocks
ELA Writing	3-11	1.0 to 1.25 Hour Blocks	1.25 to 1.75 Hour Blocks

Suggested PARCC Administrative Time Estimates in Addition to Testing Allocation

Task	Time Allocation
Preparation **before** students arrive—includes logging in and setting up computer work stations	2 minutes per computer work station (30 workstations x 2 = 60 minutes)
Preparation **after** students arrive—includes ensuring students are logged in to computer work stations, reading instructions to students, answering questions	10 minutes
Distribute test materials to students	5 minutes
Administer Field Test session (depending on session and grade level; refer to time chart)	Refer to slides 36 & 37 or links below
Additional time allowed (depending on session and grade level; refer to time chart)	Refer to slides 36 & 37 or links below
End-of-session activities, including closing testing sessions and collecting test materials	5–15 minutes

10
+ 5
+5 to15
=
20 to 30 Additional minutes per PARCC block

PARCC Test Coordinator Manual for Computer-Based Testing
ODE Test Administration Manual

Potential Testing Session Blocks By Grade: PBA

PBA

			Grade									
			3	4	5	6	7	8	9	10	11	12
PARCC	Pearson	ELA1 - Literary Analysis	1.50	1.75	1.75	2.00	2.00	2.00	2.00	2.00	2.00	
PARCC	Pearson	ELA2 - Research Simulation	1.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
PARCC	Pearson	ELA3 - Narrative Writing	1.00	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	
PARCC	Pearson	Math1	1.25	1.25	1.25	1.25	1.25	1.25				
PARCC	Pearson	Math2	1.25	1.25	1.25	1.25	1.25	1.25				
PARCC	Pearson	Algebra I, Geometry, Math I							1.42	1.42	1.42	1.42
PARCC	Pearson	Math II							1.50	1.50	1.50	1.50
PARCC	Pearson	Algebra II, Mathematics III							1.67	1.67	1.67	1.67
ODE	AIR	Social Studies		1.50		1.50						
ODE	AIR	Science			1.50			1.50				
ODE	AIR	American Government							1.75	1.75	1.75	1.75
ODE	AIR	American History							1.75	1.75	1.75	1.75
ODE	AIR	Biology							1.75	1.75	1.75	1.75
ODE	AIR	Physical Science							1.75	1.75	1.75	1.75

Highlighted Assessments can be taken in any grade 9 - 12

Potential Testing Session Blocks By Grade: EOY

EOY

			Grade									
			3	4	5	6	7	8	9	10	11	12
PARCC	Pearson	ELA1	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	
PARCC	Pearson	ELA2	1.25	1.25	1.25	1.75	1.75	1.75	1.75	1.75	1.75	
PARCC	Pearson	Math1	1.42	1.42	1.42	1.5	1.5	1.5				
PARCC	Pearson	Math2	1.42	1.42	1.42	1.5	1.5	1.5				
PARCC	Pearson	Algebra I, Geometry, Math I							1.75	1.75	1.75	1.75
PARCC	Pearson	Math II							1.75	1.75	1.75	1.75
PARCC	Pearson	Algebra II, Mathematics III							1.75	1.75	1.75	1.75
ODE	AIR	Social Studies		1.25		1.25						
ODE	AIR	Science			1.25			1.25				
ODE	AIR	American Government							1.75	1.75	1.75	1.75
ODE	AIR	American History							1.75	1.75	1.75	1.75
ODE	AIR	Biology							1.75	1.75	1.75	1.75
ODE	AIR	Physical Science							1.75	1.75	1.75	1.75

Highlighted Assessments can be taken in any grade 9 - 12

Testing Rotation Math

The number of students and rotations can be used to determine the number of computers needed to complete a rotation within a time-bounded Testing Window:

PBA Example:

20 Day Testing Window
2 Sessions Per Day
40 Possible Sessions within 20 Days
PBA rotation consumes 5 sessions
40 ÷ 5 = 8 *maximum* rotations

EoY Example:

20 Day Testing Window
2 Sessions Per Day
40 Possible Sessions within 20 Days
EoY rotation consumes 4 sessions
40 ÷ 4 = 10 maximum rotations

Students	100	250	500	1,000
Rotations	Computers			
1	100	250	500	1,000
2	50	125	250	500
3	33	83	167	333
4	25	63	125	250
5	20	50	100	200
6	17	42	83	167
7	14	36	71	143
8	13	31	63	125
9	11	28	56	111
10	10	25	50	100

Lab Computer Sizing =
Largest class in school building
+ 2-3 spares

Do Not Use Average Class Size

2015 OLA Planned Calendar

1. One calendar for all LEAs as of March 2014
2. Five week window for PARCC Math & ELA Assessments
3. LEAs choose 20 assessment days – can be non-contiguous to accommodate spring break
4. Overlap of 0, 1, or 1.5 weeks between PARCC and ODE assessments
5. Overlap results in PARCC and ODE assessments competing for same time blocks within those weeks
6. Districts will have to seek balance between two
7. MCOECN has a new model to help districts plan rotations

February-2015

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

March-2015

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

April-2015

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

May-2015

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Example Rotations For PBA

With Make-up Time

For 100 Students

Largest Class Size of 30

No Overlap - 3 PARCC Weeks, 2 ODE Weeks

Beg/End	Week		M	T	W	R	F	PR	OR
2/16/15	1	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	2	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	3	AM	O	O	O	O	O		4
		PM	O	O	O	O	O		4
	4	AM	O	O	O	O	O		4
		PM	O	O	O	O	O		4
3/20/15	5	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P		
								5	16

Minimum PARCC CPUs Required:	20
Minimum ODE CPUs Required:	7
PARCC Labs Required:	0.67
ODE Labs Required:	0.23
LabtoLab Variation (goal is 0):	-0.43
Labs Required:	1.00
Total Computers:	30
Excess Computers:	10
Excess Computers Per Lab:	10

1 Week of Overlap - 4 PARCC Weeks, 1 ODE Week

Beg/End	Week		M	T	W	R	F	PR	OR
2/16/15	1	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	2	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	3	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	4	AM	O	O	O	O	O		4
		PM	O	O	O	O	O		4
3/20/15	5	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P		
								7	8

Minimum PARCC CPUs Required:	15
Minimum ODE CPUs Required:	13
PARCC Labs Required:	0.50
ODE Labs Required:	0.43
LabtoLab Variation (goal is 0):	-0.07
Labs Required:	1.00
Total Computers:	30
Excess Computers:	15
Excess Computers Per Lab:	15

1.5 Weeks of Overlap - 3.5 PARCC Weeks, .5 ODE Weeks

Beg/End	Week		M	T	W	R	F	PR	OR
2/16/15	1	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	2	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	3	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	4	AM	P	P	P	P	P		
		PM	O	O	O	O	O		4
3/20/15	5	AM							
		PM							
								6	4

Minimum PARCC CPUs Required:	17
Minimum ODE CPUs Required:	25
PARCC Labs Required:	0.57
ODE Labs Required:	0.83
LabtoLab Variation (goal is 0):	0.27
Labs Required:	1.00
Total Computers:	30
Excess Computers:	13
Excess Computers Per Lab:	13

Work backwards for each school building and grade to determine whether existing computing assets are sufficient

No Overlap - 3 PARCC Weeks, 2 ODE Weeks

Beg/End	Week		M	T	W	R	F	PR	OR
2/16/15	1	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	2	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
	3	AM	O	O	O	O	O		5
		PM	O	O	O	O	O		5
	4	AM	O	O	O	O	O		5
		PM	O	O	O	O	O		5
3/20/15	5	AM	P	P	P	P	P	1	
		PM	P	P	P	P	P	1	
								6	20

Minimum PARCC CPUs Required:	17
Minimum ODE CPUs Required:	5
PARCC Labs Required:	0.57
ODE Labs Required:	0.17
LabtoLab Variation (goal is 0):	-0.40
Labs Required:	1.00
Total Computers:	30
Excess Computers:	13
Excess Computers Per Lab:	13

- Compare the number of needed computers to the number of available computers that meet the PARCC & ODE standards
- Determine whether available computers can be used “in-place” or need to be moved to a testing location in the school building or district
- Determine whether additional computers will be needed to meet the maximum or likely number of rotations by grade

≥

PARCC & ODE Standards

On-line Assessment Technology Components

Client Computing Devices include desktop and laptop personal computers using the Windows, OSX or Linux operating systems and tablets based on iOS, Windows or Android operating systems. Generally speaking, mobile devices – either laptops or tablets – tend to be required to support 1:1 computing capability necessary to support all students taking on-line assessments *concurrently* in a school building. This is due to two factors – the lack of sufficient space to accommodate larger desktop PC sizes and the lack of sufficient wiring to connect desktop PCs to building local area networks. Mobile devices require less space and many utilize wireless local area network connectivity. There are over 605,000 personal computing devices in Ohio's K-12 schools today. At least 28% are over 9 years old. As these assets reach the end of their useful life and fail, or PARCC or ODE technology standards require more advanced technology, these factors will require the purchase of new computing devices for on-line assessment. For example, the current PARCC minimum requirements are not expected to be supported past the 2015-2016 school year. PARCC recommends that districts upgrade these devices "as soon as possible" to avoid slower performance Of all necessary technology components for on-line assessment, client computing devices are the highest capital investment category.

	Thin Clients	*Personal Computers*			*CPUs*	*S:C Ratio*
	Thin	**Low**	**Med**	**High**		
PK	601	2,228	1,889	1,146	5,864	
K-1	7,092	18,224	12,616	8,360	46,292	4.20
2-3	7,828	19,473	15,762	11,073	54,136	3.61
4-5	8,319	20,311	18,455	12,825	59,910	3.33
6-8	11,546	27,957	30,594	25,855	95,952	3.11
9-12	15,916	33,185	46,243	44,976	140,320	2.94
Labs	15,110	38,690	59,194	52,311	165,305	3.44
Lib Med Cen	5,149	11,161	12,317	9,362	37,989	
Age		**≥7 Years**	**≥5 Years**	**≥3 Years**	605,768	3.44
		28%	*33%*	*27%*	total	average

Data based on 2010-2011 BETA Survey

PARCC: General Requirements for Desktop, Laptop, Netbook, and Thin Client/VDI[1] Computers

Operating System	Supported for Spring 2014 Field Test	Supported for 2014-2015 Operational Assessment	Minimum OS Specification[2]	Hardware Requirements (Minimum)[7]	Recommended Specifications
Windows	Yes	Yes	Windows XP – Service Pack 3[3,4]	Any processor	Windows 7 or newer
Mac OS	Yes	Yes	Mac OS 10.5 -> 10.6	Only Intel-based Macs are supported	Mac OS 10.7 or newer
Linux	**No**	Yes	Ubuntu 9-10, Fedora 6		Linux: Ubuntu 11.10, Fedora 16 or newer
Chrome OS	Yes[6]	Yes[6]	Chrome OS 19		Chrome OS 19 or newer
Memory			512MB of RAM Windows, 1GB RAM Macintosh		1GB of RAM
Screen Resolution			≥1024 x 768[5]		≥1024 x 768[5]

PARCC guidelines take precedence

For all details about device specifications, please see the *PARCC Technology Guidelines* at:
http://www.parcconline.org/sites/parcc/files/PARCCTechnologyGuidelines2dot1_Feb2013Update.pdf
For details about additional Pearson TestNave 8.0.4 Hardware Requirements:
http://www.pearsononlinetesting.com/TestNav/8/requirements_testnav_8_0_4.html

[1] Each computer operating in a thin client environment must meet or exceed hardware, bandwidth and security specifications
[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 willnot be supported by Microsoft past 4/8/14 presenting possible security risks for schools
[4] Computers running Windows XP SP3 may require a web browser other than IE due to HTML5 compatibility issues.
[5] Computers must accommodate 1024 x 768 screen resolution natively without panning. This may not be supported by Netbooks with fixed GPU's on the motherboard.
[6] For the Field Test, not all accessibility features for students with disabilities will be supported for Chrome OS. All features will be supported for the 2014-2015 Operational Year.
[7] Additional hardware requirements added by Pearson circa December 2013 – January 21, 2014

PARCC: Additional Peripheral Requirements for Desktop, Laptop, Netbook, and Thin Client/VDI Computers

Peripheral	Minimum Specification	Recommended Specification
Input Device	Keyboard + Mouse, Touchpad or Touchscreen	Keyboard + Mouse, 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 Accessibility Guidelines and Accommodations Guidelines.	
Audio In/Out	Headphones or Earphones + Microphone	Headphones or Earphones + Microphone
	Headphones/earphones are required for all students for all PARCC assessments. Some student accommodations may also require headphones/ earphones (e.g., text to speech). Microphones are required for all students taking the Speaking and Listening Assessment[1]. Some student accommodations may also require microphones (e.g., speech to text, voice controls) or other parts of the PARCC assessments.	

For all details about device specifications, please see the *PARCC Technology Guidelines* at:
http://www.parcconline.org/sites/parcc/files/PARCCTechnologyGuidelines2dot1_Feb2013Update.pdf

[1]The PARCC Speaking and Listening Assessment will not be operational until 2015-2016

PARCC: General Requirements for Tablets

Operating System	Supported for Spring 2014 Field Test	Supported for 2014-2015 Operational Assessment	Minimum Specifications[2]	Recommended Specifications
Android	**No**	Yes	Android 4.0 with ≥512MB RAM	≥Android 4.0 with ≥1GB RAM
Apple iOS	Yes	Yes	iPad2 running iOS6 with ≥512MB RAM	iPad2 running iOS6 with ≥512MB RAM
Windows	**No[1]**	**Yes[1]** **With Keyboard & Mouse**	Windows 8 with ≥ 512MB RAM	Windows 8 with ≥ 1GB RAM
Windows	**No[2]**	**Unknown[2]**	Windows RT with ≥ 512MB RAM	Windows RT with ≥ 1GB RAM
Memory			OS specific see above	OS specific see above
Connectivity			Wired or Wireless LAN Connectivity to Internet	Wired or Wireless LAN Connectivity to Internet
Screen Resolution			≥1024 x 768[5]	≥1024 x 768[5]
Screen Size			≥9.5 inches ≥9.7 inches	≥9.5 inches

For all details about device specifications, please see the *PARCC Technology Guidelines* at:
http://www.parcconline.org/sites/parcc/files/PARCCTechnologyGuidelines2dot1_Feb2013Update.pdf

[1] Windows 8.1 Tablets and touch screen devices are not supported by Pearson in TestNav 8.0.4.

[2] Windows RT will not be supported for Field Test. It is unknown if Windows RT will be supported for the 2014-2015 Operational Assessment; Guidance expected by March 2014.

PARCC: Additional Peripheral Requirements for Tablets

Peripheral	Minimum Specification	Recommended Specification
Input Device	Keyboard + Mouse, Touchpad or Touchscreen	Keyboard + Mouse, Touchpad or Touchscreen
	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. 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 computer during assessment administration. Other assistive technologies may be needed for students requiring accommodations. PARCC will publish a list of Assistive Technology Devices that have no known compatibility conflicts with the TestNav 8 test delivery system for Field Test and 1st year operational administration at the end of December 2013. The list will be continually updated as ongoing assistive technology usability research is conducted.	
Audio In/Out	Headphones or Earphones + Microphone	Headphones or Earphones + 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)[1].	

For all details about device specifications, please see the *PARCC Technology Guidelines* at:
http://www.parcconline.org/sites/parcc/files/PARCCTechnologyGuidelines2dot1_Feb2013Update.pdf

[1]The PARCC Speaking and Listening Assessment will not be operational until 2015-2016

AIR: Supported Hardware Requirements for Desktops and Laptops For Field & Operational Tests

Operating System	OS Versions	Minimum Requirements for Current Computers	Recommended Specifications
Windows	XP-SP3, Vista, 7, 8.0, 8.1, Server 2003 and 2008	Pentium 233 MHz CPU 128MB RAM 52MB Hard Drive	1.3 GHz CPU 2GB RAM 80GB Hard Drive
Mac OS	10.5 – 10.9	Intel x86 or PowerPC G3, G4 or G5 128MB RAM 200MB Hard Drive	
Linux	Fedora Core 6+ (K12LTSP 4.2+) Ubuntu 9-12	Pentium II or AMD K6-III 233MHz 64MB RAM 52MB Hard Drive	
Screen Resolution	All	≥1024 x 600	≥1024 x 600
Screen Size	All	10” Class or larger ≥9.5 inches	10” Class or larger ≥9.5 inches

Note: Ncomputing and Terminal Services are supported on ≥1024 x 600 the following platforms:

- Ncomputing is supported on computers running Windows XP and 7.
- Terminal Services is supported on Windows 2003 and 2008 Servers.

For all details about device specifications, please see the *ODE/AIR Technology Guidelines* at: http://oh.portal.airast.org/oh_fieldtest/wp-content/uploads/2013/11/Ohio_FieldTest_DeviceSpecifications_2013-2014.pdf

AIR: Supported Hardware Requirements for Tablets For Field & Operational Tests

Operating System	Supported Tablets	Minimum Requirements	Recommended Specifications
Android[1] 4.04-4.2	Google Nexus 10 Motorola Xoom Motorola Xyboard Samsung Galaxy Note (10.1) Samsung Galaxy Tab 2 (10.1)	512MB RAM	≥1GB RAM
Chrome ≥ v18	Chromebook	N/A	N/A
iOS 6.0-7.0	iPad 2, 3, and 4(Retina Display)	Apple A5 processor 512MB RAM	Apple A6X processor ≥1GB RAM
Screen Resolution	All	≥1024 x 600	≥1024 x 600
Screen Size	All	10" Class or larger ≥9.5 inches	10" Class or larger ≥9.5 inches

[1]Listed Android devices currently supported
Note that the Windows Surface RT is currently unsupported

For all details about device specifications, please see the *ODE/AIR Technology Guidelines* at:
http://oh.portal.airast.org/oh_fieldtest/wp-content/uploads/2013/11/Ohio_FieldTest_DeviceSpecifications_2013-2014.pdf

AIR: Additional Peripheral Requirements for PCs & Tablets

Peripheral	Desktops Laptops, Notebooks	Tablets
Keyboard	Required	All tablets: Require using external keyboards to override the on-screen (virtual) keyboards. Bluetooth, manual and mechanical keyboards are all permitted. Android tablets: When using the mobile secure browser, users must also select the secure browser keyboard. This keyboard replaces the default Android keyboard, which has predictive and corrective text
Mouse, touchpad, touchscreen	Required	Required
Headphones	Headphones/earphones/earbuds are not applicable for the Ohio Online Field Tests. No test items have audio or text-to-speech.	
Connectivity	Computers must be able to connect to the Internet via a wired or wireless network.	Tablets must be able to connect to the Internet via a wireless network.

For all details about device specifications, please see the ODE/*AIR Technology Guidelines* at:
http://oh.portal.airast.org/oh_fieldtest/wp-content/uploads/2013/11/Ohio_FieldTest_DeviceSpecifications_2013-2014.pdf

Client Technology Requirements : *Commentary*

- Districts will have to ensure that their client computing devices meet *both* the PARCC/Pearson and ODE/AIR hardware requirements
- In some cases the requirements between both providers *differ*
- In general, the PARCC requirements *exceed* the AIR standards – use the PARCC requirements to plan
- However, Pearson's technology is being re-written, while AIR's is a stable platform with multiple customer experiences
- **Districts should monitor changes to both the PARCC and AIR hardware requirements on an on-going basis**
- There are some elements of both standards that are confusing or potentially problematic

On-line Assessment Technology Components

Local Area Networks (LANs) connect computing devices to each other, and to building or district resources, the state's K-12 broadband network, and the Internet. Wired LANs provide 100 or 1,000 Mbps of connectivity to fixed computing locations within a school building over structured cabling. Either are capable of supporting all three On-line assessment deployment models. Existing state programs from OSFC and prior programs such as SchoolNet ensure that public schools have access to wired LANs.

Wireless LANs provide connectivity by sending radio frequencies to computing devices with built-in *wireless fidelity or wi-fi* radios. Currently available wireless LANs are capable of speeds of up to 600Mbps (802.11n), although the most common maximum installed today range from 11Mbs to 54Mbps (802.11a,b, &g). 54Mbps is necessary to support the whole-building assessment model, and in Ohio, only 20% of school buildings currently have this capacity installed on a building or campus-wide basis. Of reported buildings with wireless LANs, 47% have wireless technology that is seven years old, and 37% only have wireless access in limited areas of the school building (e.g. labs). For existing school buildings without building-wide wireless access, installation will likely require purchase of wired local area network switches capable of providing *power over Ethernet (PoE)* necessary to support installation of wireless access points in classrooms and other areas.

High Bandwidth Estimates Only

				Location & Bandwidth Sufficient?		
	802.11 n			*Whole*	*Classroom*	Lab
	940	32.91%				
20.17%	425	14.88%	Building-wide 802.11 n	Marginal	Yes	Yes
	151	5.29%	Campus-wide 802.11 n	Marginal	Yes	Yes
	364	12.75%	Limited-access 802. 11 n	No	No	Yes
	802.11 g			**Location & Bandwidth Sufficient?**		
	1130	39.57%		*Whole*	*Classroom*	Lab
47.58%	413	14.46%	Building-wide 802.11 g	No	Marginal	Yes
	148	5.18%	Campus-wide 802.11 g	No	Marginal	Yes
	569	19.92%	Limited-access 802.11 g	No	No	Yes
	802.11 a/b		@ b 11Mbps	**Location & Bandwidth Sufficient?**		
	229	8.02%		*Whole*	*Classroom*	Lab
37.29%	71	2.49%	Building-wide 802.11 a/b	No	No	Yes
	26	0.91%	Campus-wide 802.11 a/b	No	No	Yes
	132	4.62%	Limited-access 802.11 a/b	No	No	Yes

Bandwidth Capability For Deployment Models

	Bandwidth Req. Mbps		802.11 a	5Mbps	802.11 b	11Mbps
	Low	*High*	*Low*	*High*	*Low*	*High*
Whole	30.9	107.4	No	No	No	No
Classroom	6.2	21.5	No	No	Yes	No
Lab	1.9	6.4	Yes	No	Yes	Yes
	Bandwidth Req. Mbps		802.11 g	22Mbps	802.11 n	54Mbps
	Low	*High*	*Low*	*High*	*Low*	*High*
Whole	30.9	107.4	Yes	No	Yes	Marginal
Classroom	6.2	21.5	Yes	Marginal	Yes	Yes
Lab	1.9	6.4	Yes	Yes	Yes	Yes

AIR: Wireless LAN Considerations

- AIR recommends that schools maintain a ratio of wireless systems to wireless access points (WAPs) of no more than 20 to 1. Typically, the test performance begins to deteriorate after that threshold has been reached. In some instances, older WAPs may also see performance degradation when more than 15 devices are concurrently attached

- Encrypting wireless LAN traffic with WPA2/AES data encryption – this protocol may not be available on early model 802.11 WAPs

- Recommendations on the optimal number of student workstations per wireless connection:

- The optimal (or maximum) number of student workstations (computers and tablets) supported by a single wireless connection will depend on the type of networking standard being used for the connection. The two most common networking standards are 802.11g (54Mbps) and the newer and faster ratified standard, 802.11n (300Mbps). Both the access point, which emits the wireless signal, and the computer's wireless card, which receives the signal, will use one of these two standards. The recommendations below are based on the standard in use:

	802.11g Access Point	802.11n Access Point
802.11g Wireless Cards	**20** workstations or devices	**40** workstations or devices
802.11n Wireless Cards	**20** workstations or devices	**40** workstations or devices
Mix of 802.11g and 802.11n Wireless Cards	**20** workstations or devices	**40–50** workstations or devices (depending on the ratio of wireless cards used)

http://oh.portal.airast.org/oh_fieldtest/wp-content/uploads/2013/12/Ohio_TechSpecsManual_2013-2014.pdf

AIR: Other Network Considerations

- AIR recommends that network administrators perform a LAN/Internet performance analysis prior to to the administration of online tests to identify any potential network bottlenecks (pg.12)
  - AIR's Run Diagnostics Tool
  - Microsoft Windows-Specific
  - Mac OS X Specific
  - Multi-Platform

- AIR Network settings Page 8, 9 – 15-17
  - OH_TechSpecsManual_2013-2014
  - AIR Network Configuration Steps
    1. Content filters, firewalls and proxy servers must be configured to allow traffic for specific protocols and servers
    2. Session timeouts on proxy servers and other devices should be set to values *greater* than the average scheduled testing time. If testing sessions are scheduled for 60 minutes, consider session timeouts of 65-70 minutes. This will help limit network interruptions during testing.
    3. Data cannot be cached.
    4. If your client network uses any device(s) that performs traffic shaping, packet prioritization or Quality of Service, the IP addresses listed should be given a high priority to guarantee the highest level of performance.

AIR: Other Network Considerations

Ohio Online Testing Sites

The operational testing sites use a cloud-based satellite system for optimal load balancing during testing. *Note: If your network filtering devices (e.g., proxy servers) and firewalls support wildcards, you may use ***.tds.airast.org** instead of whitelisting the specific URLs listed below.*

Field Test Sites: Student Testing Site and TA Interface		
URL	**IP Address**	**Port**
oh.tds.airast.org	65.61.136.70	443/tcp (SSL)
oh.cloud2.tds.airast.org	72.3.235.124	
login1.cloud2.tds.airast.org	72.32.170.113	
sat1.cloud2.tds.airast.org	72.32.170.112	
sat2.cloud2.tds.airast.org	72.3.235.125	
sat3.cloud2.tds.airast.org	72.32.170.110	
sat4.cloud2.tds.airast.org	TBD	

Training Sites: Training Tests and TA Training Site		
URL	**IP Address**	**Port**
ohpt.tds.airast.org	72.32.170.124	443/tcp (SSL)

Mobile Secure Browser: Launchpad		
URL	**IP Address**	**Port**
mobile.tds.airast.org	50.57.2.88	443/tcp (SSL)

AIR: Other Network Considerations

Protocols

All communication with the Test Delivery System applications takes place over the following Internet port/protocol combinations. Please ensure that the following ports are open for these systems.

Port/Protocol	Purpose
80/tcp	HTTP (initial connection only)
443/tcp	HTTPS (secure connection)

Firewall, Content Filter and Proxy Servers

Content filters, firewalls and proxy servers should be configured to allow traffic on the protocols listed to the applications' servers. In addition, session timeouts on proxy servers and other devices should be set to values greater than the average duration it takes a student to complete a given test. For more information, contact the Ohio Help Desk.

Schools will need to make sure that information is not blocked in their web filters and that data are not cached. Please ensure that the IP addresses in the following table are open for the following systems.

IP Address	URL	Description
98.129.33.183	http://oh.portal.airast.org	Online Field Test Portal and secure browser files
184.106.91.185	https://oh.cls.airast.org	Common Login System
184.106.91.188	https://oh.tide.airast.org	TIDE for online administrations
72.32.170.124	https://ohpt.tds.airast.org	TA Training Site and Student Training Site
65.61.136.70	https://oh.tds.airast.org	TA Interface and Student Test sites
72.3.235.124	https://oh.cloud2.tds.airast.org	
72.32.170.113	https://login1.cloud2.tds.airast.org	
72.32.170.112	https://sat1.cloud2.tds.airast.org	
72.3.235.125	https://sat2.cloud2.tds.airast.org	
72.32.170.110	https://sat3.cloud2.tds.airast.org	
TBD	https://sat4.cloud2.tds.airast.org	
50.57.2.88	https://mobile.tds.airast.org	Mobile Secure Browser Launchpad
98.129.33.188	https://oh.reports.airast.org	Online Reporting System

AIR: Other Network Considerations

Certificate Revocation List

Schools should open their firewalls to allow the secure browser to check the certificate authenticity at Symantec VeriSign's Certificate Revocation List (CRL) at http://crl.verisign.com/.

Symantec Verisign Recommendations

Note: The following information was provided by Symantec.

It is strongly recommended that any firewall policies and/or access control devices use URLs and not IP addresses. Symantec can change these IP addresses at any time without notification. If possible white list the following entries on your firewall policies and/or access control devices to ensure seamless access to our OCSP services:

*.thawte.com
*.geotrust.com
*.ws.symantec.com

Note: If white listing wildcard entries is not permitted, you can white list the following specific fully qualified domain names (FQDNs):

oscp.ws.symantec.com
oscp.geotrust.com
oscp.thawte.com

If your firewall is configured to allow only a certain set of IP addresses to be accessed from your network, you'll need to take the following actions:

1. Get the full list of IP addresses for the new sites. Complete a short form and then you'll gain access to the site list.
2. Install or add the IP addresses to your existing list – do not replace the old IP addresses and your existing rules for Symantec OSCP IP addresses should not be deleted.

Category	Pearson Network Configuration	Purpose

Firewall / Proxy Servers / Content Filtering

When using Proctor Caching, the following must be opened in any firewalls, proxy servers, or software that is used for internet content filtering:

URL:Port ¶
Your test delivery URL, for example: *.testnav.com:80 *.testnav.com:443
s3.amazonaws.com

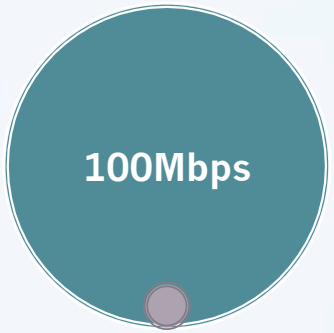
¶ TestNav content is dynamically hosted in the cloud. No static IP addresses or ranges can be provided.

Note for Mac 10.6: 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 10.6 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 exmple, testnav.com.

Pearson TestNav 8.0.4 requirements

On-line Assessment Technology Components

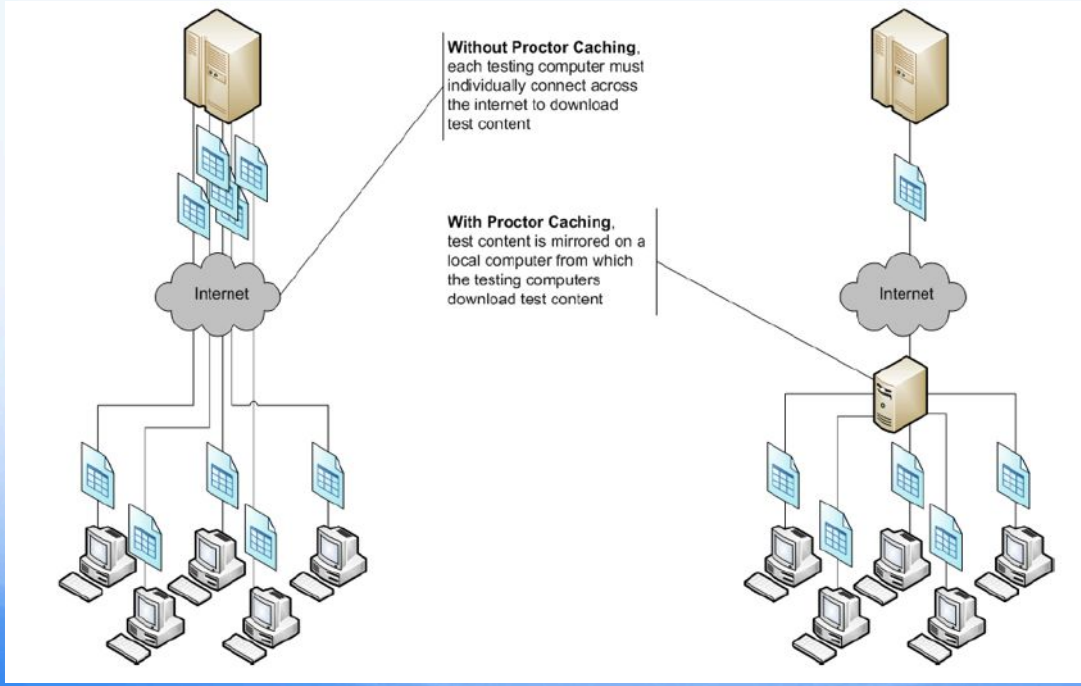
Broadband Building Connectivity connects computing devices connected to local area networks to the state's K-12 network and the Internet. High capacity broadband connectivity is needed to support multiple student connections to the PARCC assessment system *concurrently*. Over 80% of school buildings in the state have broadband building connections of 100Mbps or greater. These buildings have sufficient broadband access to support all assessment deployment models. Buildings in the state with restricted broadband capacity with between 50 and Mbps and *no additional building broadband traffic* can support all three deployment models. Severely restricted buildings (3%) can support the Lab deployment and *potentially* the classroom model if they have 5 to 10Mbps. These buildings also will have to manage their non-assessment Internet bandwidth during test deployment to ensure adequate capacity is reserved for testing. Buildings with less than 2Mbps of broadband building capacity may require upgrades to support any model.



	2012			2013		
	Severely Restricted Capacity	**Restricted Capacity**	**Sufficient Capacity**	**Severely Restricted Capacity**	**Restricted Capacity**	**Sufficient Capacity**
	Less than 10Mbps	*10Mbps or more, but less than 100Mbps*	*100Mbps or more*	*Less than 10Mbps*	*10Mbps or more, but less than 100Mbps*	*100Mbps or more*
Number of Buildings	**223**	**476**	**2,796**	**113**	**432**	**2,884**
Percent of Buildings	**6%**	**14%**	**80%**	**3%**	**13%**	**84%**

Planning For Proctor Caching

- Some vendors utilize *Proctor Caching* as a means to reduce test bandwidth capacity requirements by storing testing content on a local computer with the school environment. Caching devices can be at the lab, building, district or ITC level.
- Consider Proctor Caching for buildings with restricted internal (LAN) bandwidth connections and/or restricted external (WAN) connections
- Place proctor caches inside the most restricted network segment
- Proctor Caching also allows for student test content to be written to Local storage which enhances back-up and recovery, but this requires available storage
- Proctor Caching is expected to reduce required WAN bandwidth by as much as 90%



Proctor Caching Files

Determine LAN/WAN Bandwidth Requirements

PARCC Field Test Requirements	With Proctor Caching (Pearson)	Without Proctor Caching (Pearson)
LAN/WAN Connection	5 Kbps per student/ computer	50 Kbps per Student
ODE Field Test Requirements	**With Proctor Caching (AIR)**	**Without Proctor Caching (AIR)**
LAN/WAN Connection	Not available	5 to 15 Kbps Per Student

100 Mbps

	LAN/WAN Estimated Bandwidth Consumption in Mbps Per 100 Students by Testing Rotation									
	1	2	3	4	5	6	7	8	9	10
Pearson Cached	0.50	0.25	0.17	0.13	0.10	0.08	0.07	0.06	0.06	0.05
Pearson Un-Cached	5.00	2.50	1.67	1.25	1.00	0.83	0.71	0.63	0.56	0.50
AIR 5 Kbps	0.50	0.25	0.17	0.13	0.10	0.08	0.07	0.06	0.06	0.05
AIR 10 Kbps	1.00	0.50	0.33	0.25	0.20	0.17	0.14	0.13	0.11	0.10

Bandwidth when opening the secure browser and first access the test is much higher due to un-secure cached content

!

500 Students	PARCC-Pearson With Proctor Caching	PARCC-Pearson Without Proctor Caching	ODE-AIR 5 Kbps	ODE-AIR 15 Kbps	TR
Whole Building 1:1 Simultaneous Connections	2.5 Mbps	25.0 Mbps	2.5 Mbps	5.0 Mbps	1
Classroom 100 Computers 20 Classrooms 5 Computers Per Classroom	.50 Mbps	5.0 Mbps	0.5 Mbps	1.0 Mbps	5
Computer Lab 50 Total Computers 2 Labs	.25 Mbps	2.5 Mbps	.25 Mbps	0.50 Mbps	10

AIR LAN/WAN Bandwidth Requirements Cont'd

Number of Students Testing Concurrently in School/Building	Average Estimated Bandwidth Consumed During Subsequent Startup of Secure Browser*	Average Estimated Bandwidth Consumed During Testing**
1	8K bits/second	5–15K bits/second
50	400K bits/second	250–750K bits/second (0.25–0.75M bits/second)
100	800K bits/second	500–1500K bits/second (0.5–1.5M bits/second)

Notes:

* The bandwidth consumed when opening the secure browser and accessing a test for the first time is significantly higher than when opening the secure browser and accessing a test subsequently. The reason for this is that the initial launch of the secure browser downloads non-secure cacheable content (not test content) that can be immediately accessed upon opening the secure browser at a later time.

** Bandwidth will vary during a student's testing experience, as some test pages contain low-bandwidth content, such as multiple-choice items, and other pages contain high-bandwidth content, such as animations. Consequently, the estimated average values in this column are based on computing averages from multiple tests and test subjects.

Other Thoughts: OLA Security aka *Client Mgt*

Security Requirements – Updated for Field Test

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.

Lock down operating system and application specific features and functions:

- Local Area Network Connectivity
- ~~Bluetooth~~
- DNS Service/IP Addressing
- Built-in Cameras
- Screen Captures
- Application switching
- Electronic Mail
- Instant Messaging
- Printing

While these are inherently "configurable" Operating System level functions, a client OS platform management capability will be required to configure, manage and monitor these functions for all testing devices across a school district's installed base of client devices– unless the school wants to manually configure *each* computing device.

Use of these management tools on student-provided computing devices will require the school to configure and manage an asset owned by the student, likely requiring a change in the schools acceptable use policy.

Many tools are NOT cross-platform!

PARCC:Pearson Secure Browsers, Browsers et. Al

Windows

OS Version	Browser Versions				
	IE 9.0	IE 10.0	IE 11.0	Chrome	Firefox
Windows XP-SP3				≥ version 31	≥ version 25
Vista	√			≥ version 31	≥ version 25
7	√	√	√	≥ version 31	≥ version 25
8			√	≥ version 31	≥ version 25

Mac OS X

	Browser Versions				
	5.1	6.x	7	Chrome	Firefox
10.6	√			!	≥ version 25
10.7		√		!	≥ version 26
10.8		√		!	≥ version 27
10.9			√		

Tablet/Other OS

OS Version	Browser Versions	
	TestNav App	Safari
iOS6	√	!
iOS7	√	!
Chromebook OS Version 32	√	

! Supported for formative assessments only

Browser Dependencies

OS Version	Required Java Version	Firewall	Pop-Ups	File Access	Other
Windows (all)	Java runtime plugin version 1.7.0_51 or higher	javaw.exe exception in Windows Firewall	Enabled to Pearson Sites	Local File access to home directory	
Mac OS 10.7, 10.8 and 10.9	Java runtime version 1.7.0_51 or higher		Enabled to Pearson Sites	Local File access to home directory	
Mac OS 10.6	Java runtime version 1.6.0.65 or higher		Enabled to Pearson Sites	Local File access to home directory	Set Parental Controls to "Always Allow" for testnav.com

For all details about browser specifications, please see the Pearson *System Requirements* at: http://www.pearsononlinetesting.com/TestNav/8/requirements_testnav_8_0_4.html

Enable TestNav App automatic-updates to Google Marketplace or Apple App Store

Disable automatic Java updates for Java runtime version 7.0 only – prior to testing

ODE:AIR Secure Browsers, Browsers et. Al

Operating Systems	Supported OS Versions	Supported Devices	Secure Browser
Windows	XP (Service Pack 3), Vista, 7, 8.0, 8.1; Server 2003, 2008	Desktops/Laptops	Windows Secure Browser 6.3
Mac OS X	10.5, 10.6, 10.7, 10.8, 10.9	Desktops/Laptops	Mac Secure Browser 6.3
Linux	Fedora Core 6+ (K12LTSP 4.2+) Ubuntu 9–12	Desktops/Laptops	Linux Secure Browser 6.3
Android	4.0.4–4.2	Supported tablets	Mobile Secure Browser
ChromeOS	18+	Chromebooks	Mobile Secure Browser
iOS	iOS 6.0–7.0	Supported tablets	Mobile Secure Browser

- Please note that each application requires pop-up blocking software to be disabled and JavaScript to be enabled
- Support of web browsers is contingent on the client device's operating system, a listing of supported browsers by operating systems follows on the next page
- AIR recommends that districts check their operating system and web browser versions to make sure they are compatible

For all details about browser specifications, please see the ODE/*AIR System Requirements* at:
http://oh.portal.airast.org/oh_fieldtest/wp-content/uploads/2013/11/Ohio_FieldTest_SystemRequirements_2013-2014.pdf

ODE:AIR Supported Browsers: Windows

Supported Operating Systems	Supported Devices	Supported Browsers	TA Sites	Student Training Test	TIDE	Online Reporting System
Windows						
XP (SP3)	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Internet Explorer 6	✓		✓	✓
		Internet Explorer 7	✓		✓	✓
		Internet Explorer 8	✓		✓	✓
Vista	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Internet Explorer 7	✓		✓	✓
		Internet Explorer 8	✓		✓	✓
		Internet Explorer 9	✓		✓	✓
7	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Internet Explorer 8	✓		✓	✓
		Internet Explorer 9	✓		✓	✓
		Internet Explorer 10	✓	✓	✓	✓
8.0, 8.1	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Internet Explorer 10	✓	✓	✓	✓

Note requirements for Chrome, Firefox of IE 10 support required for HTML5

ODE:AIR Supported Browsers: Mac

Supported Operating Systems	Supported Devices	Supported Browsers	TA Sites	Student Training Test	TIDE	Online Reporting System
Mac OS X						
10.5	Desktops Laptops	Firefox 4.0+	✓	✓	✓	✓
		Safari 4.13	✓	✓	✓	✓
		Safari 5	✓	✓	✓	✓
10.6	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Safari 4.13	✓	✓	✓	✓
		Safari 5	✓	✓	✓	✓
10.7	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Safari 5	✓	✓	✓	✓
		Safari 6	✓	✓	✓	✓
10.8	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Safari 6	✓	✓	✓	✓
10.9	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
		Safari 7	✓	✓	✓	✓

ODE:AIR Browsers: Linux/Android/Chrome/iOS

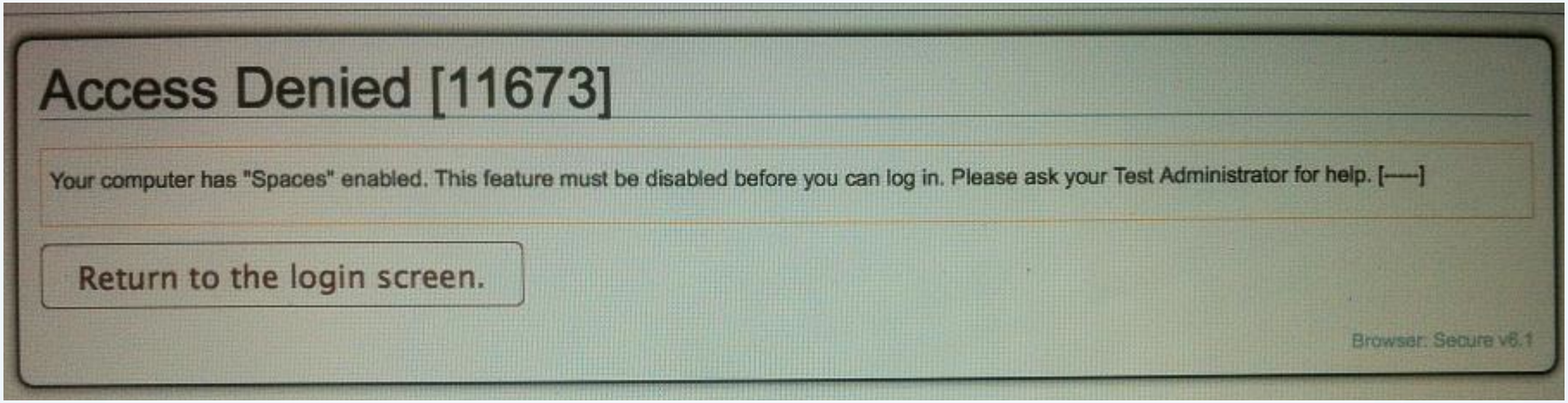
Linux						
Fedora Core 6+ (K12LTSP 4.2+)	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
Ubuntu 9-12	Desktops Laptops	Chrome 18+	✓	✓	✓	✓
		Firefox 4.0+	✓	✓	✓	✓
Android						
4.0.4–4.2	Supported tablets	Chrome 18+	✓	✓		
ChromeOS						
18+	Chrome-books	Chrome 18+	✓	✓		
iOS						
6.0–7.0	Supported tablets	Safari	✓	✓		

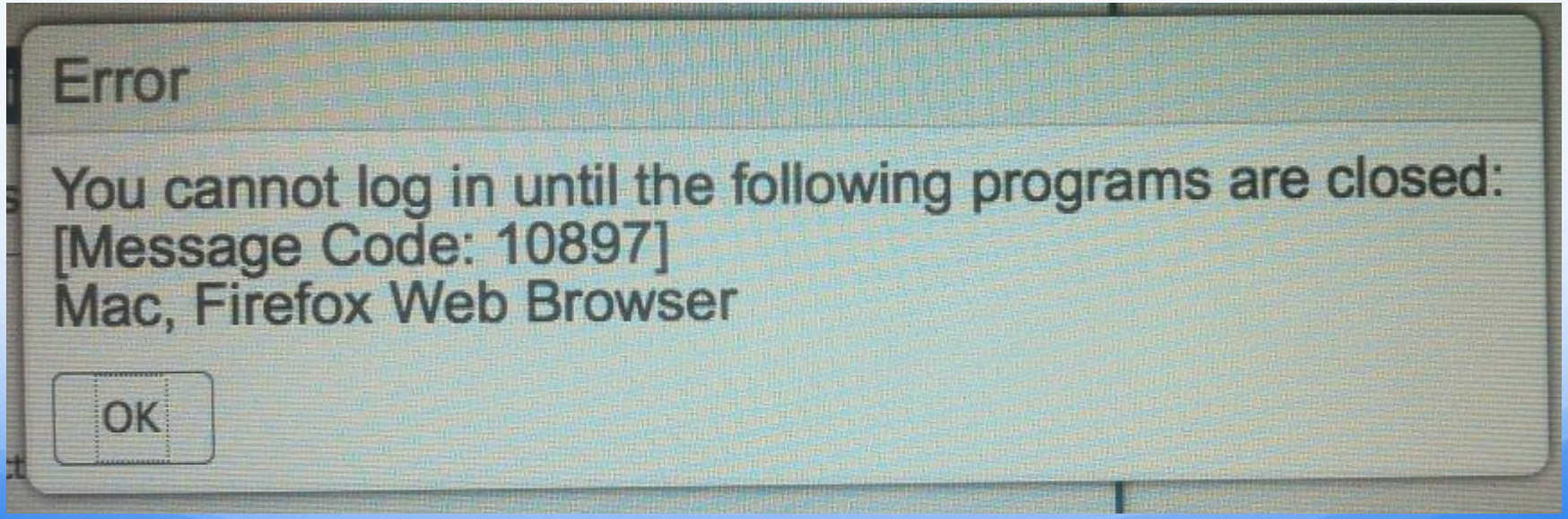
About Firefox: AIR conducts quality assurance on the most recent Firefox versions distributed by Mozilla for each system. While you may update Firefox upon new versions being released, AIR encourages you to wait a few weeks to ensure that each system works correctly with the new Firefox version.

For the Student Training Site, if you update Firefox to a new version that has not been thoroughly tested, you will receive a warning message.

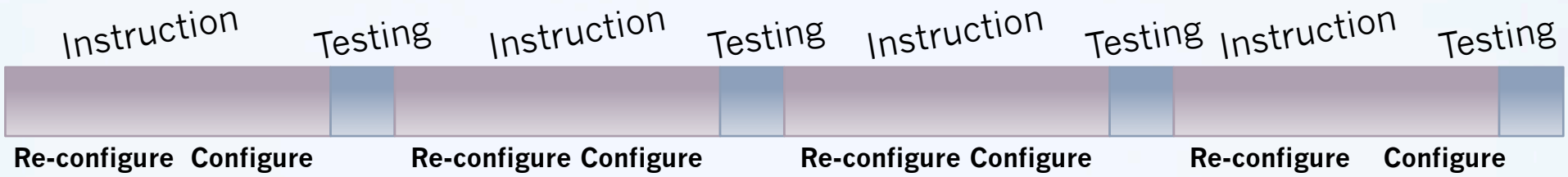
To learn how to disable auto-updates for Firefox, click here: https://support.mozilla.org/en-US/kb/forum-response-turning-auto-update. *(Caution: You may need to disable auto-updates again after installing a newer version.)*

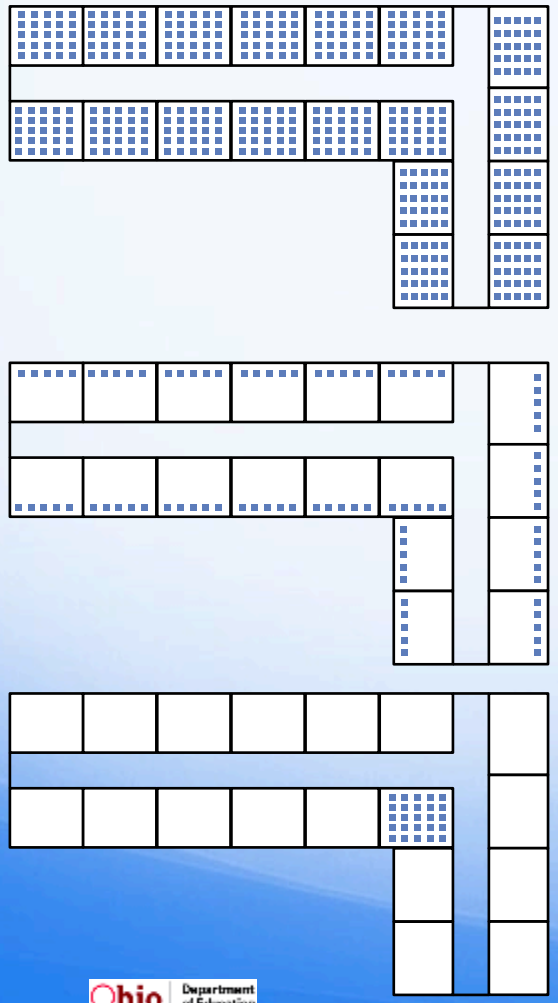
OLA Configuration: Test Your Configurations!





OLA Security: When Mgt Tools Become Critical? (See Appendices 14a and 14b for more info)





- 1:1 environments are the most complex to manage. They include the most devices, and the devices are in a constant state of movement as users enter and leave the school environment. Individual OS configuration for these environments isn't practical. Client, Classroom, or HVD solutions are critical to managing client OS device settings, especially for schools implementing BYOD without a single OS client standard
- Classroom computers tend to use the same OS image, but represent the second highest number of client devices that need to be configured. Client devices could be configured on a classroom by classroom basis, or using client management tools such as AD Group Policies
- Lab computers tend to use the same OS image, and represent the fewest number of client devices that need to be configured. Client devices are typically in one location and can be accessed holistically by tech staff on a client-by-client basis or using client management tools such as AD Group Policies

Client Device Management- The Challenge of Homogeneity (or not)

Purchase an OS-specific management tool for the district's standard OS-type

One operating system for all client devices across the school district standardizes on one platform

Purchase a cross-platform management tool capable of managing multiple client-OS types

Purchase an OS-specific management tool for each OS-type

Multiple operating systems across the district or within a school building – a mix of platforms

Purchase a cross-platform management tool capable of managing multiple client-OS types

Technology Management Complexity

Use education purpose-built tools to configure, manage and monitor student use. Expand client management to remote control and classroom presentation

Classroom Management Platforms

Hosted Virtual Desktops

Use server-hosted virtual desktops to configure and manage a unique environment for all students regardless of platform with or without Client Management Tools

Leverage commercial client or mobile device management platforms to configure and manage

Generic Client Management Platforms

Classroom Device Management Options

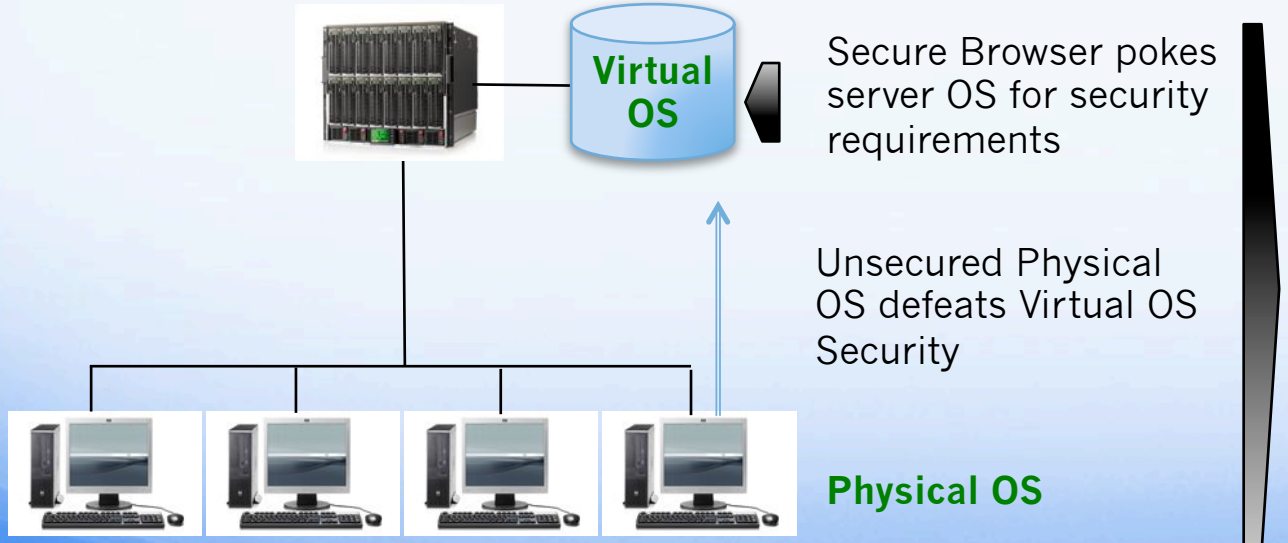
Manage At The Client Level

Configure each Client-OS and randomly monitor for changes

PC Devices			Mobile Devices				Virtual Devices		
Windows (XP, 7, 8)	Mac OS (10.5,7,8)	Linux (Ubuntu, Fedora, Suse)	Android (2, 3, 4)	iOS (5,6)	Windows Mobile	Blackberry 10	VMW View	Citrix	Hyper-V

Quick Thoughts Around Client Virtualization

- Zero or Thin-Clients may be an option for managing environments with older hardware. However, to secure the physical OS, the physical OS for Thin-Clients will have to be cannibalized via a reduced kernel to enable a network boot of the Virtual OS. The local OS kernel could be Linux, Windows Embedded Std, etc.
- HVDs are an attractive tool for managing 1:1 computing environments (especially for BYOD) but require fat client virtual OS configurations. (You would want end-users to have access to their systems off-net especially in BYOD settings)
- With HVD, Operating System "Templates" can be created with applications specific to "grades" or "subjects"
- Students can log onto their virtual environments anyplace they have a suitable client device and sufficient network access
- Administrators can establish a single username and password for students
- On testing days, students can be re-directed to a different OS instance that is configured just for an Online Assessment, however…



- Guidance from Pearson and AIR is emerging
- Pearson has a "qualified" program
- Existing qualified vendors are in process of becoming qualified for TestNav 8.0, but not necessarily for zero, thin and thick clients
- AIR gives guidance for Ncomputing and Terminal Services but otherwise says that both the physical and virtual OS instances must meet their hardware (security) requirements
- Unless the local OS is bootstrapped, if the school wants to maintain a local fat OS client, the only solution is a threaded API between OS instances

Other Thoughts: PARCC Accommodations

Accommodations – For Specific Students

All students, including students with disabilities and English learners, are required to participate in statewide assessments and have his or her assessment results be part of the state's accountability systems, with narrow exceptions for English learns in their first year in a U.S. schools (described in Section 5), and certain students with disabilities who have been identified by the IEP team to take their state's alternate assessment.

Four distinct groups of students may receive accommodations

1. Review the PARCC Accessibility Features and Accommodations Manual
    1. http://www.parcconline.org/parcc-accessibility-features-and-accommodations-manual
    2. Pearson TN8 Approved Devices: http://pearsononlinetesting.com/TestNav/AT/
2. Review your effected students IEP or 504 plans
3. Review ODE guidelines for accommodations
    1. http://oh.portal.airast.org/oh_fieldtest/wp-content/uploads/2013/12Ohio_FieldTest_Accessibility_Accommodations_2013-2014.pdf
4. Develop and implement assessment plans for effected students

Special Needs Technology Considerations

• Accommodations – For Specific Students

- Some special needs technology accommodations will be included in client software by PARCC or State vendors
- Examples include text to speech
- Expect support for these accommodations to evolve around OS-specific instances, e.g. Windows and Mac OS initially – support for all client OS are likely not to be available at launch. Newer and mobile OS are likely to come later in the development cycle, e.g. Chrome, Android, Windows RT
- Other adaptive devices needed by individual students are likely to be OS-API or Application-API driven, and may already exist in the LEA
- Districts will need to determine whether an individual student's special needs can be accommodated by its "mainstream" technology implementation for all students, or whether a unique configuration will be needed
- These factors should be considered especially when a districts is considering a new OS platform adoption for their school(s)

Student Assessment Registration

Two Vendors, Two Different Registration Systems (For Now)

- Students participating in online assessments must first be uploaded from the school district to either Pearson or AIR.
- Pearson's upload templates are available on the Pearson Access website found within this link.
- AIR uses an application called TIDE for the same purpose.
- For DASL districts, there are extraction routines available from your ITC that can be used to export the necessary students and data elements into either the Pearson or AIR applications.
- The MC•OECN is working with ODE and is hopeful that an statewide integration can occur in time for the 2015 operational test so that districts only have to validate students in either Pearson or AIR's applications rather than manually import the data.

Helpful Resources

PARCC Technology Readiness Tool Training Overview

PARCC Technology Standards

Macintosh Computers Grouped By CPU Type

Timeline of Personal Computer Operating Systems

Intel Processor History from Intel

Intel Processor History from Wikipedia

MCOECN Planning Spreadsheets

PARCC Accessibility & Accommodations Guidelines

PARCC Field Test Guidelines

PARCC Field Test Technology Guidelines

Q&A

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