

TOWN OF PARADISE VALLEY

Cell Coverage Task Force Update

December 6, 2018



Agenda

- Overview and background
- Radio Frequency (RF) study
- Request for Information (RFI)
 - Findings and observations
- In-building coverage education and outreach
- Next steps



Overview and background



Overview and background

- ✓ Desire to improve cell coverage throughout PV, both in-building and general coverage
- ✓ Identified as Quality of Life initiative January 2016
- ✓ Meetings with industry led by previous manager throughout 2016 - 2018:
 - ✓ Verizon/Triadvocates
 - ✓ Coal Creek
 - ✓ AT&T
 - ✓ Ghost Networks
 - ✓ Engineering Wireless Services (EWS)
 - ✓ American Tower
 - ✓ Crown Castle
 - ✓ T-Mobile
- ✓ Creation of Task Force spring 2018
- ✓ EWS “drive study” of PV Radio Frequency strength and quality May 2018 (sought by Task Force)
- ✓ Updated inventory and contact information for Special Use Permit (SUP) properties
 - ✓ GIS: fiber inventory, SUP properties overlaid on RF study map
- ✓ Request for Information (RFI) issued July 30, 2018
 - ✓ Town “listening sessions” with respondents
- ✓ In-building coverage education and outreach



Task Force Resident Volunteers

- Drew Smith
- Doug Jordan
- Eric Liebermann
- Dayna Kully



Radio Frequency (RF) study



Description of Testing and Results

The table to the right shows the channels that were tested for each carrier's technologies and frequency bands deployed in the town. The results for LTE (FDD & TDD) are shown as RSRP for power and CINR & RSRQ for quality. For 3G technologies (WCDMA/CDMA/EvDo) these results are measured as E_c and E_c/I_o for power and quality respectively.

It is important to note that testing was completed on the streets of the town. A drop in signal power will be seen when comparing indoor vs. outdoor measurements. That drop will vary depending on the frequency band of the signal. The effect of this drop is important since the goal of this project is to improve coverage indoors.

Carrier	Technology	Frequency Band	Channels	Bandwidth
AT&T	FDD LTE	700MHz	5780	10MHz
AT&T	WCDMA	PCS	687	5MHz
AT&T	FDD LTE	PCS	1050	20MHz
AT&T	FDD LTE	AWS	2000 & 4700	10MHz (each)
AT&T	FDD LTE	WCS	9820	10MHz
Verizon	FDD LTE	700MHz	5230	10MHz
Verizon	CDMA	800MHz	384	1.25MHz
Verizon	FDD LTE	PCS	775	5MHz
Verizon	FDD LTE	AWS	2125	15MHz
T-Mobile	FDD LTE	700MHz	5035	5MHz
T-Mobile	WCDMA	PCS	9662	5MHz
T-Mobile	FDD LTE	PCS	700	10MHz
T-Mobile	FDD LTE	AWS	2300	20MHz
Sprint	CDMA	800MHz	476	1.25MHz
Sprint	CDMA	PCS	675 & 650	1.25MHz (each)
Sprint	EvDo	PCS	625	1.25MHz
Sprint	FDD LTE	PCS	8665	5MHz
Sprint	TDD LTE	BRS	41374, 41176, 40978, 40270, 40072, & 39874	20MHz (each)

AREAS OF CONCERN

As a general overview of the Paradise Valley cellular coverage and performance, all signals are weak and not providing adequate coverage indoors and inside vehicles.

During the drive test it was observed that the areas with weakest RF coverage are concentrated along following markers:

1 - Tatum Blvd. and South of Doubletree Ranch Rd. Weak coverage seen for 3 out of 4 carriers (Verizon, AT&T & T-Mobile)

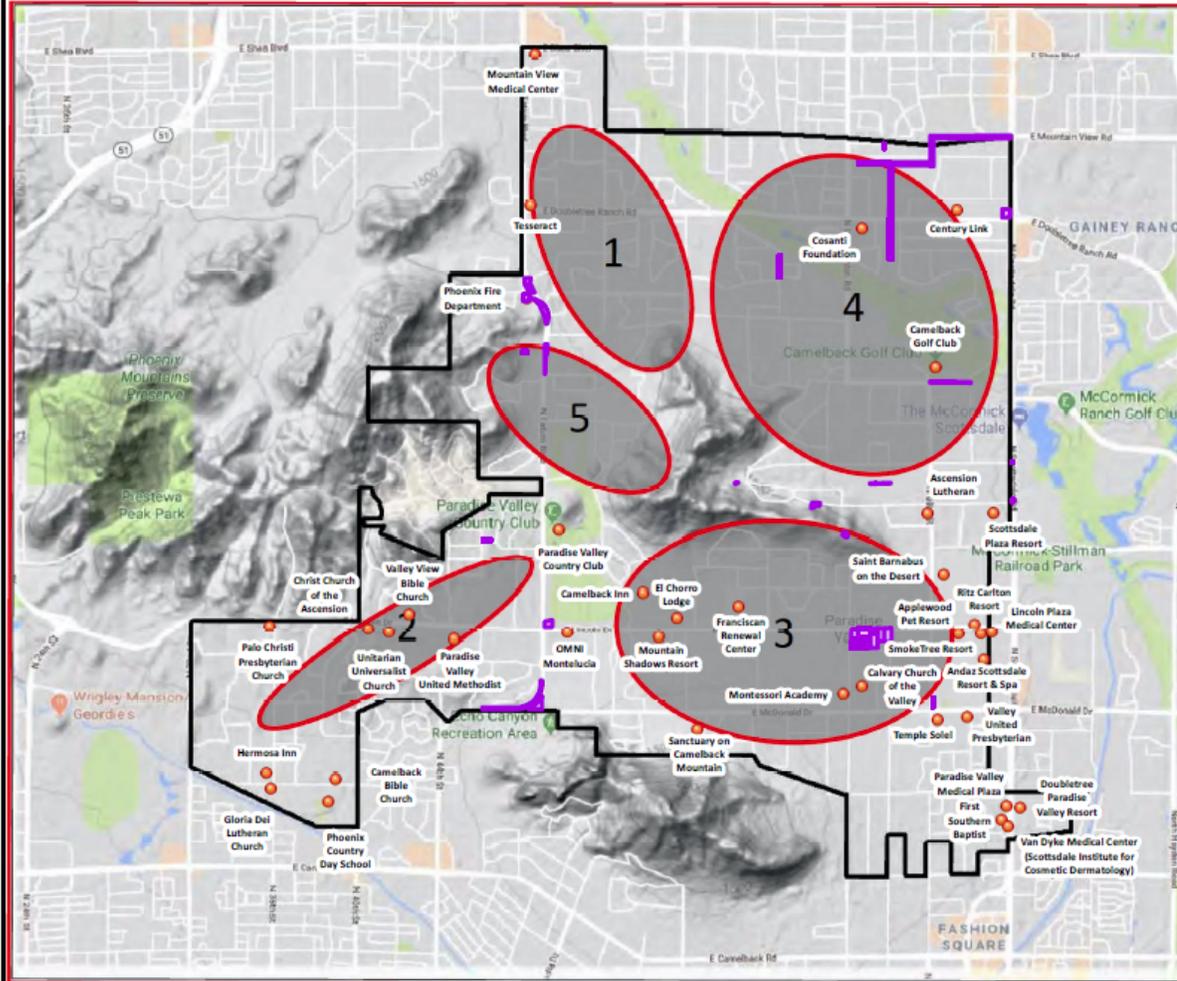
2 - Lincoln Dr. West of Tatum Blvd. to 32nd Str. Weak Coverage seen for all 4 carriers.

3 - Lincoln Dr. South of Mummy Mountain. Weak coverage seen for all 4 carriers.

4 - Area around Camelback Golf Course South and North of canal. Weak coverage seen for 3 out of 4 carriers (AT&T, T-Mobile & Sprint)

5 - East and West of Tatum Road and Road Runner Road all 4 carriers.

These areas are of general description since not all frequencies behave the same way and are dependent of the carrier's amplification, orientation and modulation.



 Town Owned Parcels

 SUP

 Town Boundary

0 0.75 1.5 3 Miles

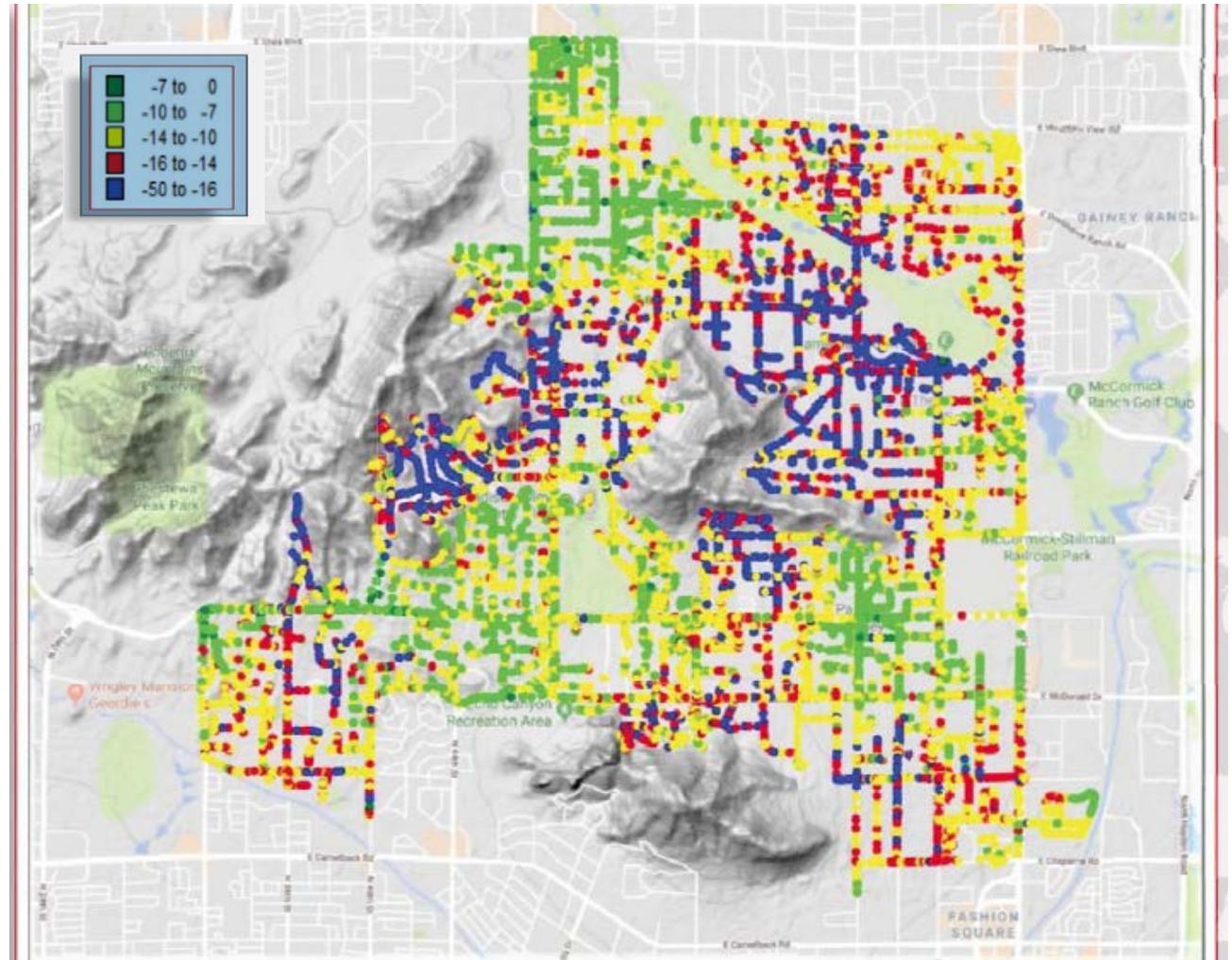


RF Example Results

EWS returned data points for both strength and quality of signal with a separate map of results for each:

- Vendor
- Technology
- Bandwidth
- Frequency

Each map was a variation of the one to the right, which is included here for illustrative purposes only. Green areas were the strongest and/or highest quality signal, while red, blue, or black were the lowest.



Request for Information (RFI)



Request for Information (RFI)

- Sought out solutions
- Reviewed efforts of other communities
 - Sedona Draft Wireless Master Plan
- Issued RFI to solicit expert perspectives
 - ☑ Issued July 30, 2018
 - ☑ Responses due September 14, 2018
 - ☑ Cellcoverage@paradisevalleyaz.gov email address established
 - ☑ Responses received from T-Mobile, AT&T, Sprint, and Crown Castle



Findings and observations



Findings and observations

- Industry appreciates our outreach – they found the “listening session” meetings unique, proactive, and refreshing.
- Industry we met with understands our needs and our desires, as set forth in RFI
- There was strong interest in working directly with SUP properties -- most familiar path for these folks; they were excited that we had been reaching out to SUP properties to assess interest and establish points of contact
- Problem areas most likely will be solved with incremental improvement to fill in gaps of service
- Industry players welcomed collaboration and will provide feedback about their work with PV



Findings and observations

- Crown/ATT ready to install new on-site radios – could require amendment to current deal in terms of payment and space for equipment in ROW
- Clear that some areas would benefit from further exploration:
 - Road standards – installing conduit and/or fiber
 - SUP/CUP standards – maintain aesthetic control and resident input, but avoid drawn-out process (e.g., with replacement of existing infrastructure)
 - SUP property checklist re: cell service, and possible amendments to code to require conduit or other infrastructure to ensure quality of service (public safety component)
 - May need to look at our small cell process and standards
 - Equipment size at the top of poles
 - Utilization of existing verticality, such as church steeples, etc.



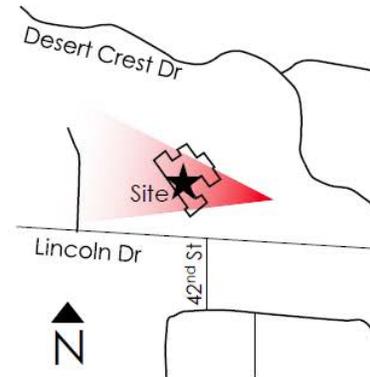
Example of requested infrastructure



PHOTO SIMULATIONS
PH10720B
Valley View Church
4222 E. Lincoln Drive
Paradise Valley, Arizona 85253



View 1 – Looking West



In-Building Coverage

Education and outreach



In-building coverage education and outreach

- Even with good outside cell coverage, in-building coverage is a challenge
- Self help options
 - Wifi calling
 - Signal boosters
- Developing educational material
 - Dayna Kully, Town resident and co-founder, 5thGenWireless, L.L.C.
 - Town Reporter
 - Website
 - Coffee with a Cop



Next steps



Desired next steps

Continue work with status update to Council 3-6 months:

- Connect SUPs with providers and carriers
- Review SUP and Town processes and standards
- Evaluate opportunities to add conduit/fiber during ROW projects
- Evaluate and propose potential cell ordinance amendments
- Publish in-building coverage material



Questions/Discussion

