VIRGINIA IT AGENCY

Network Infrastructure Report

Virginia Information Technologies Agency

vita.virginia.gov

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INTRODUCTION

BACKGROUND

This report is VITA's first on the Commonwealth's network infrastructure, pursuant to Item 90(F) of the 2021 Appropriation Act, which provides:

> *The Virginia Information Technologies Agency shall provide a network infrastructure report to the House Appropriations Committee, Senate Finance and Appropriations Committee, and Joint Legislative Audit and Review Commission by November 1 of each year. The report shall indicate whether the Commonwealth's network infrastructure is adequate to meet the needs of state agencies, and if not, identify any needed upgrades. For each network infrastructure upgrade identified, the report shall specify the estimated cost and whether the upgrade is to the portion of the network maintained by the Virginia Information Technologies Agency or another state agency.*

VITA thanks policymakers for this opportunity to report on this subject of utmost importance.

SUMMARY

VITA provides information technology (IT) infrastructure services to the Commonwealth's 65 executive branch state agencies and the workforce of over 55,000 state employees, equipping and empowering the agency's colleagues to serve Virginia's 8.6 million residents. Network services are a critical and highly visible part of those IT infrastructure services, foundational for almost all government interactions with Virginians. If the network is congested or experiences an outage, members of the public may not be able to register to vote, renew their driver's license, obtain health and other social services, or communicate with government officials.

Technological and societal advances have only heightened the importance of a capable and modernized network. Cloud-based IT services offer tremendous scalability and reliability benefits, but network traffic must flow constantly and at an adequate rate to use those services. The pandemic has spurred the rapid development of remote work and of videoconferencing and other electronic interactions, but none of that is possible if the network is down.

Over time, the Commonwealth's network has accumulated a substantial amount of "technology debt," as equipment aged, the network architecture fell behind industry standards and best practices, and roll out of new and upgraded services struggled to reach completion.

VITA's transition to the multisupplier model has enabled great progress, but additional investments and resources are needed for the Commonwealth's network to fully meet the needs of state agencies and citizens.

This report recounts the progress and challenges since the transition to the multisupplier model, describes the complexity involved and both the current and future state of network troubleshooting, and also details the additional work and investment needed to achieve the network capacity, performance, and reliability that will enable the future success of state agencies and everyone that state government serves.

RECENT NETWORK IMPROVEMENT

The multisupplier model has enabled and accelerated substantial progress on the Commonwealth's network.

EQUIPMENT MODERNIZATION

Modernizing individual pieces of network equipment has been one of the first key priorities for the primary network services supplier, Verizon. The project, which includes replacing 1,500 network outdated pieces of equipment with modernized devices, is 99% complete as of October 2021. Equipment modernization improves network security and management capabilities.

DATA CENTER AND CLOUD MIGRATION

VITA, its customer agencies, and the data center services supplier, Unisys, have partnered closely on one of the largest Commonwealth technology projects ever undertaken – moving out of the state's primary data center in Chester (known as the Commonwealth Enterprise Solutions Center, or CESC) to the modern QTS data center in Henrico. This project has entailed moving approximately 1,800 servers and is also virtually complete. The data center move has operated hand-in-glove with one of Governor Northam's first technology policy initiatives – Executive Order 19 on cloud migration. Server moves have largely been able to be accomplished through virtualization and connecting the Commonwealth's applications with cloud services. The Commonwealth uses multiple public clouds (including Oracle Cloud Infrastructure, AWS, and Azure) and private cloud infrastructure. Every stakeholder and team member involved in this project should take pride in its imminent successful conclusion.

QUICK RESPONSES TO EVENTS

The past couple of years have shown that no network is impervious to external events. The pandemic, of course, required quick adaptation, rapidly scaling up the Commonwealth's remote networking capability (virtual private networking, or VPN), help desk support, and network services. Beyond that, more everyday challenges have required quick action. Commonwealth services have been impacted several times by a common infrastructure problem: construction-related damage to network circuits (also known as fiber cuts). When such circumstances arise, VITA works with the network services supplier, Verizon, to ensure that resolution and recovery occur as rapidly as possible. VITA has expanded circuit capacity and redundancy in response to particular events and tested capabilities to re-route network traffic. More fundamentally, the Commonwealth's network architecture is transforming to be more resilient. Additional details on that transformation and investments needed for a more resilient network are provided below.

NEW ARCHITECTURE AND RELATED SERVICES

From remote access to network architecture, the Commonwealth's network has been based on long-standing technology that has become increasingly far from industry standards and best practices. VITA has taken critical steps to remedy this over the past two years, rolling out new network services that better meet the need of a modernized, ever-changing, and technologically-

driven society. These services will bring the Commonwealth's network up-to-date and, if fully implemented, dramatically improve network capacity, performance, and reliability.

Secure Access Service Edge (SASE)

SASE technology provides unified zero trust, cloud-based secure access, enabling Commonwealth agencies to seamlessly connect and secure any user, device or application. It is the modernized successor to traditional virtual private network (VPN) technology for remote access and also improves intrusion prevention, anti-malware intelligence, threat sandboxing, URL filtering, and next-generation firewall capabilities. Remote work is now common and, to some degree, a permanent fixture in working environments moving forward. SASE, which agencies have been using since 2020, modernizes and secures network access across Virginia's distributed and varied working environment.

Software Defined Wide Area Networking (SD-WAN)

Managed SD-WAN enables the seamless connection of multiple networking technologies (such as traditional Ethernet network circuits and broadband networks). Redundant network paths are a key piece of network resiliency, and SD-WAN provides the traffic management to make use of more than one network path. SD-WAN also enables adaptive policies for intelligent traffic routing that takes into account performance, security requirements, and dynamic real-time network conditions and utilizes low-cost connections for non-mission-critical applications. In less technical speak, SD-WAN enables control of network data flow and prioritization levels for applications, which can improve both performance and efficiency by managing the use of higher-cost dedicated network circuits and lower-cost broadband connections. For example, applications that have a greater network performance range tolerance, such as email, may be routed over a broadband Internet connection, avoiding impacts on applications that must flow over the mission-critical dedicated network circuit. With SD-WAN, data keeps flowing for all users and applications, with better reporting and management. When fiber cuts or other network disruptions happen in the future, SD-WAN (combined with network and power infrastructure redundancy) can ensure that agencies continue to function by adapting network traffic flow.

SD-WAN is implemented and available for agencies to order in the VITA service catalog. Funding to-date has been to develop, roll out, and pilot SD-WAN. Additional investment is needed to implement SD-WAN for all agencies.

Wireless Wide Area Network Access (WWA)

Wireless wide area network access (WWA), also known as Wireless WAN access, provides flexible, reliable connectivity and security control, in combination with other gateway and network management offerings, for agencies that require flexible location service using cellular wireless broadband. WWA's speed of implementation advantage over a wired circuit also makes it a potential interim option. WWA is implemented and available for agencies to order in the VITA service catalog.

Dense Wave Division Multiplexing (DWDM)

DWDM is a next-generation fiber networking technology that brings dramatic improvements to the core of the Commonwealth's network. DWDM replaces older synchronous optical networking (SONET) technology. DWDM's resiliency will add to protection against further outages in the

future. DWDM speeds circuit activation. And DWDM offers significantly increased bandwidth. VITA is working now to implement DWDM within the next few months.

Unified and Enhanced Network and Application Performance Monitoring

As discussed below, excellent network troubleshooting capabilities are critical to identify the cause of network performance issues. VITA, suppliers, and agencies have worked hard and spent much time troubleshooting, with some success, but the team has not had the modern tools necessary to cut through the complexity and shine light on root causes. VITA has piloted and is working to roll out new monitoring solutions that will fill this gap. Those solutions, which are not named here for security reasons, will collect data from multiple vendors to provide comprehensive network visibility, including traffic analysis, network and application performance monitoring, cloud monitoring, end-user experience monitoring, cause analysis, and capacity planning and reporting. The Commonwealth's network will take a significant step forward thanks to the new ability to see the overall picture and perform a complete, end-to-end analysis. Investment is needed to complete this rollout.

FUTURE SERVICES

VITA and the infrastructure suppliers intend to continue rolling out new services that will provide meaningful benefits to customers, improving security, performance, and user experiences. Two upcoming examples are discussed below.

The first is microsegmentation of the enterprise and support for a zero trust framework architecture. Traditional, perimeter-based security is increasingly inadequate to monitor and manage risk in a world that features extensive remote access and cloud-based services. The zero trust framework changes how enterprises secure their environments from securing a perimeter to enforcing the identity of each connection, user, and asset throughout the network to prevent breaches. Zero trust tools and services provide capabilities to baseline normal behavior and automate prevention measures when deviations are seen. Implementation of microsegmentation and zero trust will bring best practices in security and architecture to the Commonwealth's network.

Second, VITA is working to implement and rollout cloud-based virtual desktop services, providing a secure work environment wherever workers are and bringing device flexibility and management benefits to agencies.

NETWORK TROUBLESHOOTING

Anyone who has ever tried to figure out why their home Internet connection is slow has had a taste of the complexity of network troubleshooting. How capable and how busy is your computer's hardware (CPU, memory, and hard drive)? How much is your computer being slowed by the various software running on it? How strong and how congested is the WiFi leading to your Internet router? How is the traffic from your home impacted by the other users (residents) around you? How far must your traffic travel, and how robust are the networks over which it flows to reach the destination site or service? Is that site or service – or an intermediary you may not even know is involved – experiencing problems? How much are these various conditions changing minute to minute, hour to hour, and day to day?

At the Commonwealth too, network troubleshooting is a multi-faceted inquiry that necessarily involves customer agencies, VITA, and suppliers to gather and analyze performance data, identify causes, and determine what changes can resolve network issues.

VITA has heard our customers' experiences with network issues. Over the past year, knowledgeable personnel from VITA and suppliers have been fully engaged and employing a "tiger team" approach to troubleshooting. That team has met with customers to see and hear about their experiences first-hand and has taken a number of steps to reduce and resolve issues, examples of which are discussed here.

ENDPOINT SECURITY SOFTWARE REPLACEMENT

VITA and suppliers have identified older, inefficient endpoint security software (from McAfee) installed on PCs throughout the enterprise as a contributing factor to performance problems. A new solution has been identified that will continue to meet the need for host intrusion protection, firewall, and antivirus security, while improving such security services through artificial intelligence enabled solutions. More pertinent to this network report, however, the new solution will deliver that improved security with substantially better performance. Pilot deployments show that the significantly decreased impact of endpoint security software improves the user experience. VITA is moving forward with deploying the new solution enterprise-wide in a phased approach by agency and removing the old McAfee solution at the same time.

IMPROVED NETWORK AND SOFTWARE SETTINGS

VITA and suppliers have identified network and software settings that may contribute to network latency and changed those settings to improve network performance. Specifically, software update distribution has been adjusted to minimize impacts, and network security settings have been tweaked to facilitate videoconferencing through the approved enterprise videoconferencing services.

APPLICATION SETTINGS

The pilot of unified and enhanced network monitoring tools (described above) illustrated how applications may contribute to network issues. Working with one customer agency, which had long reported periodic network latency, VITA and suppliers were able to use the monitoring tools to identify problems with traffic for a key application in wide use at that agency. This enabled the

agency to better understand network issues that had long been a frustrating mystery and to address those issues more effectively by addressing a cause at the application level.

THE FUTURE OF NETWORK ANALYSIS AND TROUBLESHOOTING

With the unified and enhanced network and application monitoring services described above, the legacy tiger team approach will be less necessary and the process of diagnosing and resolving network problems will be more efficient and effective. Just like traffic analysis is a necessary part of analyzing congestion on roads and determining appropriate transportation solutions, network and application monitoring tools and analysis are needed to analyze IT performance issues and ensure adequate infrastructure.

UPGRADES AND ASSOCIATED INVESTMENTS NEEDED

Although much has been accomplished, more remains to be done. The following improvements and associated investments are needed to ensure that the Commonwealth has a modern and robust network that facilitates agencies' work and citizens' interactions with their government.

COMPLETING DEPLOYMENT OF NEW SERVICES

Services described above will improve the reliability and performance of the Commonwealth's network. Funding secured to date for these services has enabled their development and piloting. Additional investment is needed to complete their rollout across the enterprise.

Because SD-WAN was rolled out only recently, is implemented by agency and by site, and depends upon the network connections available at each agency site, VITA does not currently have an overall cost estimate for SD-WAN implementation in all settings where it could be implemented. VITA will work with customer agencies over the next year and provide additional detail in the next network infrastructure report regarding the implementation status of SD-WAN and associated costs.

VITA is partnering with the administration to address the investment needed for the unified and enhanced network monitoring solution. VITA currently estimates the cost associated with full deployment at $1,520,000 in FY23 to cover one time setup and implementation and $750,000 annually thereafter as a recurring expense for storage and licenses.

VITA is working with the administration to address the investment needed for microsegmentation and a move to a zero trust framework approach. Based on the number of servers, users, and devices in the Commonwealth's enterprise environment, VITA currently estimates the cost associated with those capabilities at $6 million annually.

MODERNIZING VITA'S SECONDARY DATA CENTER

The Commonwealth's secondary data center is currently less than 100 miles from its primary data center, which is close enough that a single disaster event may affect both sites. Since before the multisupplier model, disaster recovery services also have been focused on an all-or-nothing failover, rather than on providing high availability capabilities that are coordinated with the Commonwealth's current usage of cloud-based services. Implementing a secondary data center capable of supporting production workloads and high availability services will require working with suppliers to identify specific needs, design the associated facility services, and then stand those services up, either as "new" builds or by moving them from the existing secondary data center site. VITA is working with the administration to address the data center investment needed. VITA currently estimates one-time charges for project, engineering, and build out at $2 million, with the enhanced recurring disaster recovery services carrying a cost of $3 million annually above current levels.

UPGRADING NETWORK CIRCUITS FOR AGENCY SITES

Investment to date has enabled capacity and technology upgrades for the core of the Commonwealth's network, including the downtown Capitol Square "campus." Funding upgrades of congested network circuits serving other agency sites remains an investment need, however.

Having completed the network equipment modernization project, Verizon and VITA have been able to provide regular, monthly network bandwidth utilization reports to agencies. (A view of the most recent available report is included as an appendix to this report.) These reports detail network utilization by site and network circuit, showing which circuits are oversaturated. These reports also compare the size of circuits to VITA's recommended network bandwidth standard of 100 kilobits per second (kbs) per connected user.[1]

Where network circuit utilization is high, showing oversaturation, and where current circuit size does not meet VITA's recommended network bandwidth per user standard, VITA recommends upgrading to reduce congestion and to meet the standard. VITA has voiced these recommendations to agencies, who are responsible for decisioning and paying for the appropriate network connections.

The attached appendix lists circuits that were flagged as "red" in the September 2021 monthly network bandwidth utilization report due to oversaturation and that do not have pending upgrades. The appendix lists the monthly cost of these circuits, at current contract rates, for their current bandwidth and for the recommended circuit bandwidth (if upgraded to meet the enterprise network bandwidth per user standard). The total monthly cost for the recommended bandwidth would be $579,554.25, for an annual total of $6,954,651. That would be an annual increase of $3,833,337.24 from the annual total for the current bandwidth.[2]

For circuits flagged in the August 2021 monthly network bandwidth utilization report as "yellow," VITA recommends continued observation and further reporting next year. It takes time to complete circuit upgrades, and priority should go to the clearly oversaturated "red" circuits listed in the appendix.

EXPANDING REDUNDANT NETWORKING

Capacity is not the only measure of adequate network performance. Agencies also depend on the availability of a network connection. For critical sites that have been identified to VITA, such as hospitals and traffic operations centers, VITA and agencies have already worked together to ensure redundant network connections, either through two or more circuits or through broadband backup to traditional circuits. In today's world, however, the traditional approach to defining critical sites may be too narrow. More broadly defining critical sites might include (i) every agency headquarters, given that all agencies depend on the network for their business, and

[1] That standard was derived by VITA's Enterprise Architecture team from a combination of Gartner reporting, Commonwealth asset and user data, and Commonwealth network utilization data. Discussions with customer agencies have indicated that agencies support a robust bandwidth per user standard.

[2] If sites require special construction or do not have the standard type of Ethernet, upgrades may entail additional cost, on a site-specific basis, which are not possible to capture in this report.

(ii) every site where agencies and members of the public interact in-person in a way that cannot be fully replaced by online transactions (Department of Motor Vehicles offices, for example).

VITA recommends that agencies revisit the locations for which redundant network connections are deemed necessary and that policymakers consider investing in expansion of redundant networking to ensure higher availability. Coupled with new services such as SD-WAN (discussed above), redundant network connections can boost performance as well, through improved traffic routing and management.

Because expanding redundant network connections occurs on a site-to-site basis and requires each agency to make determinations based on its individual business needs, it is not possible at this time to detail the costs associated with expanding redundant network connections. VITA will work with customer agencies over the next year and provide additional detail in the next network infrastructure report regarding the results of those conversations.

ENSURING POWER PROTECTION AND BACKUP

Based on many service tickets submitted by agencies, VITA estimates that approximately half of network outages involve power issues. Resolving power disruptions or power-related damage also can make restoring network service a much more difficult and lengthy process.

VITA recommends that all agency sites have power protection and some degree of backup power capability for network equipment. What that entails will depend upon the particular circumstances at a given site. For example, power protection and backup capability does not necessarily mean generators at every location; ensuring that reliable uninterruptible power supplies (UPSs) and surge protection are in place can avoid or mitigate many power problems.

Because customer agencies are responsible for determining and implementing appropriate power protection and backup power capabilities, and because that involves site-by-site analysis, it is not yet possible to detail in this report the costs associated with bolstering power protection and backup.

CONCLUSION

VITA appreciates the opportunity to report on the Commonwealth of Virginia's network infrastructure. Working with suppliers and agencies to complete the modernization and transformation of the Commonwealth's network is one of VITA's highest priorities. Support from policymakers has been a critical part of the progress to date, and appropriate investment will ensure that the progress continues toward a network infrastructure that meets the needs of agencies, as well as all members of the public who depend on connectivity to government services.

APPENDIX

"HOT LIST" CIRCUIT UTILIZATION REPORT

WITH COSTS AND UPGRADE RECOMMENDATIONS

SEPTEMBER 2021 (SHOWING AUGUST DATA)

	Agency	Location Street, City	Current Bandwidth	Cost (monthly) Current	Recommended Circuit Bandwidth	Cost (monthly) Recommended Bandwidth	Additional Cost (monthly) of Upgrade	Utilization - 95 Percentile	Utilization In - 95 Percentile	Utilization Out - 95 Percentile
1	VDACS	250 CASSELL RD, WYTHEVILLE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	82.27%	82.27%	26.27%
2	VDACS	4832 TYREEANNA RD, LYNCHBURG	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	80.25%	80.25%	23.68%
3	COM (SHARED)	3700 BEAUMONT RD, BEAUMONT	4.5 Mbps	$ 2,019.43	20 Mbps	$ 1,935.29	$ (84.14)	95.64%	80.75%	95.64%
4	COM (SHARED)	233 COMMONWEALTH BLVD W, MARTINSVILLE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	95.53%	95.53%	49.39%
5	COM (SHARED)	3700 BEAUMONT RD, BEAUMONT	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.49%	81.26%	79.26%
6	COM (SHARED)	9960 MAYLAND DR, HENRICO	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	87.51%	83.06%	82.35%
7	DMS	26317 WASHINGTON ST, PETERSBURG	100 Mbps	$ 5,283.00	200 Mbps	$ 7,182.23	$ 1,899.23	94.95%	94.95%	0.57%
8	DEQ	4949 COX RD, GLEN ALLEN	6.1 Mbps	$ 2,479.93	20 Mbps	$ 1,935.29	$ (544.64)	86.91%	86.91%	41.49%
9	DFP	471 JAMES MADISON HWY, CULPEPER	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.97%	47.13%	8.18%
10	DFP	3003 PETERS CREEK RD NW, ROANOKE	2 Mbps	$ 1,117.90	5 Mbps	$ 1,291.00	$ 173.10	81.08%	73.54%	16.96%
11	DGS	1910 DARBYTOWN RD, HENRICO	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	88.95%	88.95%	17.27%
12	DJJ	35 WINE ST, HAMPTON	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	96.59%	96.59%	36.20%
13	DJJ	150 N MAIN ST, SUFFOLK	1 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	96.23%	96.23%	34.01%
14	DJJ	4093 IRONBOUND RD, WILLIAMSBURG	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	95.32%	95.32%	68.73%
15	DJJ	1600 OLIVER HILL WAY, RICHMOND	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	95%	95%	39.02%
16	DJJ	304 ALBEMARLE DR, CHESAPEAKE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	94.63%	94.63%	41.51%
17	DJJ	415 PORT CENTRE PKWY, PORTSMOUTH	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	90.45%	90.45%	19.58%
18	DJJ	9540 CENTER ST, MANASSAS	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	90.35%	90.35%	50.92%
19	DJJ	2600 WASHINGTON AVE, NEWPORT NEWS	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	86.76%	86.76%	21.94%
20	DJJ	200 N SYCAMORE ST, PETERSBURG	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86.70%	86.70%	65.02%
21	DJJ	1900 CHATSWORTH AVE, RICHMOND	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	83.09%	83.09%	28.09%
22	DJJ	215 CHURCH AVE SW, ROANOKE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	82.50%	82.50%	22.04%
23	DJJ	4301 E PARHAM RD, HENRICO	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	81.50%	81.50%	29.11%
24	DMV	2348 YORK CROSSING DR, HAYES	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	98.16%	98.16%	44.29%
25	DMV	17 FIRST ST, STAUNTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.94%	97.94%	54.15%
26	DMV	1 FORT LEE, FORT LEE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.94%	94.94%	31.06%
27	DMV	2039 HAMILTON BLVD, SOUTH BOSTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.78%	94.78%	41.20%
28	DMV	94 ALEXANDRIA PIKE, WARRENTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	92.26%	92.26%	76.15%
29	DMV	2055 ABBEY RD, CHARLOTTESVILLE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	91.66%	91.66%	44.08%
30	DMV	5220 VALLEYPARK DR, ROANOKE	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	90.58%	90.33%	47.91%
31	DMV	4 HILL ST, JONESVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	89.79%	89.79%	28.06%
32	DMV	1968 GALLOWS RD, VIENNA	4.4 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	89.48%	88.68%	69.83%
33	DMV	121 MALL RD, COVINGTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	87.04%	87.04%	41.37%
34	DMV	18505 CROSSROAD PKWY, CULPEPER	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86.05%	86.05%	44.89%
35	DMV	300 N VIRGINIA ST, FARMVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86%	86%	29.88%
36	DMV	296 KLINES MILL LN, MIDDLETOWN	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	85.21%	85.21%	20.61%
37	DMV	1301 MAIN ST, ALTAVISTA	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	84.98%	84.98%	44.93%
38	DMV	1128 E LYNCHBURG SALEM TPKE, BEDFORD	2 Mbps	$ 1,117.90	5 Mbps	$ 1,291.00	$ 173.10	84.89%	84.89%	41.68%
39	DMV	14950 NORTHRIDGE DR, CHANTILLY	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	84.29%	84.29%	36.63%

	Agency	Location Street, City	Current Bandwidth	Cost (monthly) Current	Recommended Circuit Bandwidth	Cost (monthly) Recommended Bandwidth	Additional Cost (monthly) of Upgrade	Utilization - 95 Percentile	Utilization In - 95 Percentile	Utilization Out - 95 Percentile
40	DMV	1968 GALLOWS RD, VIENNA	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	84.28%	82.43%	58.93%
41	DMV	4050 VALLEY PIKE, WINCHESTER	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	84.12%	84.12%	47.71%
42	DMV	3551 BUCKNER BLVD, VIRGINIA BEACH	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	83.84%	83.84%	48.24%
43	DMV	1968 GALLOWS RD, VIENNA	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	83.48%	81.06%	63.24%
44	DMV	103 COMMONWEALTH BLVD, EMPORIA	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	83.45%	82.41%	31.96%
45	DMV	4150 S FOUR MILE RUN DR, ARLINGTON	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	82.99%	82.99%	49.71%
46	DMV	305 TANYARD RD, ROCKY MOUNT	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	82.93%	80.25%	41.68%
47	DMV	11270 BULLOCH DR, MANASSAS	6 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	82.34%	82.34%	36.83%
48	DMV	1210 PORTSMOUTH BLVD, SUFFOLK	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	82.15%	82.15%	19.78%
49	DMV	2300 W BROAD ST, RICHMOND	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	82.15%	81.80%	38.48%
50	DMV	1712 DONNA DR, VIRGINIA BEACH	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	82.14%	82.14%	35.16%
51	DMV	3236 ODD FELLOWS RD, LYNCHBURG	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	81.36%	81.36%	47.72%
52	DMV	203 INTERSTATE 64 E, SANDSTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	80.94%	80.94%	17.56%
53	DMV	15 WATER ST, FRONT ROYAL	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	80.27%	70.37%	78.12%
54	VADOC	1213 E CLAY ST, RICHMOND	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	97.07%	97.07%	10.23%
55	VADOC	11 WATER ST, FRONT ROYAL	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	90.02%	90.02%	22.60%
56	VADOC	1037 PLANTERS RD, LAWRENCEVILLE	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	89.32%	86.89%	30.25%
57	VADOC	24427 MUSSELLWHITE DR, WAVERLY	44 Mbps	$ 6,220.91	200 Mbps	$ 7,182.23	$ 961.32	88.41%	86.90%	18.13%
58	VADOC	30A W WATER ST, HARRISONBURG	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	87.80%	87.80%	37.28%
59	VADOC	5620 SOUTHPOINT CENTRE BLVD, FREDERICKSBURG	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	86.53%	86.53%	35.28%
60	VADOC	31285 CAMP RD, HANOVER	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	86.04%	86.04%	17.10%
61	VADOC	10060 HUSKE RD, STONY CREEK	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	85.97%	85.97%	11.51%
62	VADOC	384 ESKIMO HILL RD, STAFFORD	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	84.22%	84.22%	30.96%
63	VADOC	425 W WASHINGTON ST, SUFFOLK	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	84.03%	84.03%	36.99%
64	VADOC	924 CLIFTON FARM RD, HONAKER	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	83.49%	83.49%	17.40%
65	VADOC	901 CORRECTION WAY, JARRATT	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	83.08%	83.08%	26.32%
66	VADOC	751 MILLER DR SE, LEESBURG	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	82.63%	82.63%	38.84%
67	VADOC	100 FAIRVIEW DR, FRANKLIN	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	82.14%	82.14%	5.78%
68	VADOC	1600 N COALTER ST, STAUNTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.48%	38.41%	53.01%
69	VADOC	220 DEER RUN RD, DANVILLE	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	80.97%	80.97%	32.21%
70	VADOC	6624 BEARD WOODS LN, HARRISONBURG	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	80.73%	80.73%	36.65%
71	VDOT	22448 HILLTOP DR, MC KENNEY	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	98.29%	98.29%	11.21%
72	VDOT	8278 HIDEAWAY RD, MARSHALL	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.78%	97.78%	14.59%
73	VDOT	33 DONAHUE LN, ROSELAND	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.45%	97.45%	10.58%
74	VDOT	2186 BRIGHT LEAF RD, LAWRENCEVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.28%	97.28%	12.09%
75	VDOT	25516 TIDEWATER TRL, PORT ROYAL	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.13%	97.13%	8.48%
76	VDOT	812 LEFTWICH ST, GRETNA	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	96.99%	96.99%	7.19%
77	VDOT	16289 ROLFE HWY, SURRY	3 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	96.45%	96.45%	24.13%
78	VDOT	77 SMALLWOOD LN, BERRYVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	95.35%	95.35%	13.45%

	Agency	Location Street, City	Current Bandwidth	Cost (monthly) Current	Recommended Circuit Bandwidth	Cost (monthly) Recommended Bandwidth	Additional Cost (monthly) of Upgrade	Utilization - 95 Percentile	Utilization In - 95 Percentile	Utilization Out - 95 Percentile
79	VDOT	11540 PINHOOK RD, ROCKVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.83%	94.83%	6.57%
80	VDOT	37151 KOERNER LN, PURCELLVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.47%	94.47%	14.76%
81	VDOT	125 FLEISHER AVE, MONTEREY	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.41%	94.41%	14.73%
82	VDOT	1601 ORANGE RD, CULPEPER	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	94.31%	94.31%	15.14%
83	VDOT	1956 THE TRAIL, SAINT STEPHENS CHURCH	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	93.33%	93.33%	11.88%
84	VDOT	1016 ANDERSON HWY, CUMBERLAND	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	93.19%	93.19%	8.47%
85	VDOT	14900 MURDOCK ST, CHANTILLY	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	92.08%	92.08%	7.73%
86	VDOT	3924 PATRICK HENRY HWY, CHARLOTTE COURT HOUSE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	91.73%	91.73%	9.74%
87	VDOT	260 W DUCK ST, FRONT ROYAL	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	91.65%	91.65%	16.68%
88	VDOT	8057 BURR HILL RD, RHOADESVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	90.46%	90.46%	15.41%
89	VDOT	1221 E BROAD ST, RICHMOND	300 Mbps	$ 12,567.69	800 Mbps	$ 26,152.44	$ 13,584.75	89.17%	47.16%	89.17%
90	VDOT	66882 D WOODROW BIRD MEMORIAL HWY, ROCKY GAP	6 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	87.58%	87.58%	7.83%
91	VDOT	30904 MOUNTAIN VALLEY RD, MILLBORO	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	87.45%	87.45%	11.84%
92	VDOT	25146 BUCKHORN DR, WINDSOR	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86.18%	86.18%	10.57%
93	VDOT	12 FLATWOOD RD, WASHINGTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	85.41%	85.41%	15.72%
94	VDOT	15610 COSBY RD, CHESTERFIELD	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	85.03%	85.03%	9.27%
95	VDOT	87 DEACON RD, FREDERICKSBURG	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	84.43%	84.43%	70.18%
96	VDOT	15230 ST JAMESON RD, CULPEPER	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	83.78%	83.78%	10.37%
97	VDOT	1062 GREENHOUSE RD, RUSTBURG	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	83.78%	83.78%	8.01%
98	VDOT	7 SWOPE LN, FAIRFIELD	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	83.46%	74.55%	13.17%
99	VDOT	11725 MARSH RD, BEALETON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	83.02%	83.02%	11.38%
100	VDOT	2401 LYNN HOLLOW RD, NORTH TAZEWELL	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	82.76%	82.76%	7.33%
101	VDOT	3288 TROUTDALE HWY, MOUTH OF WILSON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	82.74%	82.74%	6.06%
102	VDOT	15308 WATERWORKS RD, SMITHFIELD	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.88%	81.88%	10.75%
103	VDOT	1093 CRUTE LN, SCOTTSBURG	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.47%	81.47%	7.93%
104	VDOT	16289 ROLFE HWY, SURRY	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.21%	81.21%	20.75%
105	VDOT	13388 SMITHS NECK RD, CARROLLTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.01%	80.79%	27.82%
106	VDOT	30487 TEMPERANCEVILLE RD, TEMPERANCEVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	80.28%	80.28%	10.52%
107	DSS	17100 MONUMENT CIR, ISLE OF WIGHT	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	98.07%	98.07%	19.75%
108	DSS	177 COURT ST, NEW CASTLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.03%	97%	74.50%
109	DSS	102 HERITAGE WAY NE, LEESBURG	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	95.57%	95.32%	76.04%
110	DSS	101 S MAIN ST, MADISON	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	95.54%	95.51%	35.83%
111	DSS	69 KABLER LN, RUSTBURG	4.4 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	94.79%	94.79%	42.05%
112	DSS	1300 COURTHOUSE RD, STAFFORD	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	94.55%	94.55%	44.65%
113	DSS	5265 THE HORNES, CAPE CHARLES	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	94.15%	94.15%	67.54%
114	DSS	644 PARK AVE NW, NORTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	92.35%	92.35%	32.83%
115	DSS	242 ALLENS CIR, KING AND QUEEN COURT HOUSE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	91.93%	91.93%	22.82%
116	DSS	192 BRISTOL EAST RD, BRISTOL	5 Mbps	$ 1,291.00	20 Mbps	$ 7,182.23	$ 5,891.23	91.67%	91.67%	26.66%
117	DSS	211 MAIN ST, NARROWS	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	91.07%	91.07%	19.18%

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118	DSS	1835 INDUSTRY DR, CULPEPER	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	91.04%	91.04%	38.01%
119	DSS	2211 HYDRAULIC RD, CHARLOTTESVILLE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	89.91%	76.87%	38.36%
120	DSS	8880B JAMES MADISON HWY, FORK UNION	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86.33%	86.33%	15.67%
121	DSS	65 COURTHOUSE HILL RD, WARM SPRINGS	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86.31%	86.31%	26.69%
122	DSS	24 BAKER ST, WINCHESTER	10 Mbps	$ 1,550.65	30 Mbps	$ 2,218.98	$ 668.33	86.10%	86.10%	33.45%
123	DSS	215 W MAIN ST, STANLEY	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	85.84%	85.84%	10.23%
124	DSS	220 H G MCGHEE DR, CHATHAM	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	85.56%	85.50%	50.51%
125	DSS	22554 CENTER PKWY, ACCOMAC	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	85.48%	85.48%	15.73%
126	DSS	210 PEPPER ST S, CHRISTIANSBURG	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	85.36%	73.83%	41.48%
127	DSS	201 SHARP ST, LAWRENCEVILLE	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	85.20%	85.20%	25.69%
128	DSS	3174 SLATE CREEK RD, GRUNDY	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	84.77%	84.77%	18.38%
129	DSS	8880B JAMES MADISON HWY, FORK UNION	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	84.66%	84.66%	15.40%
130	DSS	121 BAGLEY CIR, MARION	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	84.62%	84.62%	18.91%
131	DSS	465 W 15TH ST, FRONT ROYAL	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	84.37%	84.37%	31.84%
132	DSS	129 DAVIS ST, INDEPENDENCE	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	84.06%	72.09%	50.91%
133	DSS	316 E CAWSON ST, HOPEWELL	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	83.79%	83.79%	28.80%
134	DSS	6641 SHORT LN, GLOUCESTER	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	83.47%	83.47%	23.48%
135	DSS	290 S 6TH ST, WYTHEVILLE	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	82.92%	81.88%	36.76%
136	DSS	772 RICHMOND BEACH RD, TAPPAHANNOCK	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	82.83%	82.83%	18.82%
137	DSS	6450 COURTHOUSE RD, PRINCE GEORGE	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	82.75%	82.40%	29.43%
138	DSS	105 E CENTER ST, GALAX	3.1 Mbps	$ 1,346.28	8 Mbps	$ 1,454.47	$ 108.19	82.03%	82.03%	35.30%
139	DSS	26022 ADMINISTRATION CENTER DR, COURTLAND	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	81.90%	81.90%	14.65%
140	DSS	14010 BOYDTON PLANK RD, DINWIDDIE	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	80.81%	80.81%	22.41%
141	DSS	608 JACKSON ST, FREDERICKSBURG	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	80.43%	80.43%	21.87%
142	DVS	1601 BROAD ROCK BLVD, RICHMOND	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	80.85%	80.85%	7.24%
143	DGIF (DWR)	1320 BELMAN RD, FREDERICKSBURG	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	93.97%	76.47%	85.12%
144	LVA	800 E BROAD ST, RICHMOND	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	84.84%	84.84%	9.90%
145	DMME (Energy)	3405 MOUNTAIN EMPIRE RD, BIG STONE GAP	44 Mbps	$ 6,220.91	200 Mbps	$ 7,182.23	$ 961.32	94.03%	50.60%	94.03%
146	TAX	600 E MAIN ST, RICHMOND	155 Mbps	$ 14,607.16	400 Mbps	$ 12,567.69	$ (2,039.47)	86.85%	25.03%	85.72%
147	VDH	107 N KENT ST, WINCHESTER	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	97.28%	95.34%	56.98%
148	VDH	801 LAKESIDE DR, LYNCHBURG	15 Mbps	$ 1,733.35	40 Mbps	$ 2,594.02	$ 860.67	92.70%	92.70%	15.70%
149	VDH	1 TAYLOR AVE, PEARISBURG	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	92.05%	92.05%	18.69%
150	VDH	1138 ROSE HILL DR, CHARLOTTESVILLE	15 Mbps	$ 1,733.35	40 Mbps	$ 2,594.02	$ 860.67	88.49%	88.49%	20.40%
151	VDH	201 FRANCIS MARION LN, MARION	10 Mbps	$ 1,550.65	30 Mbps	$ 2,218.98	$ 668.33	88%	88%	16.51%
152	VDH	8097 KINGS HWY, KING GEORGE	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	86.92%	86.92%	24.01%
153	VDH	830 GOFF ST, NORFOLK	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	84.39%	75.22%	43.68%
154	VDH	7501 ADKINS RD, CHARLES CITY	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.38%	81.38%	10.91%
155	VDH	1091 NORFOLK AVE, VIRGINIA BEACH	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	81.18%	81.18%	17.28%
156	VDH	830 SOUTHAMPTON AVE, NORFOLK	4.6 Mbps	$ 2,019.43	20 Mbps	$ 7,182.23	$ 5,162.80	80.21%	80.21%	18.49%

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157	VEC	2506 HOUGTON AVE, SOUTH BOSTON	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	95.34%	90.56%	50%
158	VEC	740 THIMBLE SHOALS BLVD, NEWPORT NEWS	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	94.87%	94.87%	61.81%
159	VEC	419 N CAMERON ST, WINCHESTER	1.5 Mbps	$ 673.14	4 Mbps	$ 1,223.68	$ 550.54	90.24%	90.24%	22.93%
160	VEC	211 NOR DAN DR, DANVILLE	6.1 Mbps	$ 2,479.93	20 Mbps	$ 7,182.23	$ 4,702.30	88.63%	85.05%	36.67%
161	VMFA	200 N BOULEVARD, RICHMOND	50 Mbps	$ 2,981.08	200 Mbps	$ 7,182.23	$ 4,201.15	84.71%	83.82%	76.60%
162	VSP	16835 HISTORY LAND HWY, WARSAW	5 Mbps	$ 1,291.00	20 Mbps	$ 7,182.23	$ 5,891.23	92.71%	92.71%	4.81%
			TOTALS	$260,109.48		$ 579,554.25	$ 319,444.77			