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January 11, 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
4994 Hillsdale Circle, El Dorado Hills

Executive Summary

Verizon Wireless has identified a significant gap in service in south El Dorado Hills, stretching from White Rock Road to the north to Wetsel Oviatt Road to the south, including the Heritage and Blackstone residential neighborhoods and the El Dorado Hills Business Park. This area currently receives inadequate service coverage from Verizon Wireless's existing Folsom Ranch facility located 2.0 miles northwest of the Proposed Facility, the Silva Valley Parkway facility 2.0 miles north, and the New Hillsdale facility 3.25 miles southeast. There are no other Verizon Wireless facilities nearby that provide appreciable service levels to the area. 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 lock 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
700 MHz	UHF Low Band	700 MHz	22 MHz
850 MHz	Cellular	850 MHz	25 MHz
PCS	Personal Communications Service	1900 MHz	10 MHz
AWS	Advanced Wireless Service	2100 MHz	60 MHz
CBRS	Citizen's Broadband Radio Service	3550 MHz	100 MHz
C-Band	C-Band	3700 MHz	160 MHz

Coverage Gap

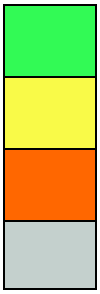
Verizon Wireless is experiencing a gap in its service coverage stretching from White Rock Road to the north to Wetsel Oviatt Road to the south. This includes a near-complete lack of reliable in-building low-band 700 MHz coverage in the Heritage and Blackstone residential areas, each with hundreds of homes, as well as the El Dorado Hills Business Park, which includes areas around Golden Foothills Parkway, Hillsdale Circle and Investment Boulevard and employs thousands of workers. There is a lack of reliable low-band 700 MHz in-vehicle service in these areas, with many local roadways lacking reliable in-vehicle service, including stretches of White Rock Road, Four Seasons Drive, Robert J. Mathews Parkway, and local roads in the Blackstone neighborhood.

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

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 the Heritage and Blackstone neighborhoods as well as industrial and office developments in the El Dorado Hills Business Park. In total, the Proposed Facility will provide new reliable in-building coverage to an area of 4.3 square miles where currently lacking, with a population of 1,528.

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.

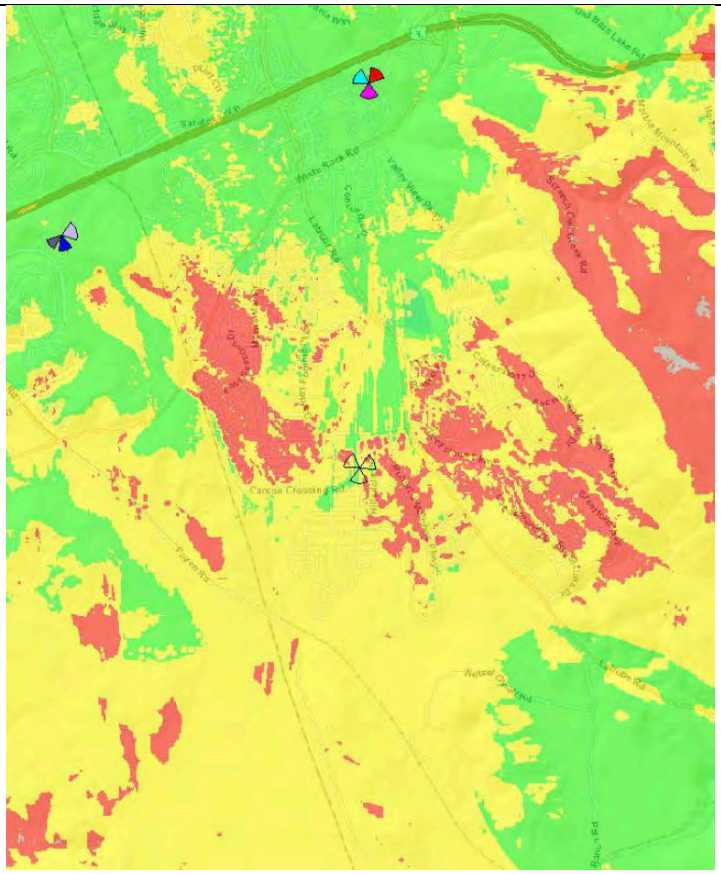
Outdoor >= -95 dBm. Red depicts reliable outdoor service only.

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

White areas do not receive reliable service levels.

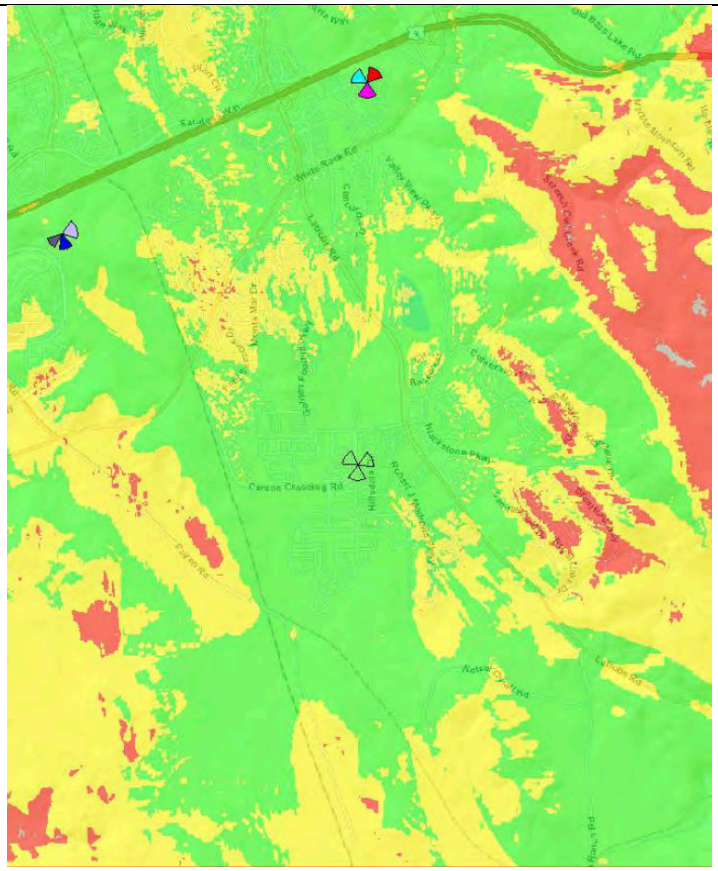
Existing
Low-Band 700 MHz Coverage

RSRP Coverage
In-building >= -75 dBm
In-vehicle >= -85 dBm
Outdoor >= -95 dBm
Unreliable >= -105 dBm



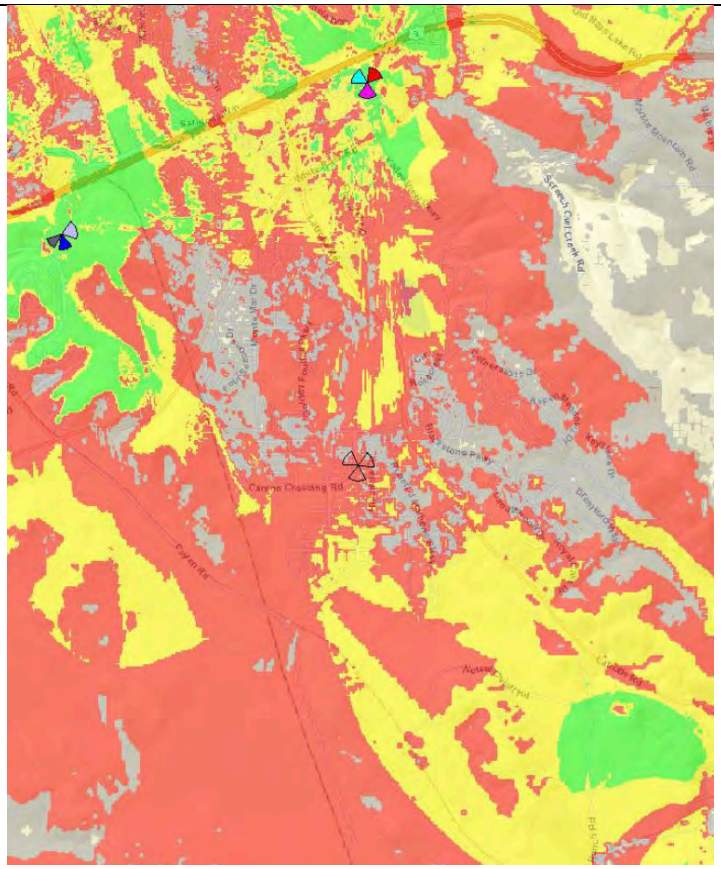
Proposed
Low-Band 700 MHz Coverage

RSRP Coverage
In-building >= -75 dBm
In-vehicle >= -85 dBm
Outdoor >= -95 dBm
Unreliable >= -105 dBm



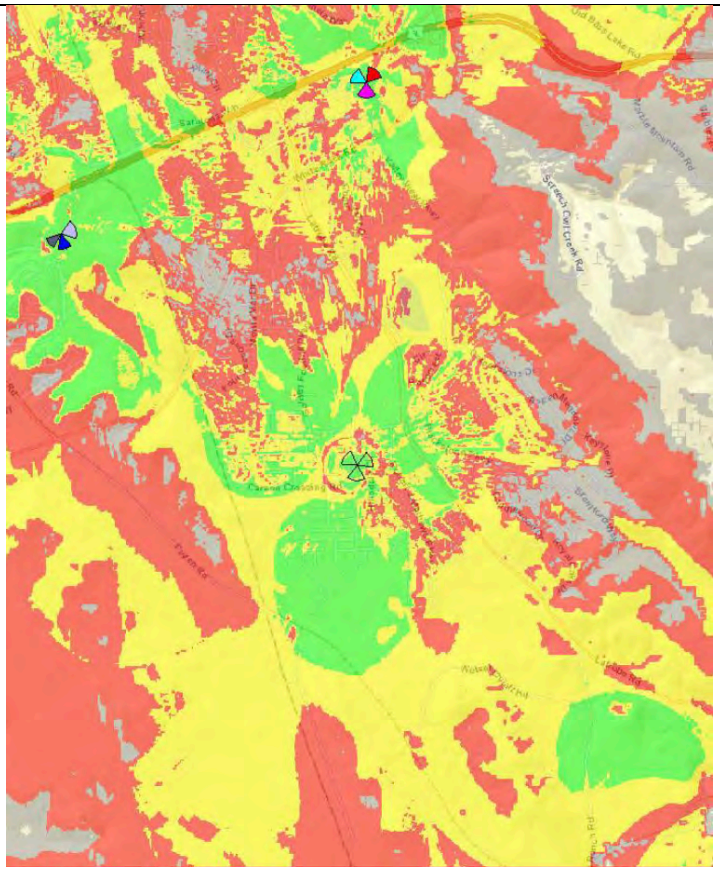
Existing
Mid-Band AWS Coverage

RSRP Coverage
- In-building >= -75 dBm
- In-vehicle >= -85 dBm
- Outdoor >= -95 dBm
- Unreliable >= -105 dBm



Proposed
Mid-Band AWS Coverage

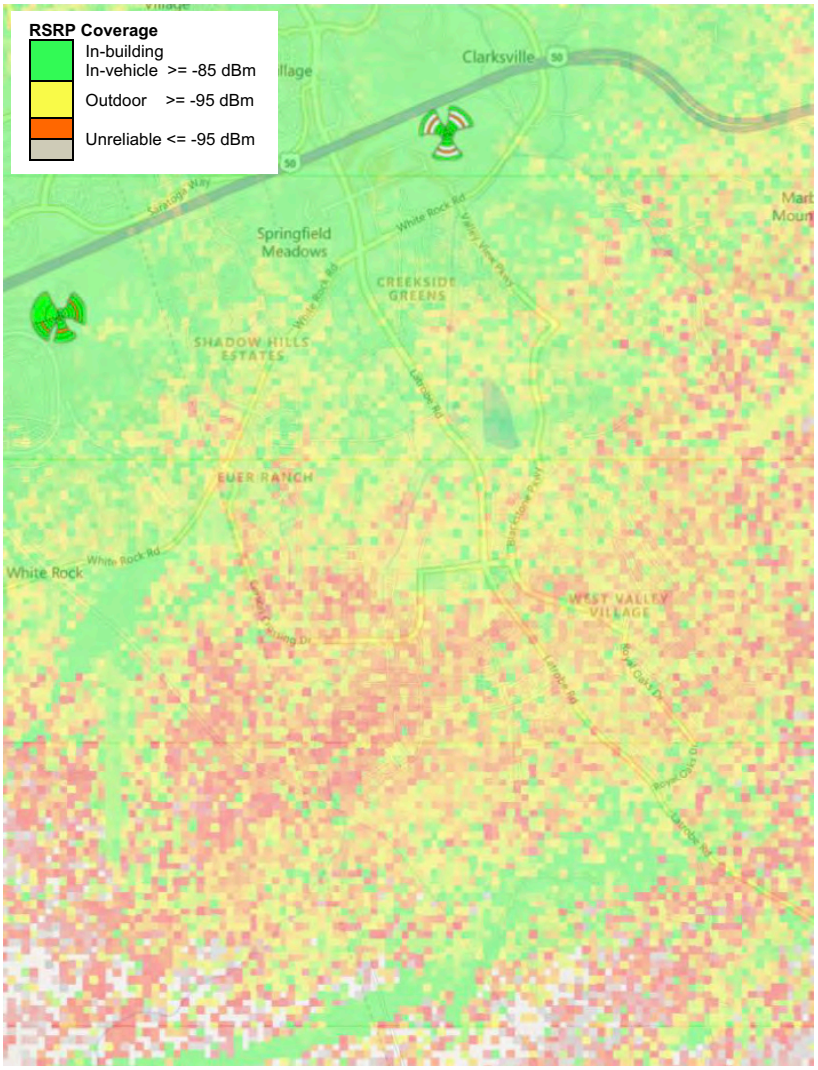
RSRP Coverage
- In-building >= -75 dBm
- In-vehicle >= -85 dBm
- Outdoor >= -95 dBm
- Unreliable >= -105 dBm



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 from December 14–16, 2023 (Thursday–Saturday). 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 much of the gap area, with much of the northern portion receiving outdoor service levels or worse, and the southern portion receiving mostly unreliable service.

RSRP Average Signal Level Reported by User Devices
December 14–16, 2023



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 three surrounding facilities: the southeast-facing antenna sector of the Folsom Ranch facility 2.0 miles northwest and 250 feet greater in elevation, the south-facing sector of the Silva Valley Parkway facility 2.0 miles north and 180 feet greater in elevation, and the northwest-facing sector of the New Hillsdale facility 3.25 miles southeast and 560 feet greater in elevation. 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. As discussed below, the Silva Valley Parkway and New Hillsdale facilities are experiencing data capacity exhaustion.

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. The New Hillsdale facility serves a particularly large area because of its high elevation, including much of the gap area.

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.

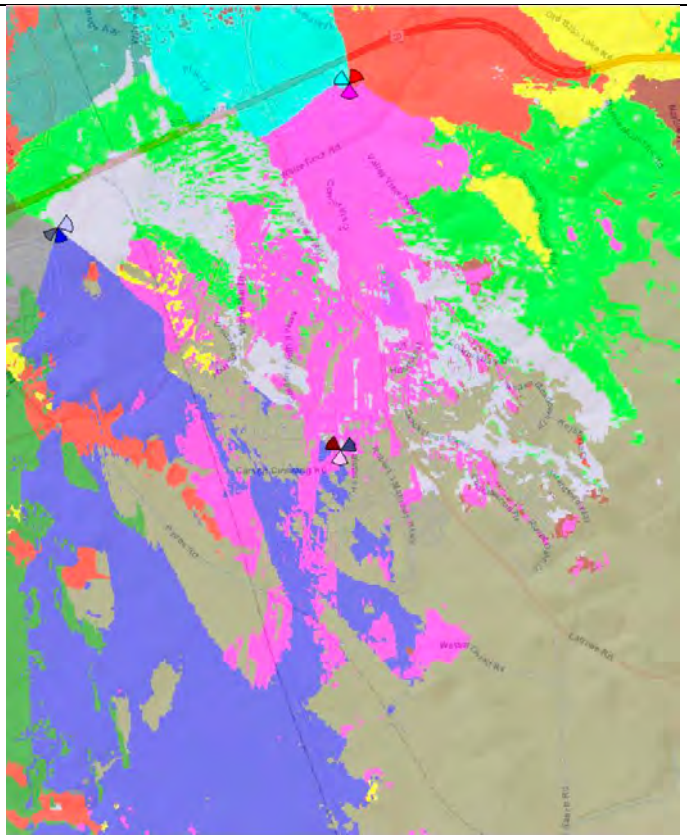
Existing
Low-Band 700 MHz Best Server

Dominant Signal of Antenna Sectors Serving Gap Area

Folsom Ranch Facility
Northeast
Southeast

Silva Valley Parkway Facility
South

New Hillsdale Facility
Northwest



Proposed
Low-Band 700 MHz Best Server

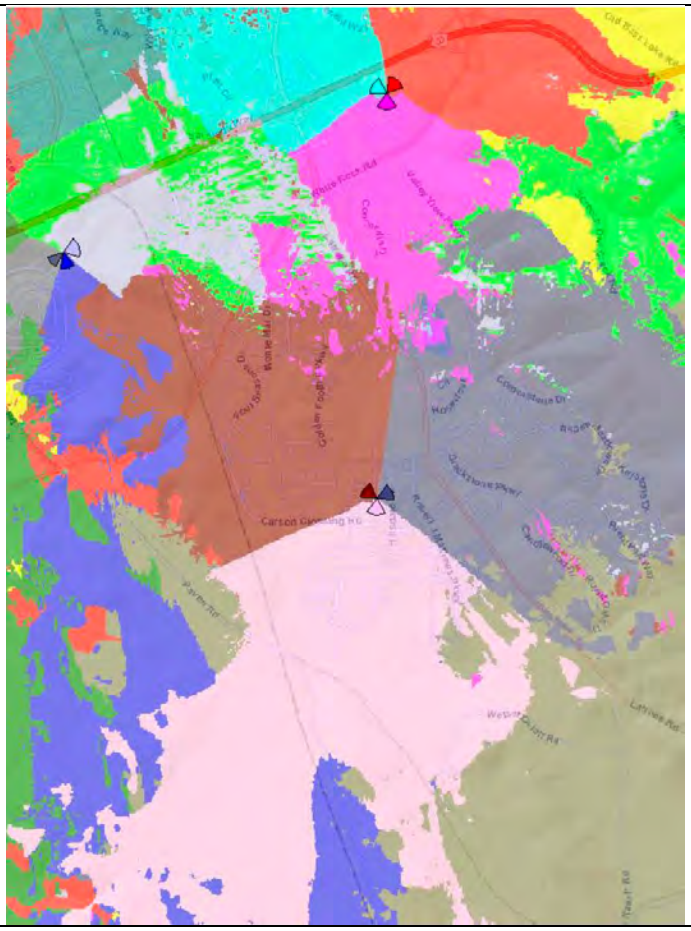
Dominant Signal of Antenna Sectors Serving Gap Area

Folsom Ranch Facility
Northeast
Southeast

Silva Valley Parkway Facility
South

New Hillsdale Facility
Northwest

Proposed Facility
Northeast
South
Northwest



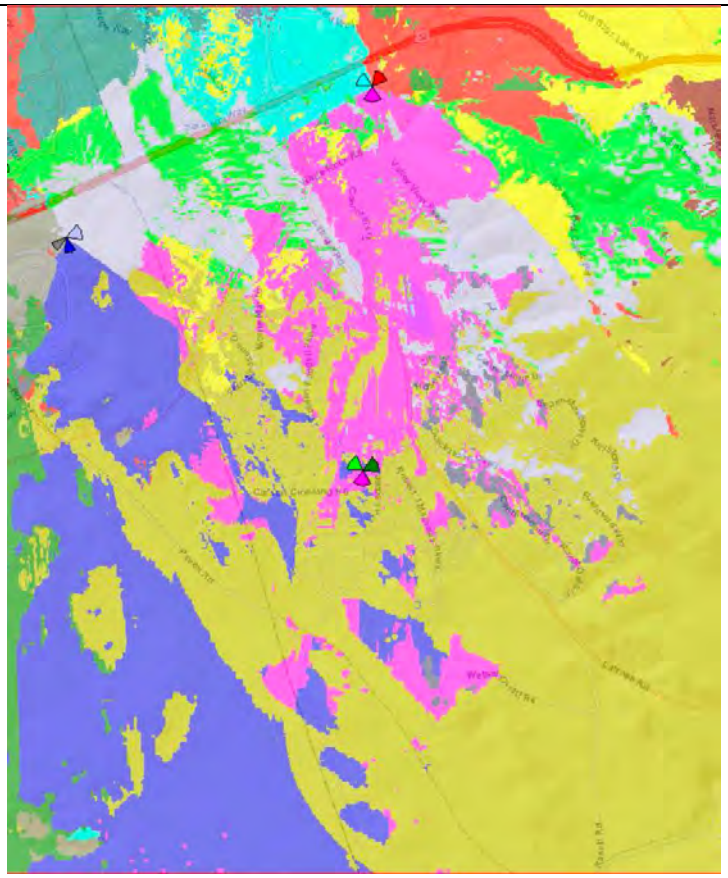
Existing
Mid-Band AWS Best Server

Dominant Signal of Antenna Sectors Serving Gap Area

Folsom Ranch Facility
Northeast
Southeast

Silva Valley Parkway Facility
South

New Hillsdale Facility
Northwest



Proposed
Mid-Band AWS Best Server

Dominant Signal of Antenna Sectors Serving Gap Area

Folsom Ranch Facility
Northeast
Southeast

Silva Valley Parkway Facility
South

New Hillsdale Facility
Northwest

Proposed Facility
Northeast
South
Northwest

Capacity Demand

As noted above, the Silva Valley Parkway facility south-facing antenna sector and the New Hillsdale facility northwest-facing sector serve much of the gap area. However, both of these antenna sectors are experiencing capacity exhaustion, which compromises network performance for users.

The following charts compare the channel TTI occupancy of these antenna sectors with their data throughput during a 10-day period from December 9–18, 2023, 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.

The chart shows that the TTI occupancy of both the Silva Valley Parkway south-facing antenna sector and the New Hillsdale facility northwest-facing sector exceeded 85 percent during many daytime hours every day December 9–18, 2023, and in particular reached 100 percent for sustained periods during daytime hours on Monday through Friday, December 11–15.

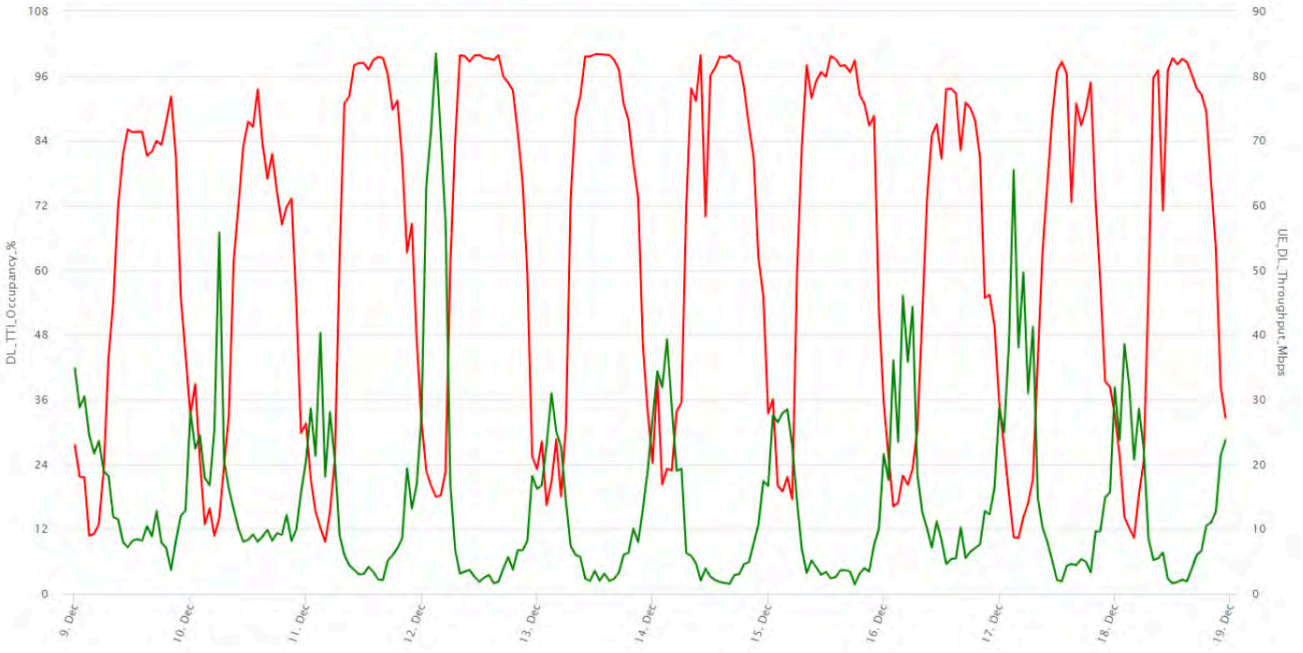
Downlink Data Throughput (green line, right axis). This shows the hourly average downlink data throughput (download speed) experienced by network users served by these antenna sectors, measured in megabits/second. The FCC defines broadband speed as downlink throughput over 25 megabits/second.

As the TTI occupancy of these sectors spiked during daytime hours each day, the data throughput correspondingly fell. For the Silva Valley Parkway south-facing antenna sector, data throughput fell to under 12 megabits/second each day, with sustained periods when throughput was only 3 megabits/second or less, notably on Monday through Friday, December 11–15. That is less than 20 percent of broadband-level speed, 25 megabits/second.

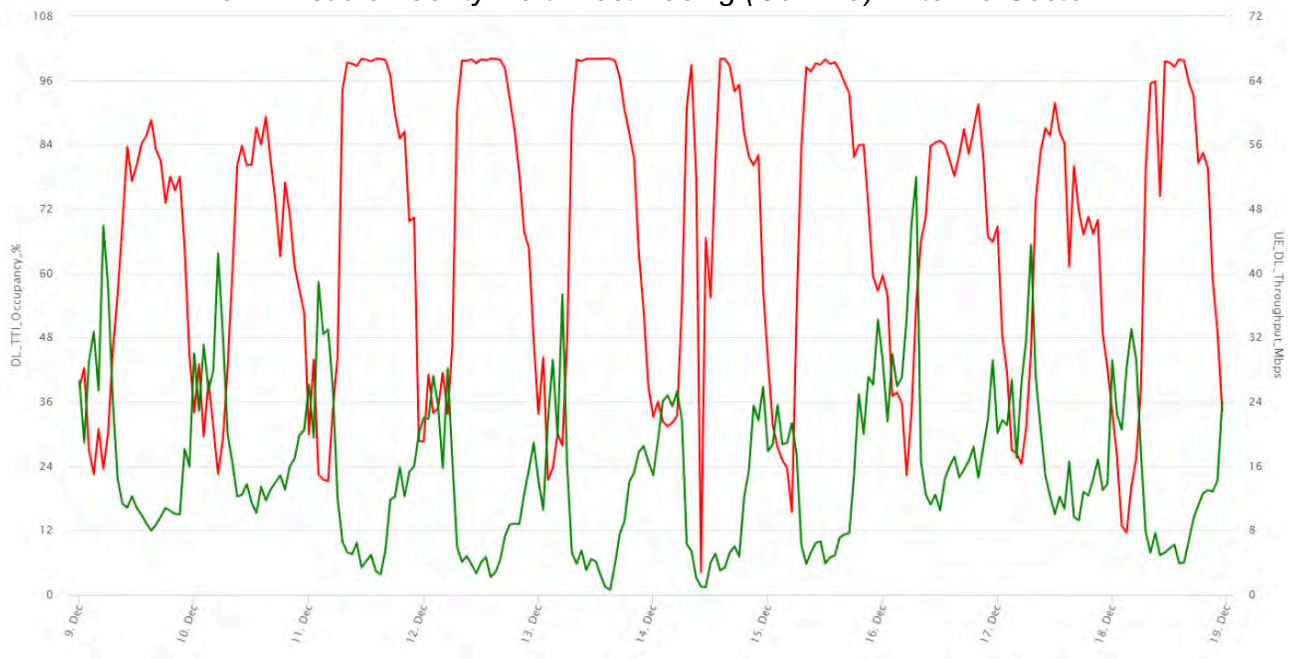
For the New Hillsdale Facility northwest-facing antenna sector, data throughput fell to under 12 megabits/second Monday through Friday, December 11–15 and Sunday, December 18, falling to under 5 megabits/seconds on several days.

TTI Occupancy versus Data Throughput
Low-Band 700 MHz Frequency
December 9–18, 2023

Silva Valley Parkway South-Facing (Beta) Antenna Sector



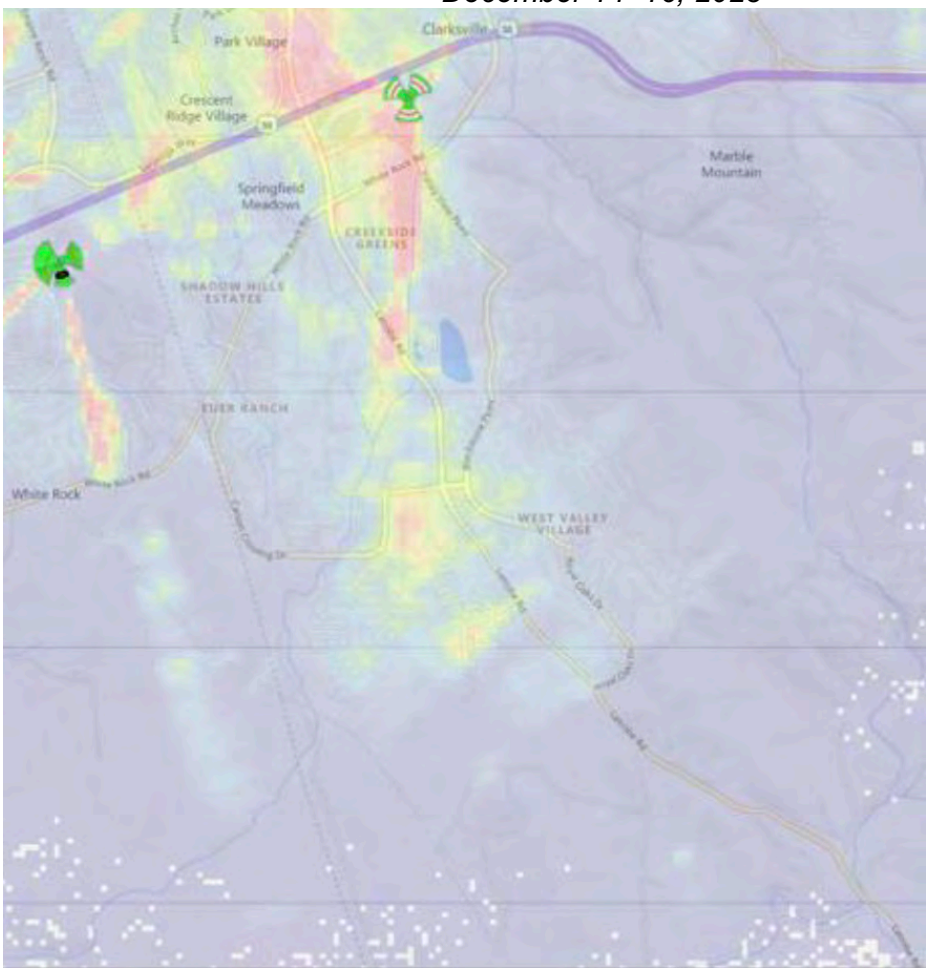
New Hillsdale Facility Northwest-Facing (Gamma) Antenna Sector



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

The following map shows the concentration of radio resource control (RRC) requests in the area, which are the number of connection requests made by customers. The map shows to total RRC requests during a three-day period, December 14–16, 2023. Areas in red experienced the most requests, including the business park area around Hillsdale Circle where the Proposed Facility is located.

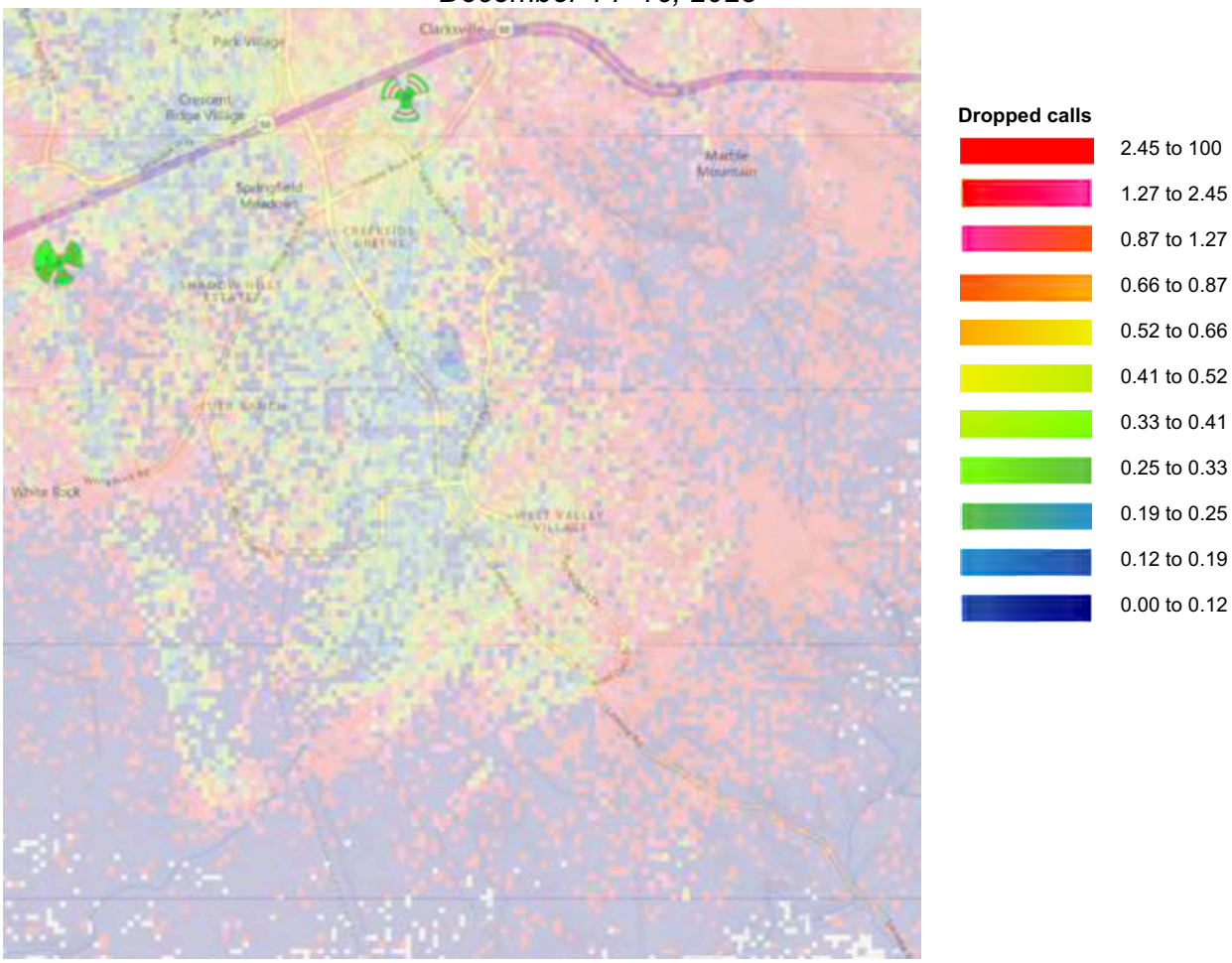
Radio Resource Control Requests (RRC)
South El Dorado Hills Area
December 14–16, 2023



When an antenna sector reaches capacity exhaustion, users engaged in voice calls experience dropped calls. The following map shows the number of dropped during a three-day period, December 14–16, 2023.

In this case, red areas indicate a high number of dropped calls, notably in the Blackstone neighborhood east of Latrobe Road.

Dropped Calls
Silva Valley Parkway South-Facing Antenna Sector
December 14–16, 2023

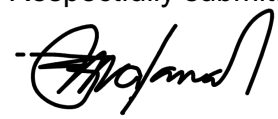


Conclusion

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 south El Dorado Hills 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 eight 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