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October 1, 2018

*Via Electronic Filing*  
Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 Twelfth Street, SW  
Washington, D.C. 20554

Re: *Ex Parte Notice: Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197.*

Dear Ms. Dortch:

On September 27, 2018, John Saw, Chief Technology Officer; Vonya B. McCann, Senior Vice President, Government Affairs; Charles W. McKee, Vice President, Government Affairs; James Goldstein, Senior Counsel – Spectrum; Amanda Todd, Director of Network Capital Finance and Strategic Analysis (all of Sprint Corporation (“Sprint”)); and the other representatives of Sprint, T-Mobile USA, Inc. (“T-Mobile”), and their controlling shareholders (collectively, “Applicants”) listed in Attachment A provided a presentation in a meeting with David Lawrence, Director; and the other members of the Federal Communications Commission’s (“Commission’s”) T-Mobile/Sprint Task Force listed in Attachment B. During this presentation, the Applicants discussed and answered questions regarding the deck submitted herewith at Attachment C.

This filing contains information that is “Confidential” and “Highly Confidential” pursuant to the Protective Order filed in WT Docket No, 18-197. Accordingly, pursuant to the procedures set forth in the Protective Order, a copy of the filing is being provided to the Secretary’s Office. In addition, two copies of the Highly Confidential Filing are being delivered to Kathy Harris, Wireless Telecommunications Bureau. A copy of the Redacted Confidential and Highly Confidential Filing is being filed electronically

Ms. Marlene Dortch

October 1, 2018

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through the Commission's Electronic Comment Filing System. Pursuant to section 1.1206(b)(2) of the Commission's rules, 47 C.F.R. § 1.1206(b)(2), this *ex parte* notification is being filed electronically for inclusion in the public record of the above-referenced proceeding.

Respectfully submitted,

/s/ Regina M. Keeney

Regina M. Keeney

cc: David Lawrence  
Kathy Harris  
Kirk Arner  
Jim Bird  
Robert Chen  
Matthew J. Collins  
Monica DeLong  
William Dever  
Stacy Ferraro  
Ben Freeman  
Garnet Hanly  
Pramesh Jobanputra  
Eugene Kiselev  
David Krech  
Katherine LoPiccalo  
Charles Mathias  
Catherine Matraves  
Sara Mechanic  
Aalok Mehta  
Robert Pavlak  
Joel Rabinovitz  
Ronald Repasi  
David Sieradzki  
Ziad Sleem  
Chris Smeenk  
Max Staloff  
Donald Stockdale  
Sean Sullivan  
Patrick Sun  
Jacqueline Tello  
Thuy Tran  
Weiren Wang  
Joseph Wyer  
Aleks Yankelevich

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**ATTACHMENT A**

MEETING ATTENDEES ON BEHALF OF SPRINT, T-MOBILE,  
DEUTSCHE TELEKOM, AND SOFTBANK GROUP CORP.

*For Sprint and SoftBank*

John Saw

Amanda Todd

Vonya B. McCann

Charles W. McKee

James Goldstein

Steven C. Sunshine of Skadden, Arps, Slate, Meagher & Flom LLP

Joseph M. Rancour of Skadden, Arps, Slate, Meagher & Flom LLP

John Flynn of Jenner & Block LLP

Regina M. Keeney of Lawler, Metzger, Keeney & Logan, LLC

*For T-Mobile and For Deutsche Telekom*

Steve Sharkey, Vice President, Government Affairs, Engineering and Technology  
Policy of T-Mobile USA, Inc.

Reinhard Wieck of Deutsche Telekom Group

George S. Cary of Cleary Gottlieb Steen & Hamilton LLP

Tom Dombrowsky of DLA Piper LLP

Nancy Victory of DLA Piper LLP

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**ATTACHMENT B**

FCC MEETING ATTENDEES

David Lawrence  
Kathy Harris  
Kirk Arner  
Jim Bird  
Robert Chen  
Matthew J. Collins  
Monica DeLong  
William Dever  
Stacy Ferraro  
Ben Freeman  
Garnet Hanly  
Pramesh Jobanputra  
Eugene Kiselev  
David Krech  
Katherine LoPiccalo  
Charles Mathias  
Catherine Matraves  
Sara Mechanic  
Aalok Mehta  
Robert Pavlak  
Joel Rabinovitz  
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Thuy Tran  
Weiren Wang  
Joseph Wyer  
Aleks Yankelevich

# **ATTACHMENT C**

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# Proposed Merger of T-Mobile and Sprint

## Sprint Network Presentation

**John Saw**

**September 27, 2018**

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# Agenda



1. Overview
2. Sprint Current Network
  - a. History, Where We Are, Where We Are Going
  - b. The Challenges of Sprint's Network
3. Sprint 5G Plans
4. Transaction Benefits

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## Overview



- Sprint's standalone network faces significant challenges
  - Lack of low-band spectrum, sufficient network footprint, and cell site density needed to achieve ubiquitous coverage and consistent subscriber experience across network
  - Smaller subscriber scale
  - Sprint's 2.5 GHz spectrum does not provide a complete solution
- Transaction presents the unique opportunity to create the best 5G network in the nation with coverage, capacity, and speeds that neither Sprint nor T-Mobile could achieve on its own
  - T-Mobile has superior cell site density and coverage, but limited capacity for 5G
  - Sprint has huge capacity for 5G, but no ability to build an ubiquitous nationwide 5G network
  - Spectrum can be more efficiently deployed by the combined company accelerating the benefits of 5G and creating a superior performance
  - Combination will lead to a dramatically improved network trajectory that is not possible for Sprint or T-Mobile as a standalone

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# Evolution of Sprint Network



- Sprint/Clearwire JV
- WiMax 4G launched 2009



- LTE launched on Sprint network with thin spectrum

- WiMax shutdown announced
- Plans for ~12K 2.5 GHz sites cancelled due to budget

- Monopole plan abandoned for more traditional build
- 5G/mMIMO announced



- Sprint and Nextel merge
- CDMA and iDEN networks run in parallel

- 2010-2014 Network Vision upgrade to multimode for 3G/4G, shutdown of iDEN
- "Rip and replace" causes network disruption and churn



- Sprint acquires Clearwire
- Shift from WiMax to LTE
- Softbank acquires Sprint
- Rip and replace of Huawei

- Sprint pursues Monopole plan to save on network costs

- Technology bets and execution problems have led to poor network performance and perception that continue today

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## Sprint Current Network

- Current network of [REDACTED] macro cell sites, [REDACTED] mini macros, [REDACTED] strand mounts, and distributed over 230,000 indoor femtocells (MagicBox)
- Sprint Network utilizes spectrum in 800 MHz, 1.9 GHz, and 2.5 GHz bands

Band	Holdings (Avg.)	# of Current Macro Sites	Current Use
800 MHz (ESMR)	~14 MHz	[REDACTED]	3G data and voice on CDMA (2 x 2 MHz) and 4G LTE data services (5 x 5 MHz)
1.9 GHz (PCS)	~40 MHz	[REDACTED]	Voice, 3G data, and primary LTE band in areas where 2.5 GHz is unavailable
2.5 GHz (EBS/BRS)	~160 MHz	[REDACTED]	Core capacity band for LTE—but only deployed on ~[REDACTED]% of sites today and typically only [REDACTED] MHz

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# Sprint Capital Plan



- Sprint's current board-approved network plan includes \$[REDACTED] billion in total network capex (\$[REDACTED] billion, including non-network) by 2022
- Sprint's Network plans require annual approval, notwithstanding multiyear plan

Sprint Multi-year Capex Plan				
2018	2019	2020	2021	2022
[REDACTED]				

	Macro Cells		Small Cells
	Total	w/ 5G mMIMO	
<b>Current 2021</b>	[REDACTED]		[REDACTED]

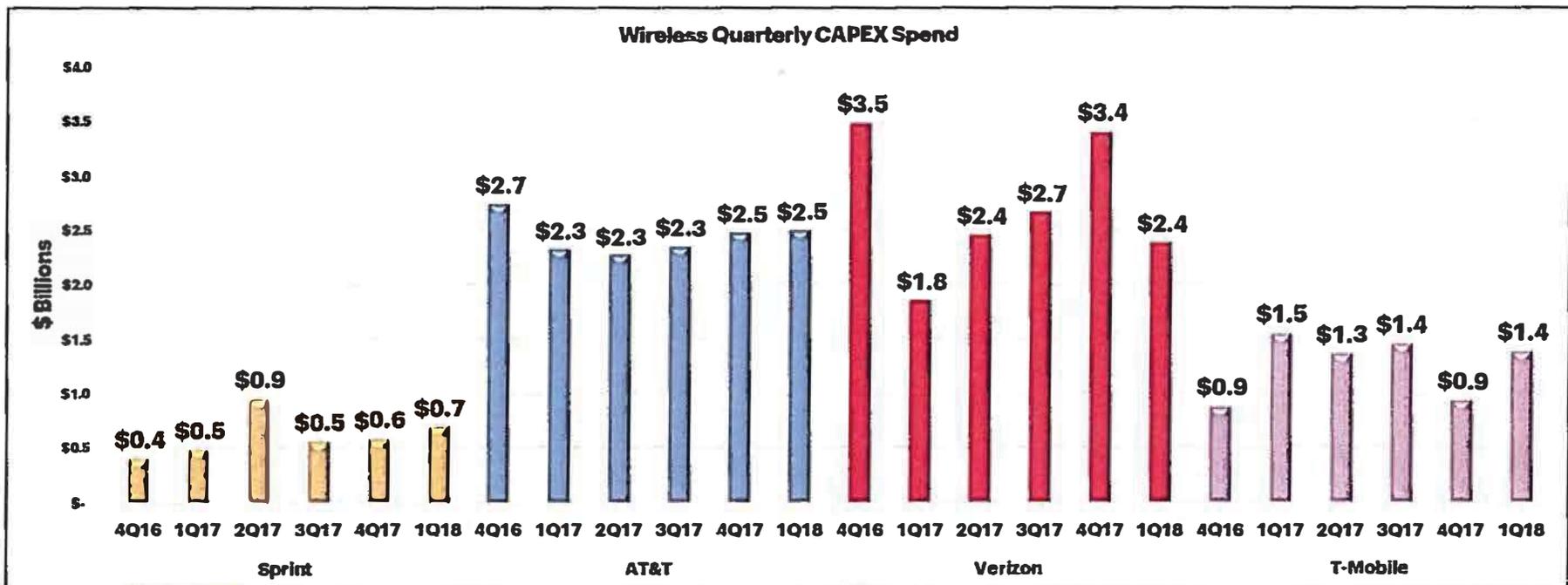
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# Sprint Network Investments Lower Than Competitors

- Sprint's capital investment per subscriber is much less than other major carriers
- Sprint's lower share of subs, SOGA, EBITDA, and higher levels of churn, have also made it difficult for Sprint to justify capex comparable to AT&T and Verizon



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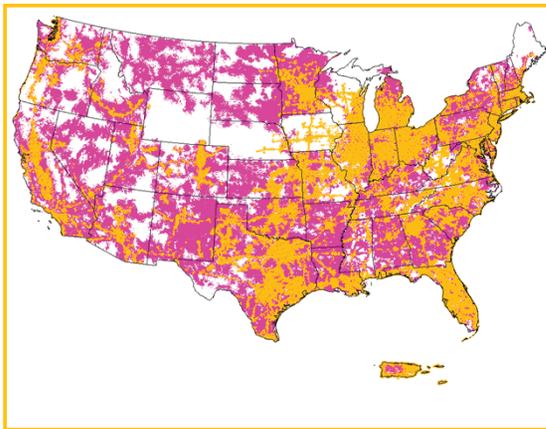
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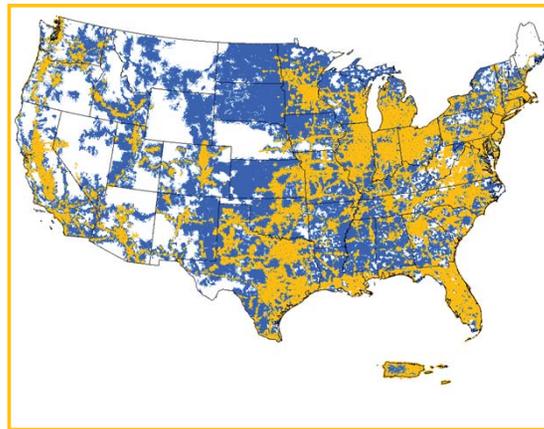
# Sprint's Network Faces Severe Challenges



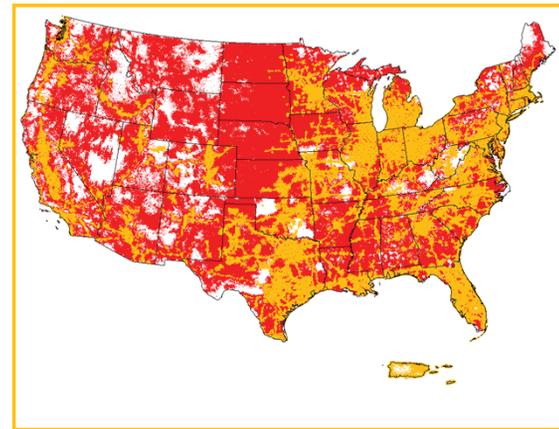
- Sprint's LTE Network footprint covers a much smaller geography and significantly fewer POPs than other national carriers



Sprint (yellow) vs. T-Mobile (magenta)



Sprint (yellow) vs. AT&T (blue)



Sprint (yellow) vs. Verizon (red)

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## Sprint Network Challenges – Lack of Low-Band Spectrum



- Most of Sprint's spectrum is in the 2.5 GHz band, and we have very limited low-band holdings
- Due to propagation characteristics, 2.5 GHz spectrum does not travel as far or penetrate buildings as well as lower-band spectrum
- Building 2.5 GHz outside of urban and suburban areas would be expensive and impractical, given Sprint's current footprint and subscriber scale
- When users move around the network and outside of the reach of 2.5 GHz they experience a dramatic drop off in performance because their connection changes to 1.9 GHz or 800 MHz which have much less depth and therefore cannot support comparable speeds

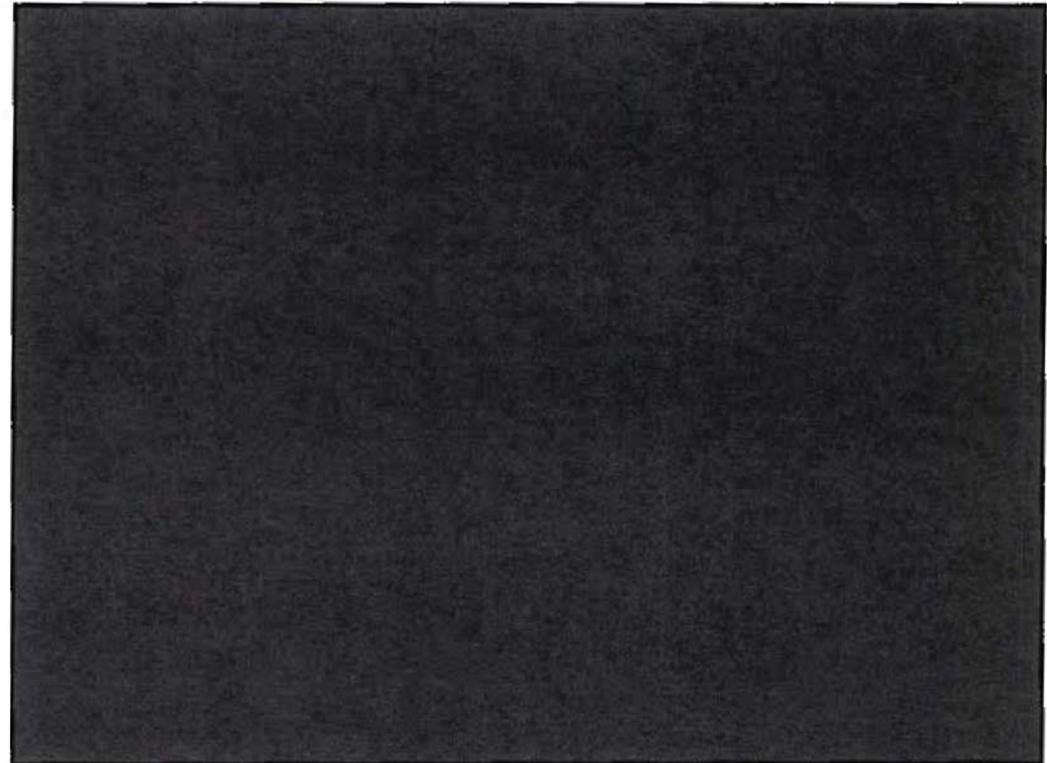
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## Sprint Network Challenges – Consistency of Experience

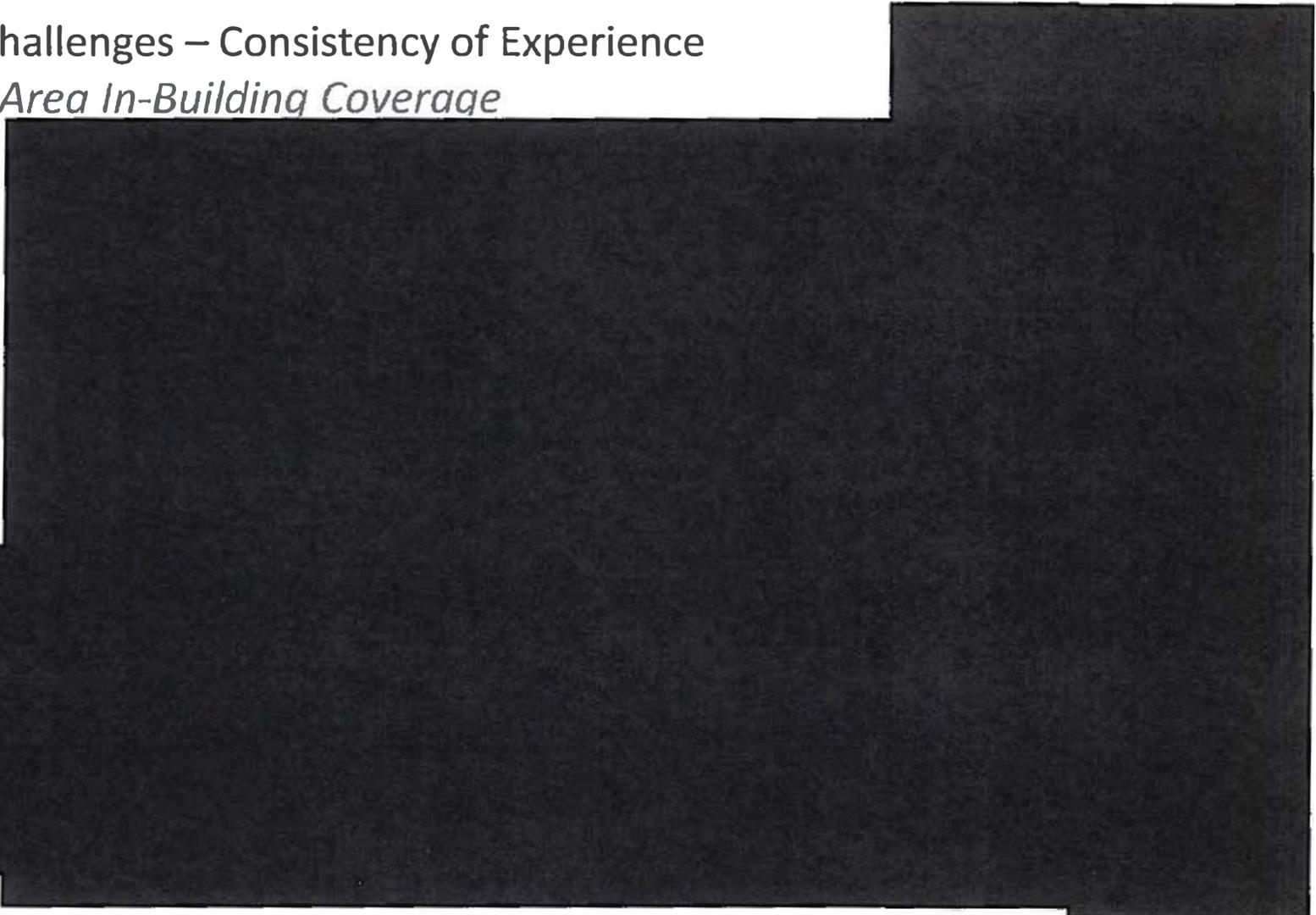
- 2.5 GHz macro LTE network covers only [REDACTED] million POPs, with [REDACTED] million POPs of indoor coverage
- The map shows an overlay of Sprint's 2.5 GHz network versus its broader (and much slower) fallback LTE network
- Sprint's best speeds limited to 2.5 GHz network covering portions of major urban and sub-urban areas as shown in orange



## Sprint Network Challenges – Consistency of Experience

### *Washington, DC Area In-Building Coverage*

- Lack of 2.5 GHz in-building coverage results in inconsistent user experience, even in major metropolitan areas that Sprint has focused on
- Users experience much slower speeds as they drop from 2.5 GHz to other spectrum bands



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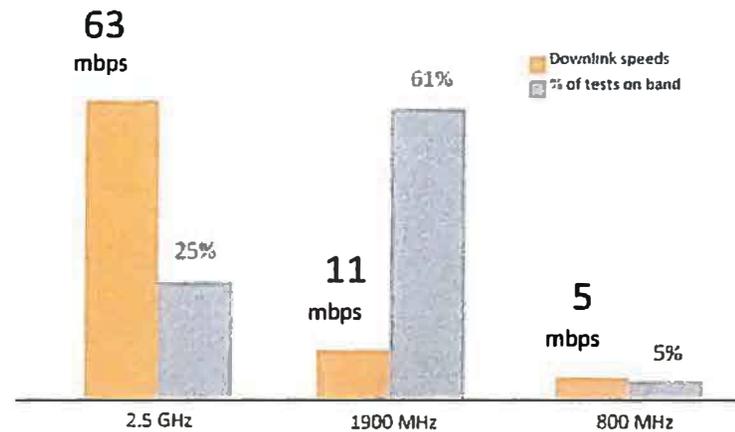
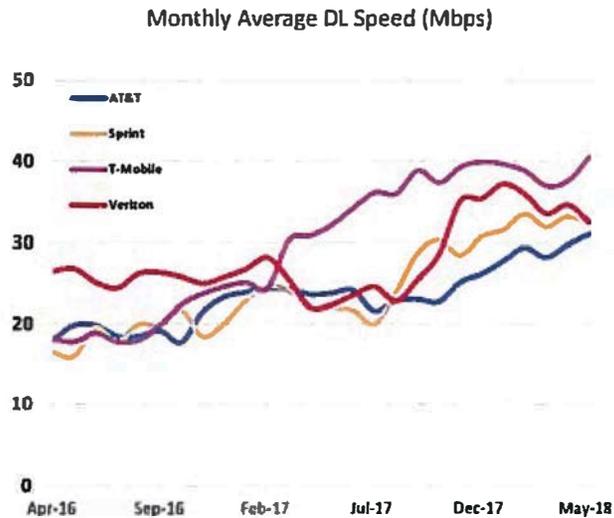
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# Sprint Network Challenges – Consistency of Experience

- 2.5 GHz spectrum delivers high speeds, but customers often do not have consistent access to that band and experience dramatically lower speeds when connecting to Sprint’s other bands

## Sprint Speeds Lag in Kansas City



- 2.5 GHz provides good speed, but customers are on this spectrum only a fraction of the time



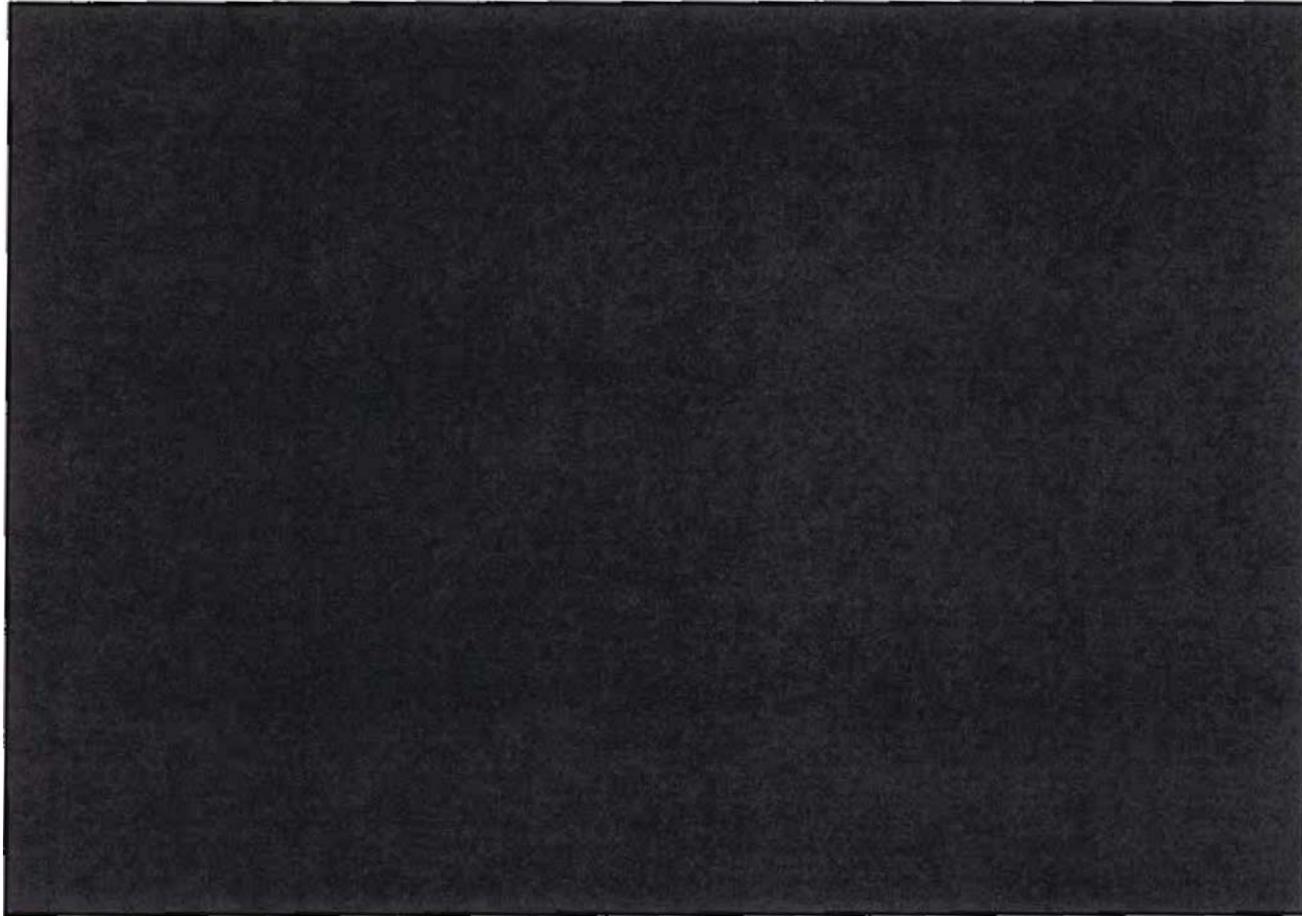
Sprint's analysis of Ookla's Speedtest Intelligence data from 03/01/16 to 05/31/18 for All Mobile Results

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## Sprint Network Challenges – Lowest Site Density



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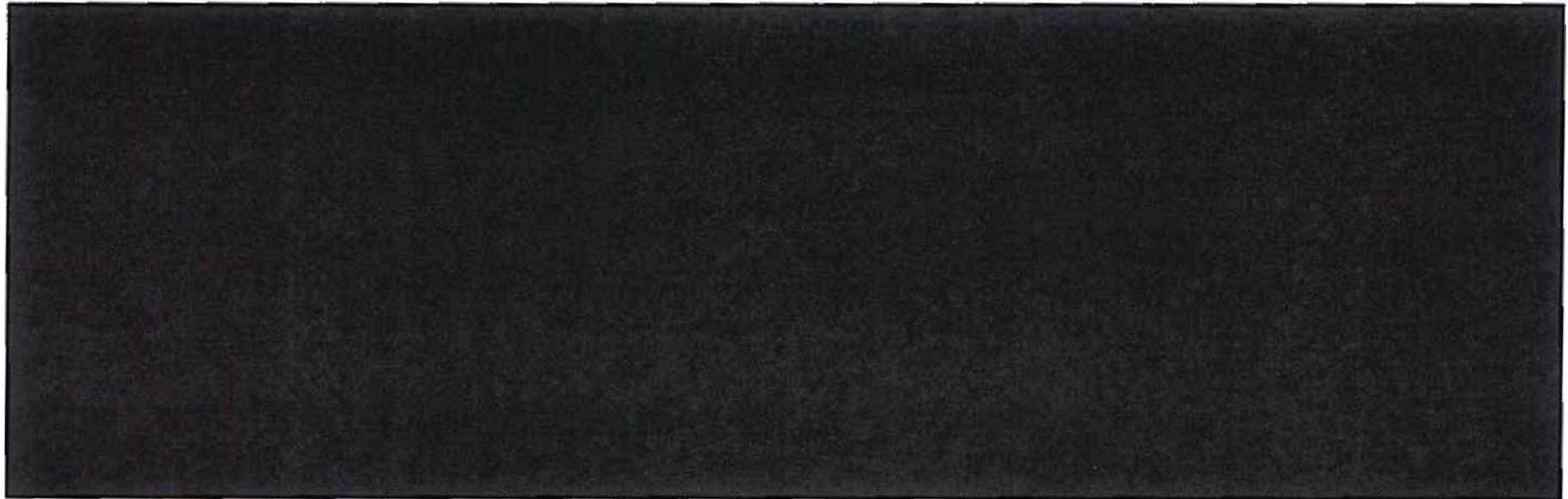
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## Network Challenges Have Led to Elevated Churn



- Network performance issues have led to elevated churn levels at Sprint compared to other carriers
- Higher churn makes it more difficult to generate consistent financial results to support network investment



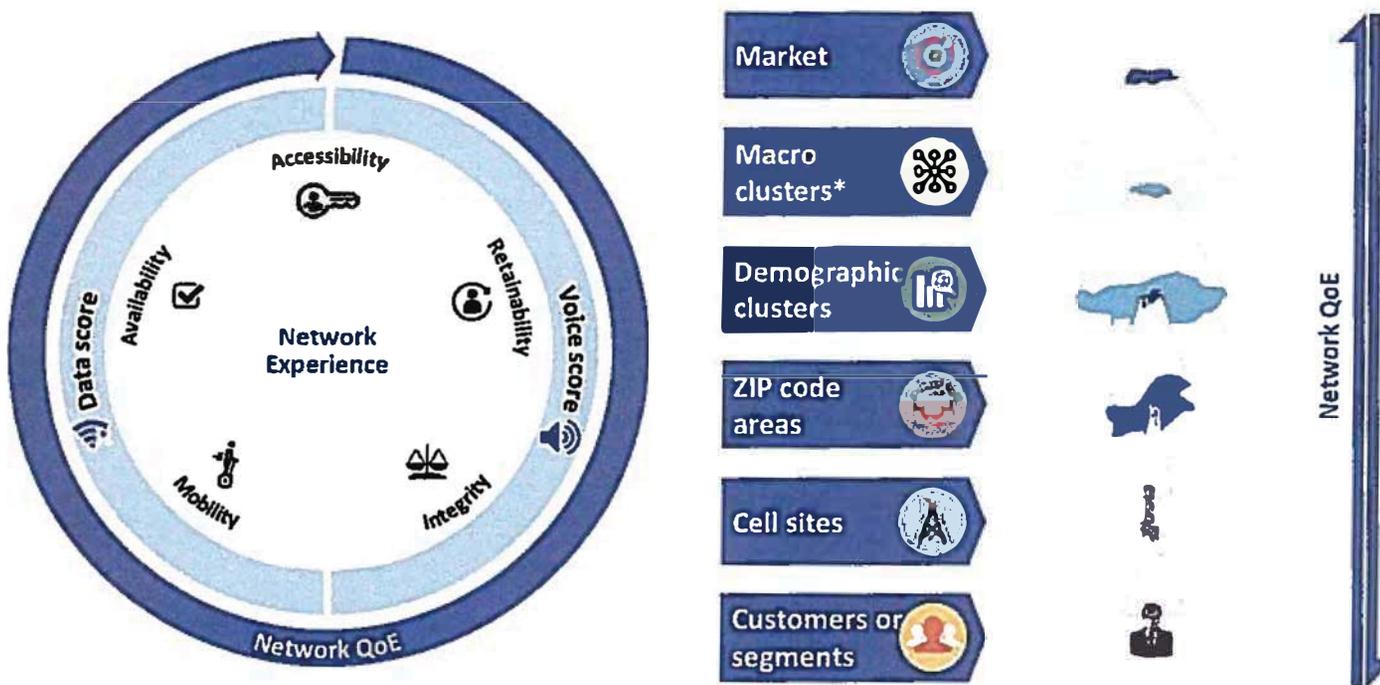
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# Sprint "Quality of Experience" – What is Sprint QoE?

- Quality of Experience ("QoE") is a recently developed metric of network quality used internally by Sprint to measure customer level network experience



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## Low QoE score has a high correlation with churn

- **QoE is a score on a 1-to-5 scale and reflects a number of network experience factors, including data throughput, data accessibility, and coverage**
  - Concept is to boil down user's experience into one number that is calculated for every subscriber, every month
  - Includes voice and data, but data factors are weighted more heavily
- **QoE score of 3 is considered a minimally acceptable network experience – anything below a score of 3 can be considered a poor network experience.**
  - For Video streaming, QOE of < 3 will mean speeds of < 2 Mbps
  - Customers with low QoE scores are much more likely to churn
- **As of April 2018, nearly [REDACTED] of the Sprint postpaid base has a QoE score under 3**

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# Sprint 5G Rollout Plans

- 5G network will be on 2.5 GHz utilizing Massive MIMO equipment
  - No plans to deploy 5G on 800 MHz or 1.9 GHz because of need to support LTE/3G data and voice services
  - Massive MIMO sites will support 4G LTE and 5G simultaneously in "split mode"
- Sprint will deploy 5G initially in 9 cities, beginning in 1H 2019

• Dallas	• Atlanta	• Houston
• Chicago	• New York City	• Phoenix
• Los Angeles	• Washington D.C.	• Kansas City

- Board-approved multi-year network plan (2018-2022) calls for [REDACTED] 5G Massive MIMO sites

5G Massive MIMO Sites (Board-approved Plan)				
2018	2019	2020	2021	2022
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]



## T-Mobile 5G Network Model Assumptions

- Network outputs presented by Neville Ray based on model developed by T-Mobile using inputs from both parties
- Model assumes Sprint will build out **more** 5G sites than are in current board-approved plan
  - Sprint multi-year plan covers five years (2018-2022) but each year subject to annual budget approval and adjustments
  - Assumed that if Sprint successfully deploys [REDACTED] 5G sites on time, it would continue to build out if able
  - [REDACTED] sites will cover about [REDACTED]; [REDACTED] 5G sites would cover nearly [REDACTED]

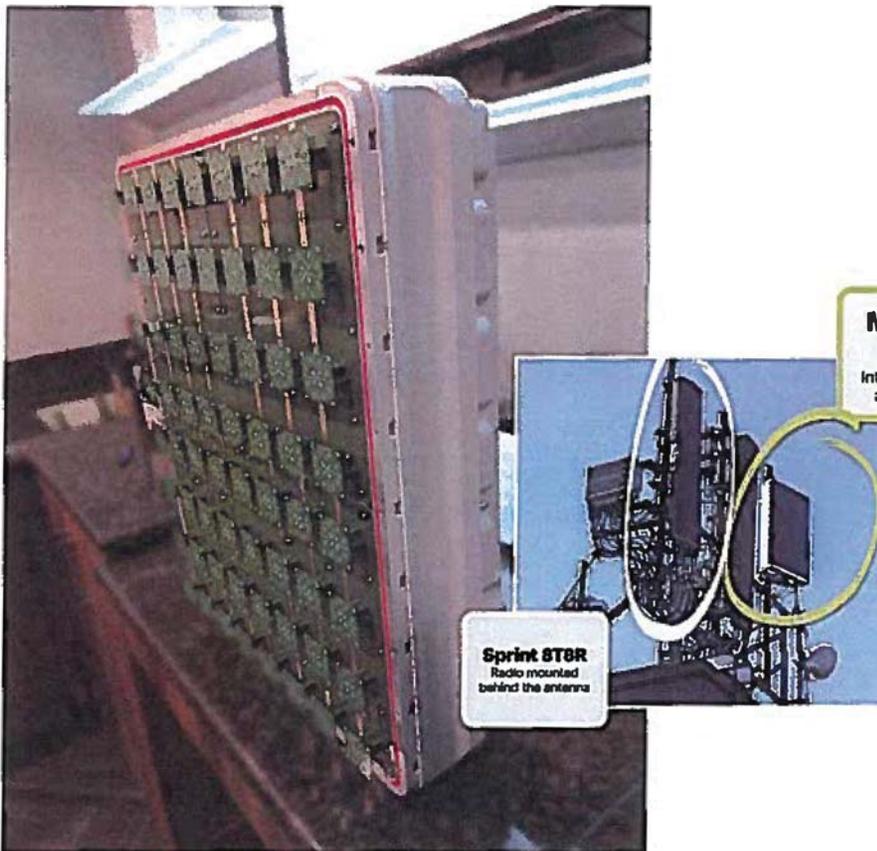


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# Sprint Will Deploy 5G Using Massive MIMO Equipment



Massive MIMO leverages a large number of antennas and beamforming to improve performance

- Sprint will deploy 64T64R Massive MIMO (128 Antenna Elements) at 2.5 GHz for LTE capacity expansion and 5G
- Upgrade subset of 2.5 GHz sites with Massive MIMO to support LTE and 5G simultaneously through “split mode”
- 5G Massive MIMO site deployment of 15K will cover only about 150 million POPs

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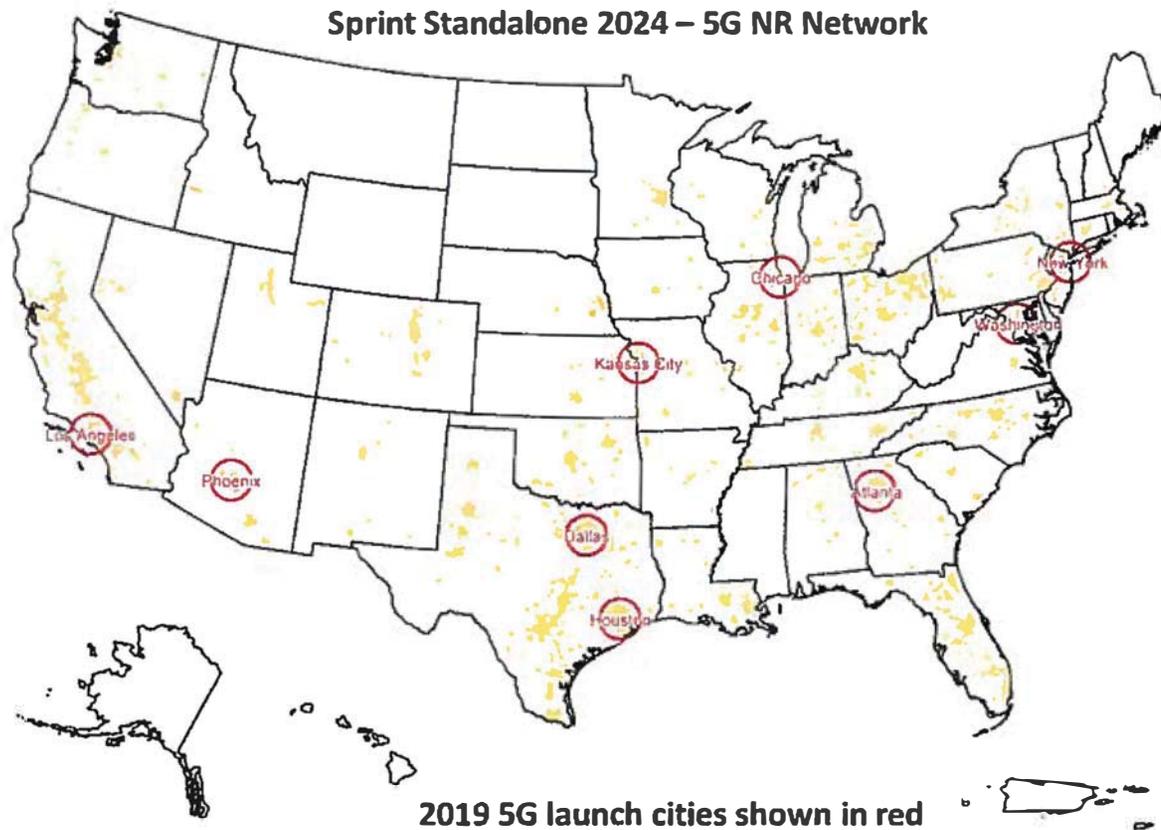
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## Limitations of Building 5G on 2.5 GHz



- Sprint's limited 800 MHz spectrum cannot provide a basis for launching a ubiquitous coverage layer for 5G.
  - Sprint must maintain 800 MHz for LTE coverage and lacks sufficient depth to also accommodate 5G
- Sprint's 2.5 GHz spectrum will deliver high speeds and capacity, but due to its propagation limitations and footprint will not provide coverage outside of major metro and suburban areas
  - Customers outside of 2.5 GHz coverage will drop to Sprint's 1.9GHz or 800 MHz bands (if available), which only offer LTE or older technology at much lower speeds
  - Dropping from Sprint's 5G down to its 1.9GHz or 800 MHz LTE layer could cause speeds to decrease by ~10X
- Infeasible and uneconomical for Sprint to build ubiquitous nationwide 5G coverage layer using only 2.5 GHz spectrum

# Lack of Sufficient Low-Band for 5G Coverage Layer Nationwide



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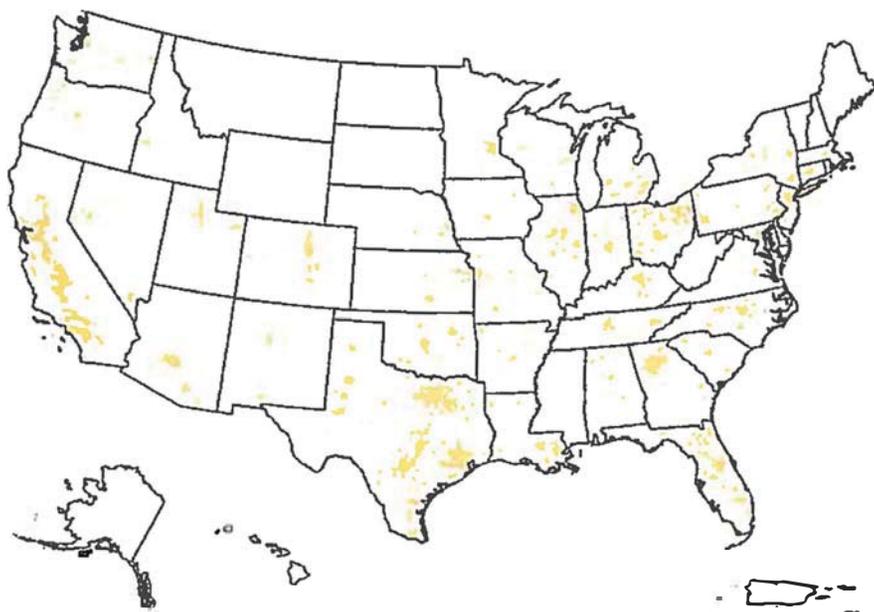
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## Merger Will Create Tremendous Network Benefits

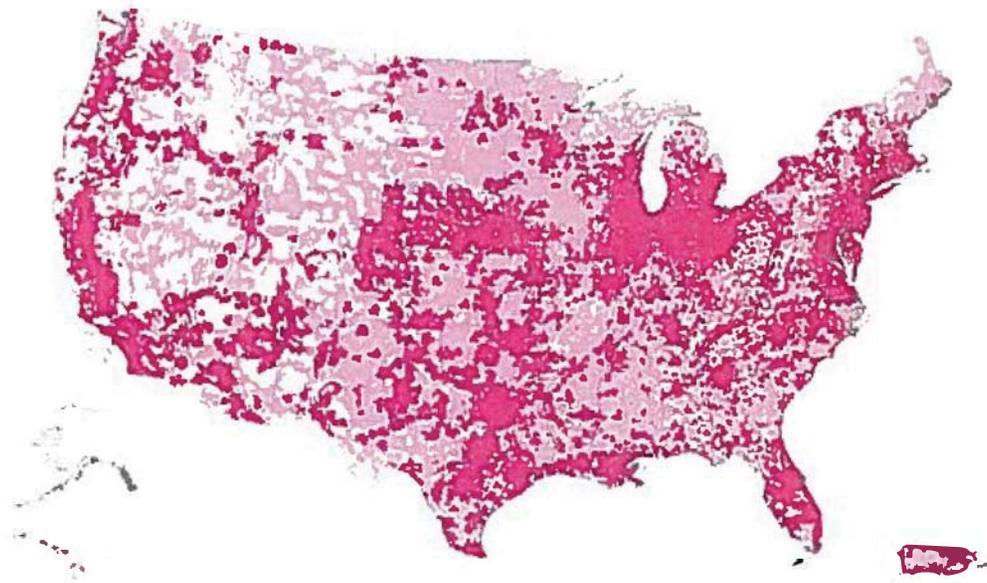


- Sprint and T-Mobile have extremely complementary spectrum assets
- Combining spectrum and network assets of Sprint and T-Mobile will result in dramatic network performance improvements and much more robust 5G offering than either company could offer alone
- New T-Mobile can deploy 5G sites on more towers than Sprint would or could do on its own
  - For Sprint, deployment of isolated pockets of 2.5 GHz absent a deep coverage layer neither sensible nor economically attractive in many areas due to limited scale
  - Anchoring New T-Mobile's network off of T-Mobile cell sites and keeping 11,000 Sprint sites will result in a denser network compared to Sprint standalone
  - T-Mobile's complementary 600 MHz coverage layer makes it more attractive for the combined company to increase buildout of 2.5 GHz outside metropolitan areas
  - New T-Mobile will have greater subscriber scale to justify additional investment

# New T-Mobile can Build a Broader and Deeper 5G Nationwide Network



Sprint Standalone 5G Footprint (2024)



Legend:  
New T-Mobile 5G 600 MHz  
New T-Mobile 5G Mid-band over 600MHz

New T Mobile 5G Footprint (2024)

Maps Source: T-Mobile Model

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## Transaction Will Provide Dramatic Benefits to Sprint Subscribers

- Majority of Sprint subscribers have handsets compatible with T-Mobile LTE network

Brand/Channel	# of LTE compatible devices
Postpaid	26.3M
Boost	7.5M
Other Prepaid	
Wholesale & Other	
<b>Total</b>	<b>37.2M</b>

- Particularly in terms of LTE and 5G coverage, Sprint's customers will see significant gains compared to what Sprint could offer on its own
  - Coverage in many more places than possible on Sprint standalone
  - Improved consistency of experience

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