2785 Mitchell Drive
Walnut Creek, CA 94598

February 15, 2024

To: El Dorado County Planning Commission

From: Ericson Malana, Radio Frequency Design Engineer
Verizon Wireless Network Engineering Department

Subject: Statement in Support of Verizon Wireless's Proposed Facility
1495 Malcolm Dixon Road, El Dorado Hills

Executive Summary

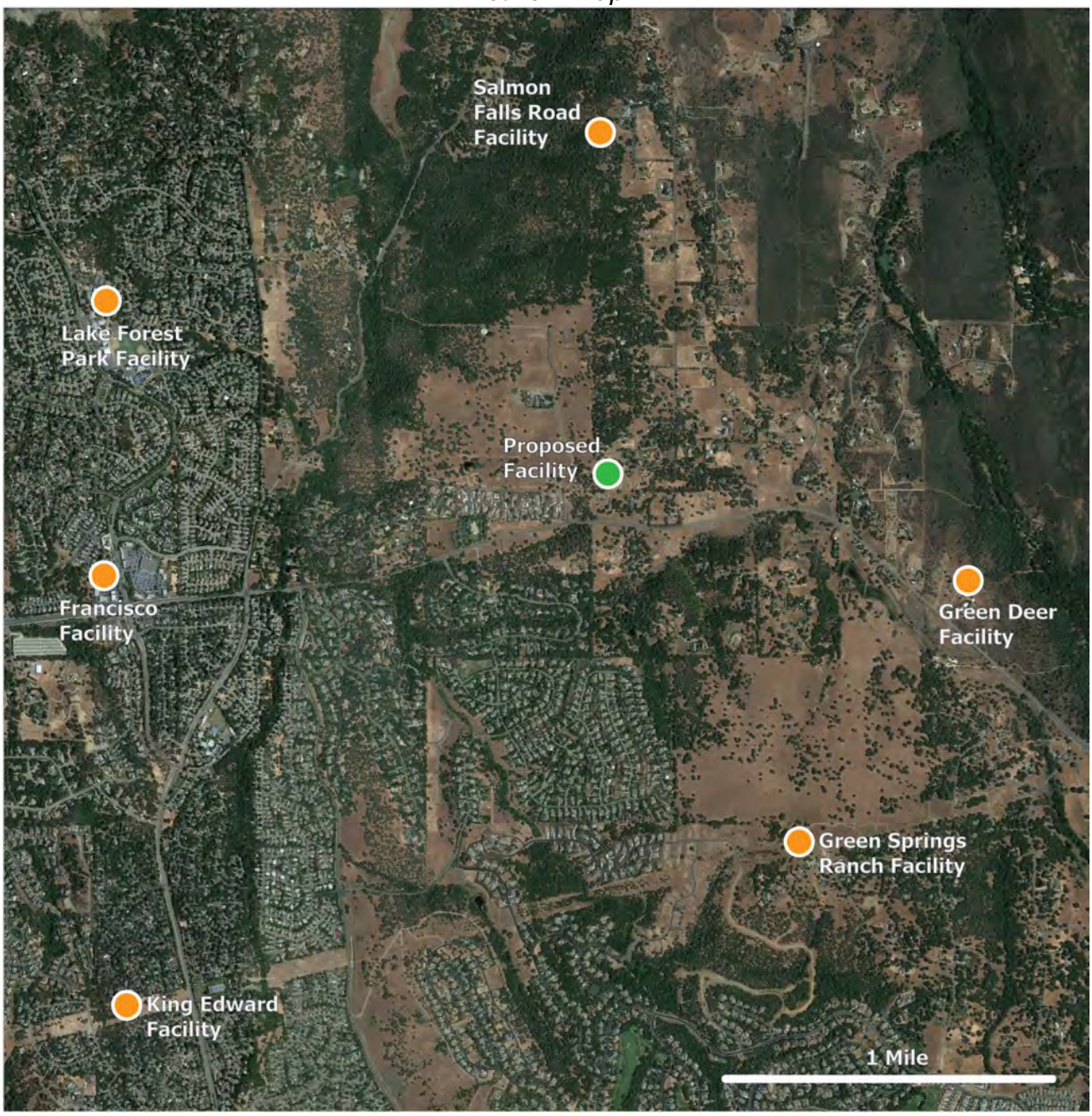
Verizon Wireless has identified a significant gap in service in the west Green Valley Road area, east of El Dorado Hills, including the Highland Hills and south Arroyo Vista neighborhoods. This area currently receives inadequate service coverage from Verizon Wireless's existing Lake Forest Park facility located 1.6 miles northwest of the Proposed Facility, the Salmon Falls Road facility 1.0 miles north, the Green Deer facility 1.2 miles east, the Green Springs Ranch facility 1.3 miles southeast, the King Edward facility 2.2 miles southwest, and the Francisco facility 1.5 miles west. A network map appears on the following page.

Due to the distance from the existing facilities, there is a gap in reliable Verizon Wireless voice and data service coverage and a lack of strong dominant signal in these areas. This compromises network performance. Network users in the area experience low data throughput, resulting in slow data speeds well below the FCC's broadband standard.

Within this area of El Dorado County, over 85 percent of Verizon Wireless's bandwidth currently in use is in the mid-band AWS, PCS, CBRS and C-Band frequencies, with the remaining portion in the low-band 700 and 850 MHz frequencies. The mid-band frequencies provide much greater data capacity. However, the mid-band frequencies do not travel as far as low-band frequencies, and require facilities closer together and closer to the end users to provide reliable service. Verizon Wireless designs its networks to ensure that both low-band and mid-band frequencies can provide adequate coverage and network data capacity.

I describe below the significant gap in coverage that Verizon Wireless seeks to remedy (the "Significant Gap"). To provide reliable coverage and broadband-level data speeds, the Significant Gap must be remedied through construction of a new Verizon Wireless facility (the "Proposed Facility").

Network Map



Verizon Wireless Services

Verizon Wireless provides personal wireless services, a category of "telecommunications services," which include voice services that allow users of mobile, handheld telephones to place and receive calls to other mobile and landline telephone users through the national, switched telephone network using conventional telephone numbers. This includes the ability of such users to connect to emergency personnel by dialing 911. Verizon Wireless's network also provides information services through its wireless facilities, which will include the Proposed Facility. These information services include wireless broadband, mobile data networks, and connection to the internet, which Verizon Wireless provides using the same infrastructure as its personal wireless services.

Verizon Wireless Bandwidth by Frequency Band – El Dorado County

Band	FCC Designation	Frequency Band	Bandwidth	Bandwidth Percentage
700 MHz	UHF Low Band	700 MHz	22 MHz	5.9 %
850 MHz	Cellular	850 MHz	25 MHz	6.6 %
PCS	Personal Communications Service	1900 MHz	10 MHz	2.7 %
AWS	Advanced Wireless Service	2100 MHz	60 MHz	15.9 %
CBRS	Citizen's Broadband Radio Service	3550 MHz	100 MHz	26.5 %
C-Band	C-Band	3700 MHz	160 MHz	42.4 %

Coverage Gap

Verizon Wireless is experiencing a gap in its service coverage in the west Green Valley Road area, east of El Dorado Hills. There is a broad gap in reliable low-band 700 MHz in-building coverage in residential areas north and south of Malcolm Dixon Road and Green Valley Road, east of Silva Valley Parkway/Allegheny Road and west of Arroyo Vista Way/Rocky Springs Court. This includes portions of the north Highland Hills neighborhood and the south Arroyo Vista neighborhood.

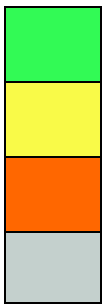
There is also a lack of reliable low-band 700 MHz in-vehicle coverage along Green Valley Road and local roadways to its south. An important coverage objective is the 1.8-mile stretch of Green Valley Road between El Dorado Hills Boulevard and Malcolm Dixon Road, with 16,831 average daily vehicle trips near El Dorado Hills Boulevard. *El Dorado County Annual Traffic Count Summary 2022*. Several sections of that road lack reliable low-band in-vehicle service.

The lack of reliable service is even more pronounced in the mid-band AWS frequency which provides the most data capacity, with no reliable in-building or in-vehicle service in these areas.

To remedy the Significant Gap, Verizon Wireless must place a new facility to ensure reliable network service. The Proposed Facility will provide new, reliable in-building coverage where lacking in residential areas, and new reliable in-vehicle service along local roadways, including Green Valley Road. In total, the Proposed Facility will provide new reliable in-building coverage to an area of 0.73 square miles where currently lacking, and new reliable in-vehicle coverage to an additional 0.5 square miles.

A graphic description of the coverage gap is shown on the following coverage maps, along with maps showing the improved coverage to be provided by the Proposed Facility. Maps have been prepared for each the low-band 700 MHz and mid-band AWS frequencies, using predictive modeling methods of Verizon Wireless's proprietary Atoll system.

Referenced signal receive power (RSRP) is a measurement of signal level in decibel milliwatts (dBm), which is a negative number that decreases due to distance and other factors. The RSRP coverage thresholds are:



In-building >= -75 dBm. Green depicts good coverage that meets or exceeds thresholds for reliable network coverage in homes and vehicles.

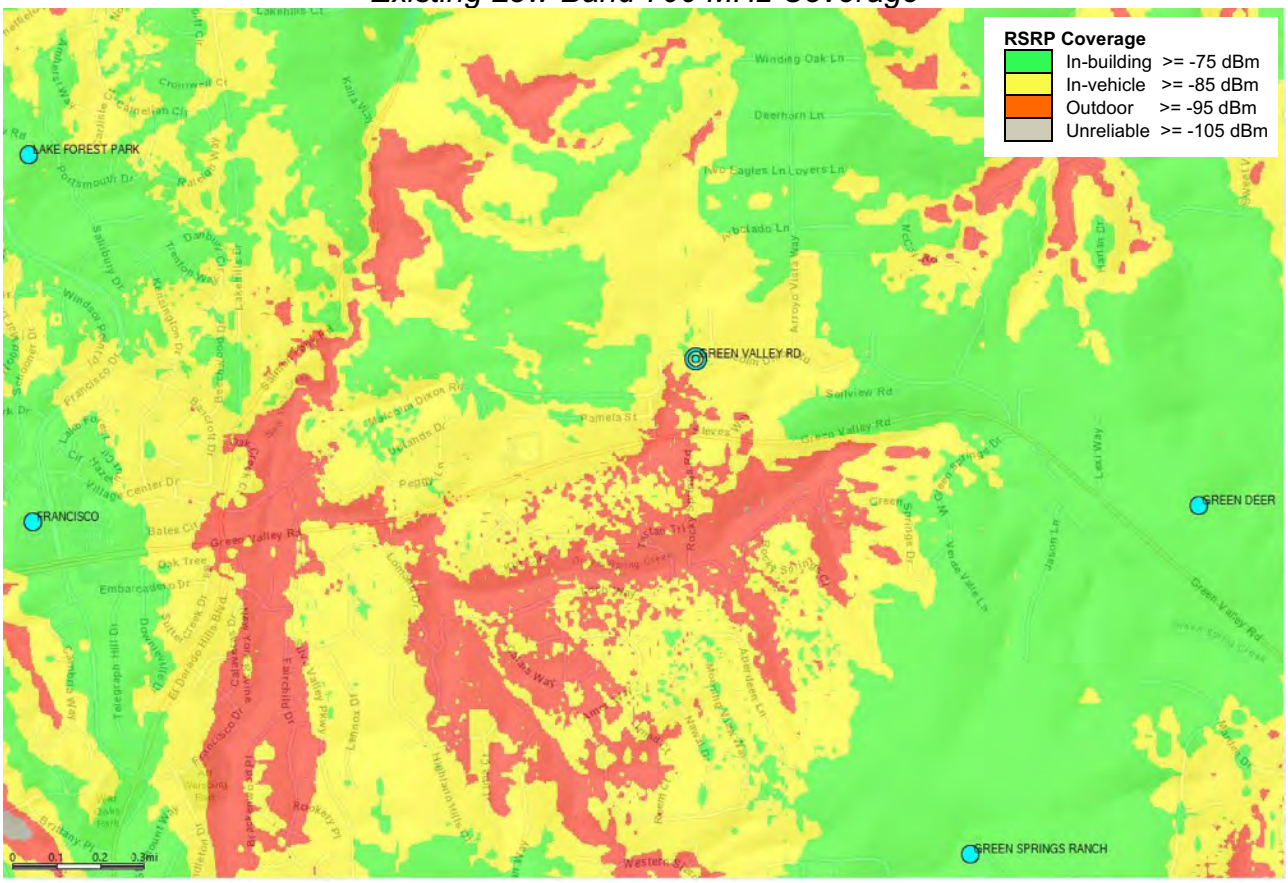
In-vehicle >= -85 dBm. Yellow depicts reliable in-vehicle coverage only.

Outdoor >= -95 dBm. Red depicts reliable outdoor service only.

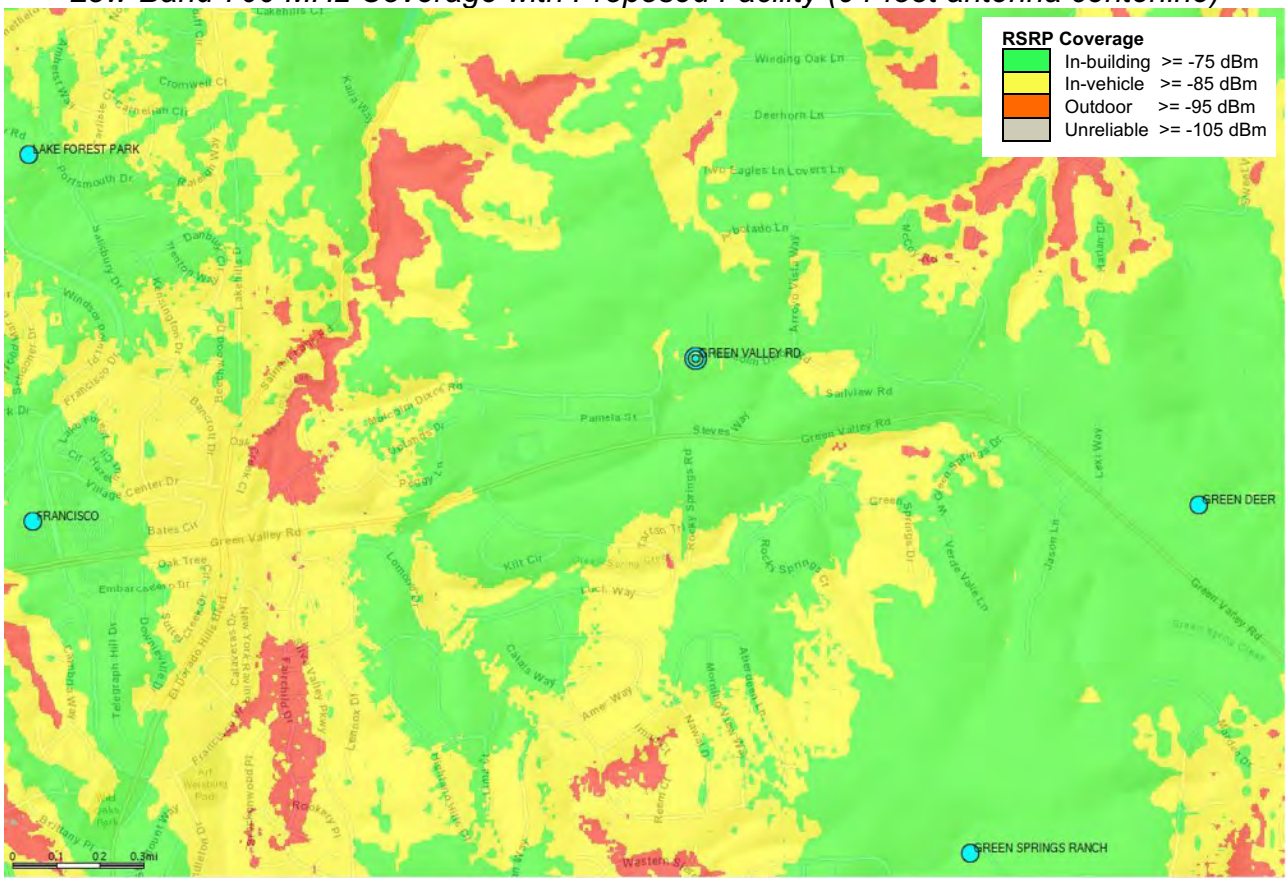
Unreliable >= -105 dBm. Gray depicts unreliable service levels.

White areas do not receive reliable service levels.

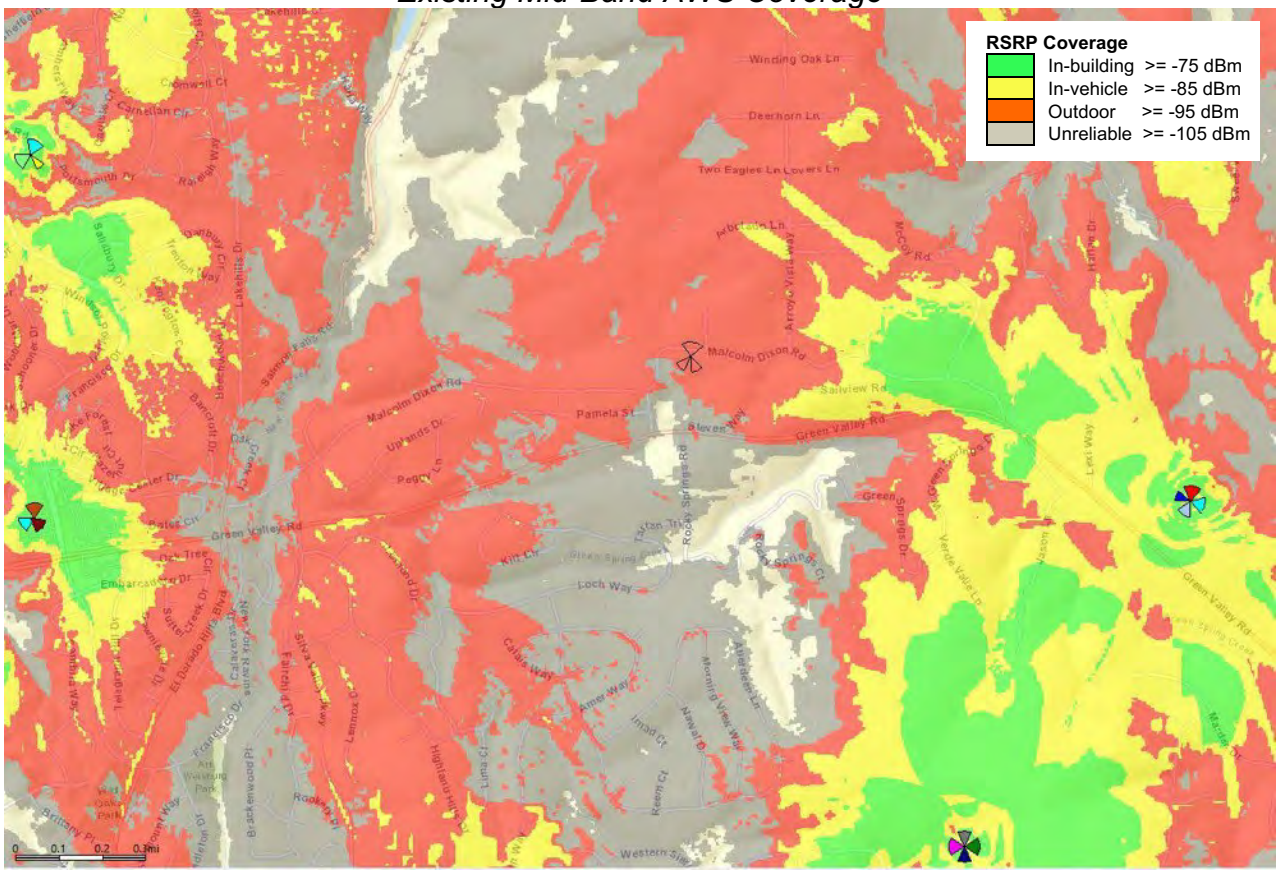
Existing Low-Band 700 MHz Coverage



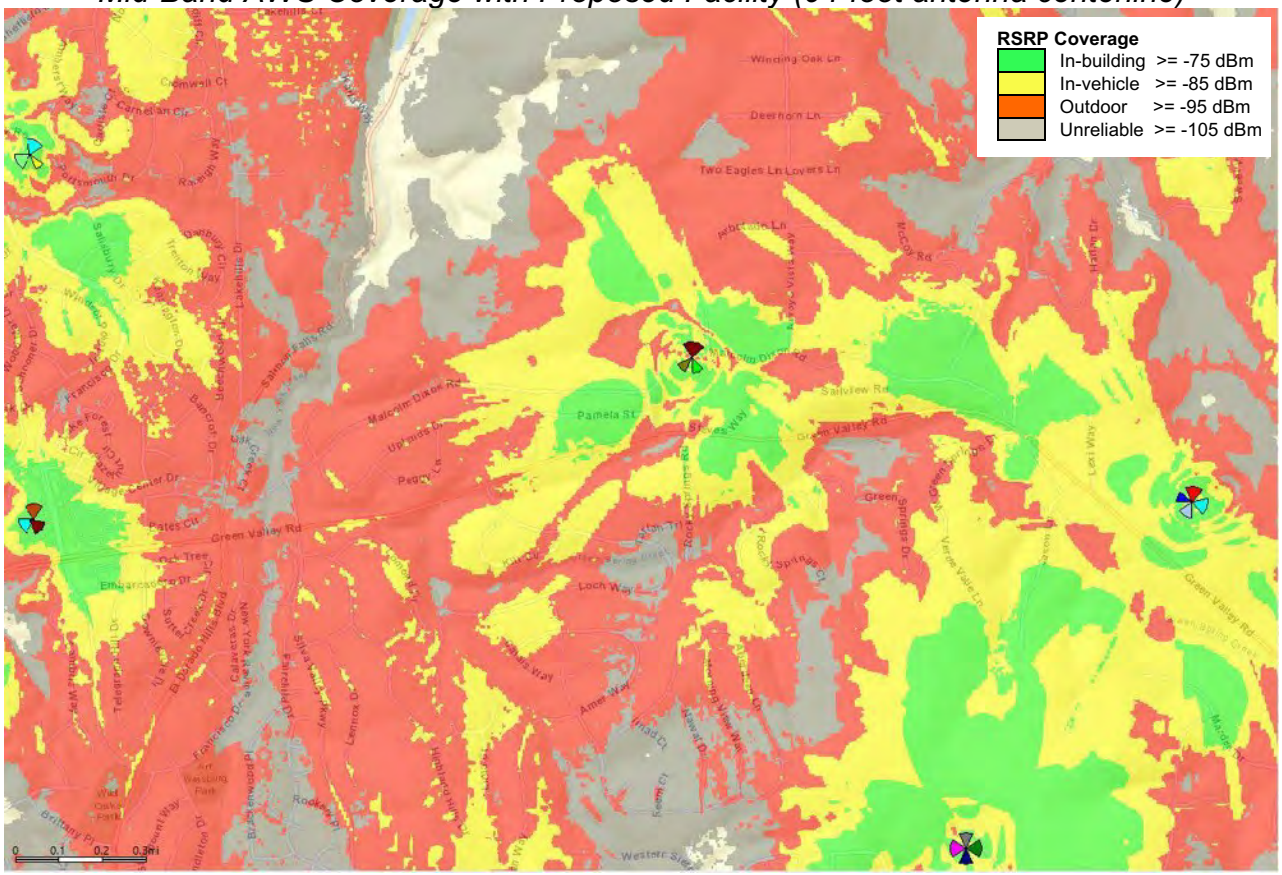
Low-Band 700 MHz Coverage with Proposed Facility (94-foot antenna centerline)



Existing Mid-Band AWS Coverage



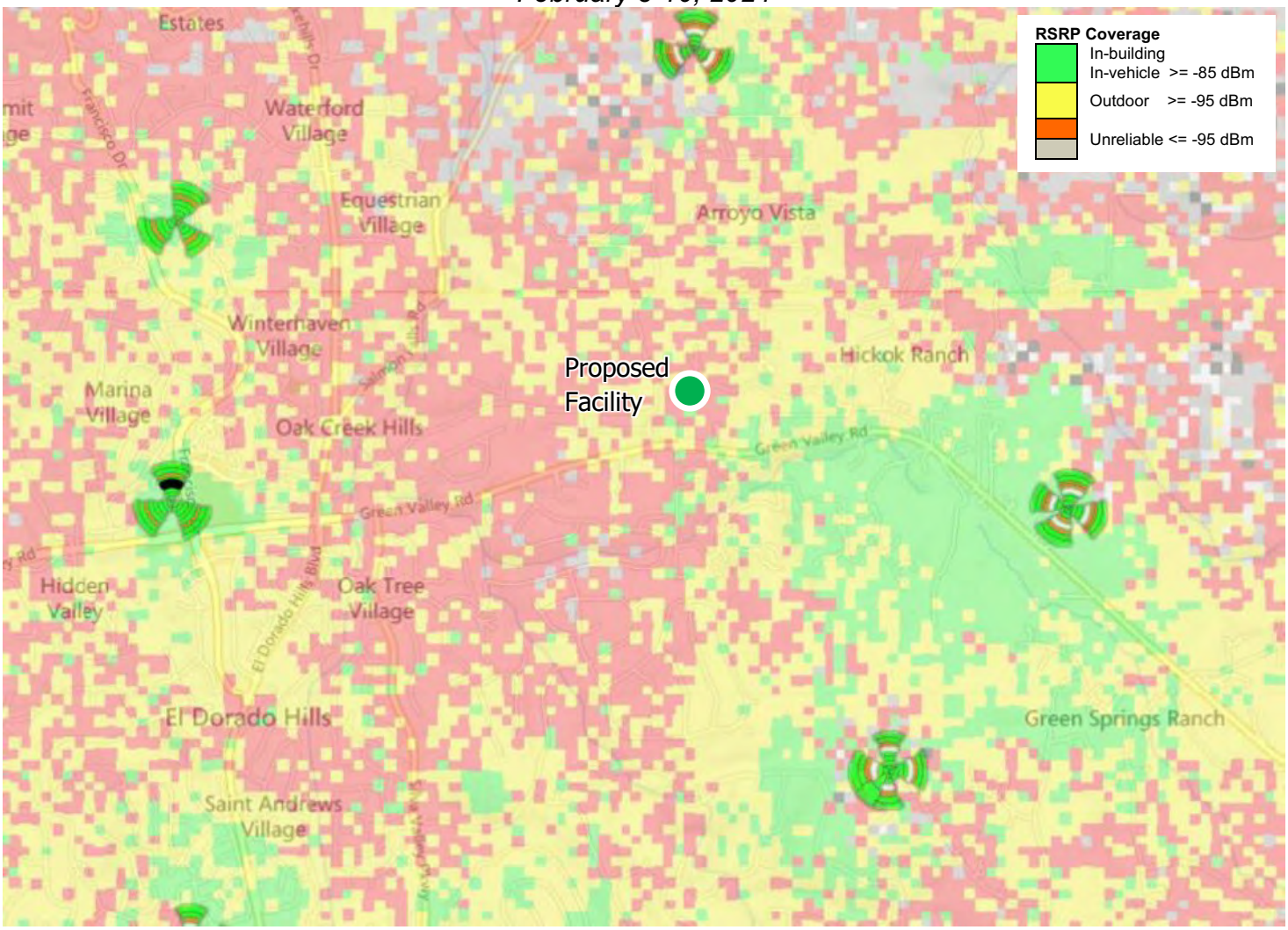
Mid-Band AWS Coverage with Proposed Facility (94-foot antenna centerline)



The following map shows the average RSRP of Verizon Wireless signal levels received by user devices in the greater area over a three-day period during February 8-10, 2024. User devices report the RSRP to the network, and Verizon Wireless uses its TrueCall tool to analyze this data and optimize system performance. The data represents the RSRP of the strongest frequency assigned by the network to user devices.

In this case, green indicates reliable in-building and in-vehicle service levels, yellow represents outdoor service, and red and gray indicate unreliable service. The map shows how service levels are inadequate throughout the gap area, with a complete lack of in-building service north, west, and south of the Proposed Facility, and very little to the east. In-vehicle service is lacking along stretches of Green Valley Road and Malcolm Dixon Road west of the Proposed Facility, as well as along local roadways west and south.

RSRP Average Signal Level Reported by User Devices
February 8-10, 2024



Dominant Signal

As described above, the identified gap area receives inadequate service from distant Verizon Wireless facilities, which provide only weak dominant signal to the area. Dominant signal is the strongest signal from a particular Verizon Wireless facility that is received by a user's wireless device in a particular area. This is apparent in the following best server maps, which depict the areas of dominant signal from each facility. Signal from each antenna sector of a facility is shown in a different color. Maps have been prepared for each the low-band 700 MHz and mid-band AWS frequencies.

Currently, the gap area receives dominant signal from all six surrounding Verizon Wireless facilities. Signal from these distant facilities is intermixed in the gap area, demonstrating a lack of strong dominant signal, which compromises network performance, including for users in transit. Those distant facilities must serve large areas with many faraway users, who demand more of a facility's data resources because of increased transmission time and error correction. For example, the north-facing antenna sector of the Green Springs Ranch facility 1.3 miles southeast of the Proposed Facility (shown in light brown) serves a very large area, due in part to its high elevation.

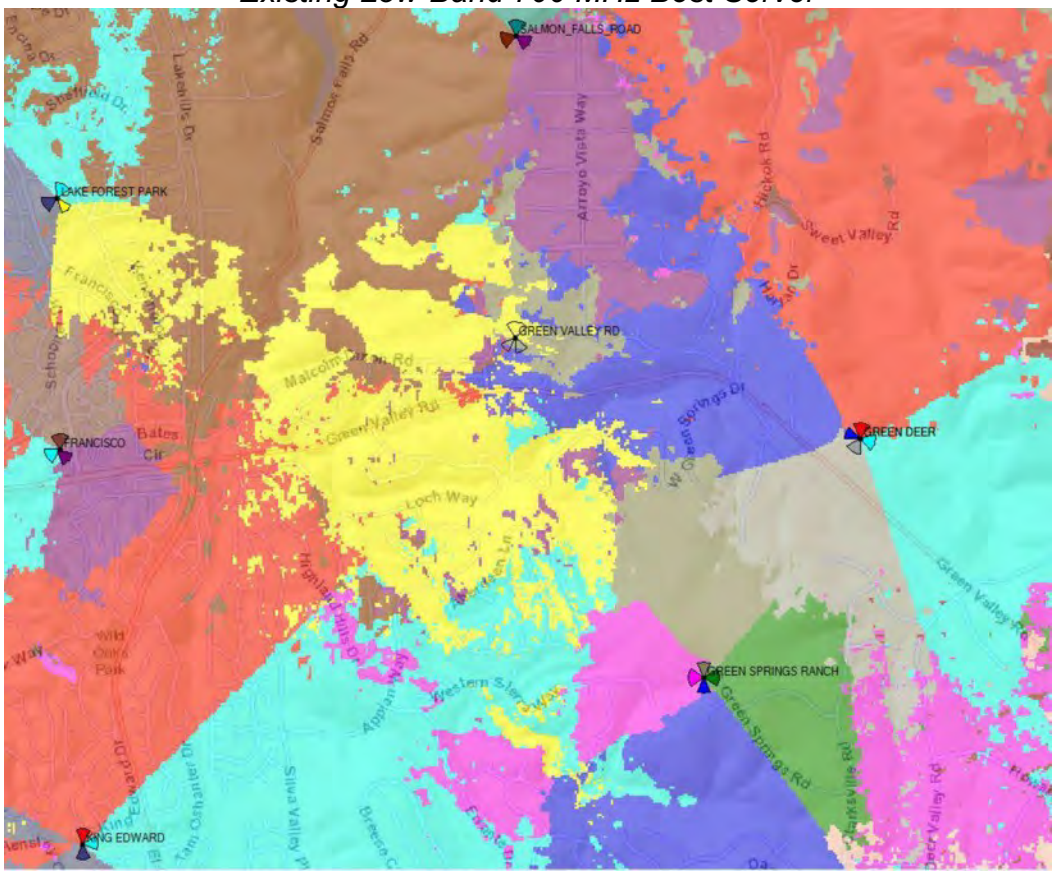
As discussed below, the Lake Forest Park, King Edward, and Salmon Falls Road facilities are experiencing data capacity exhaustion. The southeast-facing antenna sector of the Lake Forest Park facility 1.6 miles northwest (shown in yellow) serves a particularly large area, reaching the Proposed Facility location. The north- and east-facing sectors of the King Edward facility 2.2 miles southwest (shown in red and light blue) also serve residential areas southwest of the Proposed Facility.

The Proposed Facility is strategically located to provide strong, new dominant signal to the Significant Gap. Placing a new facility closer to users in the gap area will improve local network performance. The Proposed Facility also will relieve demand on the existing facilities so they can devote their resources to users closer to their locations. This will improve overall performance in the greater vicinity.

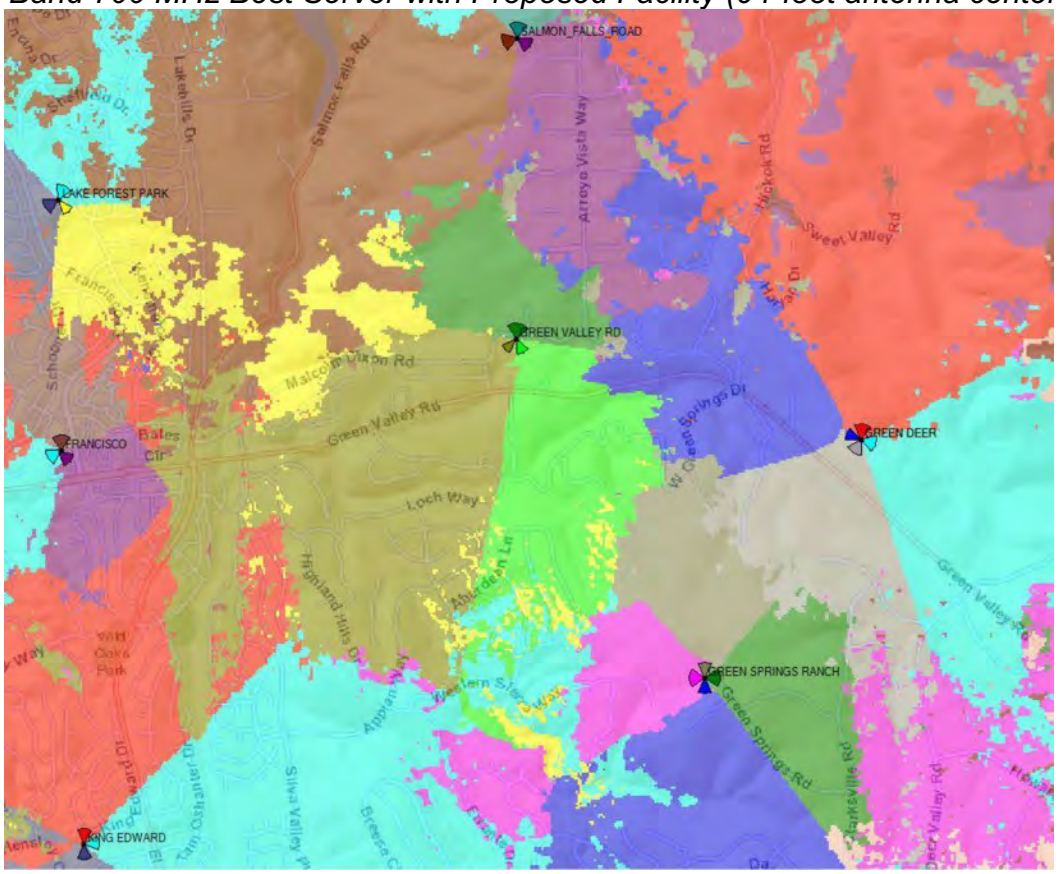
The lack of strong, reliable dominant signal degrades network performance, resulting in unreliable service, particularly during busy hours. This affects the reliability of Verizon Wireless service for residents, workers and visitors as well as for critical communications with emergency service personnel. According to the National Emergency Number Association, there are an estimated 240 million 911 calls each year nationwide, with 80 percent or more from wireless devices in many areas. In emergencies, first responder agencies increasingly rely on dependable Verizon Wireless service.

At times of high data traffic, the coverage area of Verizon Wireless facilities shrinks to accommodate an increasing number of mobile devices closer to each facility. As a result, the coverage gap expands and is exacerbated during times of high usage. The contraction of coverage during times of high usage has become more relevant as the demand for wireless services has increased rapidly over time. According to CTIA's *2023 Annual Survey Highlights*, the data traffic on wireless networks in the United States increased 38 percent from 2021 to 2022—double the prior year's increase. The number of active 5G devices nearly doubled from 2021 to 2022. Such devices include smartphones, tablets, medical devices, building security systems, and vehicle navigation and alert systems.

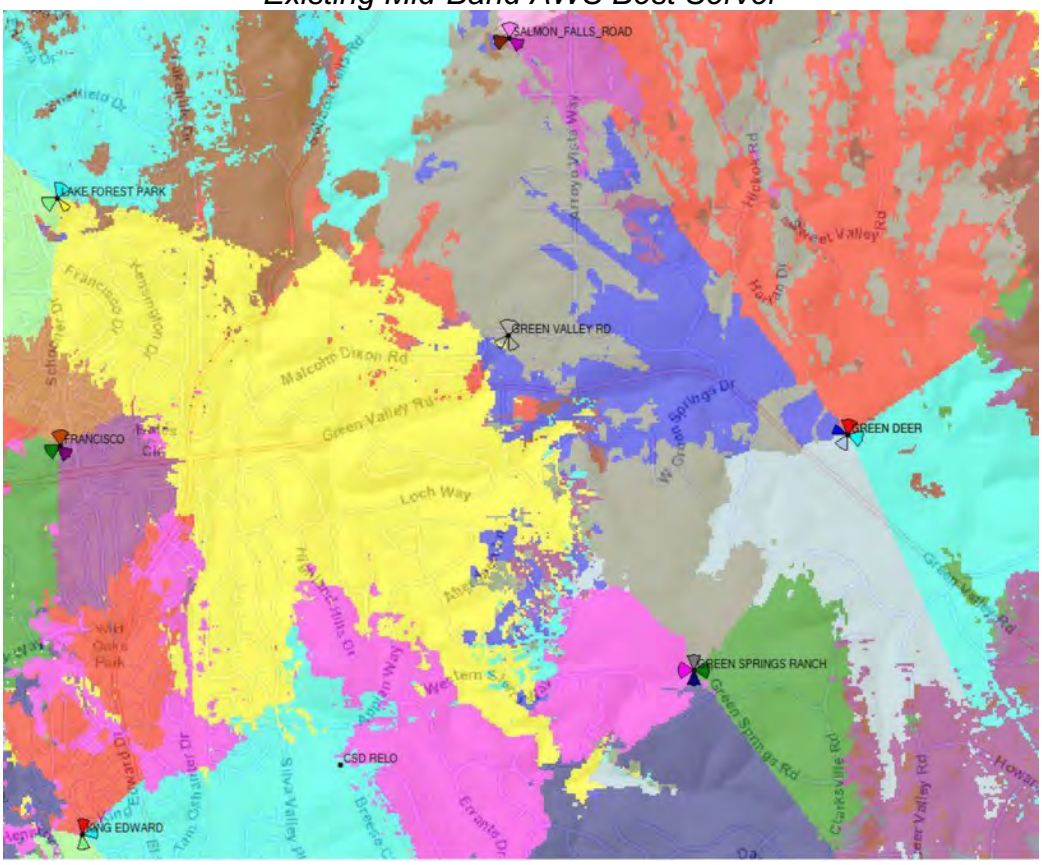
Existing Low-Band 700 MHz Best Server



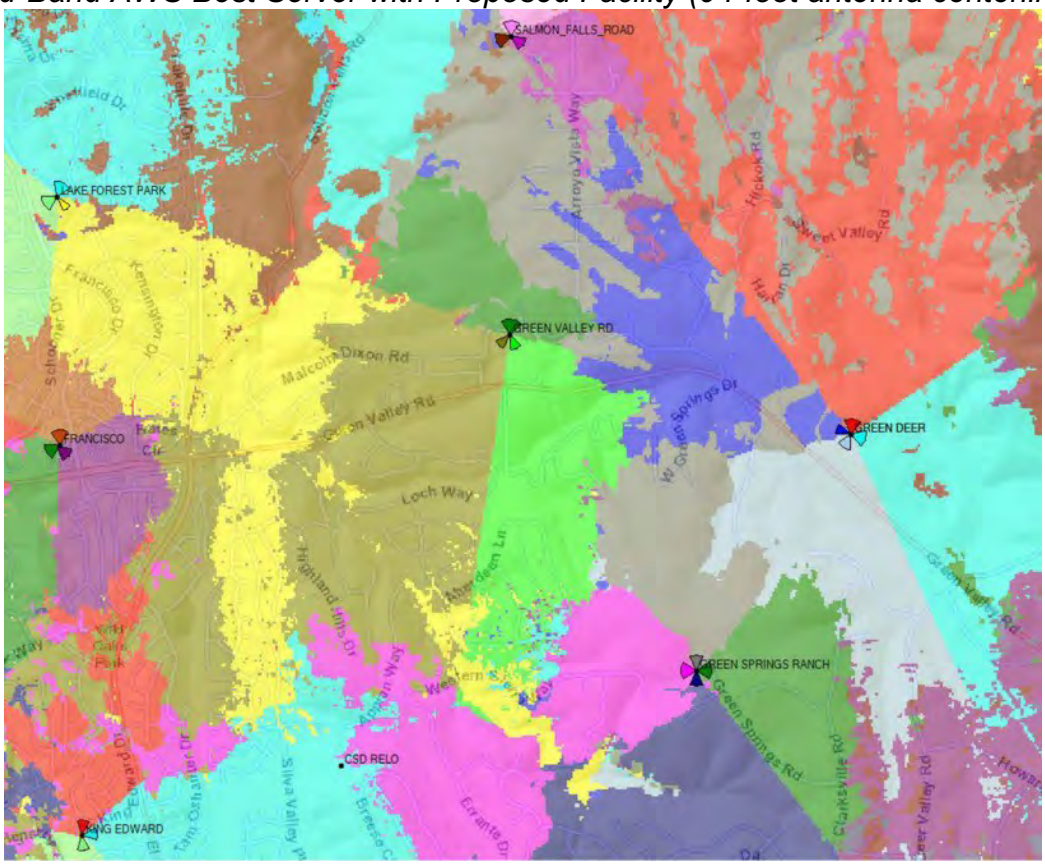
Low-Band 700 MHz Best Server with Proposed Facility (94-foot antenna centerline)



Existing Mid-Band AWS Best Server



Mid-Band AWS Best Server with Proposed Facility (94-foot antenna centerline)



Capacity Demand

As noted above, several existing Verizon Wireless facilities that serve the gap area are experiencing capacity exhaustion, which compromises network performance.

The following charts compare the channel TTI occupancy of these antenna sectors with their data throughput during a 10-day period from January 21–30, 2024 in the 700 MHz frequency band.

- ***Downlink Channel TTI Occupancy (red line, left axis).*** This shows the hourly average of the transmission time interval (TTI) occupancy, which is the percentage of an antenna sector's data resource blocks that is in use within a fixed timeframe. When TTI occupancy exceeds 80 percent, the number of data blocks available per customer is reduced, and data throughput is significantly reduced. When TTI occupancy reaches 100 percent and the facility's data resources are exhausted, existing connections are severely degraded, voice calls may drop, and users attempting new connections are rejected.

- ***Downlink Data Throughput (green line, right axis).*** This shows the hourly average downlink data throughput (download speed) experienced by network users served by these antenna sectors, measured in megabits/second. The FCC defines broadband speed as downlink throughput over 25 megabits/second.

As the TTI occupancy of these antenna sectors spiked during daytime hours each day, the data throughput correspondingly fell, as shown in the following charts.

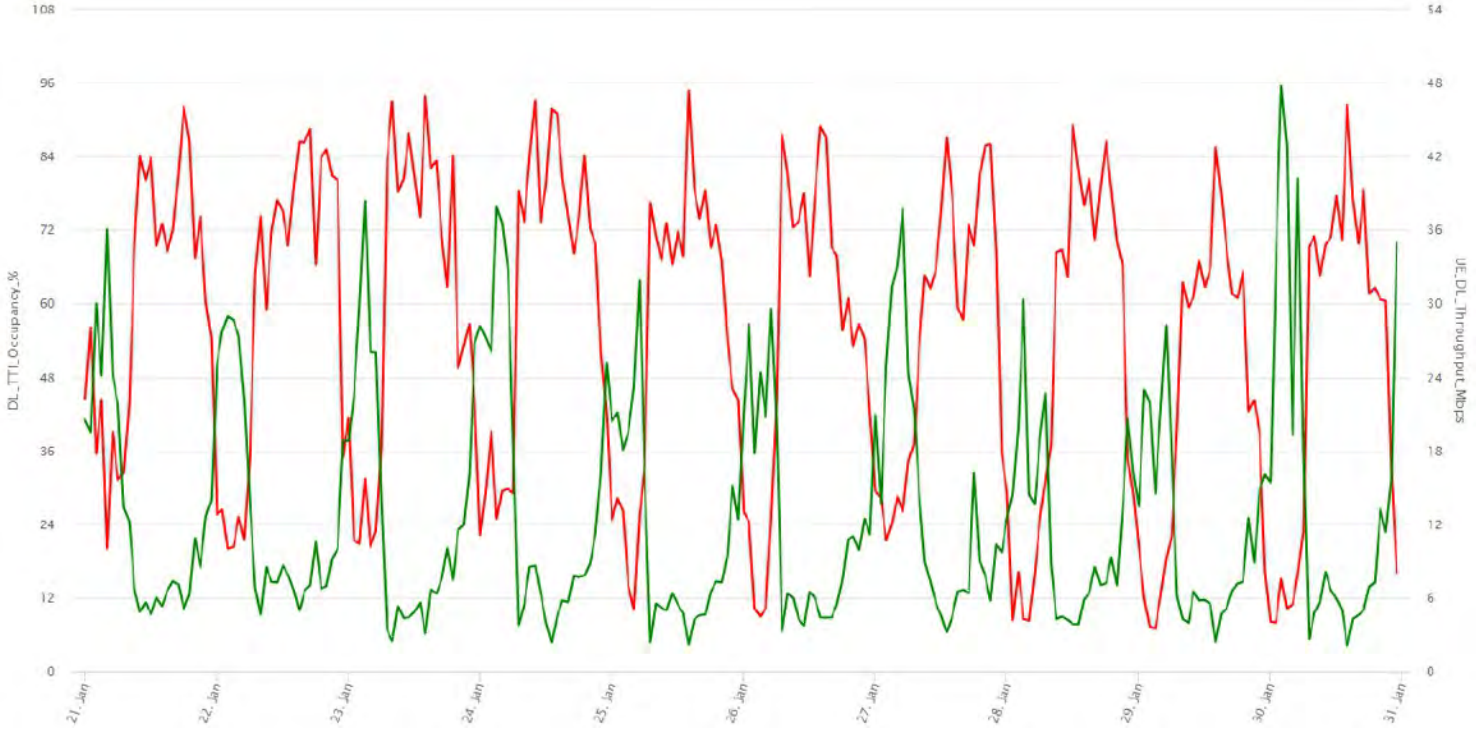
TTI occupancy of the Lake Forest Park southeast-facing antenna sector serving much of the gap area exceeded 85 percent every day, reaching about 95 percent on several days. Its data throughput fell under 6 megabits/second every day—less than one-quarter of FCC broadband level. On some days, throughput dipped well under 6 megabits/second during times of high demand.

TTI occupancy of the Salmon Falls Road southwest-facing antenna sector exceeded 85 percent most days, with throughput well under broadband level for sustained periods every day, dipping under 12 megabits/second many days.

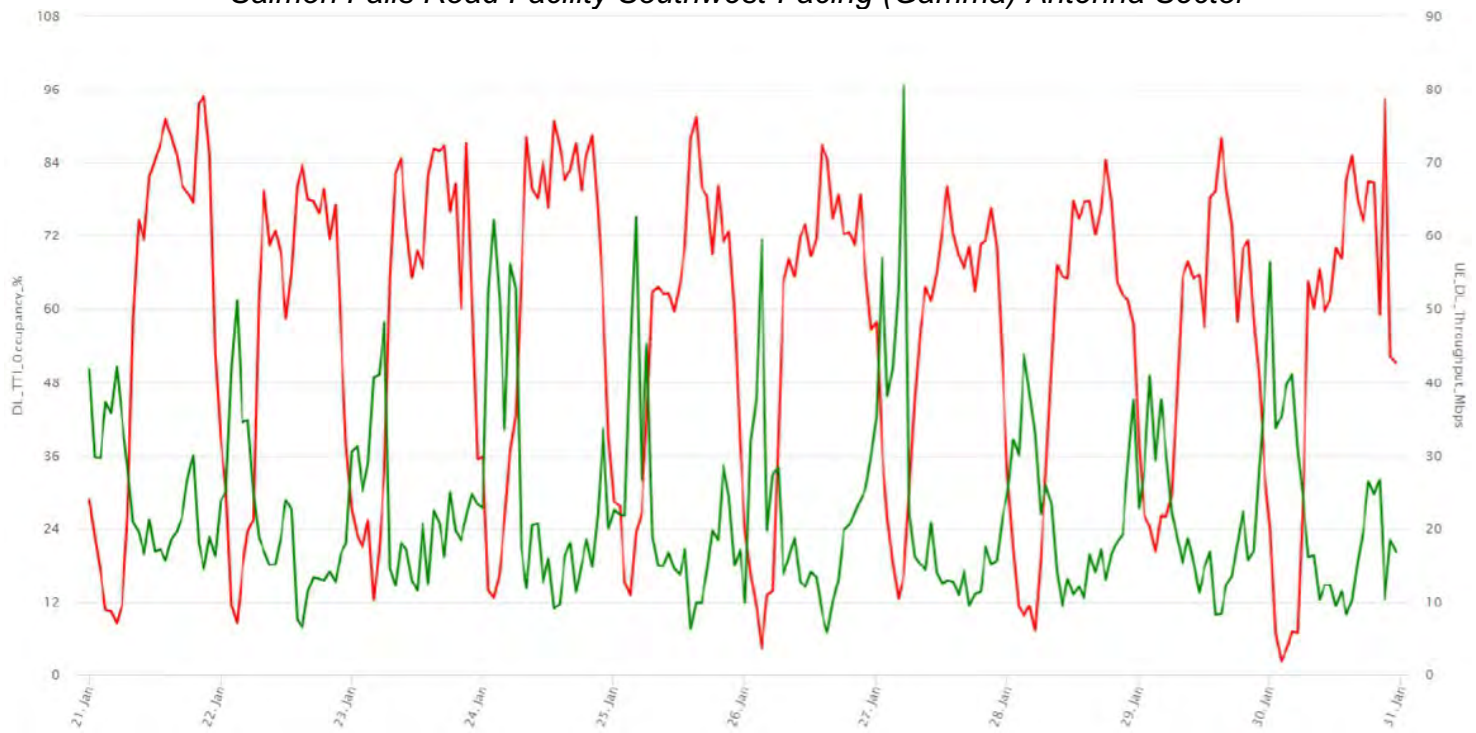
TTI occupancy of the King Edward north- and east-facing antenna sectors exceeded 80 percent on many days, with throughput of the north-facing sector around or below 12 megabits/second for sustained periods every day, and throughput of the east-facing sector falling to 12 megabits/second on many days.

TTI Occupancy versus Data Throughput
Low-Band 700 MHz Frequency
January 21–30, 2024

Lake Forest Park Facility Southeast-Facing (Beta) Antenna Sector

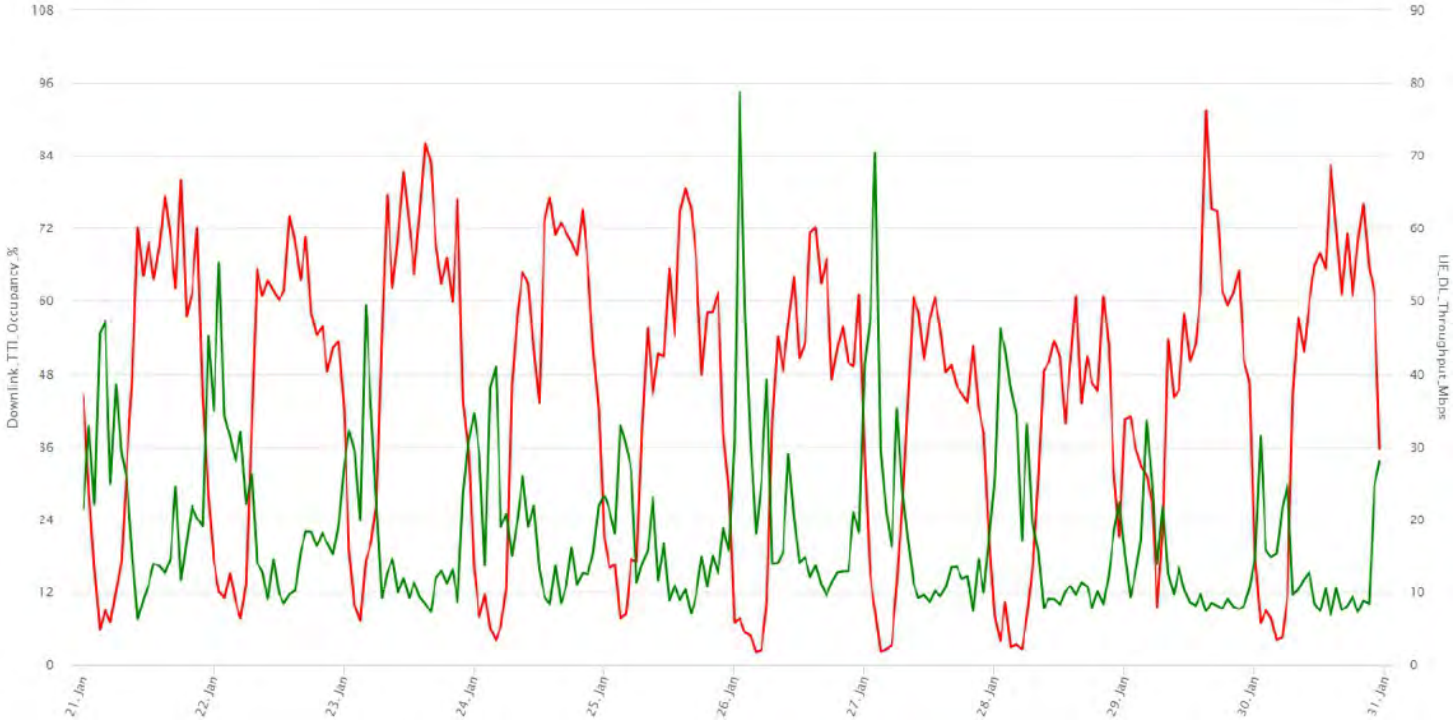


Salmon Falls Road Facility Southwest-Facing (Gamma) Antenna Sector

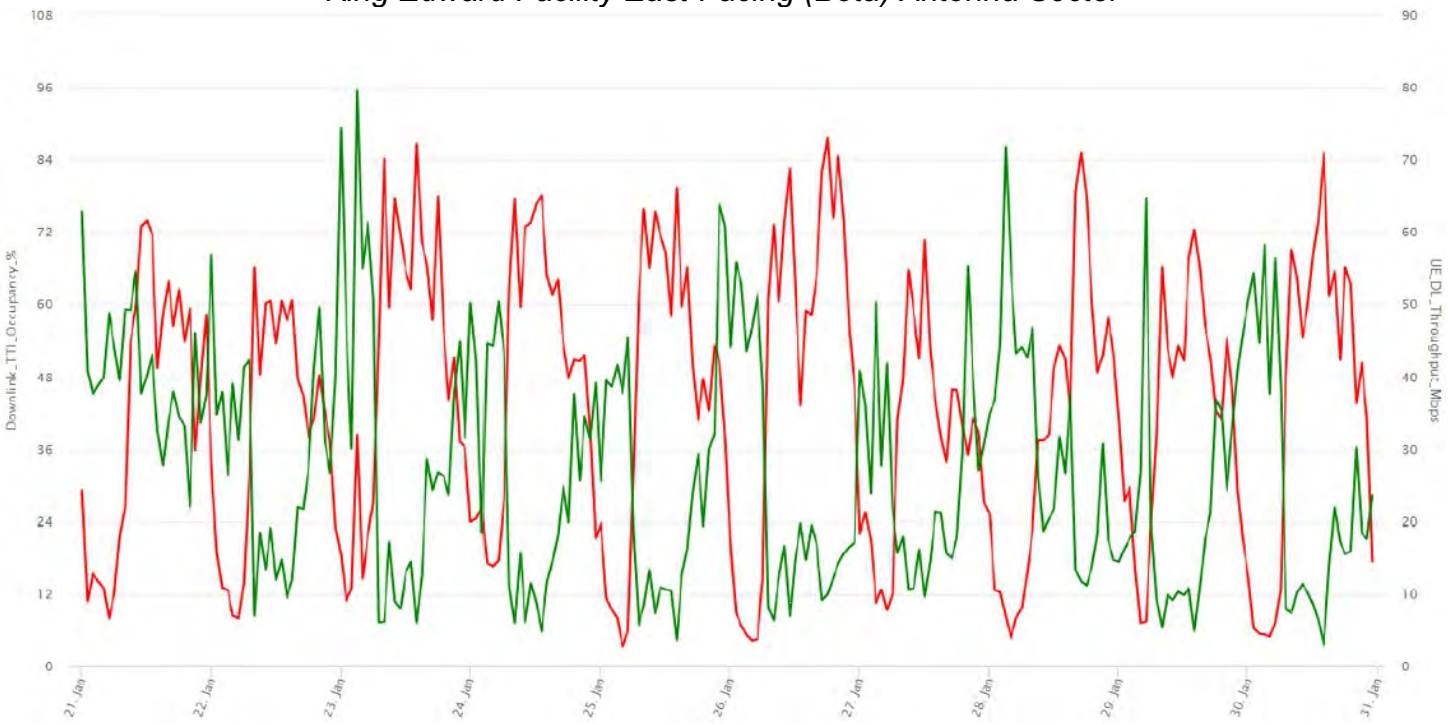


TTI Occupancy % (left axis)
Downlink Throughput (Megabits/sec, right axis)

King Edward Facility North-Facing (Alpha) Antenna Sector



King Edward Facility East-Facing (Beta) Antenna Sector

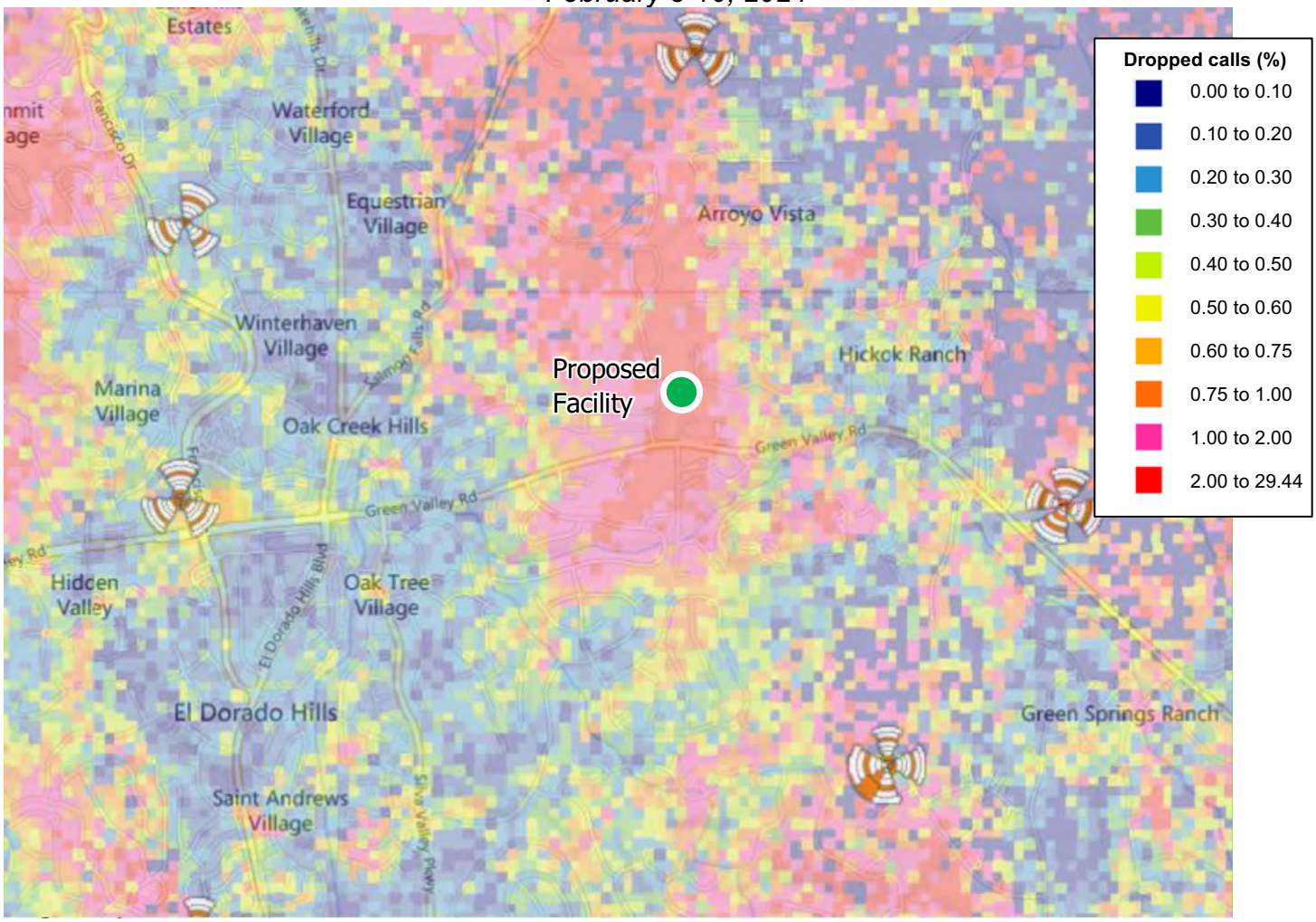


TTI Occupancy % (left axis)
Downlink Throughput (Megabits/sec, right axis)

When an antenna sector reaches capacity exhaustion, users engaged in voice calls experience dropped calls. The following map shows the percentage of dropped calls reported by user devices over a three-day period during February 8-10, 2024, analyzed by Verizon Wireless's TrueCall tool.

In this case, red areas indicate a high number of dropped calls, notably in the residential area around the Proposed Facility.

Dropped Calls Rate
February 8-10, 2024



Conclusion

As the Verizon Wireless network matures, the network must be supplemented with more sites closer to customers, in large measure due to the increase in usage of the network. New wireless technology requires facilities closer to customers, and this service cannot be provided adequately by the existing distant Verizon Wireless facilities, which provide only weak signal to the gap area. These network challenges have led to the Significant Gap in Verizon Wireless voice and data service coverage in the west Green Valley Road area. Verizon Wireless must deploy the Proposed Facility to provide reliable service to customers, and to avoid further degradation of its network in the area of the Significant Gap.

Please feel free to contact me with any questions or comments regarding Verizon Wireless's proposed facility.

Respectfully submitted,

Ericson Malana
RF Design Engineer
Network Engineering Department
Verizon Wireless

My responsibilities include planning, design and implementation of improvements to network infrastructure to provide reliable service. I have been in the wireless telecommunications industry for 29 years. I have ten years of experience in cellular RF network design. I received my Bachelor’s degree in Electronics and Communications Engineering at Mapua Institute of Technology in the Philippines