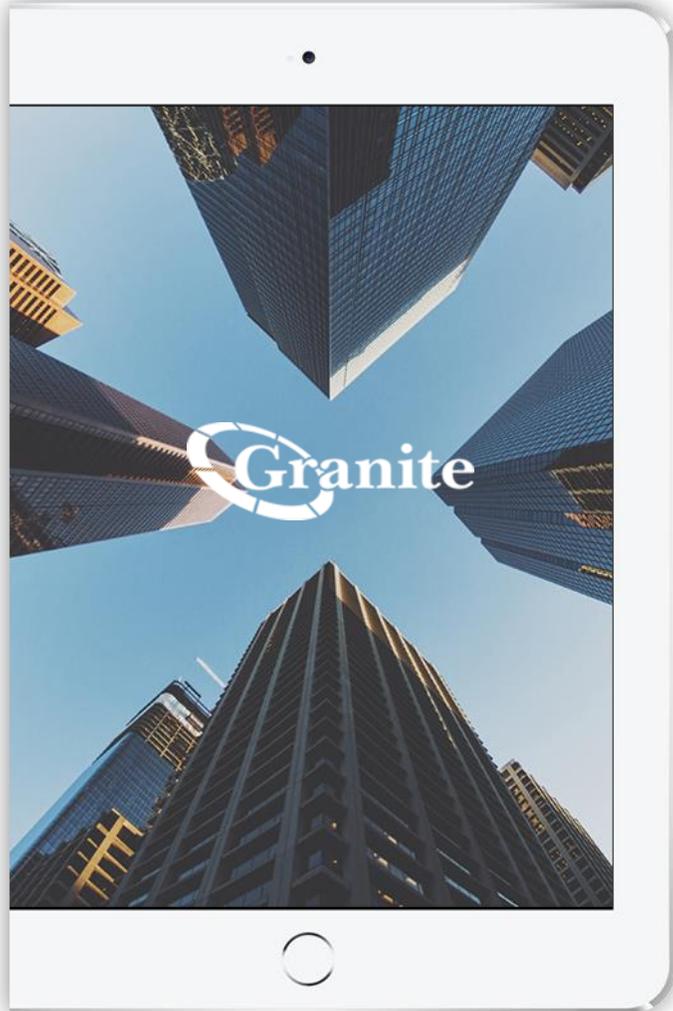




Cooperative Program Overview

Granite is a leading communications services provider for businesses with multiple locations



\$1.4B+
Granite's annual
revenue

\$100m+
Granite's annual
growth rate last
7 years

\$0
Granite's debt

9k+
Satisfied
corporate
clients

650k+
Locations
served

85+
Fortune 100
customers
serviced

1/3rd
Of staff in
customer
service role

5X
Higher retention
rate than the
industry aver.

1
Number of
invoices



CONVERGED SERVICES

TECHNOLOGY ADVISORS



DenseNetworks.com

Ernie Fernandez

**CIO and VP,
University of Miami**





Luke Lucas,
Sr. Manager, Engineering
BYOC

**BUILDING YOUR
OWN COVERAGE**

NETWORK SPEED AT THE BIG GAME

	LTE DL (Mbps)	LTE UL (Mbps)	LTE Latency (ms)	5G DL (Mbps)	5G UL (Mbps)	5G Latency (ms)
AT&T	39.18	7.96	45.84	N/A	N/A	N/A
Sprint	56.16	1.47	71.42	225.78	15.39	15.32
T-Mobile	66.35	31.76	36.04	348.33	28.89	31.99
Verizon	30.67	7.77	46.31	646.17	9.86	90.88

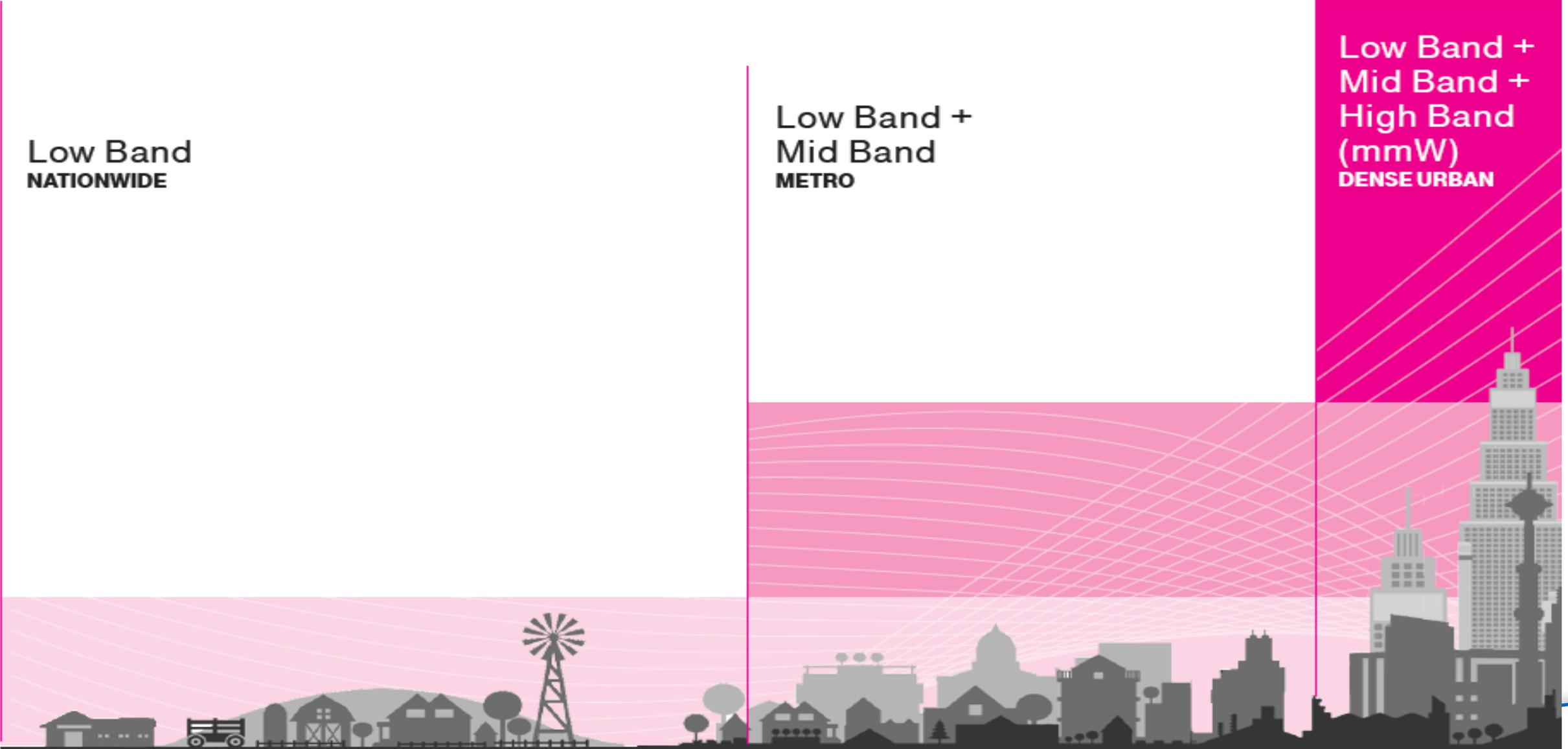
Based on analysis by Ookla® of Speedtest Intelligence® data average download speed from 4G LTE and 5G (beta) results. Tests taken at the stadium during the 2020 Pro Football Championship. Typical average nationwide 5G download speeds are 64.4 Mbps for T-Mobile, uplink on LTE. In limited areas where 5G is available, typical speeds are 198.89 Mbps for Sprint and 839.08 Mbps for Verizon according to analysis by Ookla of 5G (beta) Speedtest Intelligence data for Q4 2019. Typical average nationwide LTE download speeds are 35.82 Mbps for T-Mobile, 38.55 Mbps for Sprint, 43.28 Mbps for AT&T and 34.69 Mbps for Verizon according to analysis by Ookla of Speedtest Intelligence data for Q4 2019.

T-MOBILE'S MULTI-SPECTRUM STRATEGY

Low Band
NATIONWIDE

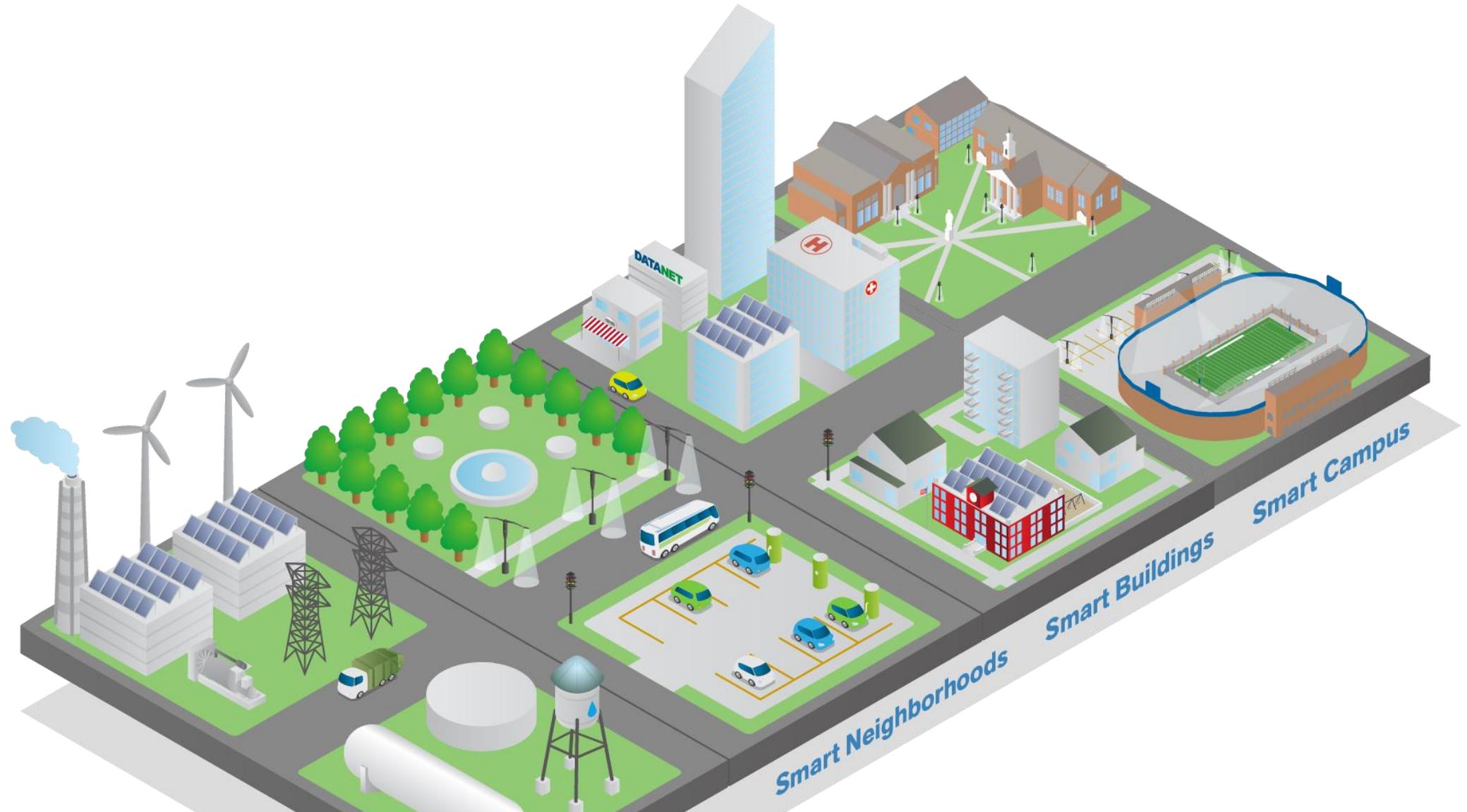
Low Band +
Mid Band
METRO

Low Band +
Mid Band +
High Band
(mmW)
DENSE URBAN





Smart City/Campus/Building

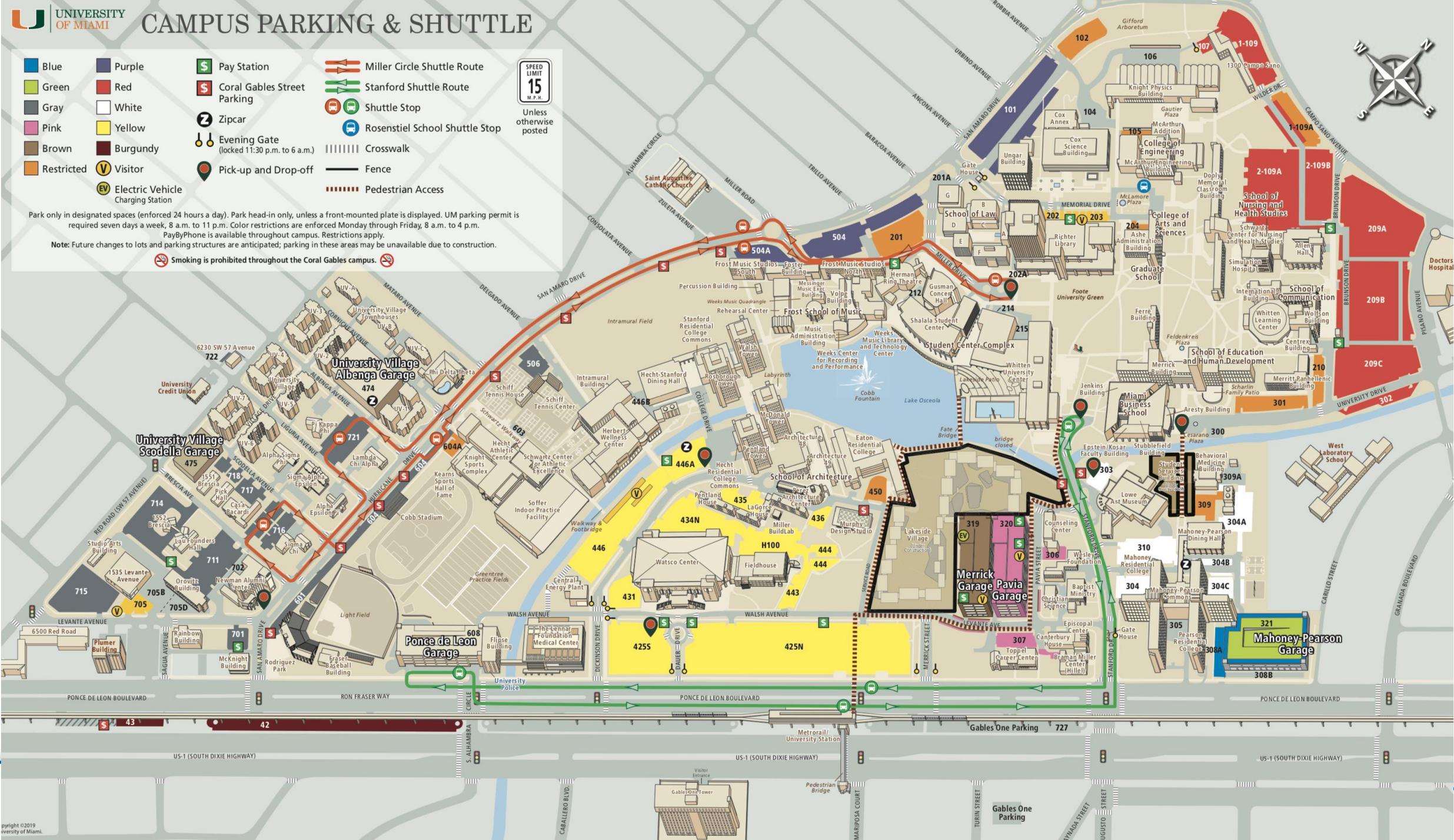


Blue	Purple	Pay Station	Miller Circle Shuttle Route	SPEED LIMIT 15 M.P.H. Unless otherwise posted
Green	Red	Coral Gables Street Parking	Stanford Shuttle Route	
Gray	White	Zipcar	Shuttle Stop	
Pink	Yellow	Zipcar	Rosenstiel School Shuttle Stop	
Brown	Burgundy	Evening Gate (locked 11:30 p.m. to 6 a.m.)	Crosswalk	
Restricted	Visitor	Pick-up and Drop-off	Fence	
Electric Vehicle Charging Station			Pedestrian Access	

Park only in designated spaces (enforced 24 hours a day). Park head-in only, unless a front-mounted plate is displayed. UM parking permit is required seven days a week, 8 a.m. to 11 p.m. Color restrictions are enforced Monday through Friday, 8 a.m. to 4 p.m. PayByPhone is available throughout campus. Restrictions apply.

Note: Future changes to lots and parking structures are anticipated; parking in these areas may be unavailable due to construction.

Smoking is prohibited throughout the Coral Gables campus.



Capacity

Coverage

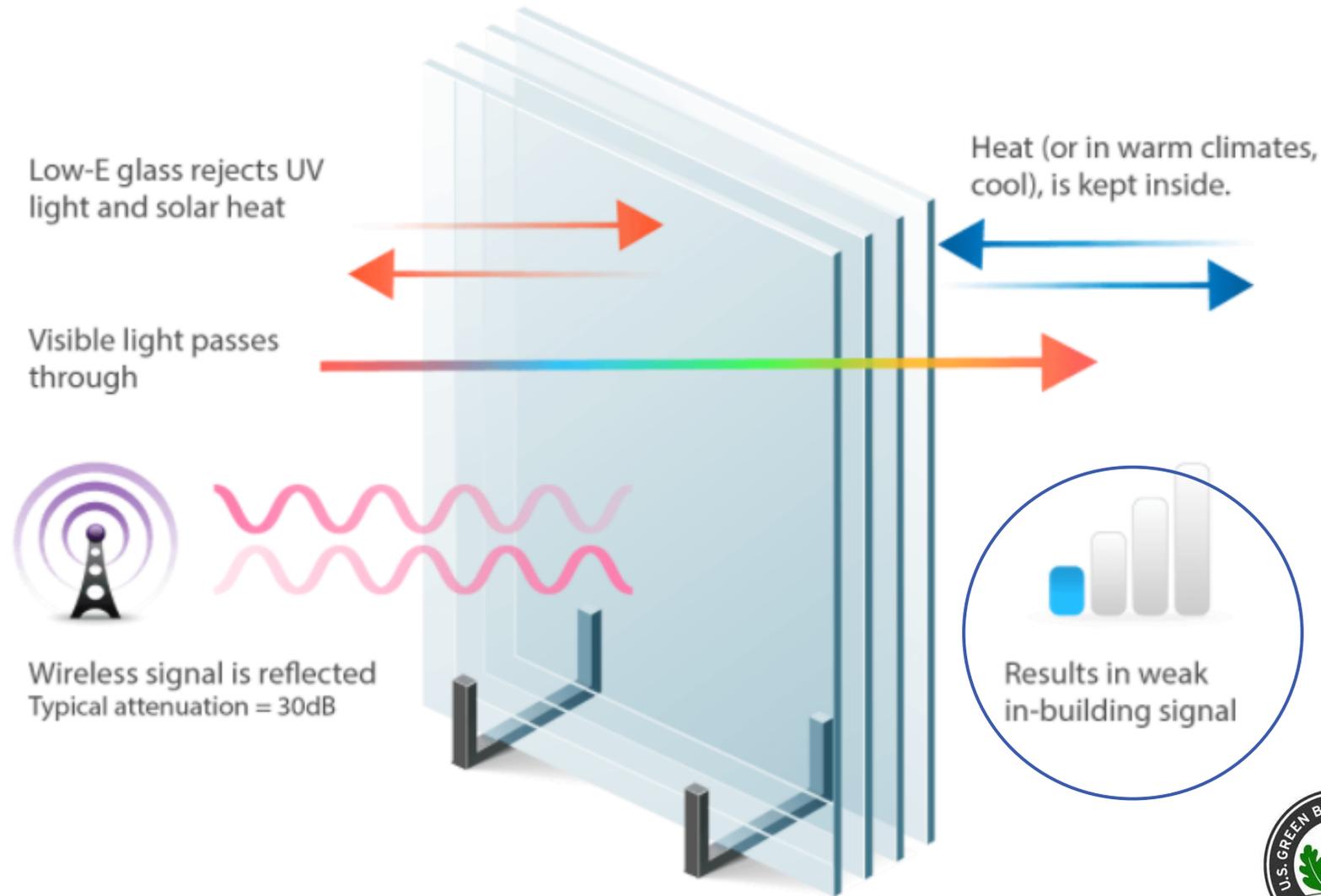


Bandwidth

ENTER

[click here for more information](#)

Effect of Low-E Glass on Cell Phone Signals



Source: RepeaterStore



Low-e Glass

6 mm Glass Pane = **-0.8 dB @ 900 MHz**

Double Glazing w/ 2 coated Glass Pane = **-23 dB @ 900 MHz**

	Material	Source	Shielding effect / dB		
			900 MHz	1800 MHz	3 GHz
Glazing	Glass pane 6 mm	[8]	-0.8	-1.3	-1.9
	Double glazing 4 mm/air 12 mm/5mm	[5]	-0.8	-1.1	-1.2
	Double glazing with commercial low-e 4 mm coated/air 12 mm/5mm	[5]	-30.6	-26.8	-27
	Double glazing with 2 coated glass	[2]	-23	-30	-36
	Double glazing with square pattern (4 %) low-e coating 4 mm coated/air 12 mm/5mm (measured)	[5]	-1.3	-1.3	-1.9
Glazing with patterned low-e	Double glazing with triangle pattern (2 %) low-e coating 4 mm coated/air 12 mm/5mm (measured/ <i>simulated</i>)	This work	-2.0/-2.0	-2.3/-2.2	-4.0/-3.9
	Double glazing with triangle pattern (2 %) low-e coating 4 mm coated/air 8 mm/5mm (<i>simulated</i>)	This work	-2.1	-3.2	-1.5
	Double glazing with triangle pattern (2 %) low-e coating 4 mm coated/air 16 mm/5mm (<i>simulated</i>)	This work	-1.8	-1.4	-7.1

Source: Bouvard, Olivia & Lanini, Matteo & Burnier, Luc & Witte, Reiner & Cuttat, Bernard & Salvadè, Andrea & Schüler, Andreas. (2017). Mobile communication through insulating windows: a new type of low emissivity coating. Energy Procedia. 122. 781-786. 10.1016/j.egypro.2017.07.396.



LIGHTS? WATER? **WIRELESS!**

In office buildings and facilities across America, basic amenities like electrical, gas and plumbing are essential components that are planned and constructed.

The new amenity being planned or added by building owners, architects and operators?

Reliable, in-building wireless coverage.

THREE IN-BUILDING WIRELESS MODELS	Build Your Own Coverage (BYOC) EXPRESS MODEL	BYOC HYBRID MODEL	BYOC MODEL
On-Site Wireless Infrastructure	Customer Provided	T-Mobile Provided	Customer Provided
Internet Connection Cost	Customer Provided	Customer Provided	Customer Provided
T-Mobile Licensing Agreement	Required	Required	Required
Power Supplied	Customer Costs	Customer Cost	Customer Cost
Carriers Included	T-Mobile	T-Mobile* with option to add other carriers	T-Mobile
Wireless Signal Source	Provided and installed by the DAS provider	T-Mobile* with option to add other carriers	T-Mobile Joins*
Fiber Back-Haul	T-Mobile Cost*	T-Mobile Cost*	T-Mobile Cost*
Additional Carriers	Optional	T-Mobile secures and manages carriers to join the system	Customer secures additional carriers to join the system

GETTING STARTED: BYOC STEP-BY-STEP

T-Mobile’s network team and operational experts have deployed countless numbers of indoor wireless networks of every shape, size and configuration. Our BYOC team removes building professionals’ pain points and streamlines the technology deployment process.



The first step is to find a strategic partner to help create a wireless infrastructure plan. We can help develop an RFP or find the right OEM or integrator.

Meet the local market and/or national BYOC team, learn more, and sign-up.

We will gather information including general system characteristics, proposed T-Mobile role and system signal power allocation, and backhaul requirements for budget approval.

We will reach out to your integrators for design files in iBwave format based on broadcast channels and bands. We will then finalize the signal source T-Mobile will provide.

The BYOC License Agreement will need to be signed by both parties. During legal review and after design approval, our local market teams will visit the site to develop lease exhibit drawings.

Once the license is fully executed, we will move to the deployment phase.

Cel-Fi SCIF

What it really looks like?

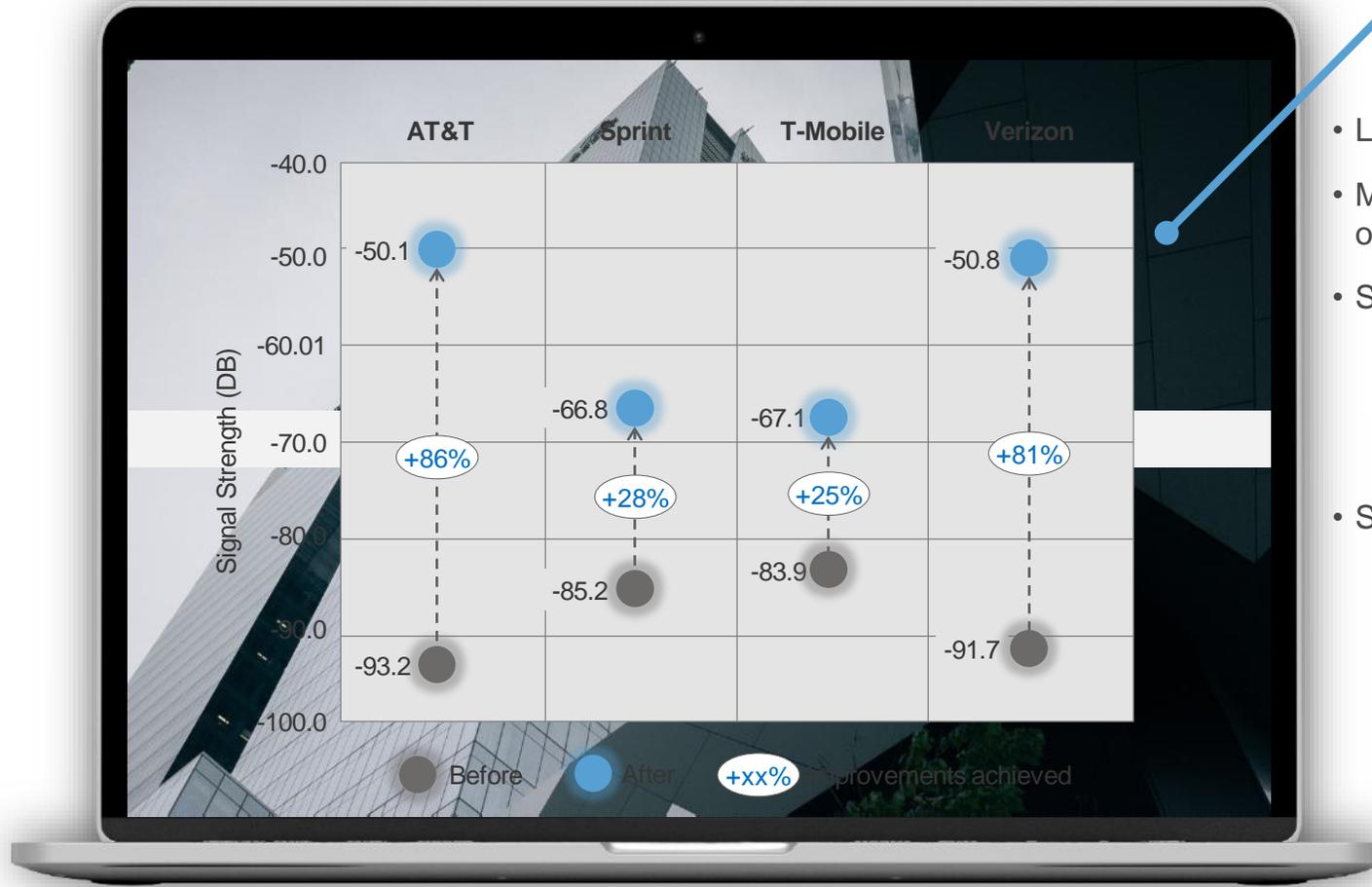
Cel-Fi QUATRA
with SCIF and
small cell



Up to four NUs
may connect to a
small cell

Successful Business Case

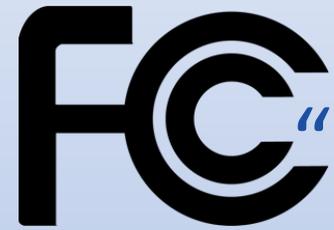
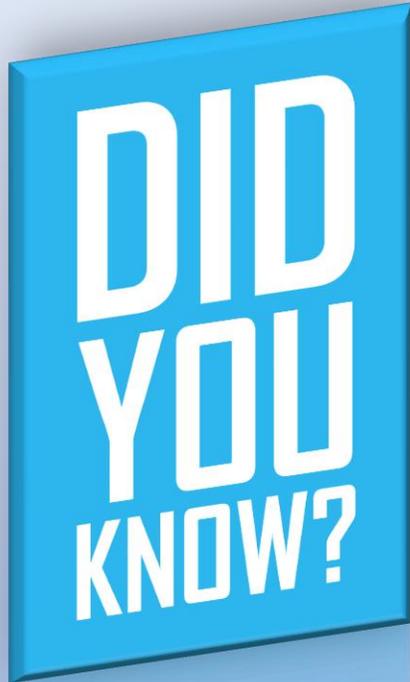
Proof Point: Senior-Living Apartments



Signal Improvements

- Located in Lake Worth, FL
- Measurements from first floor of main building
- Spectrum
 - AT&T: 850 MHz
 - Sprint: 1900 MHz
 - T-Mobile: 1900 MHz
 - Verizon: 700 MHz
- Signal source
 - AT&T and Verizon: femtocells
 - Sprint and T-Mobile: over-the-air

Driver: NG911 Location Accuracy



“The FCC estimates that a one minute improvement in 9-1-1 dispatch time could save 10,000 lives each year”

LTE in Public Safety



- All the major carriers count numerous Public Safety Agencies as customers
- DRIVERS:
 - Applications, Data Capabilities
 - COST
 - Situational Awareness, Interoperability
 - Able to call Civilian and other Agencies
 - In-Building Coverage
 - FirstNet
- Lines Getting Blurrier – Public Safety not just LMR!



GRAYBAR'S ROLE WITH U.S. COMMUNITIES

- One Combined Contract # EV2370
 - Valid date February 1, 2018
 - 5 year initial term (with “three” two year extension options)
 - Electrical, Lighting, Utility
 - Data/Communications, Networking, Wireless, Service Provider, Security
 - Comprehensive Service Offering
 - Other Related Products & Services
- Graybar has a 21 year history with USC
- City of Kansas City, Lead Public Agency
- Large Breadth of Product - Consistent and competitive pricing
- Project & Volume Discounts Available
- No contracts to sign, no spend limits, non-binding & best overall value

ELIGIBLE AGENCIES

- Over 98,000 eligible agencies can participate
 - Registration & MICPA
 - Over 60,000 registered with US Communities
 - Over 17,000 using Graybar's contracts
- Eligible Agencies Include:
 - State Agencies, Counties, Cities, Towns and Villages
 - Specials Districts: Water, MUD's, Transportation, Airports
 - Public and Private Higher Education
 - Colleges, Universities, Technical Schools
 - K-12 School Districts, Charter Schools & Other
 - Non-Profits Churches, Education, Hospitals, YMCA & Other

Advantages of Cooperative Procurement

Agency, Consultant, Contractor / Integrator, Manufacturer, Supplier

- Offer Total Solutions
 - Specify, Finance, Integration, Product
 - Product & Project Management
- Flexible & Legal Contract Vehicle
- Saves Overall Costs

No Bid

- Saves Money on Procurement Process
- Speeds up Project Timelines
- Eliminates the Unknown

Partnerships

- Brings Together the Necessary Partners

