



CACHEBOX fixes connectivity problem, enabling e-learning for Aga Khan

Challenge

- Slow access to learning content
- Student engagement levels dropping
- Network congested by software updates
- Bandwidth too expensive at some academy locations
- Latency of web content

Solution

- 3 x CACHEBOXes - one at each Academy site in three countries

Benefit

- Instant speed improvements in class
- Enhanced user experience
- Congestion-free access to content
- Affordable, cost-effective boost to classroom connectivity
- Slow content delivered much faster

About Aga Khan Academies

The Aga Khan Development Network (AKDN) is a group of 30 development agencies, institutions, and programmes aimed at achieving a better quality of life across the poorest parts of Asia and Africa.

The network governs more than 200 schools worldwide and aims to develop leading Academies in key locations across the region. The first three academies are fully operational in Mozambique, Kenya and India.

Insufficient bandwidth brings congestion and slow access

Students and teachers at each academy rely heavily on fast access to online learning content throughout the day. But each location differs in its network capabilities, as well as user equipment. In some locations students access the internet from computer labs, in others from individual user devices in the classroom.

For e-Learning to be successful, content must be accessed quickly. The academies in Mozambique and Kenya however can't access the bandwidth capacity needed to support an increasing number of internet-enabled devices, such as iPads or Chromebooks.

With smaller internet connections these academies often experience congestion. As classes of students access the same content online, they do so at the same time. This creates huge spikes in demand which saturate the network, leaving students queuing for content and facing lengthy page-load times. With students kept waiting, lesson plans suffer, as do engagement levels. Growing frustration risks students and teachers abandoning online lessons altogether.

Content slow to arrive, even on high capacity links

In India, the Hyderabad academy enjoys access to higher capacity connections - but even with far more bandwidth some key content still arrives slowly in the classroom.

This is due to a host of factors from transmission latency to slow servers upstream - and is beyond a school's control. Even with unlimited bandwidth, users can still experience slow content delivery. This leaves Hyderabad with the same problem - delays in the classroom and unhappy students.

Capacity consumed by device updates

All three academies share a problem caused by growing device numbers. As the number of classroom devices increase, so does demand for the operating system updates needed to maintain them and keep them secure.

Often many gigabytes in size, these files are requested frequently and at random, by each and every device on the network. Typically served from slow web servers, they can 'hog' most of a school's bandwidth throughout the school day - restricting access to more vital learning content.



CACHEBOX has worked very well and helped to slow down the rate of bandwidth upgrade, which we are pleased about.



Sanjeeb Mohanty
Global Head of ICT



Wherever a school is located, or however cheap bandwidth is, **CACHEBOX** gives students fast access to content that the links alone never could.

Harminder Heer
CACHEBOX Consultant



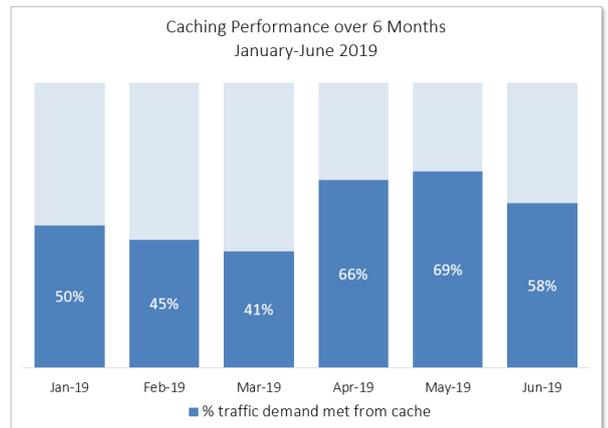
Congestion-free with CACHEBOX

Turning to caching to help resolve these bandwidth issues, Global Head of IT Sanjeeb Mohanty was delighted to discover a schools-focused caching solution that specifically handles schools' content – **CACHEBOX**.

CACHEBOX is a specialised solution, engineered for schools. As a result, it is the best tool for the job in schools.

CACHEBOX saves a copy of requested internet content locally, then serves it via the Local Area Network (LAN), meeting all subsequent demand directly. That means the majority of requests don't need to access the internet – slashing demand, eliminating congestion and making content faster. This drastically minimises the capacity a school needs to deliver an optimal e-learning experience.

With **CACHEBOX**, Mozambique has enjoyed consistently high caching performance. A review of the first six months of 2019 shows **CACHEBOX** serving substantial quantities of monthly content from cache – often well over 50%.



By freeing up so much bandwidth, **CACHEBOX** enables the academies to expand online curriculum, confident that students can access it, congestion-free.

"**CACHEBOX** has worked very well and helped to slow down the rate of bandwidth upgrade, which we are pleased about," says Sanjeeb.

Faster content with CACHEBOX

With no waiting for content to download from the internet, previously slow web content arrives many times faster.

Hyderabad's higher bandwidth capacity failed to accelerate slow web content, but with **CACHEBOX** content now arrives up to 216 times faster.

Domain	Speed from the internet	Speed from CACHEBOX	X times faster
unicef.in	4 kbps	952 kbps	216 x
vsmartdownload.com	257 kbps	12,200 kbps	47 x
ishweb.nl (managebac)	69 kbps	1,830 kbps	27 x
brianreverman.com (art edu)	636 kbps	13,900 kbps	22 x
agakanacademies.org	32 kbps	636 kbps	20 x
sjr.ac.uk (St John Rigby College)	176 kbps	3,350 kbps	19 x
wondershare.net	140 kbps	2,530 kbps	18 x
oup.com (Oxford Uni Press)	389 kbps	4,980 kbps	13 x
mathsinsider.com	1,020 kbps	7,930 kbps	8 x

CACHEBOX Performance, Hyderabad, August 2019

With classroom speeds accelerated, the academies can provide a more seamless, enhanced user experience. Pushing student engagement levels to new highs, **CACHEBOX** is helping deliver the best chance for learning success.

"Wherever a school is located, or however cheap bandwidth is, **CACHEBOX** gives students fast access to content that the links alone never could," explains **CACHEBOX** Consultant Harminder Heer.

Optimal e-learning, Maximum results

Caching delivers a better user experience, increasing student engagement and positive learning behaviours for better outcomes.

Updates offloaded with CACHEBOX

Schools worldwide are finding that one source of online traffic dominates: large, frequent software update files from operating systems and software vendors. A school with lots of student devices - particularly one with a 1:1 scheme - will typically find that more than 50% of its bandwidth is consumed by software updates.

Aga Khan Academies chose **CACHEBOX** because it caches software updates from all vendors on all platforms, including Apple, Microsoft, ChromeBook and antivirus updates.

In September 2019, user devices at the Academy of Mombasa requested over 2TBs of updates alone. This accounted for more than 70% of total downloads for the entire month.

Software Domains	Overall traffic volume	Traffic served from cache	% served from cache
microsoft.com	1568.2 GB	1145.0 GB	73.0%
apple.com	750.7 GB	424.7 GB	56.6%
cdn-apple.com	320.0 GB	139.9 GB	43.7%
windowsupdate.com	258.8 GB	189.8 GB	73.3%
mcafee.com	9.4 GB	8.3 GB	88.7%

But thanks to **CACHEBOX**, up to 88% of it didn't need to come from the internet. The vast majority of update content was served direct from cache. And, served at much faster LAN speeds, cached updates clear the network faster - leaving student access unaffected.

Caching reports from each academy show **CACHEBOX** removing gigabytes of software downloads from their internet links, giving them the confidence to add more devices without worrying about congestion or another bandwidth upgrade.

The future looks better with caching

With e-learning plans expanding, the academies want to maximise student access and engagement opportunities. So each academy plans to offer BYOD (Bring Your Own Device) access to their network. Bandwidth needs will inevitably increase, but as each Academy expands its network capabilities, **CACHEBOX** will upscale in line with need.

The **CACHEBOX** range includes models at different price/performance points so each location can closely match traffic-load and avoid spending on performance it doesn't yet need.

Sanjeeb is confident caching will help deliver the optimal user experience across each campus at lowest cost. "The Academies understand that **CACHEBOX** is now a key part of their strategy and will upgrade their units as they grow," says Sanjeeb. "This works well for them, so they don't need to invest in larger units until their network demands it."



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