



## Benefits

### Cisco IWAN with Akamai Connect helps schools:

- Maximize existing school WAN investment through application optimization and Akamai intelligent caching
- Provide high-quality experiences on any device, regardless of where the application resides
- Reduce complexity with simple optimization configuration and centralized management across all buildings
- Delay or eliminate expensive WAN bandwidth upgrade costs and increased monthly service charges
- Converge multiple network optimization functions in a single solution

## Cisco IWAN:

# Akamai Connect Bandwidth Optimization for Pearson System of Courses

## Overview

The U.S. K-12 education environment is undergoing significant transformation today. Educational applications to assist with student learning are being offered by schools as an integrated part of the curriculum. Some of these applications are designed to deliver rich content, which engages the student and provides an interactive environment for math and English subjects. Cisco® Intelligent WAN (IWAN) with scalable bandwidth optimization reduces repetitive application content, to decrease content load time by more than 80 percent and WAN bandwidth load by up to 99 percent.

## School Learning Content is Dynamic

With the emerging transition from paper textbooks to digital content, schools are gaining efficiencies in providing learning material to students. Students can carry a single, lightweight tablet device containing all learning content, rather than several textbooks. Students can have a rich media or video experience with learning content, as opposed to static text and images.

However, digital content is fluid, can occupy a lot of storage space, and often is delivered wirelessly to many students on demand inside the classroom. Sometimes a significant amount of content is delivered all at once to many individual students at one time. These varying requests can bring the school WAN network to a virtual standstill if the requests for content far exceed the WAN broadband connection at the school building. School Wi-Fi also needs to be robust and designed well to allow for these bursts and to have the right density support for the number of devices in the classroom.

## School Learning Content can be Repetitive

While the ink on textbook pages delivers content for all students at the time it is printed, in the digital environment, content is often delivered in an immediate, as-needed basis. And much of it is the same content repeated for each device, delivered to each student individually as requested.

For example, with the Pearson System of Courses using the Apple iPad, content for one application (K-1) is delivered when the student first logs in. In another application (2-12), it is delivered as the course units are requested by the student. After the initial application is installed, several gigabytes of content are downloaded, either automatically or on-demand. For each student, each unit's content is the same, downloaded each time for each student. In this way, the content is repetitive.

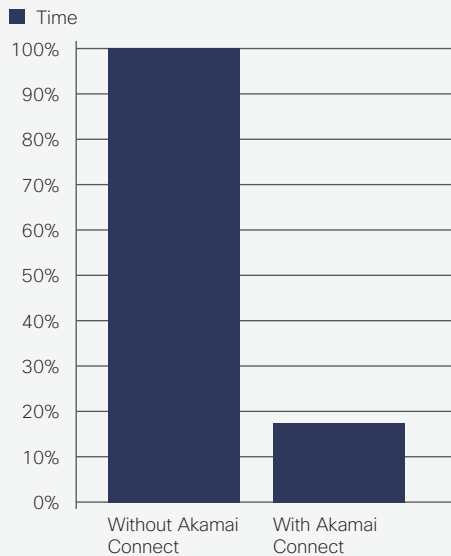
## Dynamic and Repetitive Content Delivery in Schools

When you need to deliver rich-media learning content to each student, and students can request content simultaneously, a WAN bottleneck can result. The WAN network is usually designed for minimal use by each student concurrently because of WAN circuit size, cost, or availability constraints. When content is requested concurrently, the WAN cannot keep up. It becomes completely saturated and the students do not get the content delivered in a timely manner.

What happens in the rest of the building while a single classroom potentially uses the entire WAN circuit for downloads? If a single classroom saturates the WAN link, the rest of the building must compete for the same WAN bandwidth and possibly wait for saturation to clear before their download can complete. This could take a significant amount of time, depending upon load, number of classrooms, and size of rich media content.

With dynamic content, as learning content updates are made, there is no waiting for a new complete textbook to arrive.

**PSoC K-1 Download Time**  
**Unit 1 Only 24 simultaneous Apple iPad Air 2**

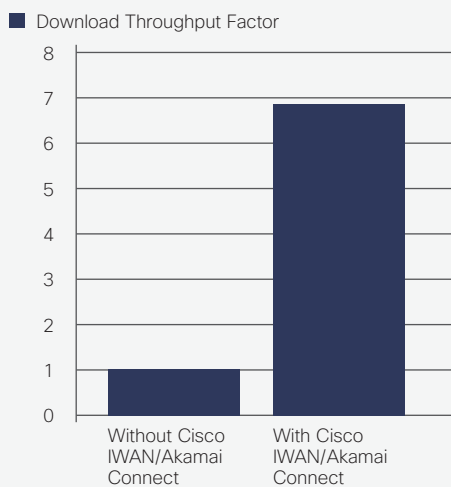


Note: First iPad has accessed content once

**Reduction in Time to Download Content**

Pearson is continuing to improve and optimize the PSoC application.

**PSoC Download Average Performance Factor, Up to 26 Apple iPad Air 2 Simultaneous**



2-12 app per iPad Improvement  
 Note: First iPad has accessed content once

**Average Performance Improvement Per Student**

With repetitive WAN traffic reduced by 99 percent, average digital content usage performance for the student, teacher, and district was nearly seven times better than before.

**What We Found**

After enabling Cisco IWAN with Akamai Connect for Pearson System of Courses, our testing shows that the single classroom download time for a single K-1 unit was reduced by more than 82 percent. And almost identical results were seen for 2-12 units.

**How it Works**

Cisco IWAN with Akamai Connect combines advanced WAN optimization and application acceleration capabilities from Cisco with Akamai intelligent caching technology into the all-in-one Cisco Integrated Services Router (ISR) solution. These technologies work together to manage traffic loads and application behavior, speeding content delivery and optimizing user experiences.

For example, Cisco Wide Area Application Services (WAAS) encompasses compression, optimization, and deduplication technologies, while Akamai Connect enables industry-leading intelligent caching. Caching places frequently accessed content in local devices so users avoid WAN delays and congestion. These capabilities significantly reduce the actual bandwidth loads delivered across the WAN. The traffic load reductions help accelerate traffic throughput and user response times. They also help you defer investments in additional bandwidth as traffic volumes grow.

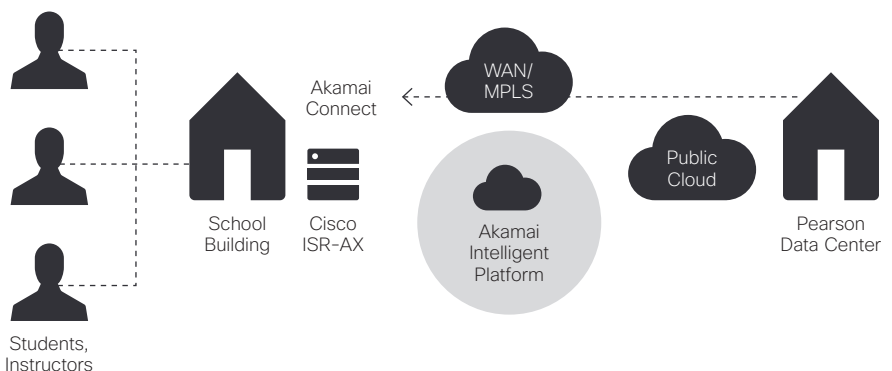
**What is Cisco IWAN with Akamai Connect**

Cisco IWAN with Akamai Connect is a family of products offered on several platforms, to fit your individual school building or district needs. The Cisco and Akamai software is an active cache that stores repetitive information and uses the Akamai Intelligent Platform to position content most effectively. Stored content is then quickly available to local users at switched LAN speed, rather than being accessed repeatedly across the slower WAN. The system is able to detect changed data at its original location and repopulate the local cache automatically.

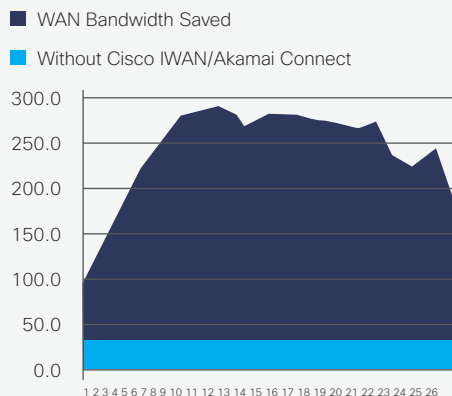
The Cisco IWAN with Akamai Connect supported platforms include:

- Cisco 4000 Series Integrated Services Routers
  - Integrated with Cisco WAAS Software
  - Cisco UCS® E-Series Servers running Cisco Virtual Wide Area Application Services (vWAAS)
  - vWAAS in Cisco IOS® XE
- Cisco 2900 and 3900 Series Integrated Services Routers
  - Integrated with Cisco WAAS Software
  - Cisco Services Ready Engine running native WAAS
  - Cisco UCS E-Series Servers running vWAAS
  - vWAAS in Cisco IOS XE
- Cisco WAVE 294/594/694/7541/7571/8541 appliances

Akamai Connect is available as a simple add-on license and is also available in Cisco ISR-AX solution bundles.



### iPad Aggregate Realized Throughput (Mbps) Existing WAN Bandwidth Utilized = Near Zero



2-12 app Before and After  
Note: First iPad has accessed content once

## What Cisco IWAN with Akamai Connect Saves

Increasing WAN speed can be challenging because of provider availability, physical logistics to attach to the service, and cost.

The Cisco IWAN with Akamai Connect solution saves WAN bandwidth between school buildings and the Internet. The graph at left shows the realized aggregate WAN bandwidth achieved after the first student downloads a unit when the number of students along the bottom of the graph are downloading simultaneously.

Notice that the total throughput saved includes nearly all the baseline WAN bandwidth, because 99 percent of the WAN traffic was eliminated. In our tests, more than 280 Mbps of total WAN throughput was realized across many student iPads, while existing service bandwidth was a maximum of 30 Mbps.

## Scalability is Key for Schools

Schools have some of the highest-density user environments. Students and teachers occupy classrooms and large assembly areas together throughout the day and are constantly engaged in activity. One-to-one learning environments can create continuous demand. This means school interactive digital environments be designed to scale.

Cisco IWAN, Cisco WAAS, and Akamai Connect provide solutions for small to very large school environments. As capacity requirements are developed, flexible licensing and performance options can be designed to fit your needs.

As many classrooms use the network and access Pearson System of Courses, Cisco IWAN with Akamai Connect can scale with your bandwidth requirements.

## How Cisco IWAN with Akamai Connect Is Managed

Cisco WAN optimization solutions are centrally managed, reducing staffing requirements at each school. The WAAS Central Manager provides web-based access for ease of use. Cisco IWAN with Akamai Connect can be enabled by selecting a single checkbox. Throughput and performance are displayed in graphical format, with performance history stored for later review and analysis.

## Summary

The K-12 education environment continues to experience transformation. The Pearson System of Courses delivers rich content to students using tablet technology. Cisco IWAN with WAAS and Akamai Connect reduces repetitive application content on the WAN and enables efficient delivery of content using a school's switched network. In Cisco and Pearson simulated classroom testing using Cisco IWAN with Akamai Connect, Pearson System of Courses download performance was an average of 6.9 times faster per student, with an 82 percent reduction in download time for an entire classroom. The single classroom WAN connection of 30 Mbps increased to more than 250 Mbps of realized local throughput for Pearson content, leaving 30 Mbps of WAN available to other classrooms. Cisco IWAN with Akamai Connect deployed with Pearson System of Courses is an outstanding combination to improve student-teacher experiences and reduce district

## For More Information

To learn more about Cisco IWAN with Akamai Connect, visit [cisco.com/go/akamai](http://cisco.com/go/akamai).

To learn more about Pearson System of Courses, visit [pearsonsystemofcourses.com](http://pearsonsystemofcourses.com).