



March 7, 2022

To: County of Marin

**From: Ravijot Randhawa, Radio Frequency Design Engineer
Verizon Wireless Network Engineering Department**

**Subject: Statement in Support of Verizon Wireless's Proposed Facility
1500 Butterfield Road, Sleepy Hollow**

Executive Summary

Verizon Wireless has identified a significant gap in service in the Sleepy Hollow area of Marin County. This area currently receives inadequate service coverage from the existing Skywalker Ranch facility 3.8 miles northwest of the proposed facility, the Fairfax facility 2.1 miles southwest, and the Butterfield facility 2.2 miles southeast. Existing facilities east along Highway 101 cannot serve the area due to distance and the high-elevation terrain in between along Terra Linda Ridge.

Due to the distance from existing facilities and a lack of strong dominant signal, there is a gap in reliable service coverage and poor signal quality in the Sleepy Hollow area.

In this area of Marin County, 40 percent of Verizon Wireless's bandwidth currently in use is in the low-band 700 MHz and 850 MHz frequencies. 60 percent is in the mid-band PCS (1900 MHz) and AWS (2100 MHz) frequencies. The low-band frequencies travel farther and are essential for providing reliable coverage to a target service area to ensure that customers can access the network. Mid-band frequencies supplement coverage and provide additional data capacity. Reliable low- and mid-band service is important for residents, visitors, workers, customers in transit, and contact with emergency response personnel.

Verizon Wireless is also deploying C-Band frequencies (3700-4000 MHz) recently licensed from the FCC. However, with higher frequencies than currently used, C-Band has a limited range, and if deployed on nearby facilities it could not expand their coverage to serve the gap in Sleepy Hollow.

I describe below the significant gap in coverage that Verizon Wireless seeks to remedy (the "Significant Gap"). To provide reliable coverage and strong dominant signal in the Sleepy Hollow area, the Significant Gap must be remedied through construction of a new facility camouflaged as a water tank (the "Proposed Facility").

Verizon Wireless Bandwidth by Frequency Band – Sleepy Hollow Area, Marin County

Band	FCC Designation	Frequency Band	Bandwidth
700 MHz	UHF Low Band	700 MHz	10 MHz
850 MHz	Cellular	850 MHz	10 MHz
PCS	Personal Communications Service	1900 MHz	10 MHz
AWS	Advanced Wireless Service	2100 MHz	20 MHz
C-Band	C-Band	3700 MHz	60 MHz

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.

Coverage Gap

Verizon Wireless is experiencing a gap in its service coverage in the Sleepy Hollow area. Reliable in-building and in-vehicle coverage is entirely lacking in the residential neighborhoods along the valley floor, with only limited in-vehicle coverage on hillside slopes.

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 a broad residential area of Sleepy Hollow west of Sleepy Hollow Drive, including residential neighborhoods around Butterfield Road, Van Winkle Drive and Irving Drive, and stretching south to upslope residential areas around Raven Road and Ledger Road. The Proposed Facility will provide reliable in-building coverage to an area of 1.95 square miles with a population of 1,690. It also will provide new in-vehicle coverage in a larger area, including along Butterfield Road extending east to Deer Hollow Road.

A graphic description of the coverage gap is shown on the following coverage map, followed by a map showing the improved coverage to be provided by the Proposed Facility. Maps have been prepared for the 700 MHz frequency band, which provides the broadest coverage. With similar frequencies, the 700 MHz and 850 MHz bands have similar propagation characteristics.

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



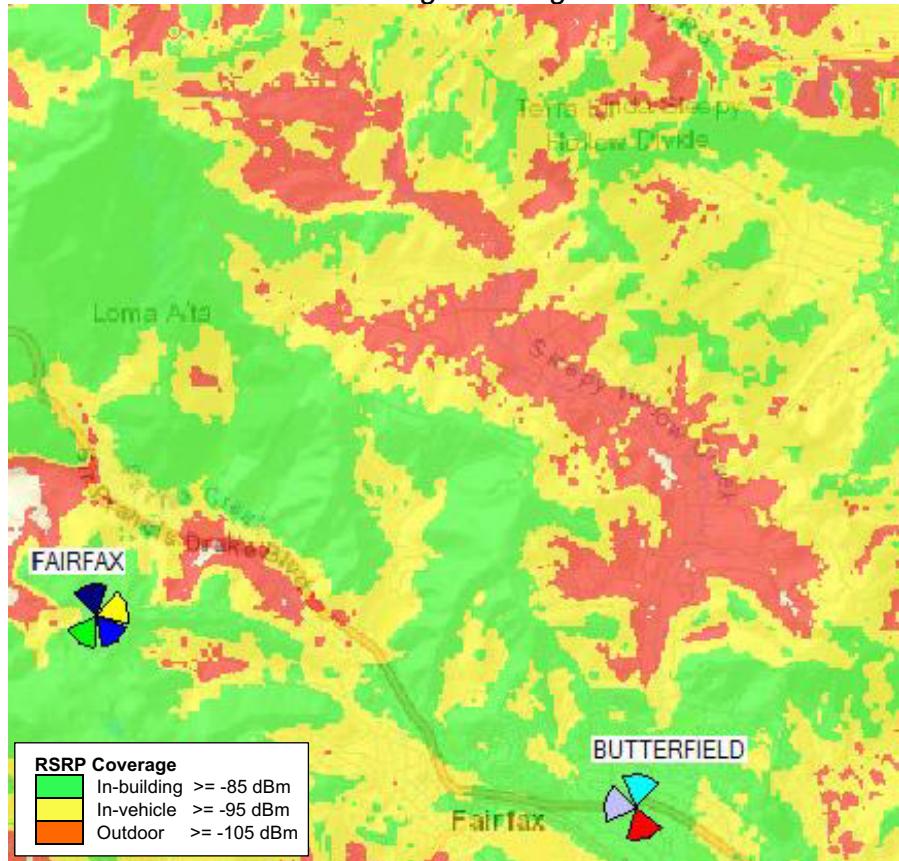
In-building >= -85 dBm. Green depicts good coverage that meets or exceeds thresholds for reliable network coverage in homes and vehicles.

In-vehicle >= -95 dBm. Yellow depicts reliable in-vehicle coverage only.

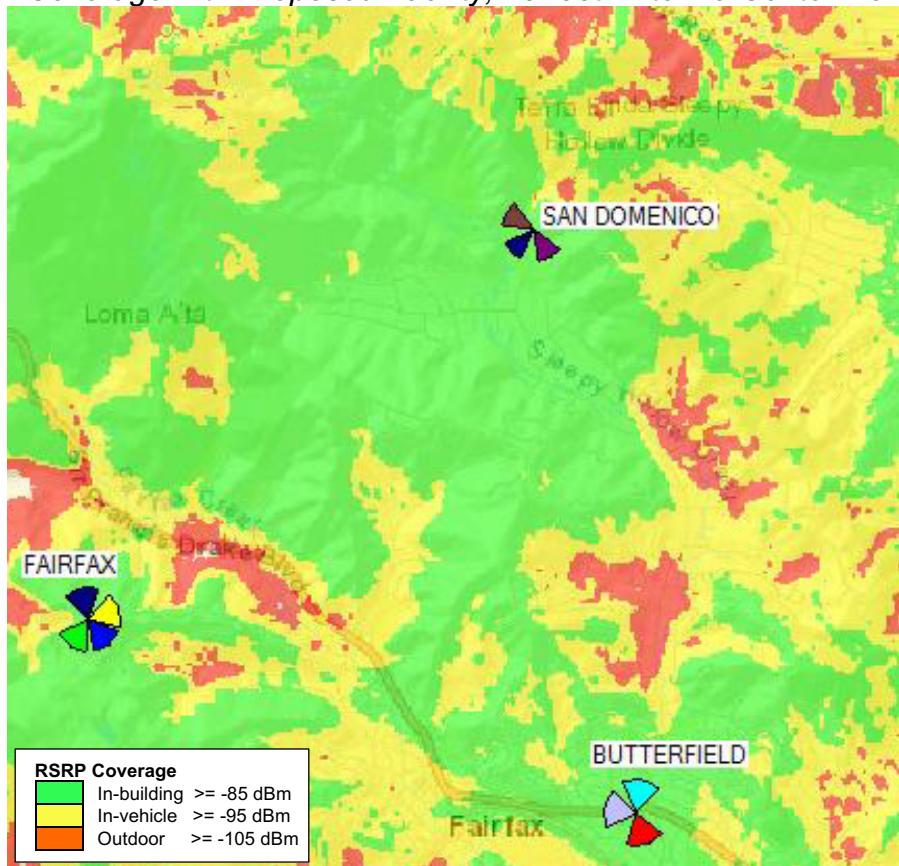
Outdoor >= -105 dBm. Red depicts reliable outdoor service only.

Unshaded areas do not receive reliable service levels.

Existing Coverage



Coverage with Proposed Facility, 25-foot Antenna Centerline



Dominant Signal

As described above, the identified gap area receives inadequate service from distant Verizon Wireless facilities that 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 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 these facilities is shown in a different color. The maps are prepared using the 700 MHz frequency band.

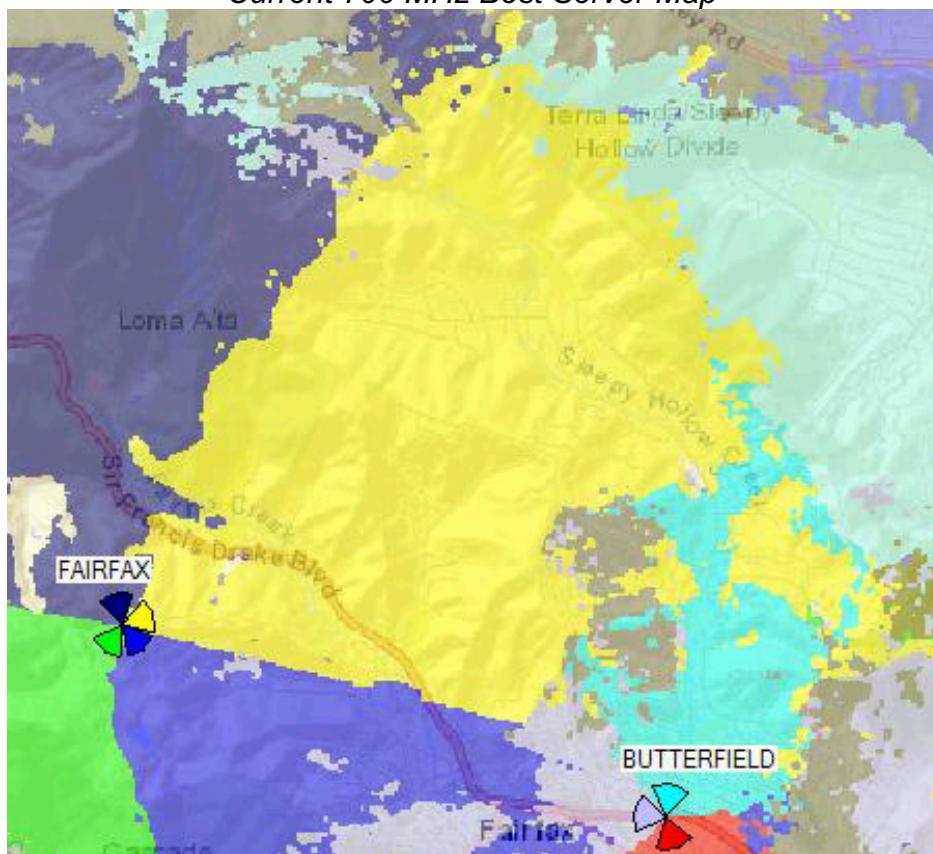
Although dominant, the signal from distant Verizon Wireless facilities is weak in the gap area. The northeast-facing antenna sector of the Fairfax facility (shown in yellow), at a high elevation 2.1 miles southwest of the Proposed Facility, is the primary server for a very large area including much of Sleepy Hollow. The north-facing antenna sector of the Butterfield facility (shown in blue), located on a building 2.2 miles southeast, serves a small area in east Sleepy Hollow.

At times of high traffic volume, the coverage area of the surrounding Verizon Wireless facilities shrinks to accommodate an increasing number of mobile devices closer to each facility. As a result, the coverage gap area expands and is exacerbated during times of high customer 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 2021 *Annual Survey Highlights*, mobile wireless data traffic more than doubled since 2016.

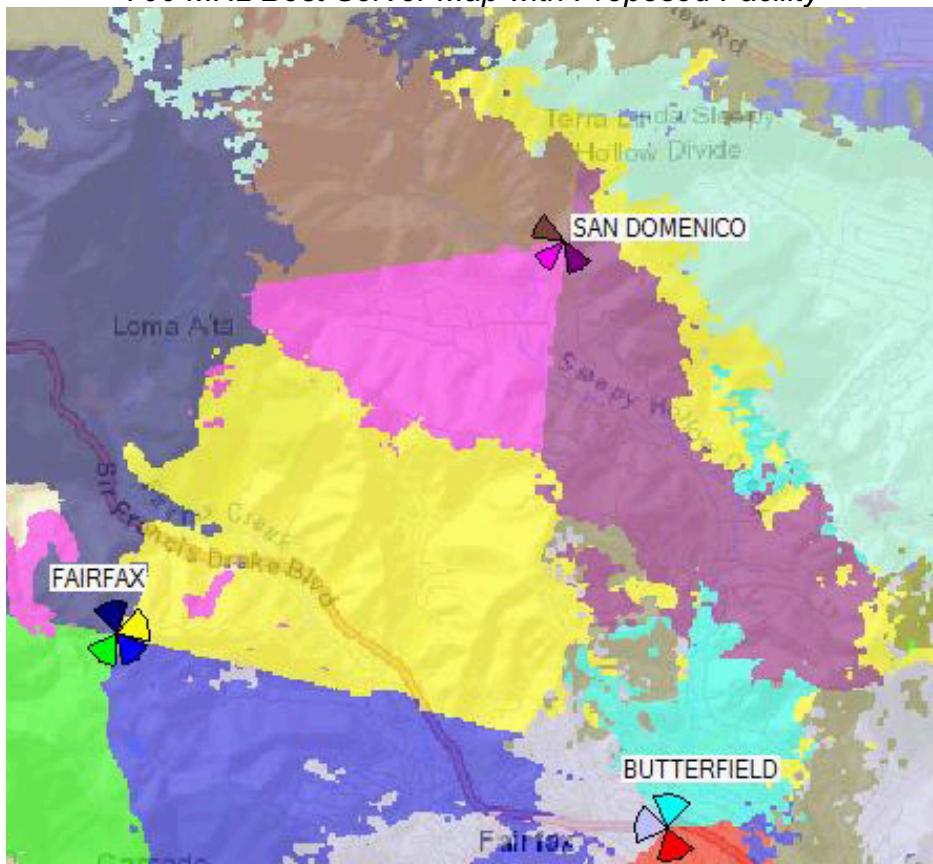
The lack of strong, reliable dominant signal degrades network performance, resulting in unreliable service, particularly during busy hours. This affects the reliability of Verizon Wireless service for residents, workers and visitors as well as for critical communications with emergency service personnel. 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.

As shown on the second best server map, the Proposed Facility is strategically located to provide strong, new dominant signal to the gap area (shown in shades of brown and purple). This will relieve the demand on the distant facilities so they can devote their resources to customers closer to their locations. This also will improve signal quality and overall network performance in the greater vicinity.

Current 700 MHz Best Server Map



700 MHz Best Server Map with Proposed Facility

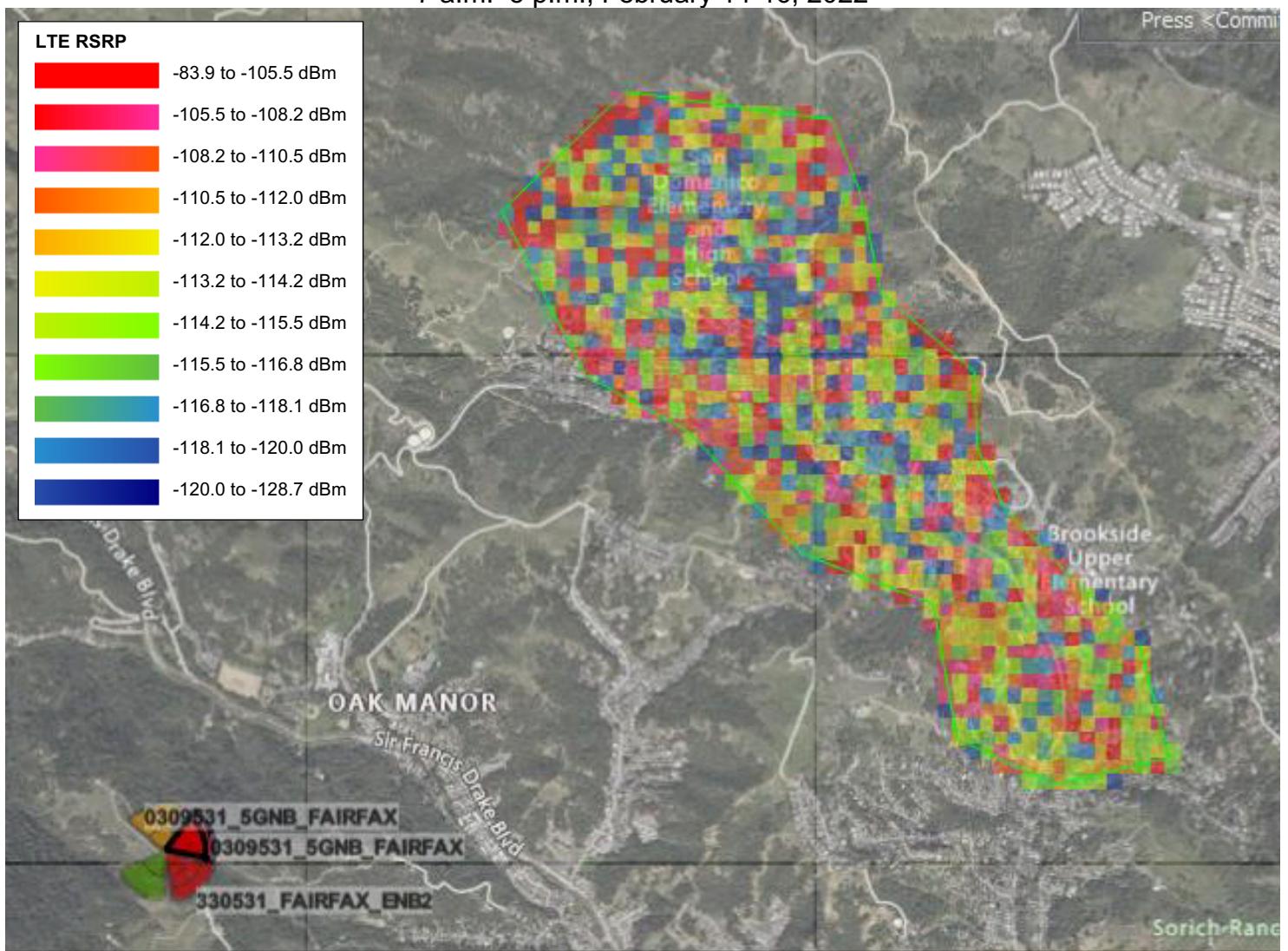


Signal Level and Quality

The following map shows the average RSRP of Verizon Wireless signal received by user devices within the Sleepy Hollow area between 7 a.m. and 5 p.m. from February 14-16, 2022. The devices report the RSRP to the network, and Verizon Wireless uses its TrueCall tool to analyze this data and optimize system performance.

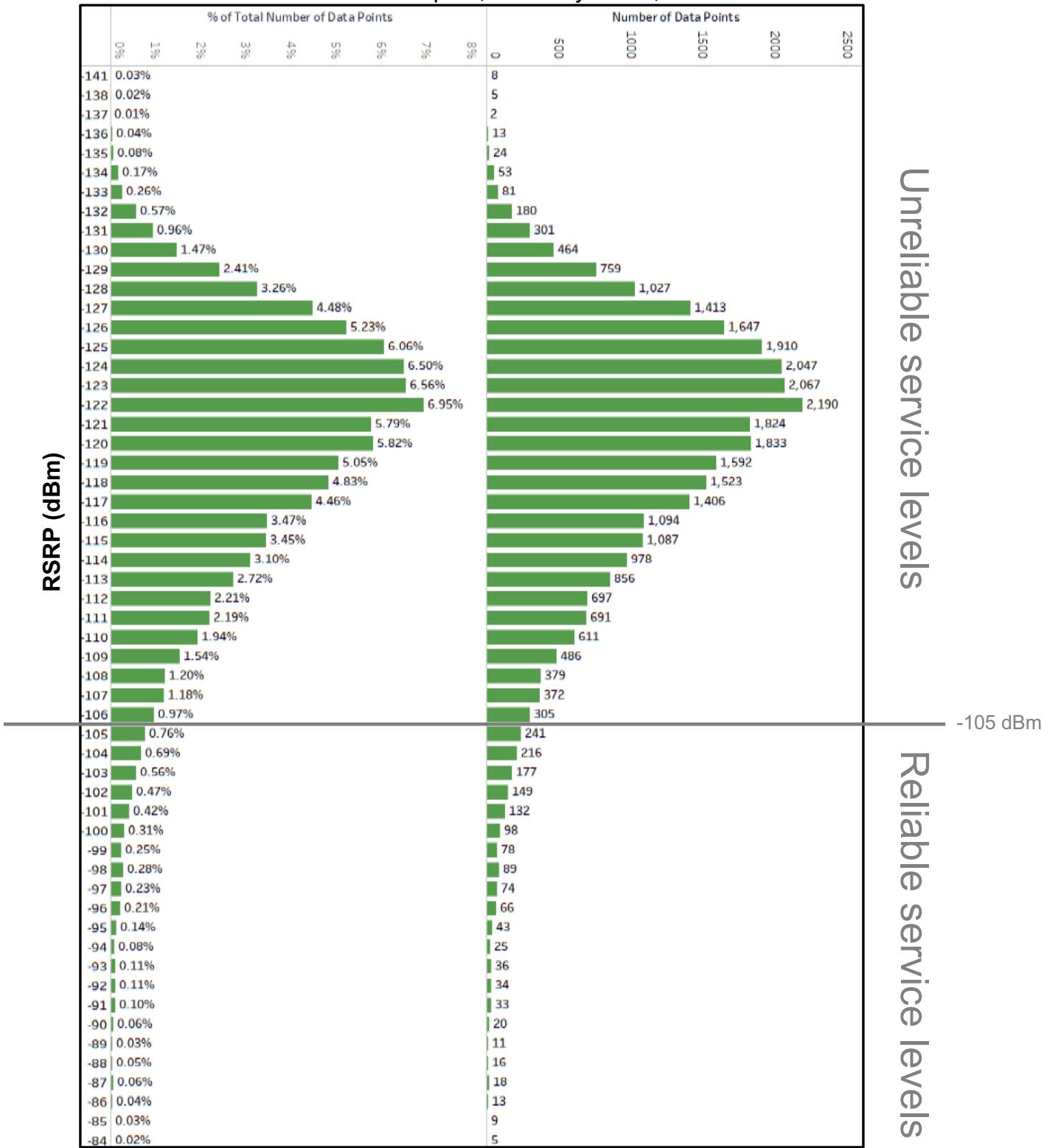
In this case, dark red squares indicate service levels as low as -105.5 dBm, the lowest threshold for reliable outdoor-level service, but those are the minority of results and scattered throughout the area. The orange, yellow, green and blue squares indicate unreliable service levels and are predominant in the area, with numerous green and blue squares showing very poor signal levels, particularly in the northern area of the gap near the Proposed Facility.

*RSRP Average Signal Level Reported by User Devices
7 a.m.–5 p.m., February 14–16, 2022*



The following chart shows the RSRP of individual connections reported by user devices within the Sleepy Hollow area between 7 a.m. and 5 p.m. from February 14-16, 2022. The chart shows both the percentage and total results in one-decibel increments. Only 5.01 percent of the user data reported indicated service levels at or above -105 dBm, the lowest threshold for reliable outdoor-level service.

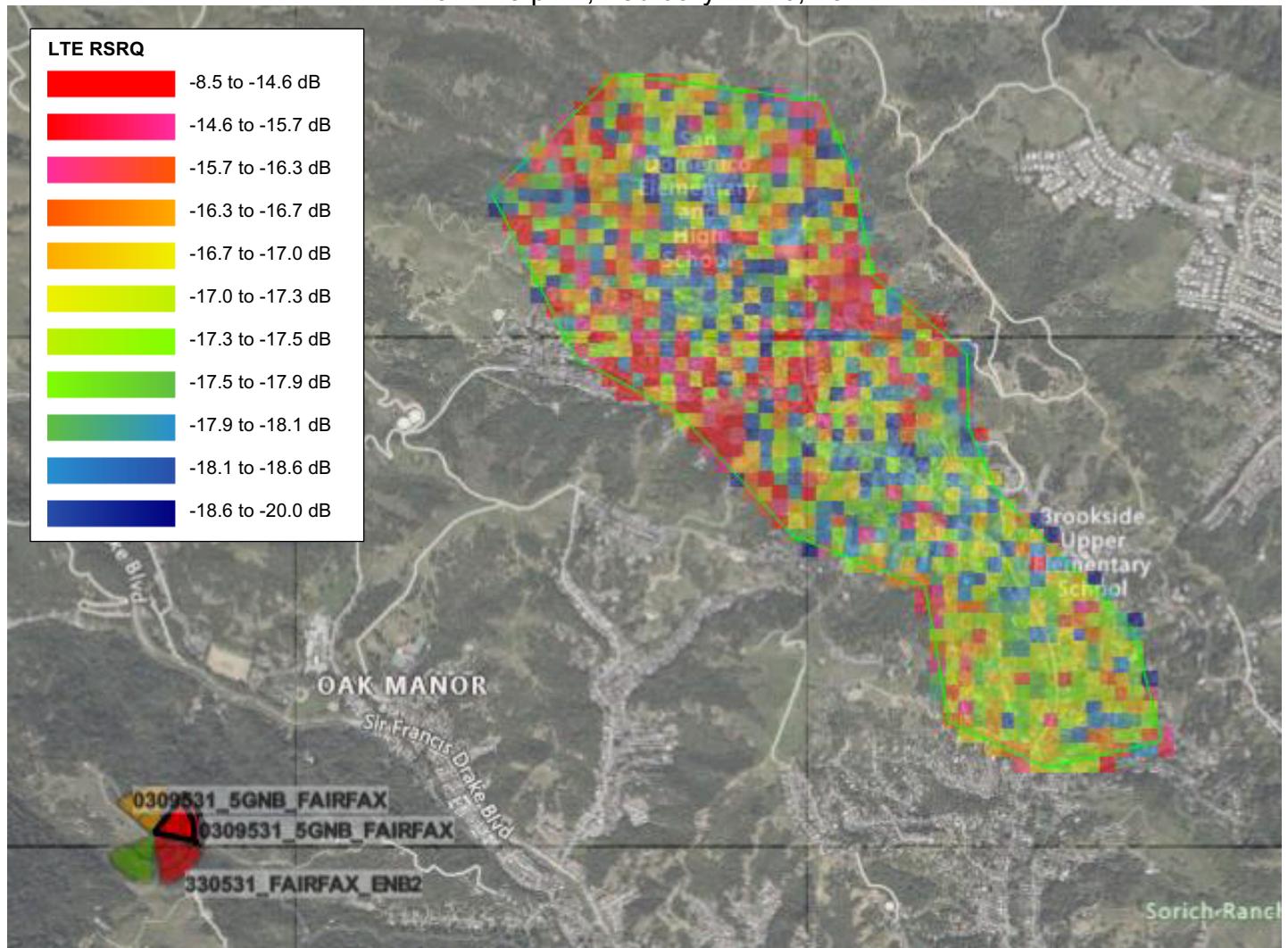
*RSRP Signal Level Reported by User Devices
7 a.m.–5 p.m., February 14-16, 2022*



The following map shows the average referenced signal receive quality (RSRQ) reported by the same user devices between 7 a.m. and 5 p.m. from February 14-16, 2022. This reflects the ratio of the signal level from existing Verizon Wireless facilities compared to interfering signal levels. As with RSRP, this measurement of signal quality is a negative number. The higher the number, the less interference, indicating better signal quality, connectivity and network performance. Lower numbers approaching -20 dB indicate poor signal quality, which results in connectivity issues. This data assists the network in assigning customer handsets to particular facilities.

The numerous yellow, green and blue squares indicate generally poor signal quality throughout the gap area. The Proposed Facility will provide strong new signal to improve signal quality and connectivity for users.

*RSRQ Average Signal Quality Reported by User Devices
7 a.m.–5 p.m., February 14-16, 2022*



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 facilities that provide only weak signal to the gap area. These network challenges have led to the Significant Gap in Verizon Wireless coverage in the Sleepy Hollow 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 facilities.

Respectfully submitted,

Ravijot Randhawa

Ravijot Randhawa
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My responsibilities include planning, design and implementation of improvements to network infrastructure to provide reliable service. I have over 10 years of experience in the wireless telecommunications industry. I received my degree in electronics and communication engineering from Guru Nanak Dev University in Amritsar, India.