

The Last Mile

1000 Mbps Full Duplex

A large satellite dish is positioned in the lower-left foreground, mounted on a white pole. The dish is white and has a network jack symbol on its face. A blue beam of light originates from the dish and extends across the cityscape towards the upper-right. The beam is semi-transparent and contains the text '1000 Mbps Full Duplex' in white, 3D-style font. The background is a high-angle view of a dense urban area with many skyscrapers and buildings under a clear sky.

edit Las Vegas
13 November 2008

The Last Mile

How far is the last mile really?

Last leg?
Rural Vs Urban
Fiber viability
Wireless Viability – WiFi, WiMax, LTE?

Proxy Servers
Appliance Servers
Best practices

Is bandwidth optimization going to be meaningful?

How important is mobility

On Campus
Any Place
Any Time
At home – digital divide
Other

The Last Mile?

Gig E, Cat6
802.11.x
EVDO
LTE
WiMax

What are your priorities for infrastructure?

What is all the bandwidth for?

Applications
Voice
Rich media
Data

Does multi agency bring value?

How much bandwidth is enough?

What is core to education delivery?

QOS issues
Bandwidth calculator

Geography
Cities, Counties Schools

Cell Phone Polling How-To

- Send a message to this phone number: 41411
- Your message should be:

The word *CAST*, followed by a 5 digit number representing the answer choice.

Example: *CAST 25256* “my message or answer”
(no quotes requited)

How important will mobile computing be in delivering a 21st Century Education?



To vote, text a **KEYWORD** to **41411**

Very Important	CAST 24570
Important	CAST 24571
So-So	CAST 24572
Not Very Important	CAST 24573
Not Important At All	CAST 18465

How Long is the Last Mile?

Text **CAST 24565** and your message to 41411



No responses received yet

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Historical Perspective

- Once upon a time a dial-up AOL line in the library counted as “internet connectivity”
- After E-rate in 1996, schools turned to broadband, primarily T-1 lines.
- Big disconnects between bandwidth drivers and purchasing decisions

Let's look at the survey results

What is Your Bandwidth Today? What Will Be Your Bandwidth in 5 Years?

- Definition: Bandwidth per student, in kilobits/second.
- Example: 100,000 students, and an OC-3
- $155,000,000/100,000 =$

1.55 kilobits/sec/student

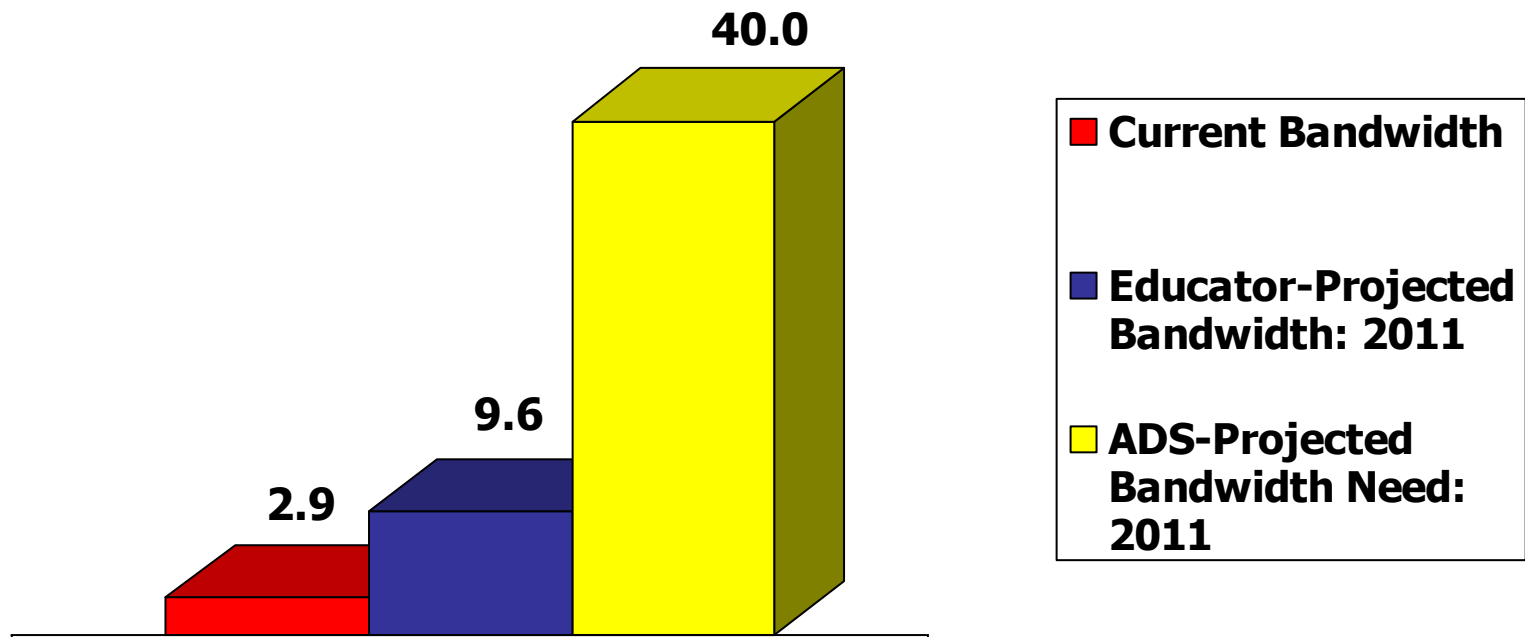
What is your bandwidth per student, in Kilobits/second/student, today? What will it be in 5 years?



Text **CAST 24557** and your message to 41411

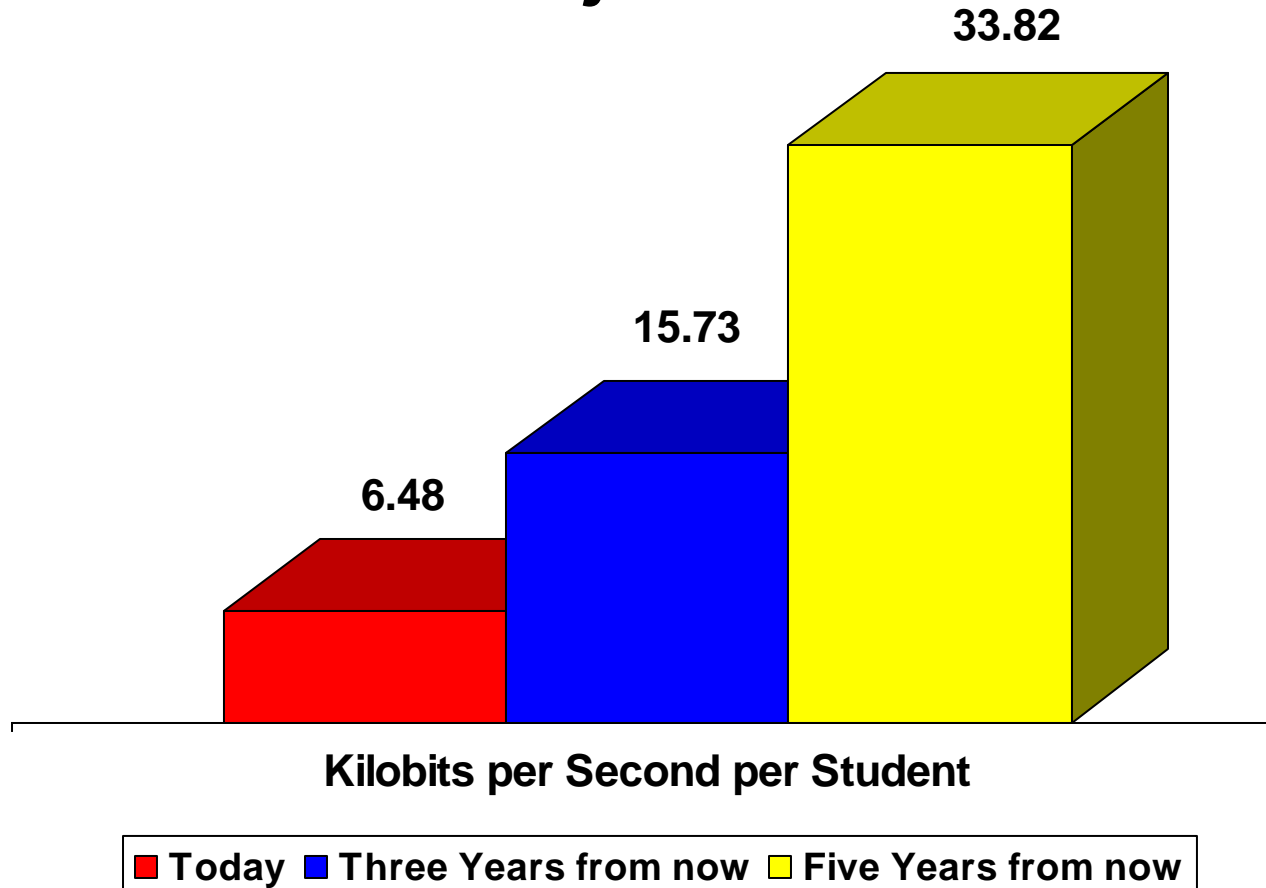
2006 Bandwidth per Student Projection

Kilobits per second per student



What is the actual available bandwidth to the Internet on a per student average basis today in 2006? Note that this is a new way to define bandwidth.

2008 Bandwidth per Student Projection



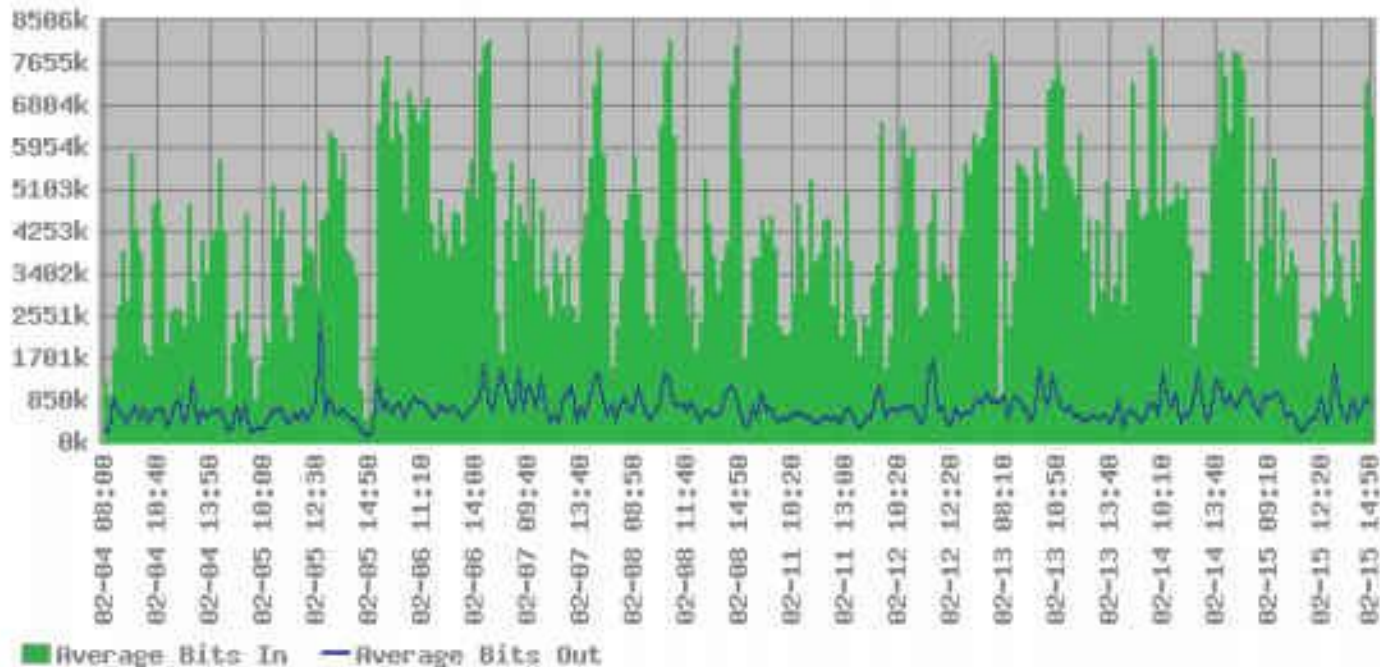
What is your total aggregate bandwidth, between all schools and district buildings and the Internet via your ISPs? How do you expect bandwidth per student to increase in the future?

What is Causing Bandwidth Growth?

- Web page size is growing
- Web application use is growing
 - Online education growing at 40% a year
 - Online assessment growing at 30% a year
 - Online research growing rapidly
 - Use of bandwidth intensive applications such as streaming video is increasing
- More machines
 - Laptop use is growing at 25% a year
- Desire for ASP hosting to cut local costs

Peak Load Rarely Considered

- All our bandwidth calculations are just averages.
- However we know peak load is an important factor in school bandwidth usage.
- When the bell rings, bandwidth spikes.



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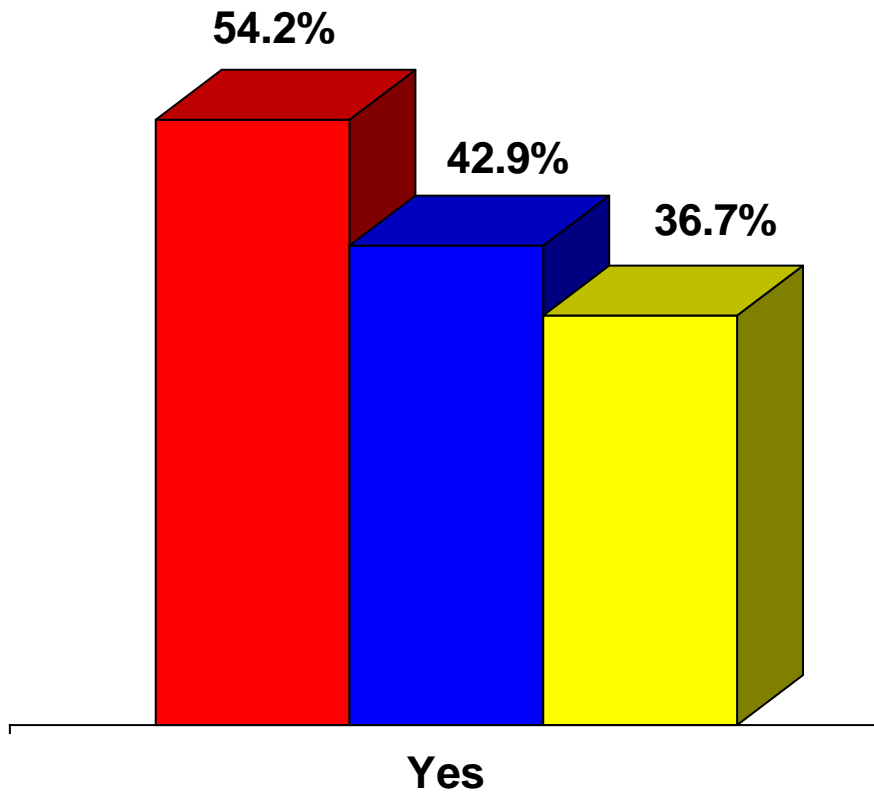
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What is core to education delivery?

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Future Funding Challenges

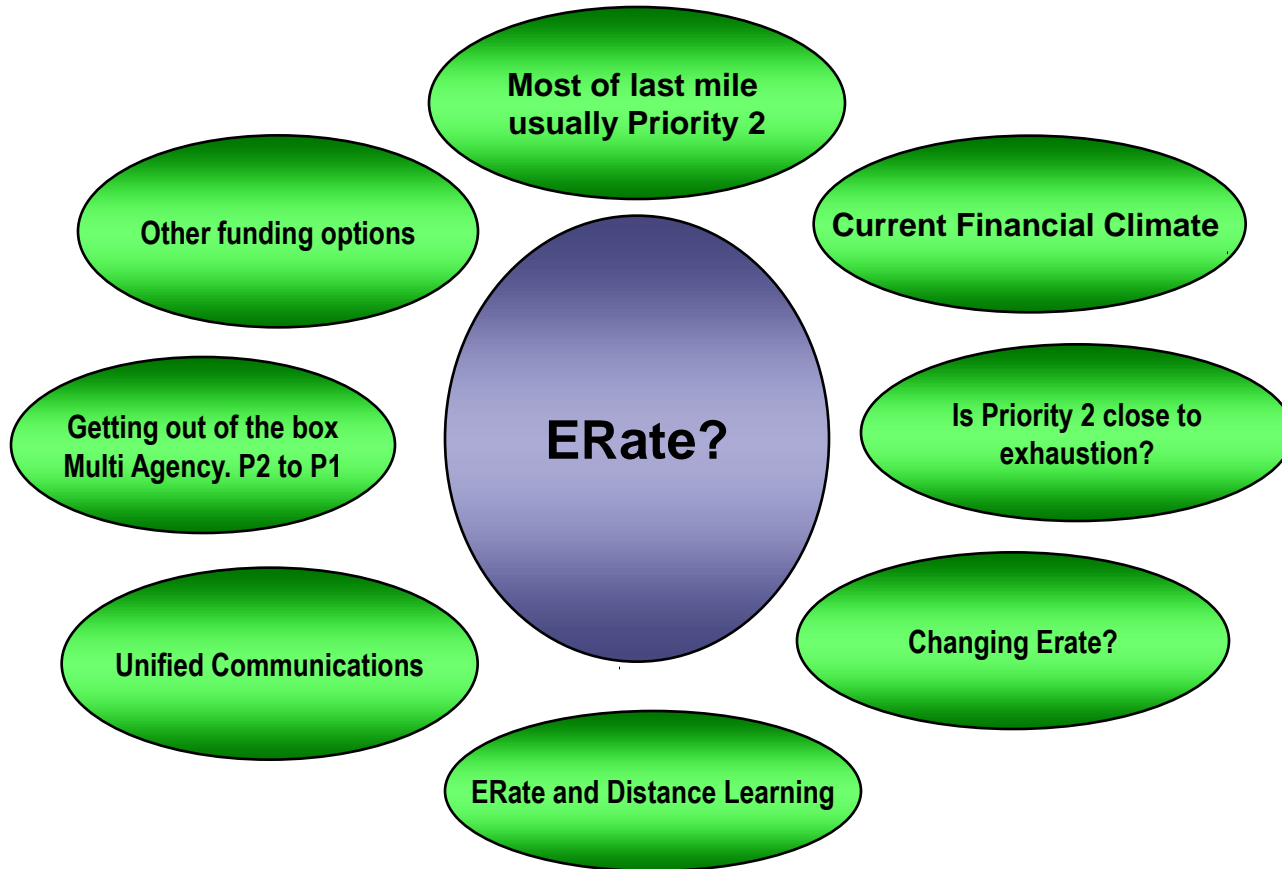
Pct. of Respondents
Multiple Answers Allowed



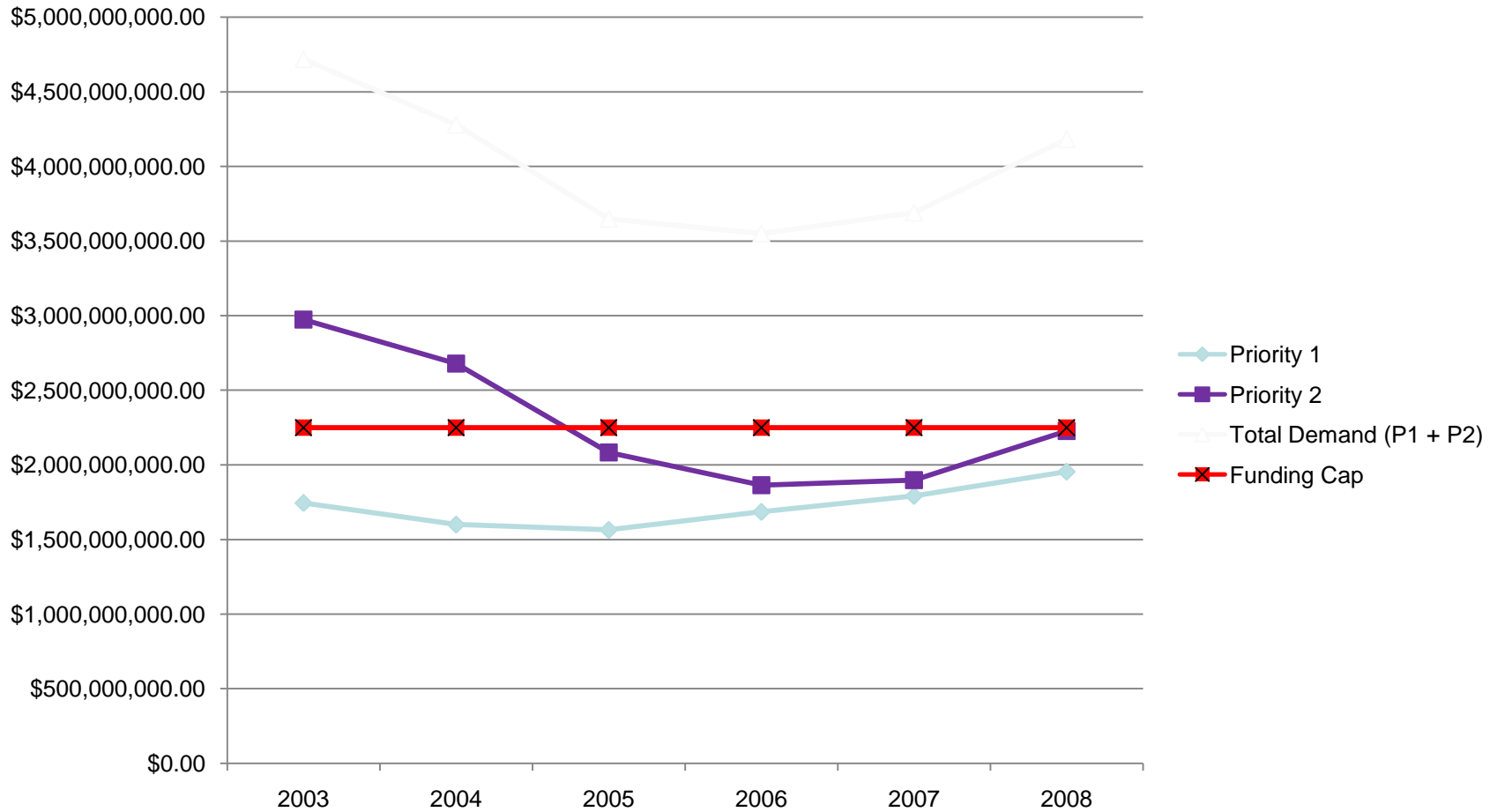
- Do you foresee a problem obtaining sufficient funding, regardless of the source, for your required bandwidth?
- Do you foresee a problem with E-Rate funding your future bandwidth needs at the current percentages?
- Do you foresee a problem obtaining sufficient bandwidth, regardless of your ability to pay?

Do you foresee problems with bandwidth funding?

Paying for The Last Mile

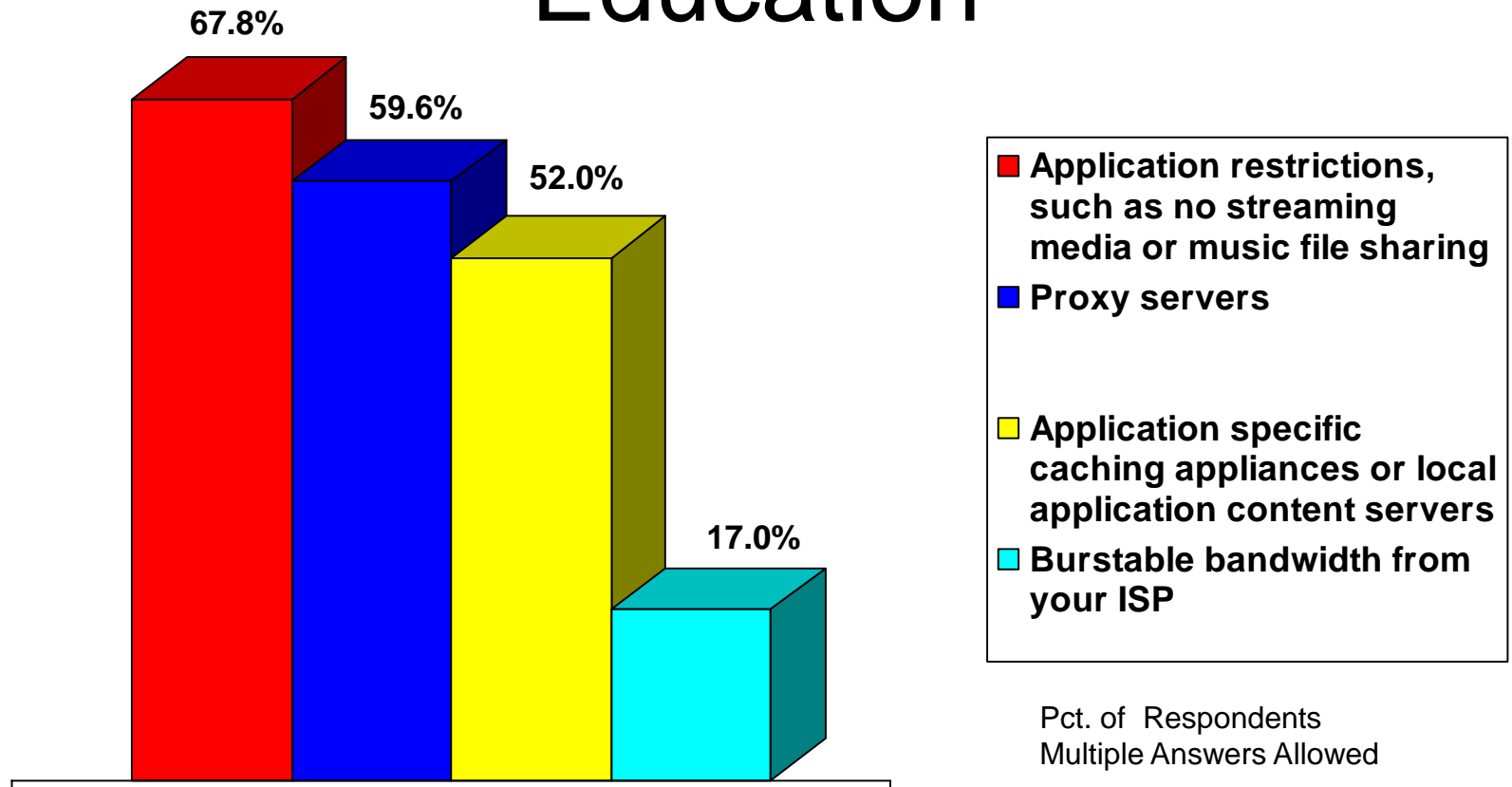


E-rate Funding: So Far



E-rate Funding Demand, P1 & P2: FY2003 - 2008

Bandwidth Leveraging is Impeding Education



Have you used any of the following to leverage the existing capacity of your bandwidth?
Please check all that apply.

Key Points

- We have a school Bandwidth Crisis
- The Crisis is impacting education
- The Crisis has multiple dimensions
- The fixes are not necessarily cheap or quick
- Action is required now!

Recommendations

- Build five year bandwidth usage models for each application area
- Look at alternative models – applications and connectivity
- Get the word out to policy makers and legislators
- Get behind national bandwidth recommendations, such as SETDA's.
- Lobby to expand E-Rate funding to current need levels and have it indexed upwards each year. (In 1996 \$2.25B was just fine. Not now!)
- Urge a re-look at what constitutes a priority 1 service.
e.g. WiMAX, EVDO, LTE
- Special considerations for geographically challenged schools

Act NOW!