March 30, 2022

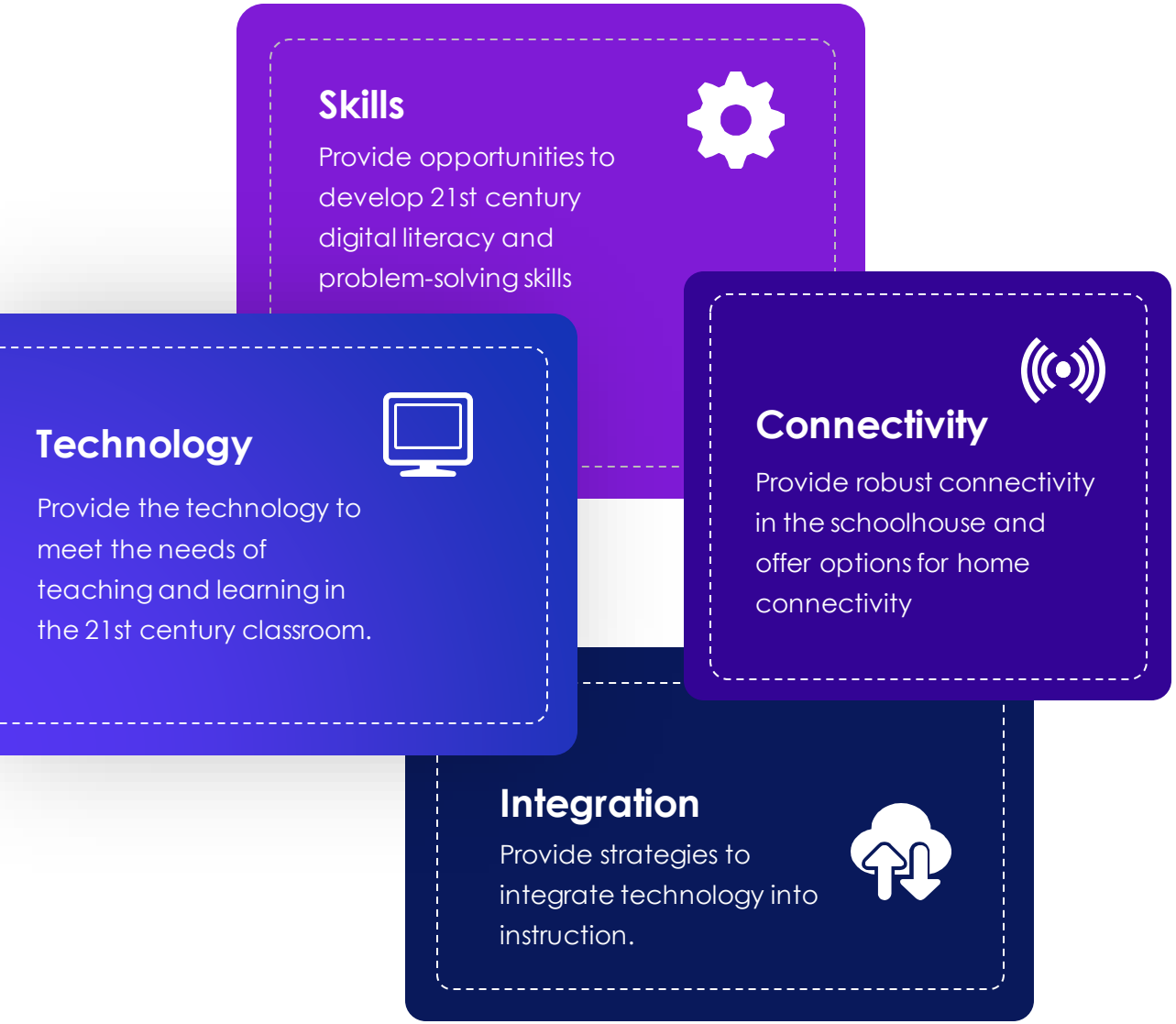
# TECHNOLOGY Board Workshop

## Miami-Dade County Public Schools

The Vision

# A Vision for the future of technology at M-DCPS

that includes considerations for teaching and learning. The scope of this five-year vision is designed to provide a district-level blueprint for technology initiatives.

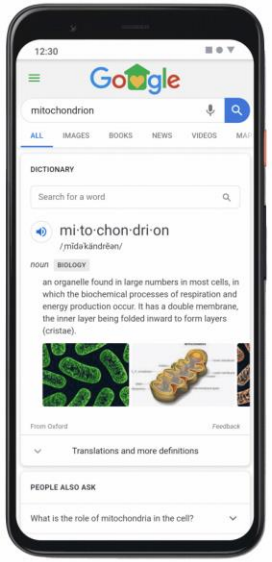



The Principles

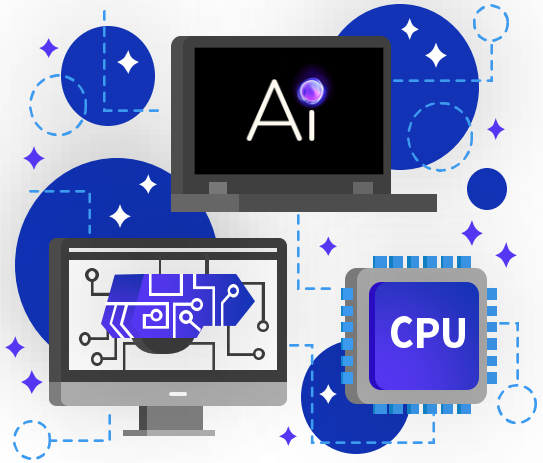
# Four principles behind the Vision

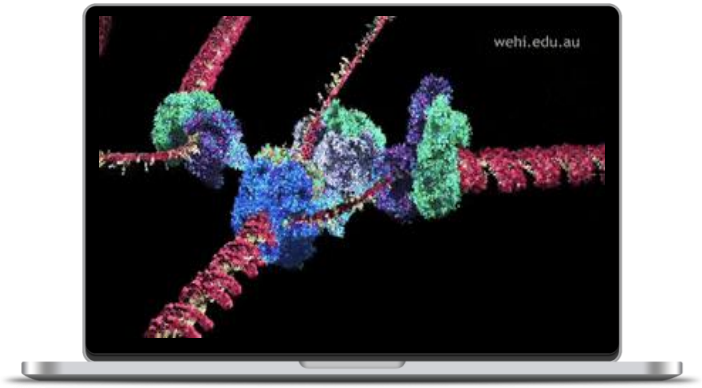
These principles are part of a much larger conceptual framework that will drive technology advancements in the District over time.

# Tools of the Future




- Artificial Intelligence
- Chatbots
- Augmented & Virtual Reality
- Interactive Video




# CLASSROOM TECHNOLOGY

# Laptop Specifications

| Mobile Devices for Students/Teachers |
| --- |
| Intel® Pentium® Silver N6000 Processor (4M Cache, up to 3.30 GHz) |
| 8-16 GB volatile storage |
| 120GB SSD hard drive |
| Microsoft Windows 11 |
| Integrated or Discrete graphics processor capable of 1440 X 900 resolution, or better (1920 X 1080 or 1200 ideal) |
| 802.11 ax/Wi-Fi 6 & 5.0 BT wireless technology or greater |
| 5 MP front-facing camera capable of capturing/recording images and video at 1080p; Built-in mono-speaker (2w); Built-in microphone |
| Eight-hour battery capacity |
| 11.6-inch diagonal multi-touch capacitive touch display -1440 X 900 minimum resolution or better |
| At minimum, the device must include the following ports:<br>• 3 USB (USB 3.0 + 1 USB-C)<br>• 1 HDMI<br>• 1 3.5-mm stereo mini-jack<br>• 1 RJ-45 |
| 3.5 lbs. or less weight |
| 5-year warranty |

# Desktop Specifications

| Teacher Stations | Student Stations | All-in-Ones |
|---|---|---|
| Intel® 11th Generation Core i5-11500 (Rocket Lake) (12MB Cache, 4.6 GHz turbo) Six Core | Intel® 10th Generation Core™ i3-10105 Processor (4 Cores/6MB Cache/up to 4.40 GHz,65W) | Intel® 10th Generation Core™ i3-10100 (4 Cores/6MB/4T/3.6GHz/65W) |
| 16 GB 3200 MHz DDR4 Memory (2x8GB) | 16 GB 2666MHz DDR4 Memory | 16 GB 2666MHz DDR4 Memory |
| Intel® UHD Graphics 630 (must be Dual Monitor capable) | Intel® UHD Graphics 630 (must be Dual Monitor capable) | Intel® UHD Graphics 630 (must be Dual Monitor capable) |
| 512 GB Solid State Storage | 256 GB SATA SSD | 256 GB SATA SSD |
| 1+ Gig Ethernet 100/1000BASE-T & required Bluetooth 5.1 | 1+ Gig Ethernet 100/1000BASE-T & required Bluetooth 5.1 | 1+ Gig Ethernet 100/1000BASE-T & IEEE 802.11ac Dual-band 2x2 Wi-Fi with MU-MIMO + Bluetooth 5 |
| 24" IPS Monitor (23.8" 2560x1440 (2K), 16:9, 1000:1, 60Hz) HDMI, DisplayPort | 21 Inch Flat Panel (Minimum 1920x1080, 600:1 Contrast 60Hz) HDMI, DisplayPort | 21 Inch Flat Panel (Minimum 1920x1080, 600:1 Contrast 60Hz) HDMI 2.0, DisplayPort 1.2+ with integrated 5MP+ webcam capable of 1920x1080p video |
| 2 USB 3.0 ports Front 4 USB 3.0 ports Back | USB 3.0 ports | USB 3.0 ports |
| 5 Year Onsite Warranty | 5 Year Onsite Warranty | 5 Year Onsite Warranty |

# Instructional Mobile Devices (Laptops)

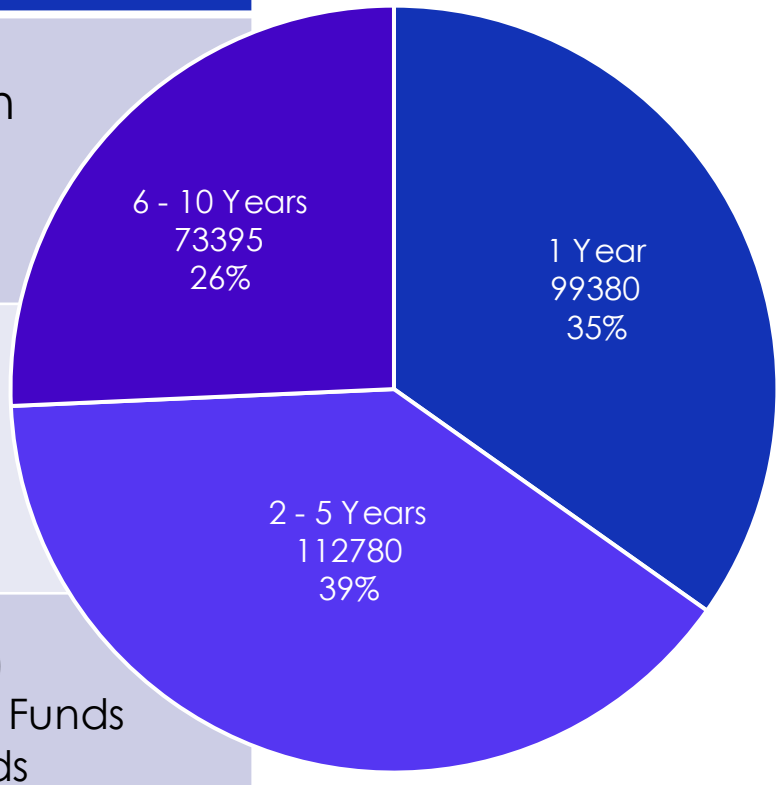


## Student Laptops

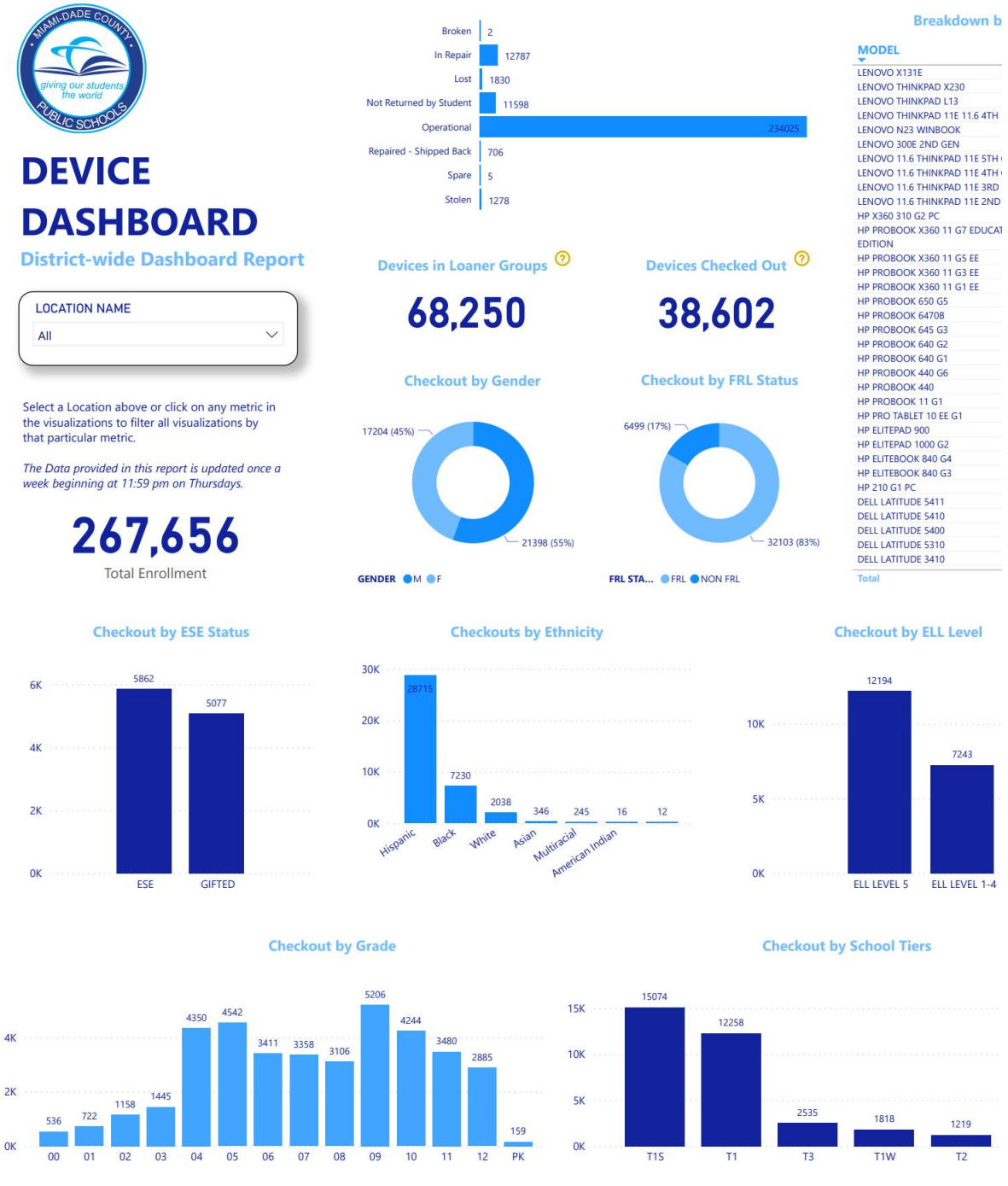
Achieve and sustain a 1:1 device/student ratio

| Metric | Cadence / Cost |
|---|---|
| Full Inventory Replacement | $ 114 million<br>5 years |
| Annual Repair Costs (non warranty) | $ 1 million |
| Historical Funding Sources *(limited)* | -Loans (BofA)<br>-Categorical Funds<br>-Capital Funds<br>-ESSER |

Age of Existing Mobile Devices



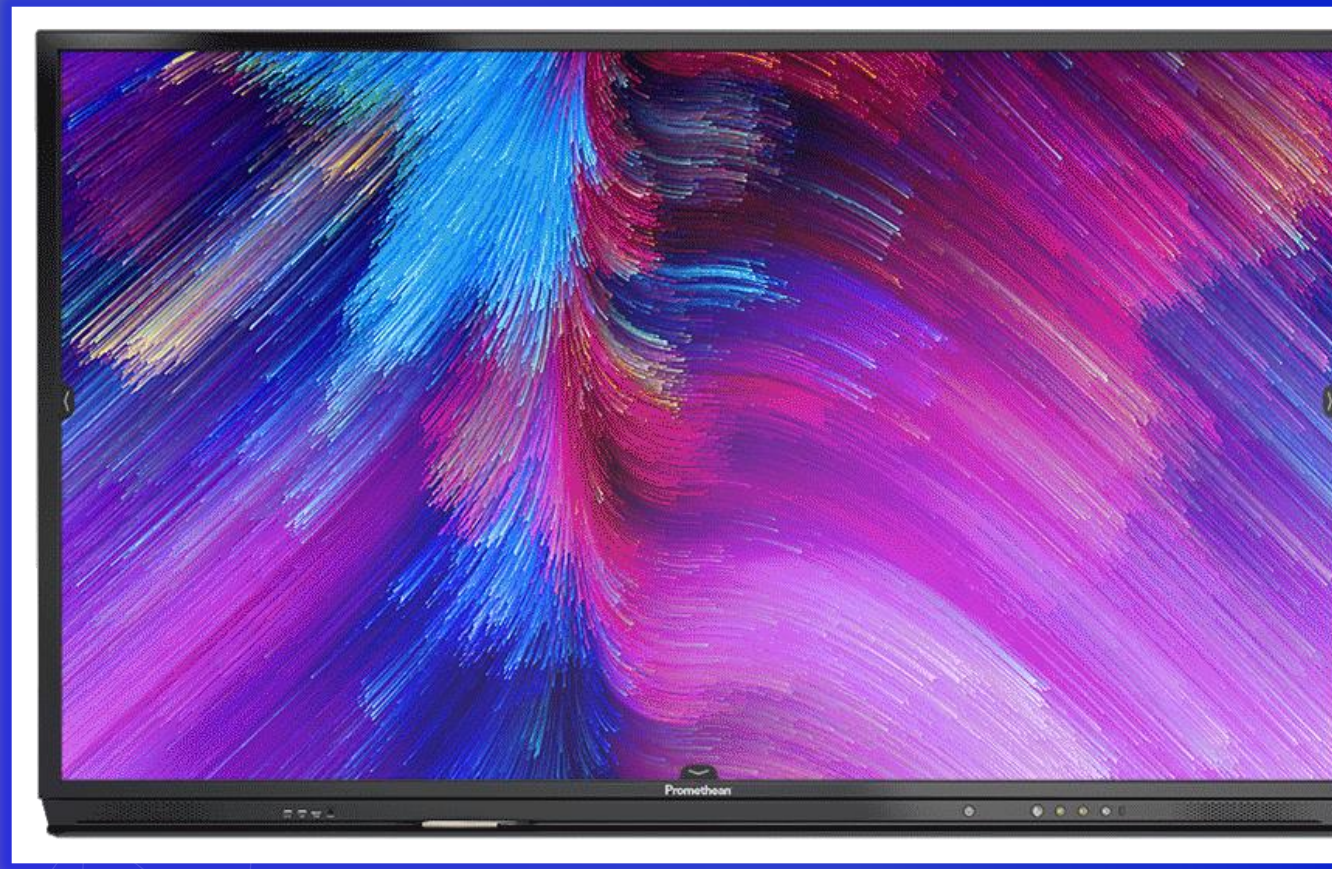
# Instructional Mobile Device Dashboard




Power BI

Classroom Interactivity

# Promethean Interactive Panels



# Interactive Panels

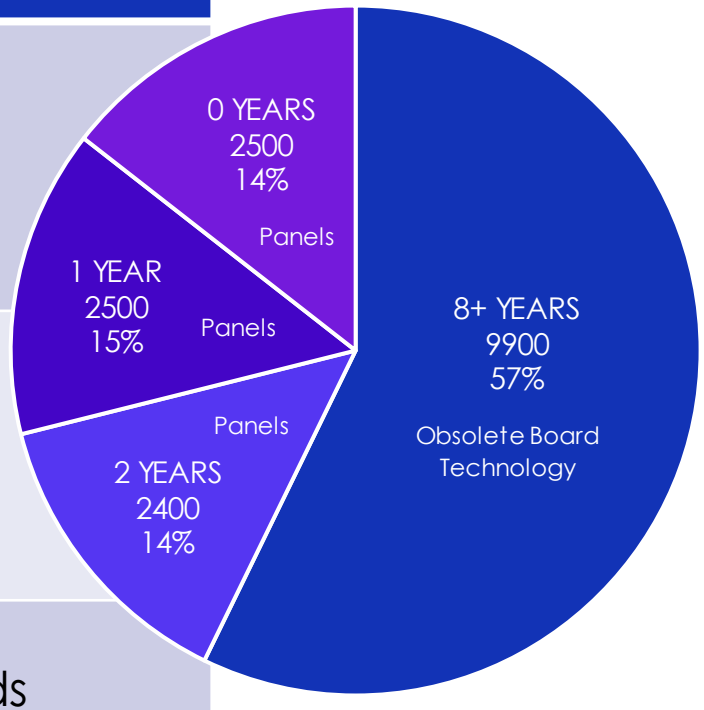


## Interactive Panels

Replace existing interactive boards with new interactive panels

| Metric | Cadence / Cost |
|---|---|
| Full Inventory Replacement | $ 60 million<br>10 years |
| Annual Recurring Costs | $ 500,000<br>*Estimated* |
| Historical Funding Sources<br>*(limited)* | -Capital Funds<br>-GO Bond<br>-ESSER |

Age of Existing IWBs



Webcam Solutions

# Hyflex Classroom Readiness

"Hybrid-Flexible" (Hyflex) Classrooms are learning spaces that are remote-ready, audio-enhanced rooms that will enable easy access to distance learning.

| Ceiling Mounted, High-end Cameras | Specifications |
|---|---|

- USB 3.0 Port
- 4K Ultra HD Video calling
  (up to 3840 x 2160 pixels @ 30 fps) w/ 5x HD Zoom & motorized pan/tilt
- Integrated microphone with 3 beamforming elements & 95dB SPL speaker

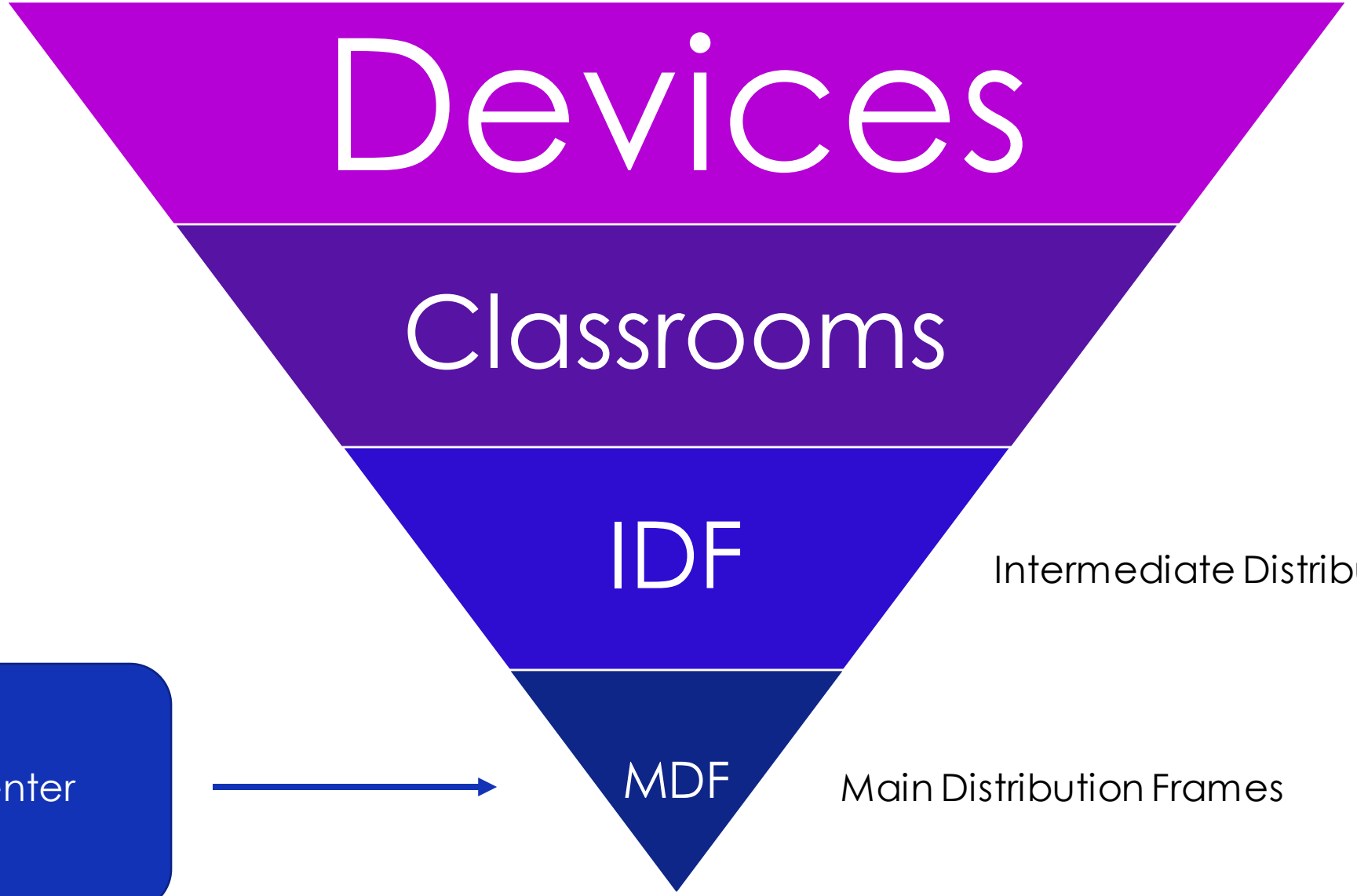
# Closing the Digital Divide

The District is providing options for families including partnering with T-Mobile via the Emergency Connectivity Fund to provide 35,000 free unlimited data hotspots to students as well as partnering with Miami Connected to provide high speed internet via Comcast.

35,000 Hotspots

High Speed 5G Network
Unlimited Data
Free

# THE NETWORK




Intermediate Distribution Frames

Main Distribution Frames

Data Center

# Network Architecture

Wireless Controller

Router

UPS

MDF
Main Distribution Frame

IDF 1

IDF 2

IDF 3

# Scope of Network

| School Type | Typical # of IDFs | Wired endpoints |
|---|---|---|
| ES | 9 | 1,152 |
| MS/K8 | 12 | 1,536 |
| HS | 18 | 2,304 |

# Network Hardware Upgrades



## Wireless

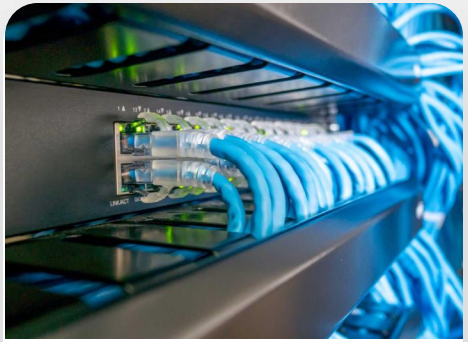
Upgrade 27,000 APs and add additional to "Dead Zones"

## Routers

Upgrade Routers to enhance Traffic Control at schools

## Power

Expand electrical infrastructure to support the expanding network.



## Switches

Upgrade all schools to the new Network Architecture

## VOIP

Provide each school with a Voice Over IP (VOIP) telephone system

# Wireless Hardware

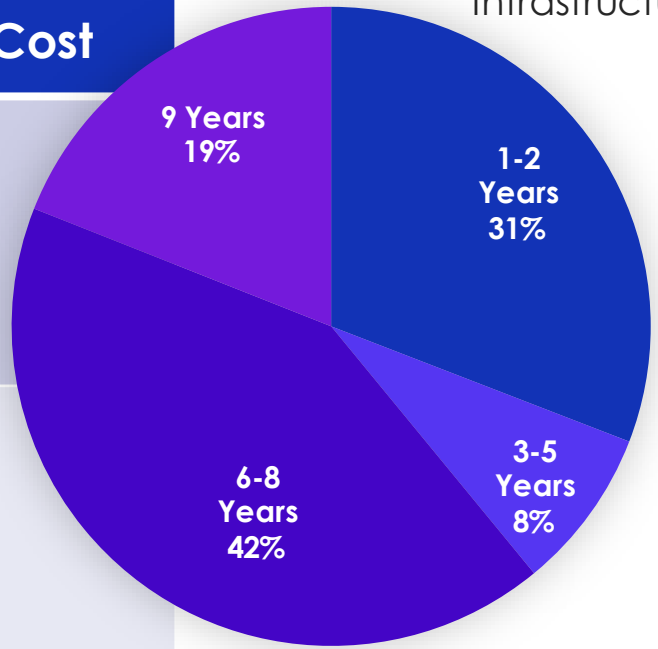



## Wireless Connectivity

All schools will be at wireless systems standard **802.11.ax (Wi-Fi 6)**

| Metric | Cadence / Cost |
|---|---|
| Wireless Network Replacement | $ 30 million<br><br>5 years |
| Annual Recurring Costs | $ 2 million |
| Historical Funding Sources | -ESSER<br>-E-Rate<br>-Capital Projects<br>-GO Bond |

Age of Existing Wireless Infrastructure




- Higher level encryption
- Advanced Intrusion detection
- Increased client count
- Increased bandwidth

# Network Routers

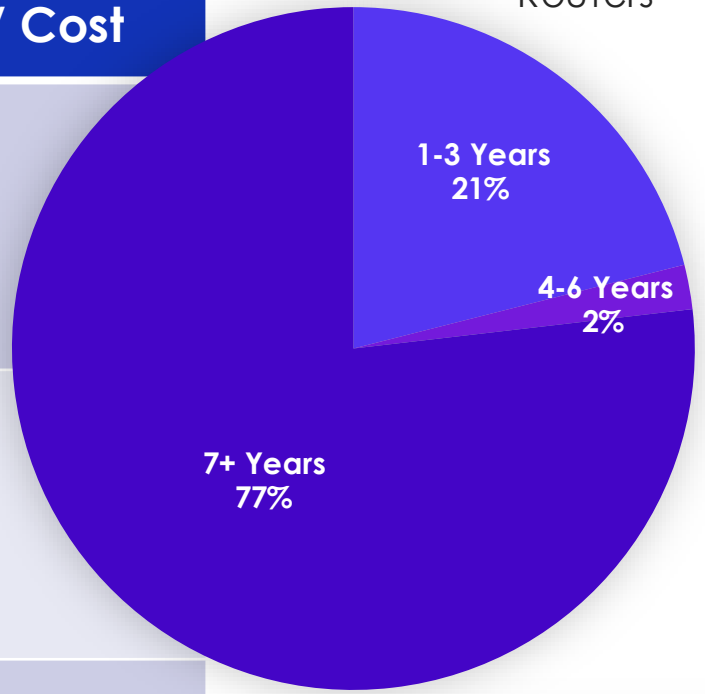


## Routers

The goal is to deploy a high-capacity network router with elevated security features at every school

| Metric | Cadence / Cost |
|---|---|
| Router Replacement | $ 7 million<br>5 years |
| Annual Recurring Costs | $ 2,000 per unit |
| Historical Funding Sources | -ESSER<br>-E-Rate<br>-Capital Projects<br>-GO Bond |

Age of Existing Routers




- Increased port bandwidth
- Enhanced security features
- Greater visibility from Core Network
- Threat Management

# Uninterrupted Power Supply (UPS)

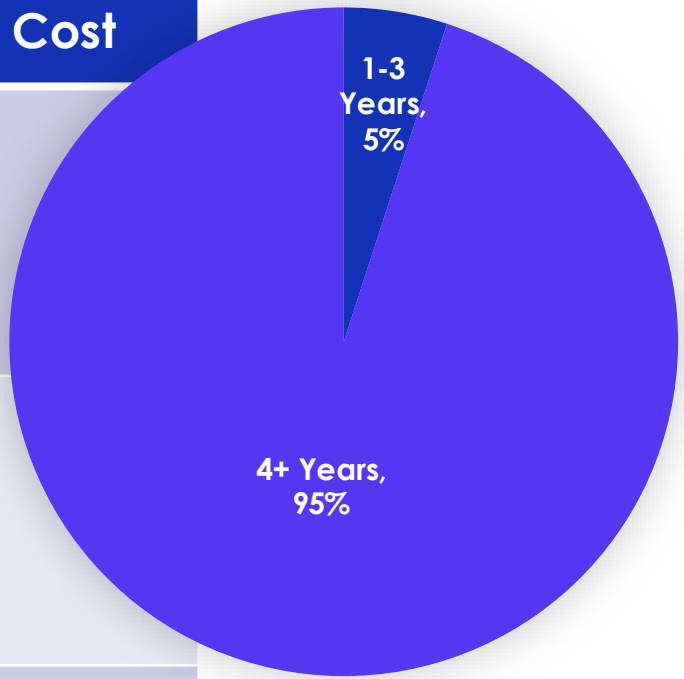


## Power

Equip Lithium-Ion UPS units in all MDF and IDF closets

| Metric | Cadence / Cost |
|---|---|
| UPS System Replacement | $ 7 million<br>5 years |
| Annual Recurring Costs | Replacement costs only when batteries fail |
| Historical Funding Sources | -ESSER<br>-E-Rate |

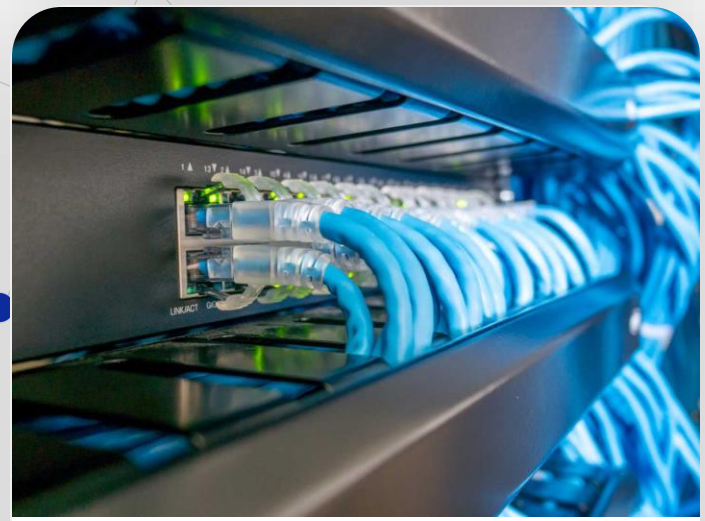
Age of UPS Units




- Power Flux Protection
- Critical systems power back-up
- Remote monitoring of UPS health

# Network Switches



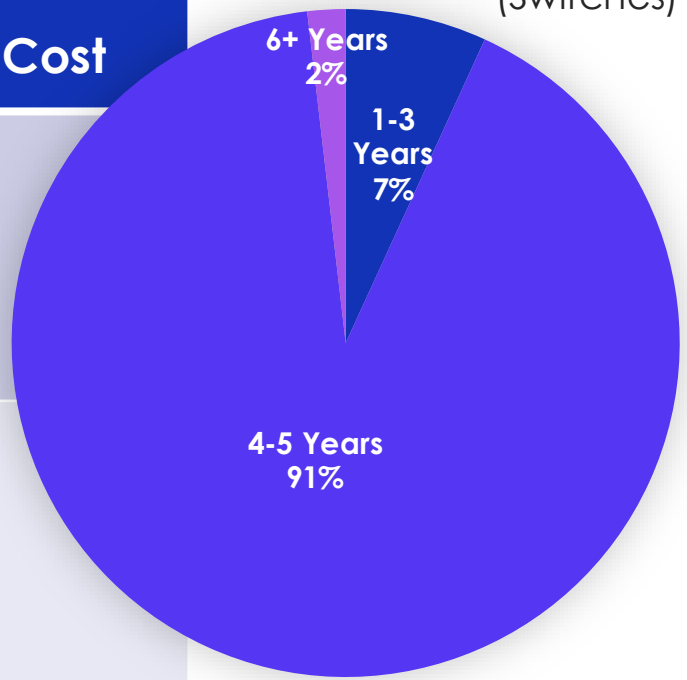


## Switches

Upgrade all schools to the new Network Architecture

| Metric | Cadence / Cost |
|---|---|
| Backbone System Replacement | $ 165 million<br><br>5 years |
| Annual Recurring Costs | $ 0 |
| Historical Funding Sources | -ESSER<br>-E-Rate<br>-Capital Projects<br>-GO Bond |

Age of Network Backbone (Switches)




- Security updates
- Increased port bandwidth
- Increased POE
- Enhances identity mgmt. and Network Access Control

# VOIP Telephone Systems

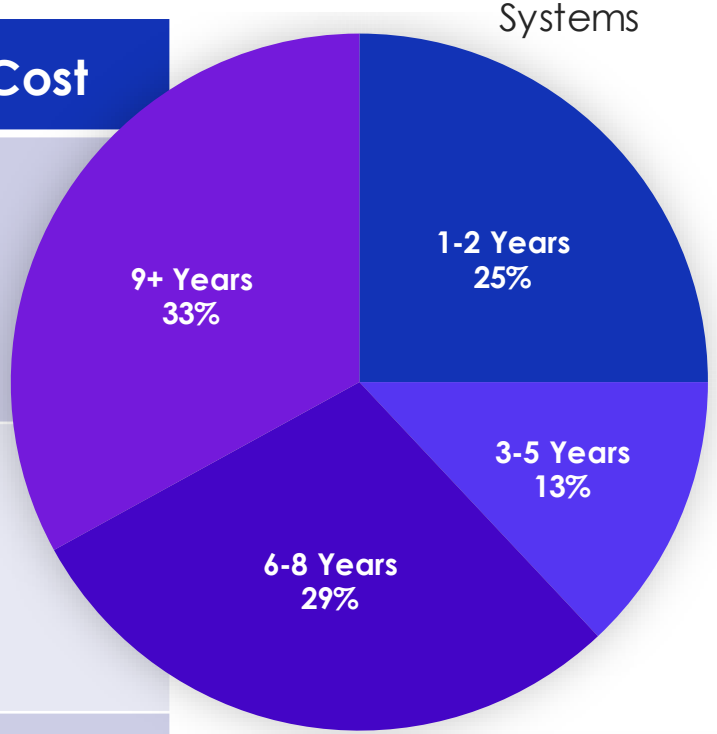


## VOIP Phones

Goal is to provide each school with a Voice Over IP (VOIP) telephone system

| Metric | Cadence / Cost |
|---|---|
| VOIP System Replacement | $ 24 million<br><br>10 years |
| Annual Recurring Costs | $ 180,000 |
| Historical Funding Sources | -ESSER<br>-General Fund<br>-Capital Projects |

Age of Telephone Systems




- Reduced Infrastructure wiring expenditures
- Reduced MTBF and increased system reliability

# Bandwidth Upgrades



- [x] 01 40 Gbps to 100 Gbps
- [x] 02 DDoS Mitigation
- [ ] 03 Second 100 Gbps ISP

# TRAFFIC SHAPING

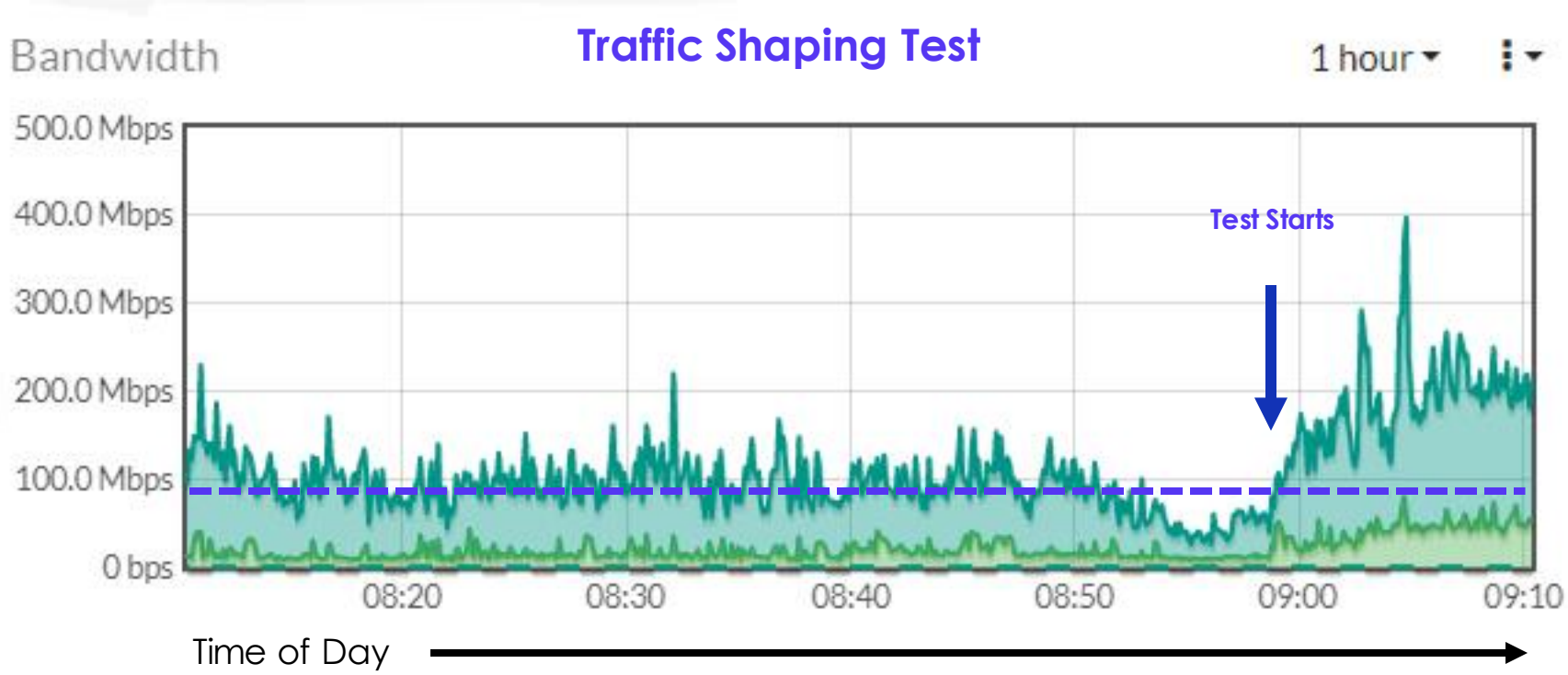

**Traffic shaping** is a bandwidth management technique used on computer networks which ***delays*** data to bring it into compliance with a desired ***traffic profile***.

**Traffic shaping is used to optimize or guarantee performance, improve latency, or increase usable bandwidth for some kinds of data packets by delaying other kinds.**

It is often confused with traffic policing, the distinct but related practice of data packet dropping.

# Miami Sunset Senior High School Test

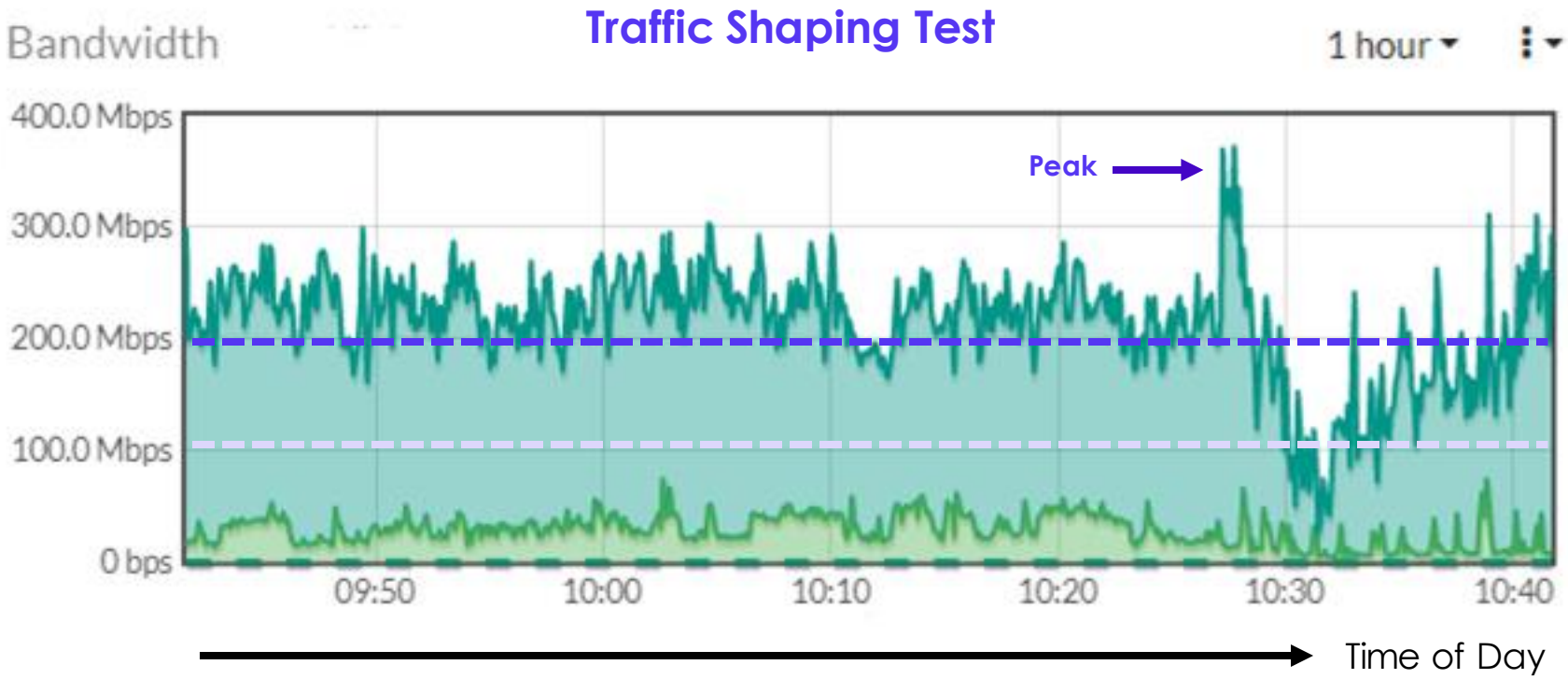





**100 Mbps**

# Miami Sunset Senior High School Test





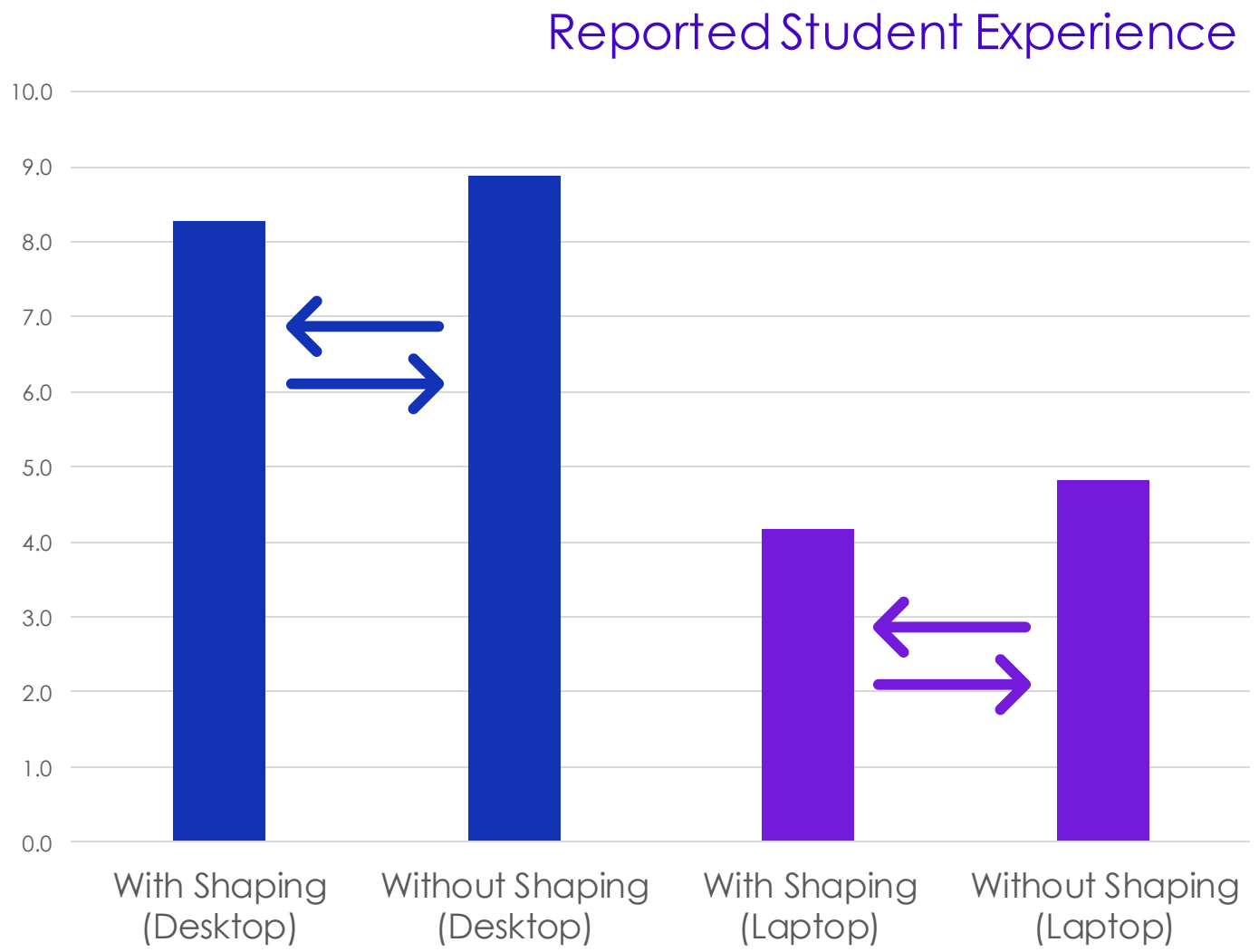

**200 Mbps**

**100 Mbps**

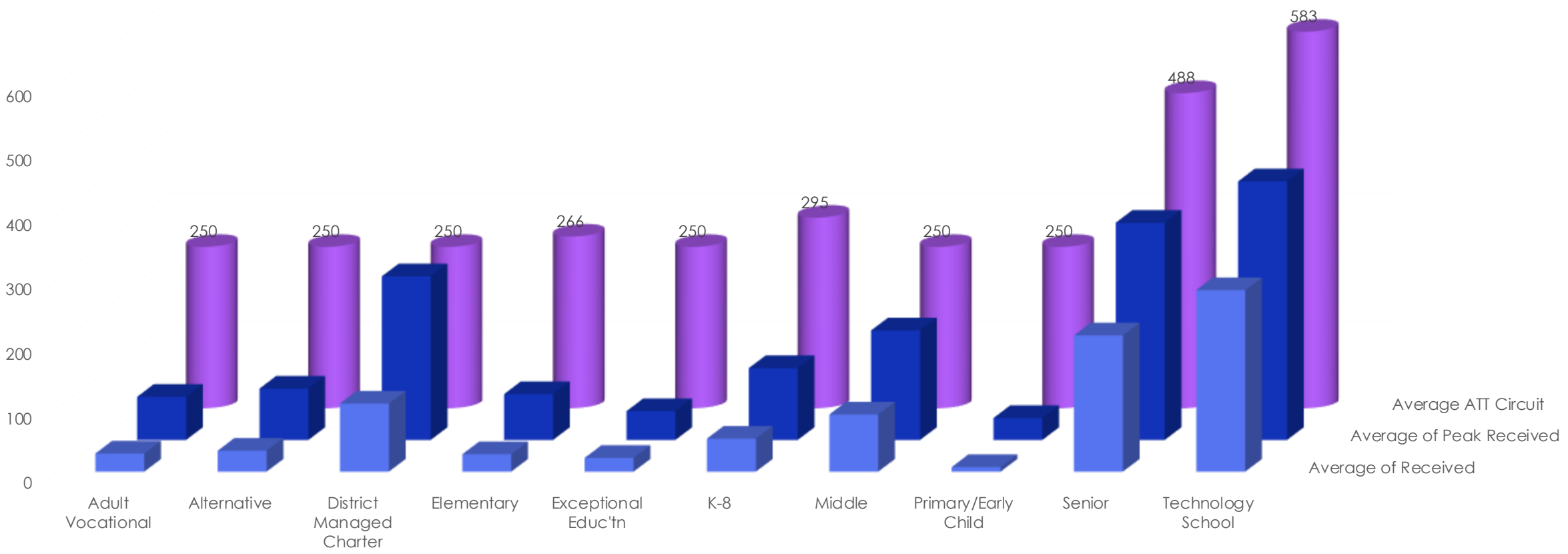
# Miami Sunset Senior High School Test



- No difference in reported user experience with traffic shaping
- Difference noted between desktop and laptop experience



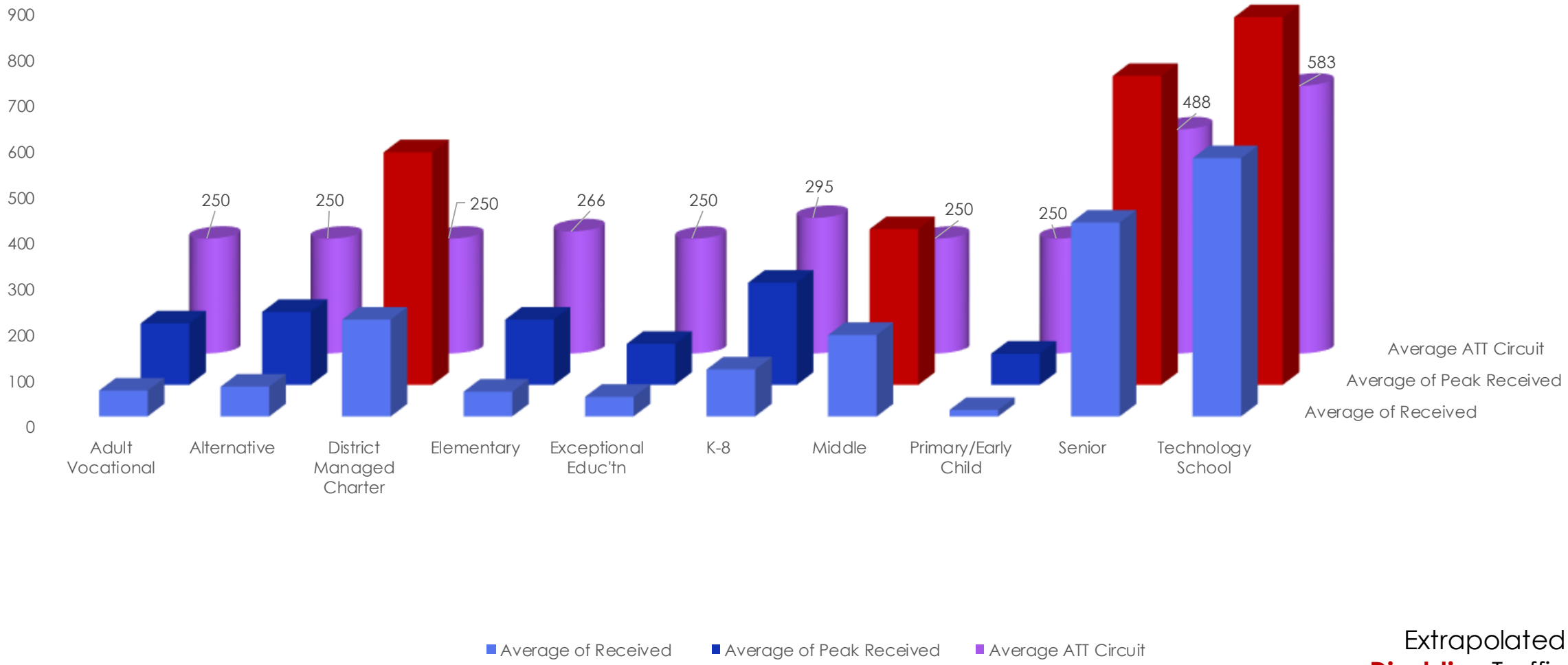
# Implications : What is the effect of relaxing traffic shaping?




Traffic *(Mbps)* on Average School Day with Traffic Shaping **Enabled**

# Implications : What is the effect of relaxing traffic shaping?






Extrapolated Effect of **Disabling** Traffic Shaping

# Miami Arts Studio Re-Test



## Laptop Observations & Re-Test Results

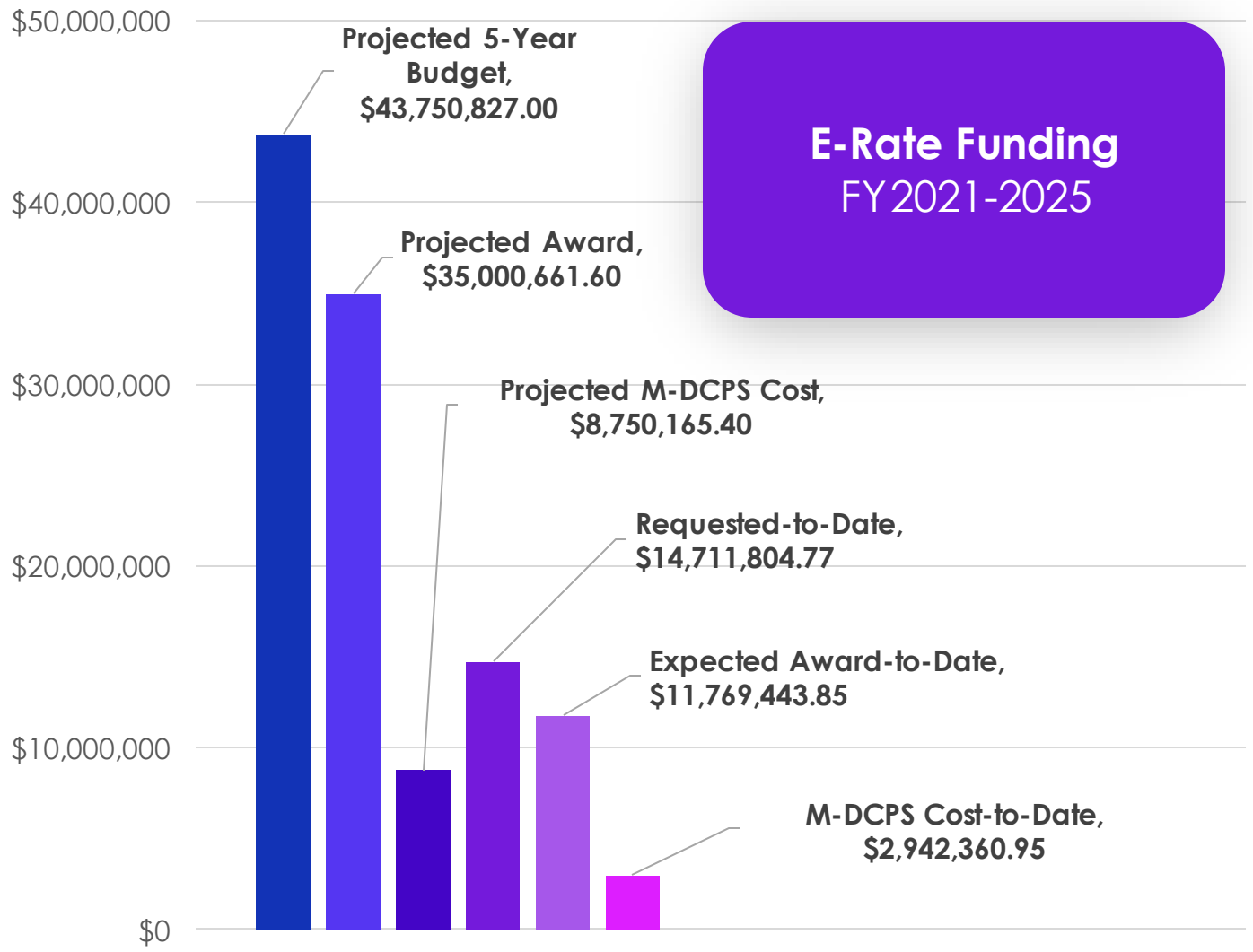
- One-to-One Deployment Model provides optimal experience
  - Students with **checked out** devices experienced no lagging or memory saturation
  - Students that logged into the devices for the **first-time** experienced lagging and memory saturation
- Startup policies will be adapted to remove non-essential apps and services

# PROJECTED COSTS

# E – Rate Program FY2021-2025


- Federal program that provides discounts for:
  - **Category I**
    - Telecommunications WAN Services
    - Internet access
  - **Category II**
    - Internal connections
      - Wiring
      - Wired/Wireless Infrastructure
      - Uninterruptable Power Systems (UPS)
- M-DCPS is currently receiving an **80% discount** on eligible equipment and services based on **FRL eligibility**.

# E – Rate Program FY2021-2025


**E-Rate Funding**
FY2021-2025

| ESTIMATED 5-YEAR RECURRING COSTS RELATED TO NETWORK INFRASTRUCTURE, CONNECTIVITY, & INSTRUCTIONAL TECHNOLOGY | |
|---|---|
| ITEM | 5 YR EXPENDITURE |
| Internet Service Provider Costs - 2x100 Gbps pipes | $1,000,000.00 |
| Equipment Costs - 200 Gbps upgrade | $6,000,000.00 |
| Infrastructure Upgrades (Wiring, Electrical, POE, etc.) | $47,688,000.00 |
| Wireless Communication | $30,000,000.00 |
| UPS | $7,000,000.00 |
| Routers | $7,000,000.00 |
| Network Infrastructure | $165,000,000.00 |
| Mobile Devices | $114,000,000.00 |
| Interactive Panels | $30,000,000.00 |
| Data Security Licensing | $50,000,000.00 |
| Telecom PBX | $17,000,000.00 |
| School Site Servers | $3,000,000.00 |
| Disaster Recovery | $2,500,000.00 |

5-Year Total: $480,188,000.00

Approximately **$96M per year**

# PROCUREMENT UPDATE

# Status of Technology Bids | Under Cone of Silence



| BID NUMBER | OPENING DATE | TITLE | STATUS |
|---|---|---|---|
| RFP-21-038-MC | 4/14/2022 | ESSER-Funded Asset Management System | OPEN SOLICITATION |
| RFP-21-013-MJ | 4/14/2022 | Cybersecurity Training Software | OPEN SOLICITATION |
| ITB-21-017-MJ | 3/31/2022 | Student Laptops | OPEN SOLICITATION |

| BID NUMBER | OPENING DATE | TITLE | STATUS |
|---|---|---|---|
| ITB-21-021-MJ | 3/15/2022 | Desktop Computers, Laptops, Servers, Monitors and Carts | PENDING EVALUATION |
| RFP-21-034-CM | 2/22/2022 | Network Security Assessment, Testing, and Consultation Services | PENDING EVALUATION |
| ITB-21-027-TM | 2/17/2022 | ESSER Funded Conference Cameras | PENDING EVALUATION |
| ITB-21-019-MV | 2/8/2022 | ESSER-Funded Promethean Panels | PENDING EVALUATION |

# Status of Technology Bids | Awarded



| BID NUMBER | OPENING DATE | TITLE | STATUS |
|---|---|---|---|
| ITB-20-068-CM | 10/19/2021 | Recycling of Computing Devices | AWARDED |
| RFP-20-038-CM | 5/18/2021 | Multi-Factor Authentication Services | AWARDED |
| ITB-18-034-DP | 1/24/2019 | IT Hardware Equipment, Accessories, Peripherals, and Support | SUPPLEMENTAL AWARD |
| ITB-19-053-DP | 7/23/2020 | Audiovisual Equipment, Supplies, and Installation Services | SUPPLEMENTAL AWARD |
| RFP-20-046-CM | 5/25/2021 | Security Information & Event Management (SIEM) | AWARDED |
| ITN-20-007-DP | 2/4/2021 | Copier Services | AWARDED |
| ITB-20-054-DP | 5/6/2021 | NetApp Equipment | AWARDED |
| ITB-20-053-DP | 5/4/2021 | Veritas NetBackup Maintenance | AWARDED |
| ITB-20-032-DP | 4/8/2021 | Microsoft Licensing | AWARDED |
| RFP-19-026-CM | 1/14/2020 | School Information System/Learning Management System | AWARDED |
| ITB-19-053-DP | 7/23/2020 | Audiovisual Equipment, Supplies, and Installation Services | AWARD CORRECTED |
| ITB-19-019-EA | 9/15/2020 | Maintenance Inspection Deficiencies Repairs and Renovations | AWARDED |

# FINANCIAL CONSIDERATIONS

# TECHNOLOGY
# Board Workshop

## Miami-Dade County
## Public Schools

TECH WORKSHOP