

**A2P0217A**  
**St Lucie Trails**  
**Wireless Telecommunication**  
**Facility**

**Radio Frequency (RF) Engineering Report**

Last Updated	03/18/21
Revision Number	V1.4

## Table of Contents

Search Ring Area .....	3
Current Cell Site Coverage and Predicted Improvements .....	4
Certification Statement of Non-interference .....	6
Appendix A: Cellular Traffic Increase and Impact on Network Performance .....	7

Search Ring Area

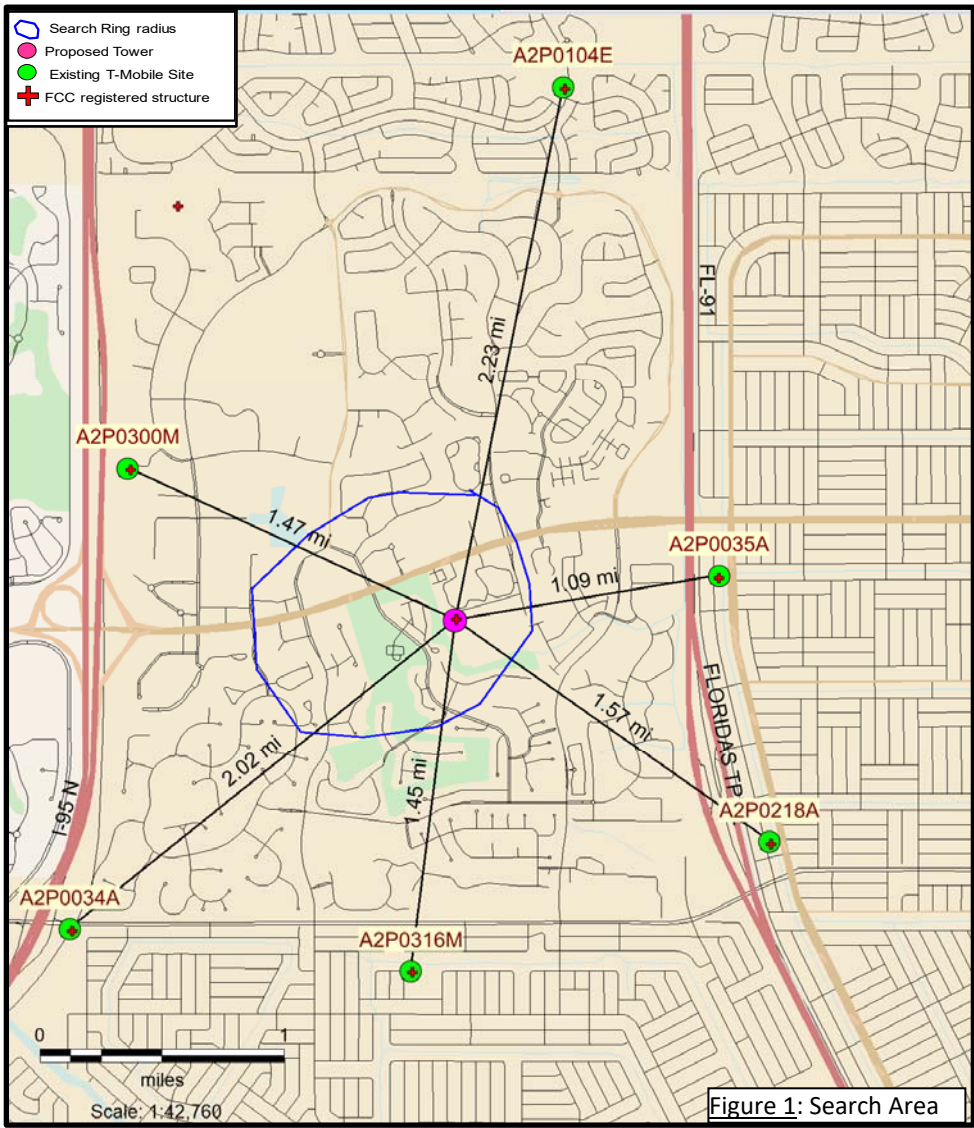


Figure 1: Search Area

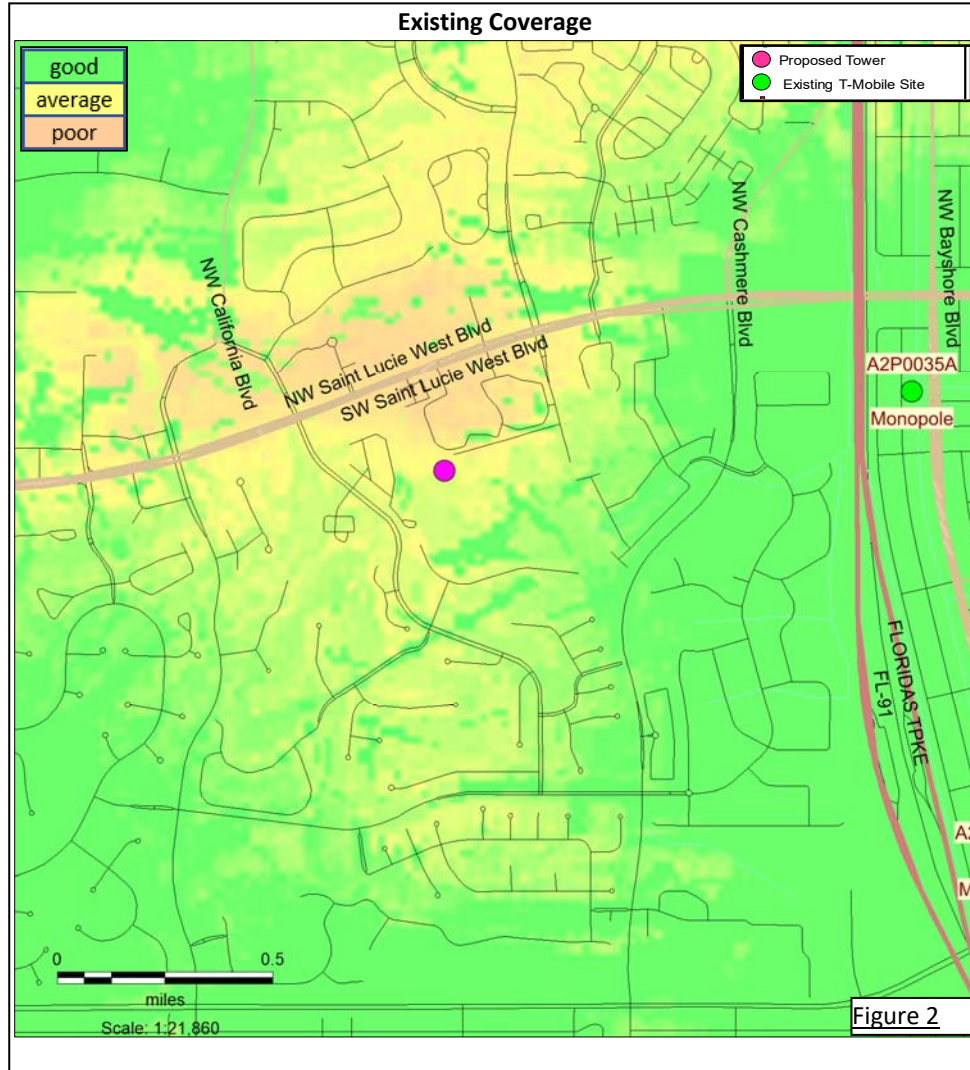
As part of T-Mobile’s commitment to improve service in the south Florida market a number of “search rings” have been issued to address coverage deficiencies in the cellular network. Each search ring is in an area where service levels are inadequate to provide the necessary cell phone coverage or capacity. Within the search ring existing towers or structures of sufficient height are sought with the goal of deploying radio transceivers and antennas to improve the local area service levels. Due to the dramatic increase in cell phone traffic and the popularity of wireless data applications over the last few years, significant demands have been placed on network coverage and capacity. One such area in need of improved services is in the area of St Lucie County from approximately NW Peacock Blvd in the north to Crosstown Pkwy in the south and from NW California Blvd in the west to SW/NW Cashmere Blvd in the east. Coverage levels are too low to support the capacity and coverage needs for this part of the network. Users placing calls indoors and especially during network busy hours may experience dropped calls, ineffective network attempts and slow data application speeds. In the worst-case a user may not be able to place a E911 call. There were no towers or structures of sufficient height within the T-Mobile search area that could accommodate the addition of new facility that would provide an adequate coverage improvement. The surrounding facilities have undergone extensive upgrades over the last decade

with no appreciable improvement in service levels in the area of concern. Shown above in Figure 1 is the T-Mobile search ring and the proposed location surrounded by existing T-Mobile cellular facilities (“cell sites”). The addition of a new tower of 120’ elevation will alleviate the significant service issues in this area.

TMO ID	Name	Class	Address	City	Antenna Elevation (ft)	Structure Height (ft)	Distance (mi)
A2P0035A	Atlantic Coast	Monopole	601 SW Bitmore Street	Port St Lucie	150	150	1.1
A2P0316M	L033 - 3_33 - Apache Park Tower S	Flag Pole	1445 SW Apache Avenue	Port Saint Lucie	144	150	1.5
A2P0300M	ALLTEL RESERVE/FPL	Monopole	417 NW FPL Drive	Port Saint Lucie	120	150	1.5
A2P0218A	Crown 813897 Crosstown	Monopole	1365 SW Biltmore Street	Port Saint Lucie	145	150	1.6
A2P0034A	AT&T	Self Support Tower	2200 SW JULIET AV	Port Saint Lucie	176	300	2.0
A2P0104E	Crown 810821 Torino	Flag Pole	5490-TW NW East Torino Parkway	Port Saint Lucie	116	120	2.2

**Current Cell Site Coverage and Predicted Improvements**

Good (reliable indoor service)	Average (reliable outdoor service)	below average (poor service)
Signal power levels able to support a wide range of wireless services both indoors and outdoors. These services include voice calls and high-speed data.	Users may experience call quality issues depending on the signal power levels at their specific location. These issues could include dropped calls, ineffective attempts (blocked calls) or slow data speeds. Service in outdoor locations would be markedly better than indoors in many instances.	A user would encounter call quality issues especially indoors or during network busy hours due to low signal power levels. These issues could include dropped calls, ineffective attempts (blocked calls) and slow data speeds. Service may only be available in outdoor locations. In the worst case a user may not be able to place an emergency (E911) call.



As part of T-Mobile’s design and development process a number of engineering studies are completed to ensure a best-fit approach for cell site additions in the network. Propagation or prediction plots are one of the most important of these and are used extensively to determine if a new proposal is adequate.

In Figure 2 the cell site propagation is shown as shades of color which represent signal power levels that a user would experience at a particular location. The propagation model is based on a predictive computer simulator application that is derived from proprietary methodologies. Green areas indicate signal power levels able to support a wide range of wireless services both indoors and outdoors. These services include voice calls and high-speed data. The yellow color indicates areas where a user may experience call quality issues due to inconsistent signal power levels. This may depend on their specific location. For instance, a person may be able to use the cell phone on one side of their house near a window but unable to connect in another part of the house. The red areas represent where a user would encounter call quality issues due to low or unusable signal power levels. This would be especially true indoors or during network busy hours. These issues could include dropped calls, ineffective attempts and slow data speeds. In the worst case a user may not be able to place an emergency (E911) call.

Predicted Coverage with New Facility

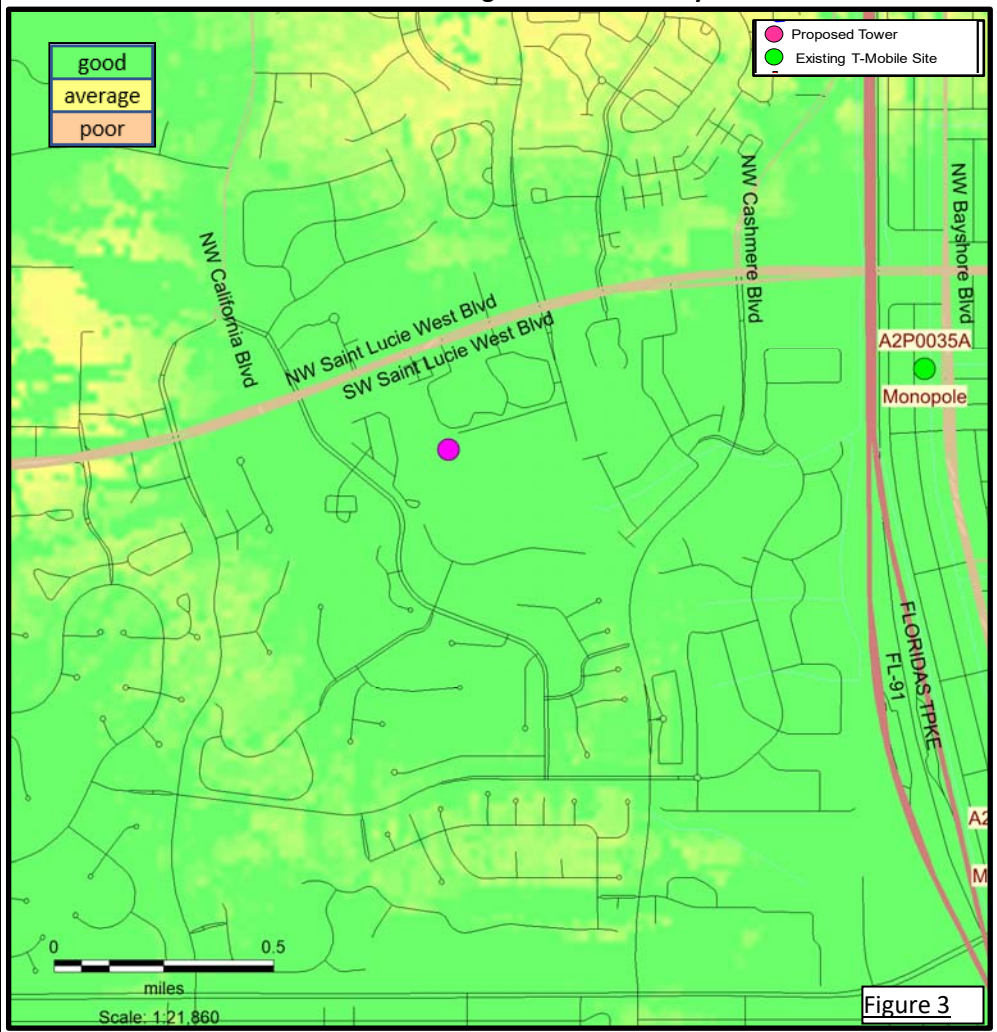


Figure 3

The propagation map shown in Figure 3 depicts the predicted signal power levels for the proposed tower when added to the existing network. As can be seen almost all the residential areas have a minimum of average service levels. This is especially important for users who are transitioning from one geographic area to another due to a more consistent coverage overlay. Users indoors will also benefit tremendously due to the closer proximity to the antenna locations. Areas where below average signal power levels still exist can sometimes be alleviated through network optimization methods after the new site comes online. (These processes are iterative and require a more medium to long term engineering approach)

In summary, T-Mobile has recognized the demand for advanced telecommunication services in these communities. The existing T-Mobile facilities cannot provide these services through upgrade or expansion, due to the distances from the existing tower facilities and cell phone users in this area. Further, no towers or structures of sufficient height were identified in the search ring that could provide the necessary improvements to the network coverage.

These propagation maps graphically demonstrate T-Mobile's business needs based upon existing and predicted customer demands. T-Mobile's goal is to provide reliable wireless service in the areas shown as defined by proprietary QOS (Quality of Service) design parameters.

**Certification Statement of Non-interference**

This letter provides information about the proposed T-Mobile transceiving equipment on the proposed facility at 460 SW Utility Drive in Port Saint Lucie, FL and its potential interference with communication facilities located nearby; as well as the FCC rules governing the human exposure to radio frequency energy (OET 65 guidelines). T-Mobile shall comply with all FCC rules regarding interference to other radio services and T-Mobile shall comply with all FCC rules regarding human exposure to radio frequency energy. The proposed tower facilities, and reception and transmission functions will not interfere with the visual and customary transmission or reception of radio, television or similar services as well as other wireless services enjoyed by surrounding properties.

The Federal Communication Commission (FCC) has allocated frequencies exclusively for use by cellular service providers. Each cellular service provider is assigned specific frequencies (channels) on which to transmit and receive radio signals.

Cellular transmitters must be type-accepted by the FCC to ensure compliance with technical standards that limit the frequencies, output power, radio frequency emissions, spurious radio noise and other technical parameters. Cellular licensees like T-Mobile owns are required to use type-accepted equipment. The assignment of frequencies and FCC rules keep cellular radio signals from interfering with or being interfered with by other radio transmissions and provide guidelines outlining the limits for permissible human RF exposure. In the event of a complaint of interference or other concerns about cellular antenna facilities, the FCC has a resolution process to determine the source of interference and whether a facility is in compliance with FCC rules.

In the event of interference or other known issues with the transmission facility contact with the T-Mobile Network Operations Center (NOC) can be established 24 hours a day, 7 days a week 365/366 days per year at the following numbers: (877) 611-5868 (DAY), (877) 611-5868 (NIGHT)

Name Patrick Keane

Title T-Mobile Sr Engineer, Radio Frequency



Signature \_\_\_\_\_

Appendix A: Cellular Traffic Increase and Impact on Network Performance

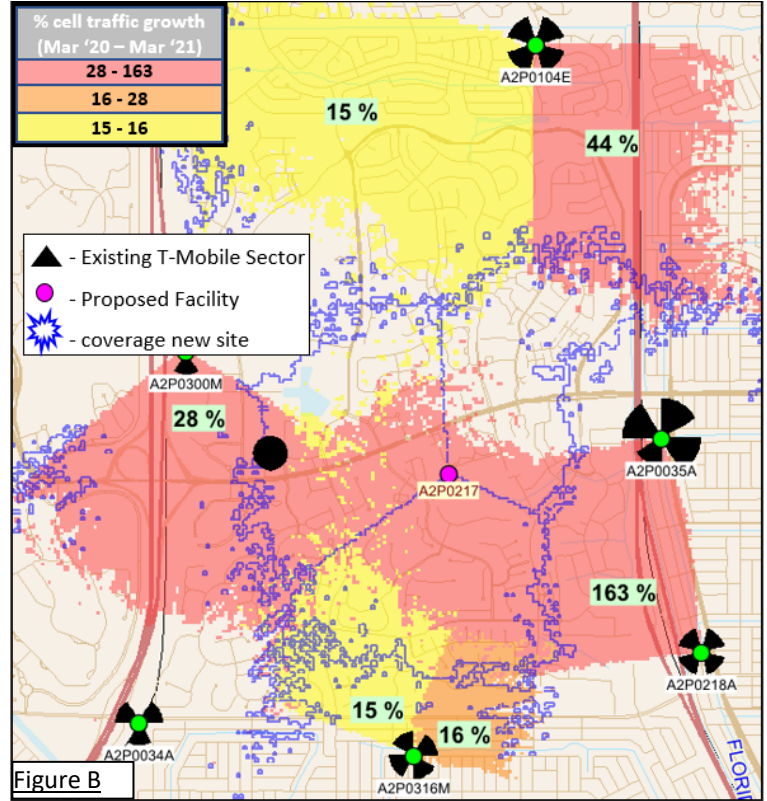
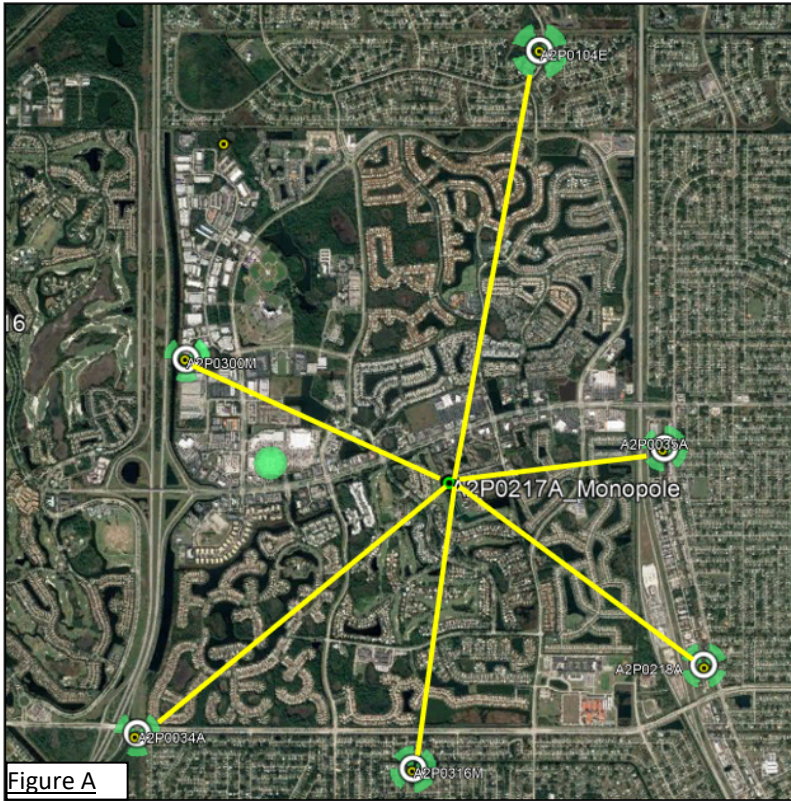


Figure A

Figure B

Cellular traffic growth, or the amount of cell phone usage increasing over time is a normal part of cell phone network operations. As more electronic devices connect to the network and new and more applications are utilized, usage generally increases. In some circumstances there may be atypical increases in cellular traffic at the cellular facilities or in a given area. This may include when a new residential development or commercial center is constructed nearby one of the sites. (A site or facility is the location of T-Mobile equipment including a base-station and antennas, usually on a tower or rooftop)

One such area is shown in Figure A with the proposed facility in the center with radials indicating the neighbor or adjacent facilities. (See Search Ring section of this report for more details) The proposed tower is necessary to improve the network coverage. Four of six of the neighbor sites have shown a significant increase in cellular usage over the last year. In particular, the fourth sector of site A2P0218A to the southeast of the proposed tower has seen traffic growth by one-hundred-sixty-three percent. (a sector is an antenna array deployed at a facility that focuses the transmission/reception in a specific direction) In Figure B a map of the proposed tower location and the adjacent sites are displayed. The sectors or directional antenna arrays for each of the existing facilities are indicated by the dark wedges. Overlaid on the proposed tower location is the predicted coverage footprint (PCF) from that site. (blue outline) The PCF of the facilities' sectors with significant cellular traffic growth are color coded with the percentage of that growth over a one-year period. (red/orange/yellow polygons) Note that the PCF from the proposed tower overlaps with the existing PCFs. During network integration the PCF for each tower will be balanced. This is important so the new tower can offload or pick up excessive cellular traffic from its neighbors. The percentage of the sectors' cellular traffic growth over the course of one year and the direction or azimuth of the antenna arrays are shown in Table A.

Site_sector	% cell traffic growth (Mar '20 – Mar '21)	Sector Azimuth (from true north)
A2P0218A_4	163%	315°
A2P0104E_2	44%	120°
A2P0300M_2	28%	180°
A2P0035A_3	28%	210°
A2P0316M_1	16%	60°
A2P0104E_3	15%	240°
A2P0316M_4	15%	330°
A2P0218A_3	13%	255°

When a facility is serving an area and there is a traffic increase that is above the operational threshold of that facility it can no longer add new users. Devices connected to that facility would experience performance degradation that may include inability to access services, interference, slow speeds and dropped connections. In Figure C, the drop call rate (DCR) indicates that there is significant performance degradation in the areas where the new facility will cover. Users attempting to maintain connections are more likely

to have their voice or data session disconnected. The new tower will alleviate these conditions.

It is not uncommon for areas with poor coverage to have significant network performance issues. The location where the new tower is proposed was previously identified as a low-coverage, poor performance area. The increase in cellular traffic has coincided with an increase in performance issues. This includes the drop call rate shown in the attached charts. Like cellular traffic growth, these performance issues also increase in some circumstances in an atypical fashion. The trend in DCR for all the high traffic growth neighbor sectors within the PCF of the new tower is exhibited in Chart A. A significant increase in the DCR can be observed over the one-year data collection period. There is a similar chart of the DCR of the highest traffic growth sector, A2P0218A\_4 in Chart B.

Although it is sometimes difficult to determine the actual cause of unusual or incongruous call traffic performance, the situation in the area in question does follow recent trends in other parts of the network. It is possible if not likely that some of the network traffic has shifted due to COVID-19 exigencies. With more people working and attending classes at home, this largely residential area may have contributed to the overall increase in traffic and performance degradation.

The new tower was originally proposed to improve low coverage. The impact of both normal and atypical traffic increases reinforces the need for a new facility in order to meet T-Mobile's service goals.

