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Amendment to the ITS Strategic Execution Plan to Approve the IT Infrastructure to Support Learning Program

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December 12, 2023

Proposed Projects (slides 3 through 9)
As devices and online content become more and more essential to student learning and embedded in everyday life, the District's IT Infrastructure must be modernized to support this new learning paradigm

Proposed Projects (Slides 10 through 35)
1.   Network Infrastructure Modernization (BOE #134-23/24) – Slides 11-18
2.   School Network Systems Upgrade, Phase 2 (BOE # 118-23/24) – Slides 19-29
3.   Intelligent School Network Controls (BOE #135-23/24) – Slides 30-35

Recommendation (Slide 36)

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Instructional Technology Growth / A New Learning Paradigm

THE EXPERTS BELIEVE INSTRUCTIONAL TECHNOLOGY HAS THE CATALYTIC POWER TO TRANSFORM EDUCATION

U.S. Department of Education, Office of Education Technology:
Technology can be a powerful tool for transforming learning. It can help affirm and advance relationships between educators and students, reinvent our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of all learners
Link: National Education Technology Plan Update
&
Recommends building a robust technology infrastructure as a tool for equity
Link: Building Robust Infrastructure as a Tool for Equity | by Office of Ed Tech | Medium

Consortium for School Network:
Student access to robust digital tools is key to their success as 21st-century citizens.

Institute for Digital Transformation:
Identifies lack of IT infrastructure capable of enabling digital learning platforms as a top barrier to Digital Transformation

Digital Strategy in Education (institutefordigitaltransformation.org)

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STUDENTS USE LEARNING DEVICES TO ACCESS:

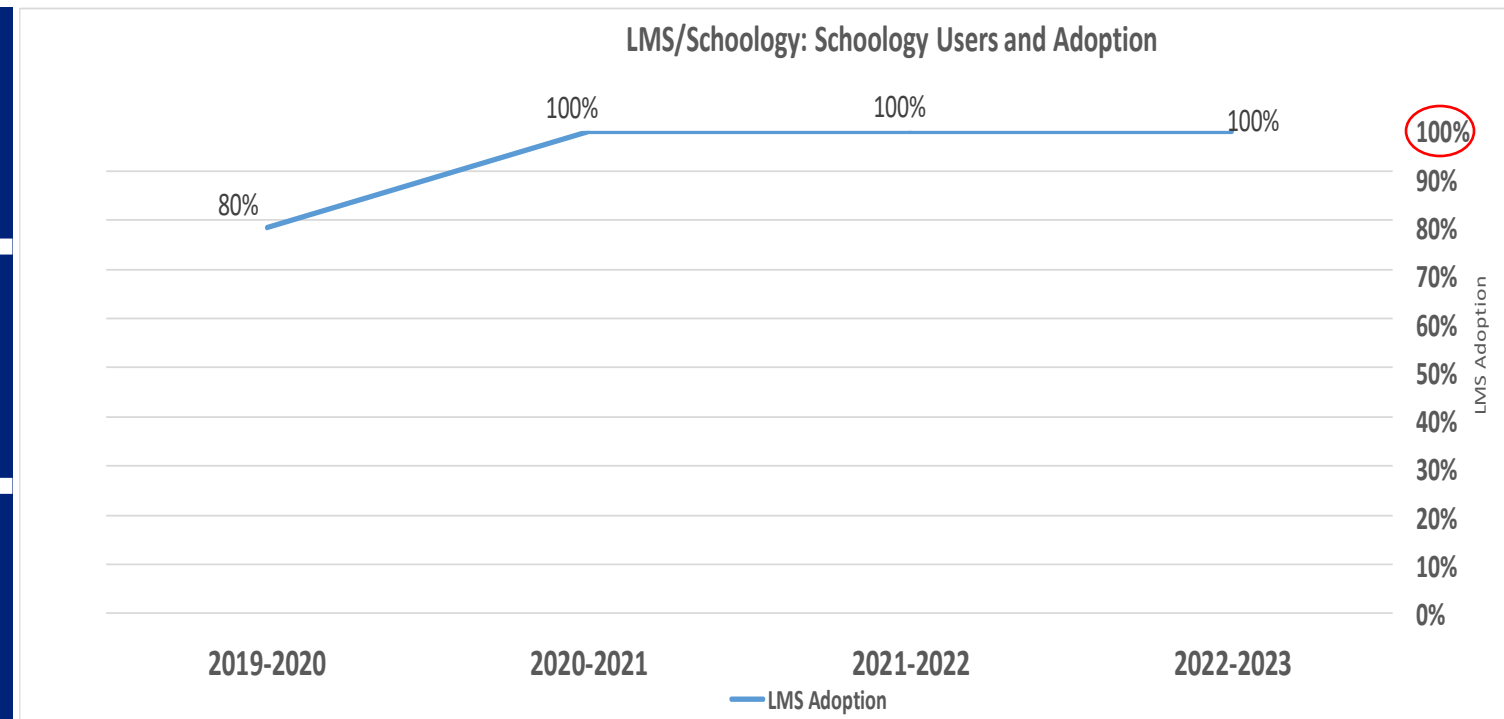|	
🖥️	Learning Management System - Schoology
📋	California Standardized Tests
✉️	Email and Collaboration Tools
💻	E-curriculum
🎓	Credit recovery and online opportunities via Edgenuity
👥	Video Conferencing

Instructional Technology Growth / A New Learning Paradigm

THE GROWTH IN ONLINE EDUCATION CONTENT: LEARNING MANAGEMENT SYSTEM (LMS) USAGE

- The LMS is a portal to student learning and engagement

- First introduced in 2016, the LMS was fully adopted by all District students by 2020-2021

- Teachers, Support staff, parents and others also utilize the LMS

LMS/Schoology: Schoology Users and Adoption

80% → 100% → 100% → 100%

2019-2020 2020-2021 2021-2022 2022-2023

LMS Adoption

Instructional Technology Growth / A New Learning Paradigm

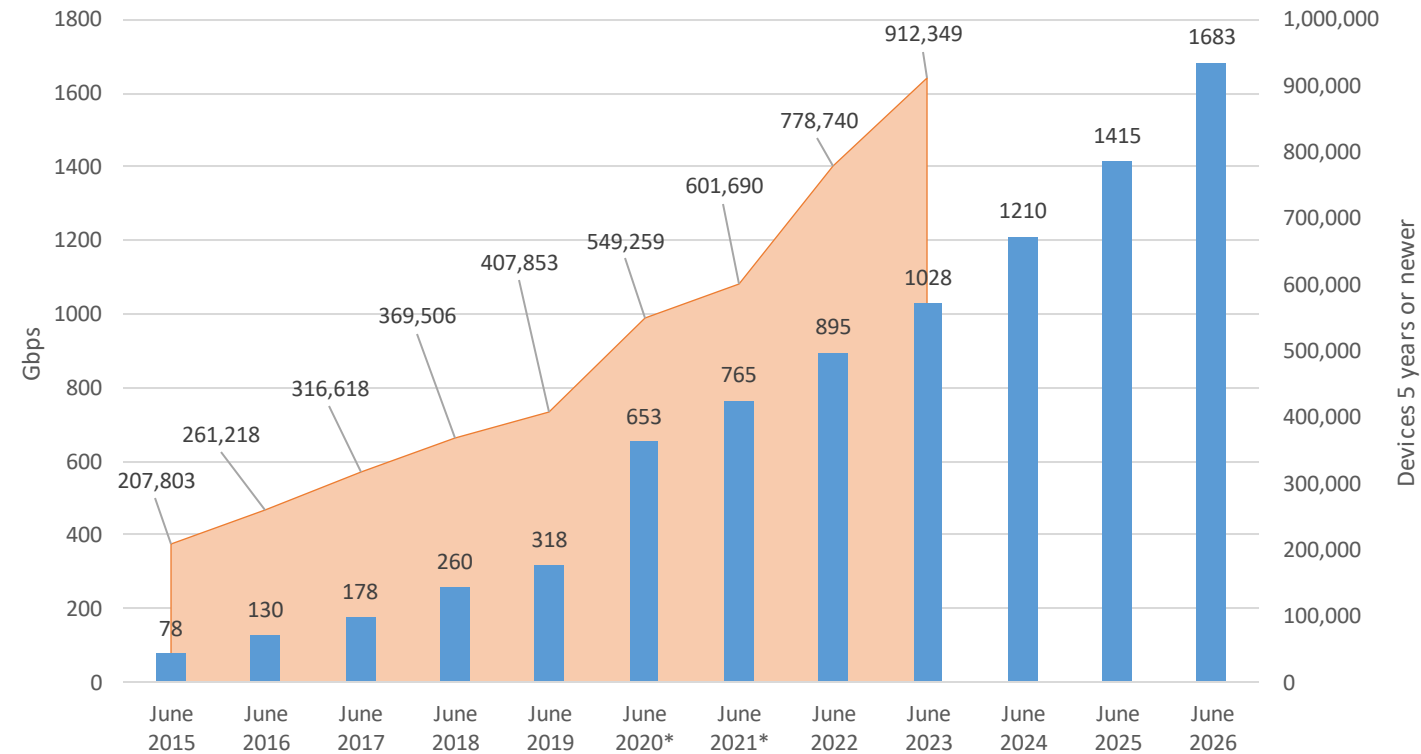## INTERNET BANDWIDTH USAGE TRENDS & CAPACITY GROWTH FORECASTS

Best practice[1] guidelines for large K-12 districts
- 10 Gbps capacity per 1,000 students
- 1.4 Mbps per student

LAUSD bandwidth
- 4X increase in school computing devices
- 400 Gbps total for 435K students + staff
- 10 Gbps max capacity at each school
- 10X growth between 2015 and 2023
- 30% average annual growth rate
- Bandwidth usage is increasing due to online testing, increased digital content, and other instructional uses.

Site Bandwidth Usage & Estimated Growth

June 2015	June 2016	June 2017	June 2018	June 2019	June 2020*	June 2021*	June 2022	June 2023	June 2024	June 2025	June 2026
78	130	178	260	318	653	765	895	1028	1210	1415	1683
207,803	261,218	316,618	369,506	407,853	549,259	601,690	778,740	912,349			

Gbps (left axis), Devices 5 years or newer (right axis)

* This data was estimated, as actual data was unavailable due to school closures

Information Technology Services

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GROWTH IN SCHOOL-SITE LEARNING AND SUPPORT TECHNOLOGIES

- **Internet of Things (IoT)** describes the network of physical objects— "things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.

- **A school site's IoT-enabled universe can include:**

  - Instructional/ Teaching Devices, such as Virtual Reality Headsets, Interactive Whiteboards, Media Streamers, etc.

  - STEAM/STEM, Robotics, E-Sports program equipment

  - Building Automation Systems (BAS), such as Lighting Management, HVAC (Heating, Ventilating, and Air Conditioning), Low Voltage (Irrigation, Power Control, etc.), Photovoltaic (Solar, Battery, Energy Management, etc.), Food Service Kiosks, CCTV, Intrusion Alarms, Master Clocks, Bells, Speakers and Phones.

Instructional Technology Growth / A New Learning Paradigm

THE GROWTH IN SCHOOL-SITE LEARNING AND SUPPORT TECHNOLOGIES

Streaming
media adapter

eSports
computers & consoles

building
automation systems

# Instructional Technology Growth / A New Learning Paradigm

The District's IT Infrastructure must be modernized to support the new learning paradigm.

PROPOSED PROJECTS

	Board Report	
1) Network Infrastructure Modernization	Board Report **134-23/24**	**Slides 11-18**
2) School Network Systems Upgrade, Ph 2	Board Report **118-23/24**	**Slides 19-29**
3) Intelligent School Network Controls	Board Report **135-23/24**	**Slides 30-35**
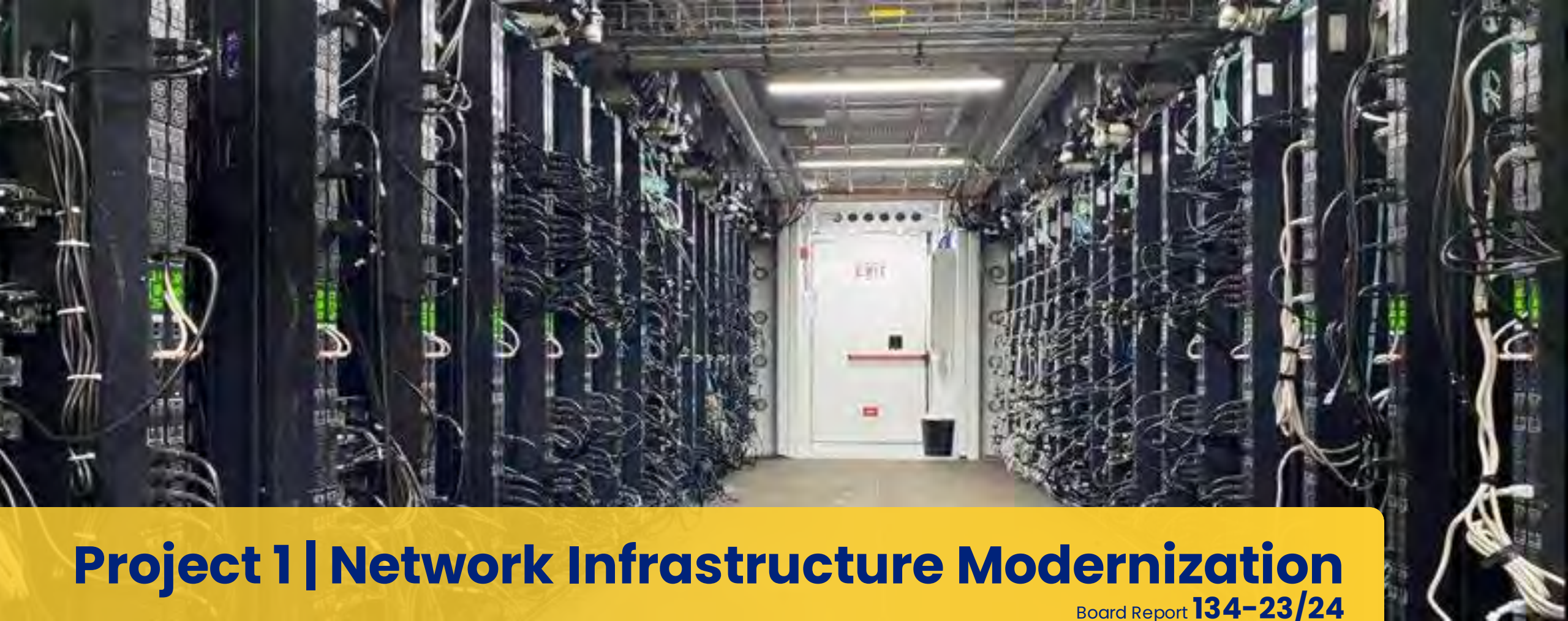
Project 1 | Network Infrastructure Modernization

Board Report **134–23/24**

1 Network Infrastructure Modernization: Outcomes & Benefits

Supports anticipated future growth of high-performance student and teacher computing devices

Delivers technology infrastructure that contributes to a safe and healthy learning environments
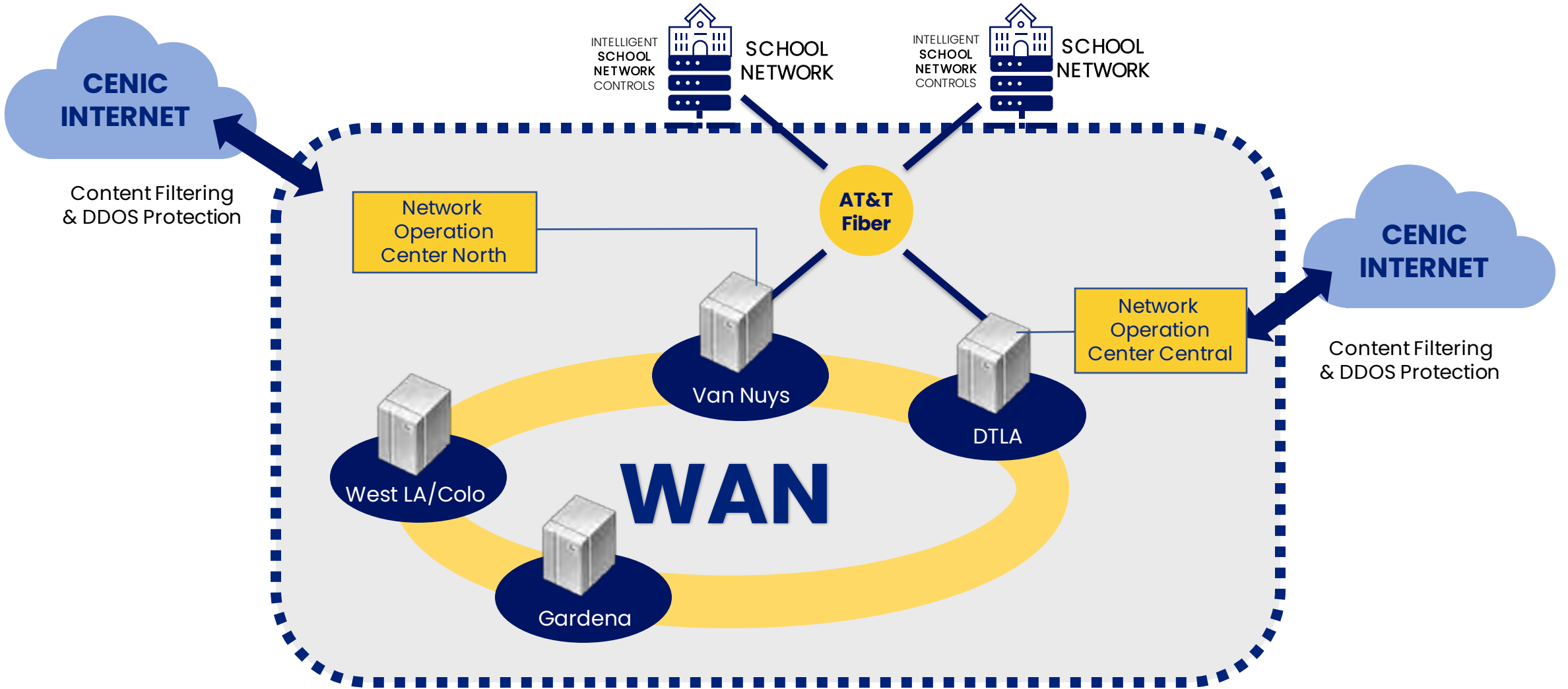
Delivers new network infrastructure equipment that will be supported by the manufacturer for the next 7-10 years

Improves space and power efficiency

Directly contributes to the achievement of the District's Goals to Eliminate Opportunity Gaps (Pillar 1: Academic Excellence), create Welcoming Learning Environments (Pillar 2: Joy and Wellness), and Modernize Infrastructure (Pillar 4: Operational Efficiency)

1 Academic Excellence
- High-Quality Instruction
- Enriching Experiences
- Eliminating Opportunity Gaps
- College and Career Readiness

2 Joy and Wellness
- Welcoming Learning Environments
- Whole-Child Well-Being
- Strong Social-Emotional Skills
- Outstanding Attendance

3 Engagement and Collaboration
- Strong Relationships
- Accessible Information
- Leading for Impact
- Honoring Perspectives

4 Operational Effectiveness
- Data-Driven Decision-Making
- Modernizing Infrastructure
- Sustainable Budgeting
- District of Choice

5 Investing in Staff
- Diverse Workforce
- Professional Learning
- Staff Wellness
- High Performance Standards

EXISTING CORE NETWORK HARDWARE IS:

- Nearing end of planned 10-year lifecycle
- Will reach End-of-Support from manufacturer starting in June 2024
  - Limited replacement parts for failed equipment
  - No security updates to patch vulnerabilities
- Operating at maximum equipment design capacity
- Cannot add capacity to meet the District's growth needs
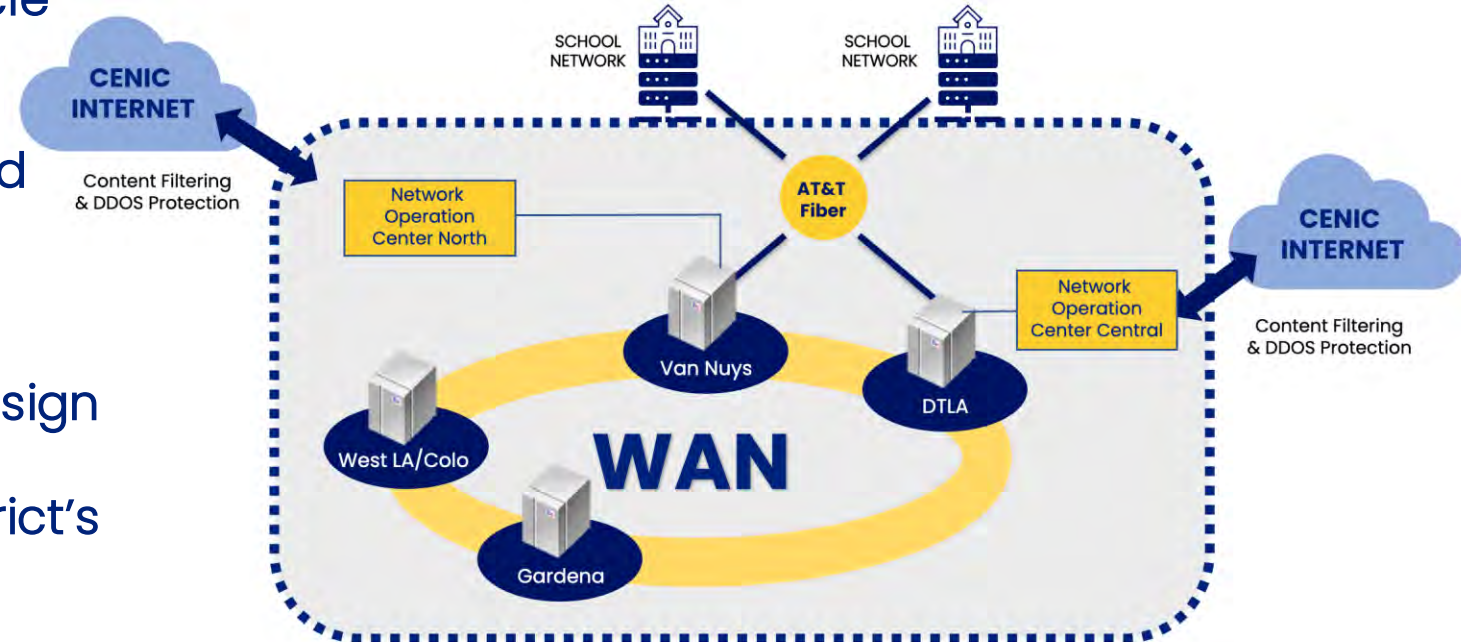
# Network Infrastructure Modernization: Scope & Approach

Phase 1 **Node Modernization**	Phase 2 **Data Center Routers & Firewall Modernization**	Phase 3 **Core Switches & WAN Routers Modernization**	**Stabilization & Closeout**
Replace wide area network (WAN) core routers and optical equipment at 4 nodes Increases capacity from 400Gbps to 1.6Tbps	Replace data center routers and switches at 2 data centers Upgrade data center firewalls at 2 data centers	Upgrade core switches at 4 nodes Upgrade WAN routers that connect to WAN service provider	Monitor & optimize performance Project closeout Update network documentation

	2023				2024				2025				2026			
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Network Infrastructure Modernization		███	███	███	███	███	███	███	███	███	███	███	███	███	███	███
Phase 1: Node Modernization		███	███	███	███	███										
Identify replacement products		███	███													
Procurement & Ordering				███	███											
Implementation & Go-Live						███										
Phase 2: Data Center Routers & Firewall Modernization							███	███	███							
Identify replacement products							███									
Procurement & Ordering								███	███							
Implementation & Go-Live										███						
Phase 3: Core Switch & WAN Router Modernization											███	███	███	███		
Identify replacement products											███					
Procurement & Ordering												███	███			
Implementation & Go-Live														███	███	
Stabilization & Closeout																███

Network Infrastructure Modernization: Project Budget
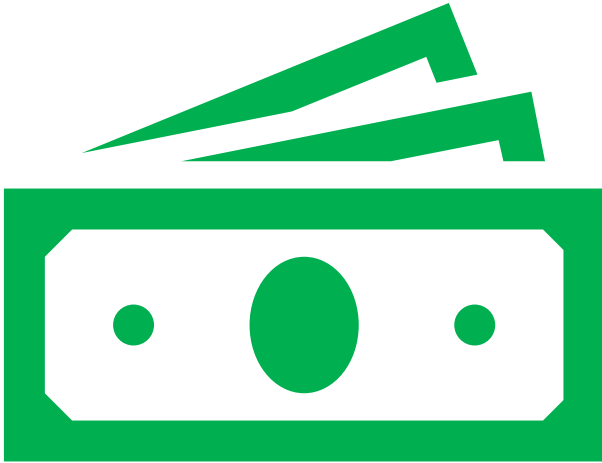
Cost Component	$12,281,000*
Hardware **	$11,569,000
Node Modernization ($3,600,000)	
WAN & Data Center Routers ($5,800,000)	
Core Switches Modernization ($2,169,000)	
Labor & Professional Services	$712,000

* Project will leverage 95% Bond Funds ($11,666,950) and 5% General Funds ($614,050)
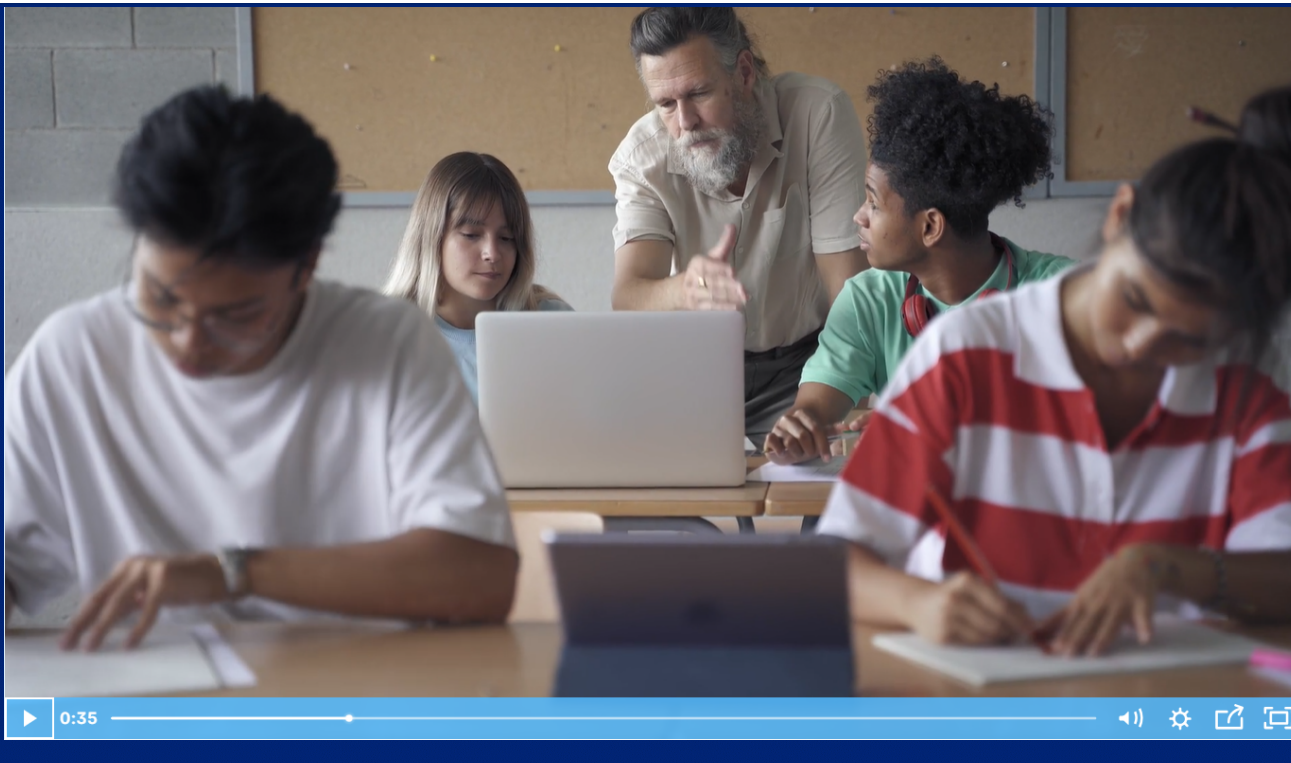** Funds may shift between phases depending upon several variables

Project 2 | School Network Systems Upgrade: Phase 2

Board Report **118-23/24**

School Network Systems Upgrades - School Feedback

"Due to the network upgrades classrooms are able to stay connected all day long."
–*Mathew Needleman* (Principal – Melrose ES)

"It's more accessible to today's technology."
-*Frances Valadez* (Principal – West Vernon ES)

"New systems reduce a lot of the [service] calls."
-*Paul Fallat II* (Complex Project Manager)

"Teachers feel more connected to the office in an emergency."
-*Yadira Andrade* (School Administrative Assistant – Bell HS)

"[New] phones are much more versatile than previous phones."
-*Andrea Kittelson* (Principal – Walgrove ES)

Video: https://lausd.wistia.com/medias/fh26c8ovtc

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Improves speeds for streaming instructional content, utilizing applications such as Zoom, and accessing / downloading i.e., digital textbook content from the District's LMS.

Improves access to online content

Develops opportunities for career exploration, work-based learning, post-secondary pathways, and employment for students.

Promotes collaboration with DACE and ITS to provide apprenticeship opportunities for high school students to obtain a technical certification to qualify for employment as an Associate IT Electronics Communication technician.

Directly contributes to the achievement of the District's Goals of provide High-Quality Instruction, Eliminate Opportunity Gaps, and developing College and Career Readiness (Pillar 1: Academic Excellence)

1 Academic Excellence

| High-Quality Instruction | Enriching Experiences | Eliminating Opportunity Gaps | College and Career Readiness |

2 Joy and Wellness

| Welcoming Learning Environments | Whole-Child Well-Being | Strong Social-Emotional Skills | Outstanding Attendance |

3 Engagement and Collaboration

| Strong Relationships | Accessible Information | Leading for Impact | Honoring Perspectives |

4 Operational Effectiveness

| Data-Driven Decision-Making | Modernizing Infrastructure | Sustainable Budgeting | District of Choice |

5 Investing in Staff

| Diverse Workforce | Professional Learning | Staff Wellness | High Performance Standards |

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2 **School Network Systems Upgrade, Phase 2: Outcomes & Benefits**

Improves safety and emergency communications throughout the schools and classrooms.

Provides a safer connection for increased security to enhance online and remote learning instruction.

Allows teachers, support staff, and administrators to connect with parents and other school stakeholders more easily and reliably.

Delivers new, reliable IT Infrastructure

Directly contributes to the achievement of the District's Goals to create Welcoming Learning Environments (Pillar 2: Joy and Wellness), build Strong Relationships (Pillar 3: Engagement & Collaboration), and Modernize Infrastructure (Pillar 4: Operational Efficiency)

1 Academic Excellence

| High-Quality Instruction | Enriching Experiences | Eliminating Opportunity Gaps | College and Career Readiness |

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Existing school network systems are:

- Beyond their planned lifecycles
  - Public address / intercommunications systems are 15-20+ years old
  - Telecommunications cabling infrastructure is 15-30+ years old
- Experiencing reliability & availability challenges

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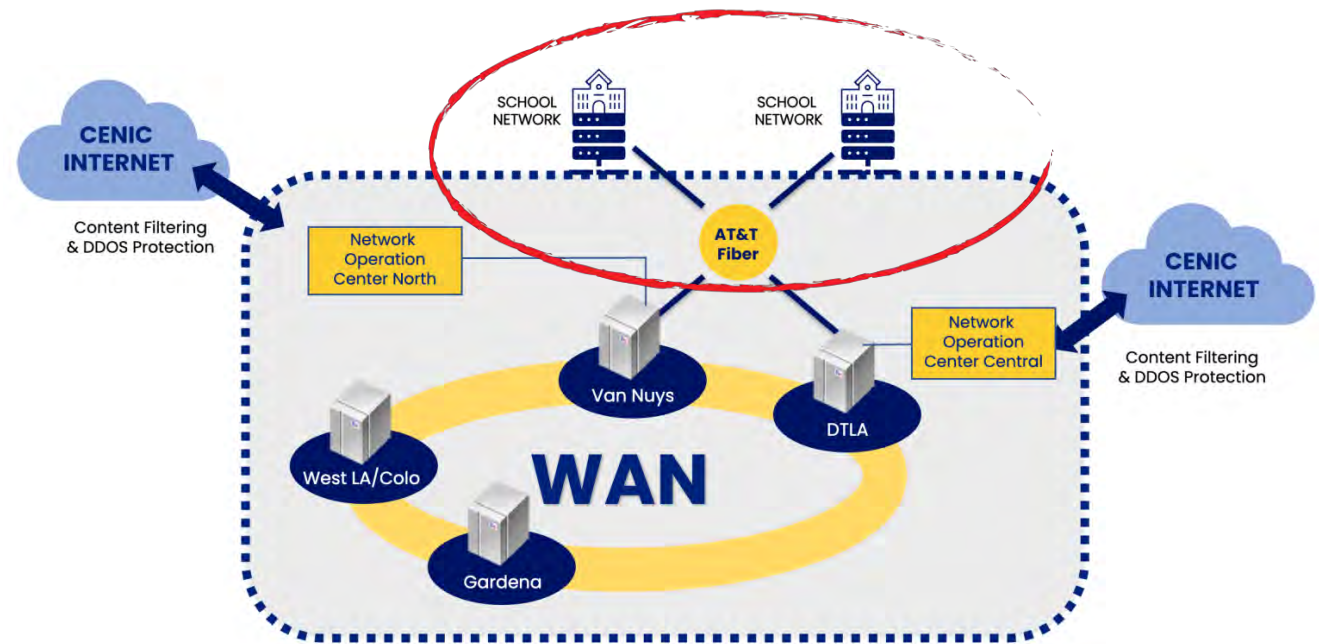
2 School Network Systems Upgrade, Phase 2: Approach

1 LAN Mod YR (2013-2015)
Measure K/R: 74 District school sites completed LAN Modernization.

2 Site Surveys (2015)
ITS conducted a two-year on-site IT infrastructure survey at all 713 schools.

3 S-A-F-E-T-I Criteria & Results (2017)
ITS Schools were assigned a score to assess their IT infrastructure conditions and were prioritized based on their level of repair need/urgency.

4 Identifying IT Upgrades (2017)
ITS developed Telecommunications Plan outlining IT upgrades needed at schools.

5 Telecommunications Modernization Projects (TMP) (2018)
362 District school sites approved to receive combination of LAN, WLAN, PA, VoIP upgrades.

6 Upgrade Review (2020)
Development of a five-year plan To upgrade all schools to a Modern state.

7 SNSU Ph 1 Project Funded (2022)
Yr. 1 (154 Sites) Projects Started.
Yr. 2 (108 Sites) :
• 21 Sites in Award
• 87 Sites Awarded in 2024.

8 Phase 2 Project Approval (2023)
TCI Survey completed in 2023 to prioritize remaining group 3, 4, & 5 (349 Sites), which will go to Board for funding approval in December 2023

9 TMP 83/WLAN 160 Completion (2024)
Completion of Phone, PA, LAN, WLAN upgrades at 83 sites and Wireless Upgrades at 160 Sites by June '24.

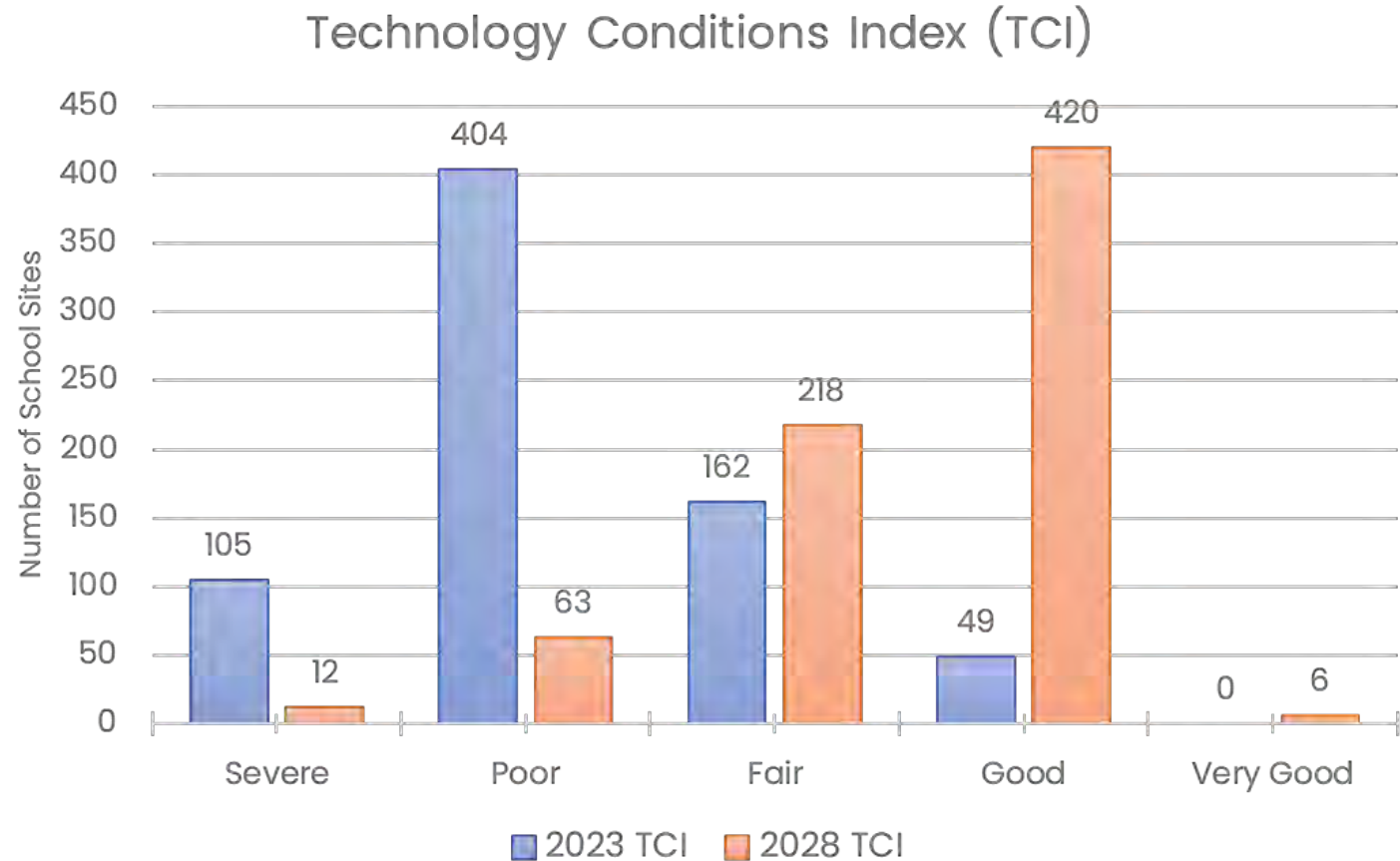**10 Next Refresh Cycle/SEP (2028)**
Approval of next Five-Year SEP to refresh LAN/WLAN for all schools including fiber optic cabling upgrades for 107 sites.

The Worst, First – Technology Conditions:

- 2023 Technology Condition Assessment data to prioritize the Phase 2 schools with the worst technology conditions based on age, system failures, and useful life.

The Distribution Ratio:

- Weighting additional factors such as the SENI Index and ISTAR data along with technology conditions are applied to the Phase 2 schools list to achieve an equitable distribution for projects across the District.
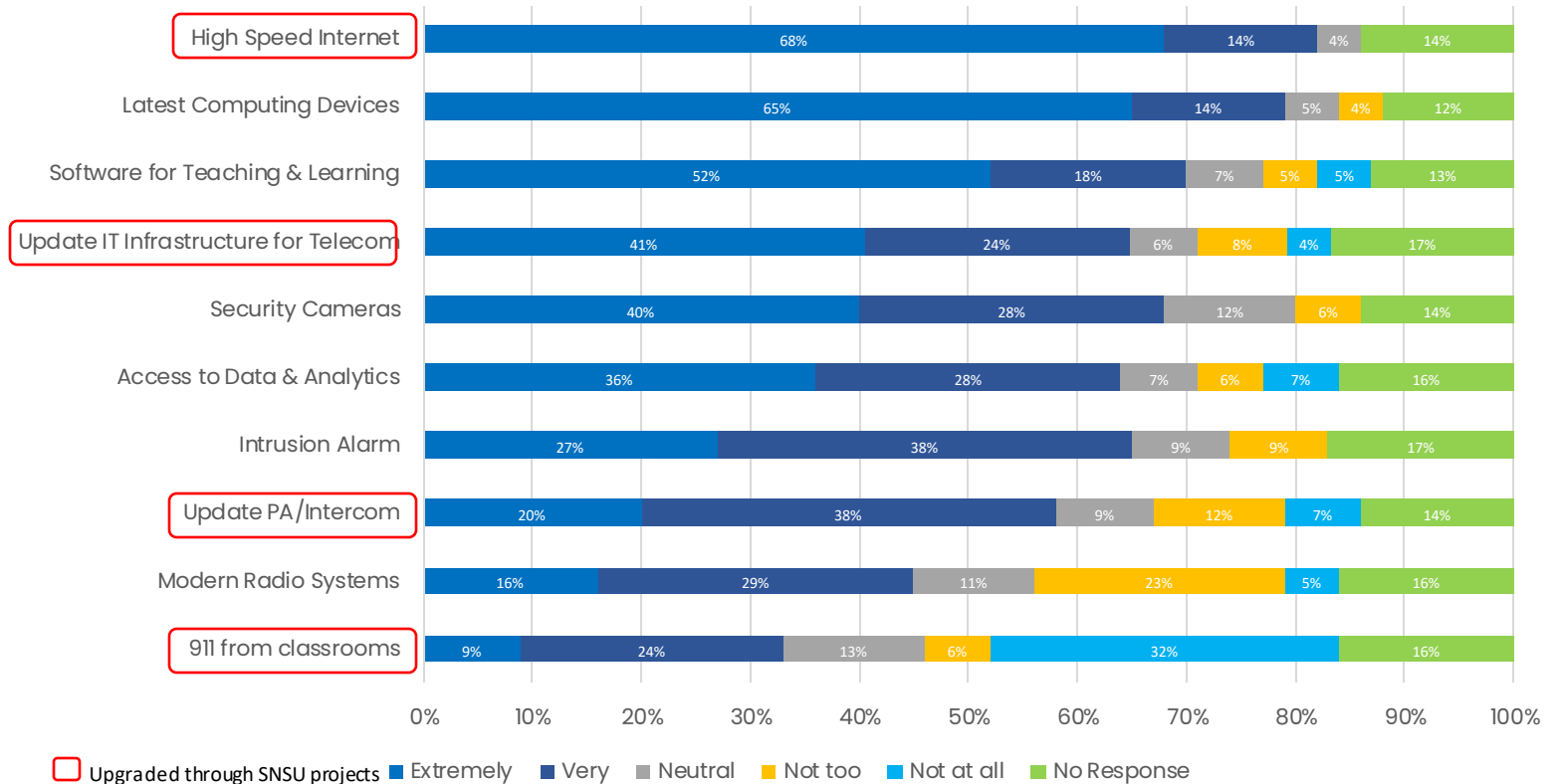
Technology Conditions Index (TCI)

TCI Category	2023 TCI	2028 TCI
Severe	105	12
Poor	404	63
Fair	162	218
Good	49	420
Very Good	0	6

Y-axis: Number of School Sites

School Leadership Feedback:

- Six (90-minute) Zoom sessions held with 54 participants to collect input through online polling tool and follow-up discussions.

- Participants included Region leadership and school administrators.

- Results prioritized "High Speed Internet" across all grade levels.

Importance of Technology Investments at Schools

Category	Extremely	Very	Neutral	Not too	Not at all	No Response
High Speed Internet	68%	14%	4%			14%
Latest Computing Devices	65%	14%	5%	4%		12%
Software for Teaching & Learning	52%	18%	7%	5%	5%	13%
Update IT Infrastructure for Telecom	41%	24%	6%	8%	4%	17%
Security Cameras	40%	28%	12%	6%		14%
Access to Data & Analytics	36%	28%	7%	6%	7%	16%
Intrusion Alarm	27%	38%	9%	9%		17%
Update PA/Intercom	20%	38%	9%	12%	7%	14%
Modern Radio Systems	16%	29%	11%	23%	5%	16%
911 from classrooms	9%	24%	13%	6%	32%	16%

☐ Upgraded through SNSU projects   ■ Extremely ■ Very ■ Neutral ■ Not too ■ Not at all ■ No Response

School Network Systems Upgrades – Completions

LAN → **WLAN** **PA** → **NEW PA** **PHONES** → **NEW PHONES**
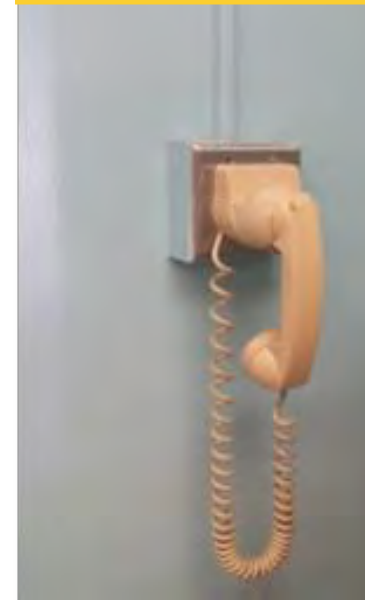
This project's scope includes surveying, planning, designing, procuring, installing, configuring, testing and acceptance of a new 10 Gigabit fiber infrastructure, LAN/WLAN, VoIP telephone system, and new integrated IP PA Intercommunications solution at the school sites.

Targeted Components	Project Output	Benefit to Students & Schools
Fiber Optic Cabling	10G fiber for **improved** capacity and bandwidth speeds	Improves access to online content and provides a safer connection for increased security to enhance online and remote learning instruction.
Local Area Network (LAN) / Wireless Local Area Network (WLAN	**Faster** internet speeds to the classroom and **modernized** backup batteries	Improves speeds for streaming instructional content, utilizing applications such as Zoom, and accessing / downloading i.e. digital textbook content from the District's LMS.
Voice-over-Internet Protocol (VoIP) Phone	**Enhanced** calling service and integration with PA system with less risk of phone outages	Allows teachers, support staff, and administrators to connect with parents and other school stakeholders more easily and reliably.
Public Address (PA)	**More reliable** and integrated PA and phone systems	Improves safety and emergency communications throughout a school and school classrooms.

Phase 2 projects:

- Pending Board approval, project will commence in Q1 2024.
  - Vendor will conduct an assessment at each school site to develop design criteria, detailed work plans, and project costs.

Phase 2 Schedule	2024				2025				2026				2027				2028			
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
School Network Systems Upgrade, Phase 2																				
Group 3 (110 Sites)																				
Assess / Design																				
Installation																				
Group 4 (106 Sites)																				
Assess / Design																				
Installation																				
Group 5 (133 Sites)																				
Assess / Design																				
Installation																				

Phase 2 projects:

Group 3 | 110 Sites

Group 4 | 106 Sites

Group 5 | 133 Sites

Phase/Year	Budget
Phase 2	$382,487,934*
Group 3	$97,184,427
Group 4	$131,628,394
Group 5	$153,675,113

* Project will leverage 100% Bond Funds

Project 3 | Intelligent School Network Controls

Board Report 135-23/24

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Frees up high-value instructional time by allowing local school staff to quickly register smart school devices on the local network without requiring lengthy ITS processing delays.

Increases the quantity and type of usable smart devices for instructional purposes on the network.

Improves network accessibility and visibility and safeguards smart school devices from data breaches.

Complies with requirements to protect student and business information through network segmentation.

Provides analysis and insight into the performance and security of smart devices to sustain continued uptime for instructional use.

Directly contributes to the achievement of the District's Goals to provide High-Quality Instruction & Eliminate Opportunity Gaps (Pillar 1: Academic Excellence), and Modernize Infrastructure (Pillar 4: Operational Efficiency)

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WHY DO SCHOOLS NEED INTELLIGENT SCHOOL NETWORK CONTROLS:
Intelligent School Network Controls allow IoT-enabled devices to quickly and securely connect to a school-site network. Without these Controls educators, students and facility managers may experience:

1. Limited number and type of smart devices capable of being used in the classroom.

2. Increased security risks due to lack of device segmentation.

3. Rejection of or delays in authorization for devices to use the network for communications.

4. Inability to compete in sanctioned eSports STEAM/STEM, and Robotics programs.

Configure

school networks to support multiple categories/types of IoT devices.

Deploy

a device profiling system to categorize IoT devices for secure connectivity.

Create

security policies to safeguard and accommodate different types of devices.

Deliver

new network services needed by modern classroom instruction.

Provide

a self-service portal to register devices that cannot be categorized.

	2023				2024				2025			
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Intelligent School Network Controls				■	■	■	■	■	■	■	■	■
Workstream 1 - Configure School Networks				■	■	■	■	■				
Workstream 2 - Develop Policies and Procedures					■	■	■					
Workstream 3 - Configure Device Registration Portal							■	■				
Workstream 4 - Deploy Device Profiling and Automation							■	■	■	■	■	
Stabilization & Closeout												■

Intelligent School Network Controls	$5,471,000*
Hardware	$1,200,000
Software	$1,842,000
Labor & Professional Services	$2,417,000
Training	$12,000

* Project will leverage 100% Bond Funds

IT Infrastructure to Support Learning: Recommendation

ITS recommends amending the ITS Strategic Execution Plan to modernize the District's IT Infrastructure to Support Learning, utilizing a little over $400M in existing bond & general funds, over the next 5 years.

Questions?