Key to Interpreting and Understanding the New Mexico Public School Facilities Authority's Broadband Deficiencies Correction Program (BDCP) per school Status Report

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Title section on first page:

New Mexico Public School Facilities Authority
Broadband Deficiencies Correction Program (BDCP)
Single School, Dependent Connection, Status Report

Possible entries include:

1) **Single School, Dependent Connection** – this is a single school facility (Elementary, Middle/Junior, Senior, or Combined) that does NOT have its own connection to the Internet, BUT rather is dependent on another school facility location to get to the internet. This is the majority of status reports generated. (Type #2 report – as seen in footer of report)

2) **Single School, Direct ISP Connection** – this is a single school facility (Elementary, Middle/Junior, Senior, or Combined) that does have its own connection to the Internet, BUT does NOT have any another school facility locations dependent on it to get to the internet. Most common examples are, but not limited to, State and District Charter schools. (Type #1 report – as seen in footer of report)

3) **Multi-School, Direct Connection via a School Facility** – this this is a single school facility (Elementary, Middle/Junior, Senior, or Combined) that does have its own connection to the Internet, AND does have one or more other school facility locations dependent on it to get to the internet. Most common examples are, but not limited to, a Senior High school in the District that has the ISP connection that all or most of the dependent schools use for internet access. (Type #3a report – as seen in footer of report)

4) **Multi-School, Direct Connection via a Non-School Facility** – this is a single non-school facility (District Admin, Data Center, ISP facility, etc.) that does have its own connection to the Internet, AND does have one or more other school facility locations dependent on it to get to the internet. Most common examples are, but not limited to, a District Administrative Office or District Data Center location that has the ISP connection that all or most of the dependent schools use for internet access. (Type #3b report – as seen in footer of report)

_____

School Information section on first page:

1)   This question/answer is referring to whether or not there are any Network monitoring tools used at this school facility today that can be leveraged in the future to facilitate a larger scale remote monitoring initiative. This is a Yes/No answer field. SELF-REPORTED

2) | Cost to add monitor capability: $0.00 | This number is related to the above question. If "Yes" no cost was added to the schools remediation estimate. If "No", then a flat rate cost (based on industry standard, commercially available and supported solutions) was added to ensure that the cost of remote monitoring capability was added to the schools remediation estimate. The flat rate cost includes both Capital and Operational aspects. (Hardware, Software, Installation, Maintenance (1yr), and FTE support)

3) | School general background internet bandwidth used in Kbps: 3004.03 | This figure is calculated by multiplying the total headcount (staff & students) at a school by a number (background "noise" in kbps per person) that was derived from a formula based on factors such as 1) Rural or Urban schools, 2) Large, Medium, Small schools (enrollment), 3) median average of network bandwidth utilization during normal, closed, and testing periods. This figure is used in other calculations in these Status Reports as a means of accounting for the constant and ever present traffic or "noise" on any network at any given time.

4) | Number of FTE supporting IT: 0.1 | For each school we asked how many FTE (full time employees) support the local IT environment. SELF-REPORTED For example (1): If there are 2 FTE in the School District supporting 10 schools then that would be 2 divided by 10 = .2 So the answer would be .2 FTE supporting this schools IT needs. For example(2): If a Teacher/Staff member at this school spends two thirds of their time in a Classroom or Office and one third of their time doing IT support then the answer would be .33

5) | % of IT-FTE network tasks: 100 % | For each school we asked how much time the FTE that support IT spend on network components and networking related tasks. SELF-REPORTED 0 to 100 %

6) | Estimated number of network devices being supported: 34 | Estimate from the Onsite Verification Survey of the number of 1: Wired and wireless network components, 2: Internet Appliances, 3: Routers/Bridges/Microwave 4: Firewalls/Filters, 5: etc.

7) | Cost analysis of Network-IT FTE support for this facility, contracted or staff, is estimated annually to be: $4,000.00 | This number is an estimate of an annual network support cost, calculated by using a ($40k fully loaded annual salary) - multiplied by – (the Number of FTE supporting IT) - multiplied by - (% of IT-FTE network tasks). Using the examples above that would be: $40,000 x 0.1 x 100% = $4,000.00 per year to support 34 network devices.

8)

Recommended IT-FTE cost based on Industry Standard number of network devices and annual support cost/device is:	$36,108.00

This figure is the recommend annual network support cost based on a commercial industry standard annual support cost per network device – multiplied by - the estimated number of network devices being supported.   Using the examples above that would be: $1062 x 34 = $36,108.00 per year to support 34 network devices.

Status of LAN/WAN Information section on second page:

1)

The maximum rated DOWNLOAD speed of the LAN/WAN connection is (in Mbps):	100

The "rated" DOWNLOAD speed of the LAN/WAN (Ethernet over fiber/copper, Microwave, Wireless Bridges, T1 lines) is the current speed on the media that is either owned by the school or leased from a service provider.   For example if the LAN/WAN media is school owned fiber then the speed in Mbps is most likely to be in the range of 100, 1000, or 10,000 Mbps (depending on distance, type of fiber, and fiber optic transceivers).   If the LAN/WAN connection is a leased media connection from a service provider then the number listed here is what is being paid for under contract. To convert this answer to Kbps, multiply the number by 1000. EX. 100 Mbps = 100,000 Kbps

2)

The rated DOWNLOAD speed, per headcount, is estimated to be:	31.54 Kbps/headcount

This number is the result of the following formula:
Rated speed - background bandwidth / expected students + staff (FTE) = Purchased Kbps/headcount

Formula explained: the *Rated speed* is described just above, the *background bandwidth* is described on page 4 of this document and shown on page 1 of each Status Report, *expected students + staff (FTE)* are numbers provided by the state and/or SELF-REPORTED and are shown on page 1 of the Status Report.

3)

The maximum rated UPLOAD speed of the Broadband connection is (in Mbps):	100
The rated UPLOAD speed, per headcount, is estimated to be:	31.54 Kbps/headcount

The "rated" UPLOAD speed explanation and formula calculation are the same as used in the "rated" DOWNLOAD section above.   The difference between in speed between UPLOAD and DOWNLOAD is primarily based on the technology used. For example, DSL, Cable, and Satellite are commonly an Asynchronous technology meaning different speeds in different directions. On the other hand, Ethernet (over fiber or copper or wireless) tends to be a Synchronous technology meaning same speeds in both directions.

The above examples shows that based on current LAN/WAN speed of 100 Mbps (converted to Kbps) minus the calculated general background usage, then divided by the total number users

(students + staff) gives us an estimate that each user can concurrently use 31.54 Kbps of network bandwidth, which is below the recommended minimum standard of 100 Kbps/user.

The average measured DOWNLOAD speed from ISP is (in Mbps):	57.01
The measured DOWNLOAD speed, per headcount, is estimated to be:	43.06 Kbps/headcount
The average measured UPLOAD speed from the ISP is (in Mbps):	68.69
The measured UPLOAD speed, per headcount, is estimated to be:	51.88 Kbps/headcount

4) The "average measured" speeds (up and down) are the median average of multiple speed tests taken during the Onsite Verification Surveys. The formulas to determine the Kbps/headcount is slightly different as shown here:

Measured speed / expected students + staff (FTE) = Measured Kbps/headcount

The main difference is we do not subtract the general background usage number because the speed tests were taken on live networks with background traffic of some degree on it already.

	Transport Media $		ISP Service $
	Capital Costs	Operational Costs	
The cost to improve the LAN/WAN connection annually to 100 Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the LAN/WAN connection annually to 300Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the LAN/WAN connection annually to 600Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the LAN/WAN connection annually to 1,000Kbps/headcount is:	$0.00	$0.00	$0.00

5) This chart is used to show an estimated cost to improve the current LAN/WAN connection/service to meet the thresholds of 100 Kbps/headcount up to 1,000 Kbps/headcount. Different LAN/WAN technology solutions can have vastly different costs and some LAN/WAN technologies have limitations with regard to maximum achievable speeds, distances, environmental conditions/obstructions, and others.

Status of Broadband Information section on second page:

1)

The maximum rated DOWNLOAD speed of the Broadband connection is (in Mbps):	20

The "rated" DOWNLOAD speed of the Broadband connection is the current speed on the media that is being provided from an Internet Service Provider.   The number listed here is what is being paid for under contract. To convert this answer to Kbps, multiply the number by 1000. EX. 100 Mbps = 100,000 Kbps

2)

The rated DOWNLOAD speed, per headcount, is estimated to be:	69.06 Kbps/headcount

This number is the result of the following formula:

Rated speed - background bandwidth / expected students + staff (FTE) = Purchased Kbps/headcount

Formula explained: the _Rated speed_ is described just above, the _background bandwidth_ is described on page 4 of this document and shown on page 1 of each Status Report, _expected students + staff (FTE)_ are numbers provided by the state and/or SELF-REPORTED and are shown on page 1 of the Status Report.

3)

The maximum rated UPLOAD speed of the Broadband connection is (in Mbps):	20
The rated UPLOAD speed, per headcount, is estimated to be:	69.06 Kbps/headcount

The "rated" UPLOAD speed explanation and formula calculation are the same as used in the "rated" DOWNLOAD section above.   The difference between in speed between UPLOAD and DOWNLOAD is primarily based on the technology used. For example, DSL, Cable, and Satellite are commonly an Asynchronous technology meaning different speeds in different directions. On the other hand, Ethernet (over fiber or copper or wireless) tends to be a Synchronous technology meaning same speeds in both directions.

The above examples shows that based on current Broadband speed of 20 Mbps (converted to Kbps) minus the calculated general background usage, then divided by the total number users (students + staff) gives us an estimate that each user can concurrently use 69.06 Kbps of network bandwidth, which is below the recommended minimum standard of 100 Kbps/user.

4)

The average measured DOWNLOAD speed from ISP is (in Mbps):	18.17
The measured DOWNLOAD speed, per headcount, is estimated to be:	83.75 Kbps/headcount
The average measured UPLOAD speed from the ISP is (in Mbps):	19.48
The measured UPLOAD speed, per headcount, is estimated to be:	89.75 Kbps/headcount

The "average measured" speeds (up and down) are the median average of multiple speed tests taken during the Onsite Verification Surveys. The formulas to determine the Kbps/headcount is slightly different as shown here:

Measured speed / expected students + staff (FTE) = Measured Kbps/headcount

The main difference is we do not subtract the general background usage number because the speed tests were taken on live networks with background traffic of some degree on it already.

	Transport Media $		ISP Service $
	Capital Cost	Operational Cost	
The cost to improve the Broadband connection annually to 100 Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the Broadband connection annually to 300Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the Broadband connection annually to 600Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the Broadband connection annually to 1,000Kbps/headcount is:	$0.00	$0.00	$0.00

5) This chart is used to show an estimated cost to improve the current BROADBAND connection/service to meet the thresholds of 100 Kbps/headcount up to 1,000 Kbps/headcount. Different BROADBAND technology solutions can have vastly different costs and some BROADBAND technologies have limitations with regard to maximum achievable speeds, distances, environmental conditions/obstructions, and others.

Distribution Equipment Information section on third page:

1)
The maximum rated speed (Ethernet) of this equipment is (in Mbps):	1000

The "rated" speed of the Distribution Equipment is the current measured speed, in Mbps, thru the Distribution Equipment (i.e. Firewalls, Internet appliances, WEB cache, Web Filters, etc.) that reside between the local school owned LAN equipment and the WAN equipment (school or provider owned hardware that brings outside connectivity into the school).

Other possible answers seen here are:
"No REQUIRED DE equipment exists" - This answer indicates that no distribution equipment was found during the assessment AND based on current network industry standards there should be to provide a security layer between the school and the WAN.
"No DE equipment Required" - This answer indicates that no distribution equipment was found during the assessment AND based on current network industry standards there is no need to provide any as this LAN/WAN connection is privately owned and supported by the school district.

2)

The percent probability this equipment WILL NOT perform another 3-5 years:	80 %

The formula for this number is: The age of the DE equipment - divided by - average life cycle equipment replacement age (5) = the answer in a % format.

> Example 1)   4 year old equipment / 5 = 80% probability this equipment will <u>not</u> be functional in 3-5 years.
> Example 2)   7 year old equipment / 5 = 140% probability this equipment will <u>not</u> be functional in 3-5 years.

Any % number over 80% currently is recommended to be refreshed with new equipment based on State of NM and industry standards.

3)

The cost to improve the throughput speed to 1,000Kbps/headcount is:	$31,762.60

The $0.00 cost either represents no DE equipment is required OR the existing DE equipment does not need refreshing. Any other cost is an estimate of a DE hardware/software solution that includes installation, maintenance, and FTE operational cost.

Status of Wired Infrastructure section on forth page:

Existing School Network Switch Equipment for LAN

1)

The cost to improve/sustain throughput speed to support 1,000Kbps/headcount is:	$49,639.82

This cost is the estimated cost to add additional and/or refresh the core and edge switch environments. This cost can include the following:

> Switch hardware, racks, patch panels, UPS, patch cables, fiber transceivers, etc.
> Installation, annual maintenance, and FTE operational cost.

2)

The cost to improve facility MDF/IDF's to standard network environment is:	$0.00

This cost is the estimated cost to build new or improve existing MDF/IDF locations to a networking/telecommunication industry standard level.   This cost can include the following:

> Building construction, HVAC for cooling, Security, expenses to relocate storage, etc.

Existing School Network LAN Cabling

1)

The percentage of cabling installed prior to the CAT 5e/6 standard in 2002?	0.00 %

This is the <u>SELF-REPORTED</u> estimate of old, pre-CAT 5e/6, wiring in each school building. Pre-CAT 5e/6 cabling does not support gigabit speeds and is recommended to be replaced.

2)

The cost to improve cable throughput speed to support 1,000 Kbps/headcount is:	$0.00

This estimated cost is a construction cost based on Gross square footage of the school - multiplied by - the % of old cabling (see above) – multiplied by - a per square foot cabling cost.

Status of Wireless Infrastructure section on forth page:

1)

The current approximate percentage of educational coverage is:	0 %

This is the SELF-REPORTED estimate of wireless coverage in the school building.

2)

The # of additional AP's to meet 1 AP per classroom:	31

This is the estimated number of new additional Access Point's needed to achieve 1 AP in each General Classroom and Specialty Classroom and 2 AP's in each Large Event Room (auditorium, cafeteria, library, gym, etc.)

3)

The cost to improve wireless to meet 1 AP per classroom:	$74,567.81

This cost is the estimated cost to add additional AP's to the school network. This cost can include the following:

> Wireless AP Controller, Access Points, 1 new CAT 6 cable run per AP to nearest MDF/IDF. Installation, annual maintenance, and FTE operational cost.

Summary of Costs to Improve section on fifth page:

1)

	Total Cost	Capital Cost	Operational Cost
The cost to improve the LAN/WAN Transport Media annually to 1000Kbps/headcount is:	$0.00	$0.00	$0.00
The cost to improve the LAN/WAN Service annually to 1000Kbps/headcount is:	$0.00	$0.00	

This is the estimated cost to improve the Broadband or LAN/WAN throughput to 1000 kbps per person based on the ISP service model.

	Total Cost	Capital Cost	Operational Cost
The cost to improve the Distribution Equipment:	$31,762.60	$24,149.00	$7,613.60
The cost to improve/sustain the Wired Network:	$49,639.82	$36,459.02	$13,180.80
The cost to improve facility MDF/IDF's environment:	$0.00	$0.00	
The cost to improve cabling infrastructure:	$0.00	$0.00	$0.00
The cost to improve/sustain the Wireless network:	$74,567.81	$58,874.81	$15,693.00
The cost to add monitor capability:	$0.00	$0.00	$0.00
Totals:	$155,970.23	$119,482.83	$36,487.40

2) Summary of all the assessment costs. Capital costs include hardware/software, construction, cabling and installation. Operational Costs include annual maintenance, warranty and annual industry standard FTE support cost.