

Assessing the impact of BDS market dynamics on innovation and competition in the wireless market

Telecom Advisory Services, LLC

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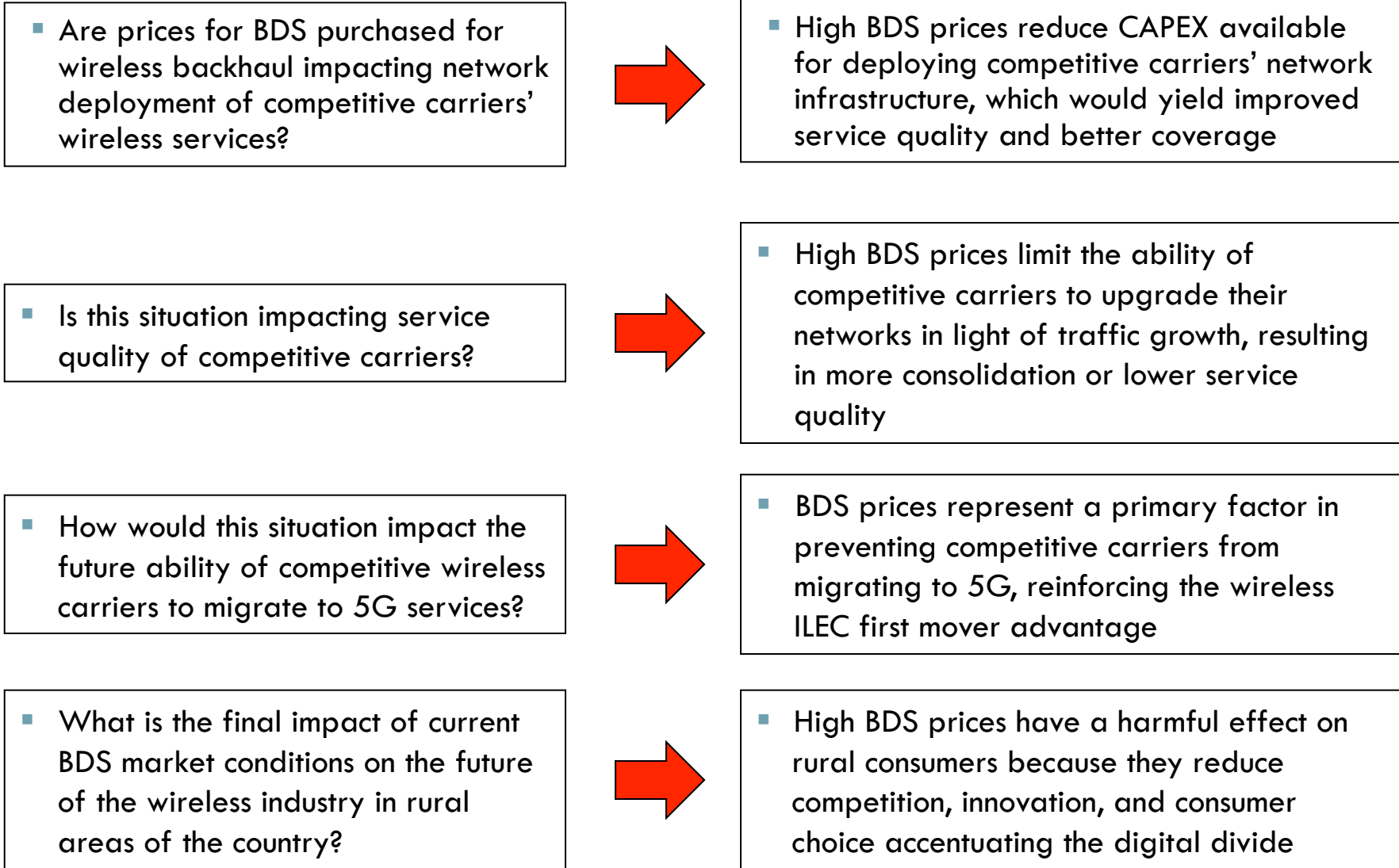
AGENDA

- Introduction
- The impact of BDS pricing on wireless investment
- The impact of BDS pricing on wireless broadband quality of service
- The impact of BDS pricing on future ability of competitive carriers to deploy 5G services

THE OBJECTIVE OF THIS STUDY WAS TO ASSESS THE IMPACT OF CURRENT BDS MARKET DYNAMICS ON CURRENT ECONOMICS AND INNOVATION CAPABILITY OF COMPETITIVE WIRELESS CARRIERS

- The wireless industry value chain comprises a number of inputs that are either owned (spectrum licenses, base station electronics, mobile switching infrastructure), shared, or purchased from third parties (cell towers)
- Wireless backhaul
 - Carriers can deploy their own infrastructure (such as microwave links) or, in some cases, purchase it from their wireline affiliate
 - Backhaul can be acquired from price cap ILECs (the sole provider at 73% of locations nationwide)
 - Where available and offered, backhaul can be purchased from CLECs and/or cable operators.
 - Few locations are served by more facilities-based BDS providers than the ILEC plus one other (~3% of locations nationwide)
- Based on industry interviews, benchmarks and wireless engineering data, this study tackled four questions:
 - Are prices for BDS purchased for wireless backhaul impacting network deployment of competitive carriers' wireless services?
 - Is this situation impacting service quality of competitive carriers?
 - How would this situation impact the future ability of competitive wireless carriers to migrate to 5G services?
 - What is the final impact of current BDS market conditions on the future of the wireless services and choices in rural areas of the country?

THIS STUDY CONCLUDES THAT HIGH BDS PRICES HAVE A NEGATIVE IMPACT ON WIRELESS INVESTMENT, COMPETITION AND INNOVATION, ESPECIALLY FOR CONSUMERS IN RURAL AREAS



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THE IMPACT ON NETWORK DEPLOYMENT OF HIGH BDS PRICES

KEY PREMISES

- A reduction of backhaul costs and contractual arrangements that penalizes switching costs would increase the amount of capital spent for network deployment
- An increase in spending in network deployment would foster competition and improve consumer welfare

METHODOLOGY

Calculate the portion of a wireless total OPEX spent on backhaul

- Drill down of benchmarking data
- Bottom-up analysis based on secondary data and interviews

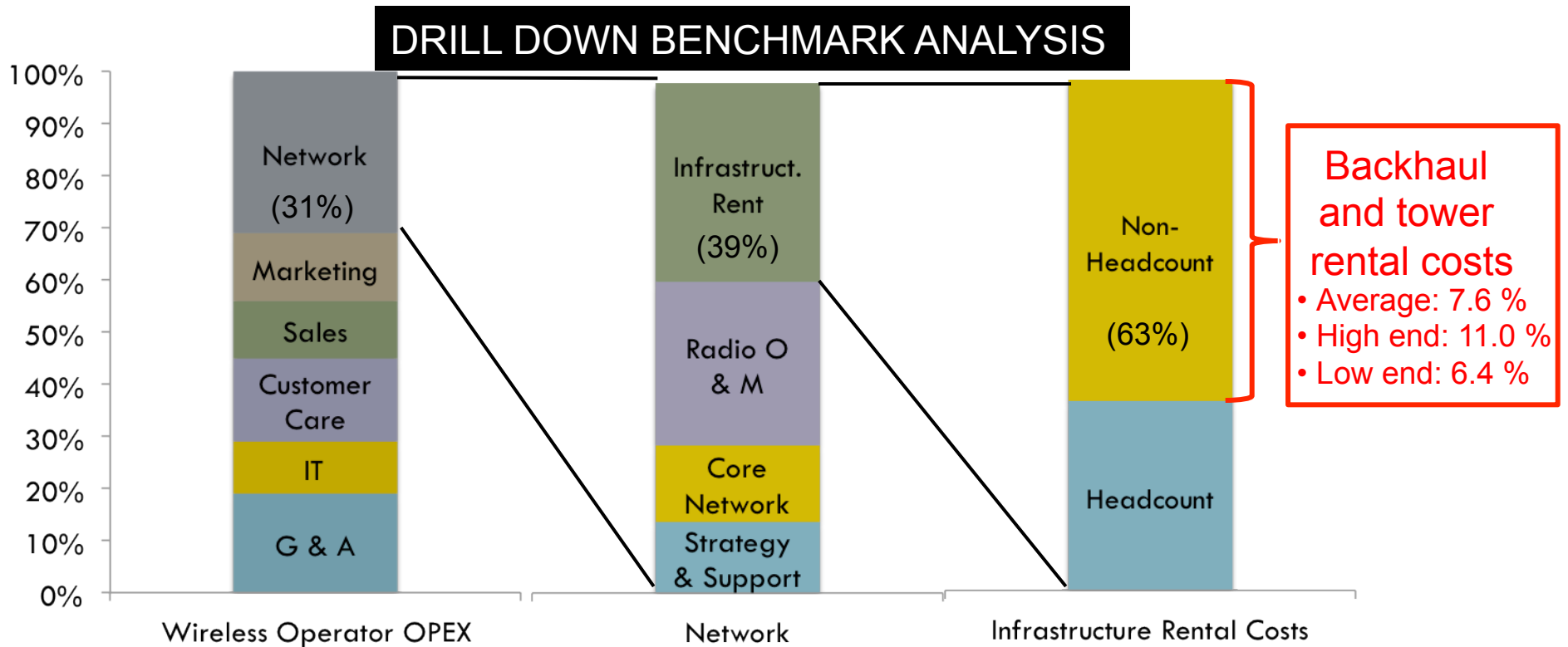
Assume backhaul pricing reduction scenarios

- Review data in FCC proceedings
- Sensitivity analyses of 10%, 20%, and 30% savings

Estimate impact of changes in backhaul pricing on CAPEX

- Econometric modeling of impact of regulatory initiated cost reduction initiatives on CAPEX

**BACKHAUL COSTS REPRESENT ALMOST 30% OF TOTAL NETWORK COSTS
AND 6 % OF A WIRELESS CARRIER OPEX**



BOTTOM-UP ANALYSIS

	Backhaul as per cent of total OPEX			Backhaul as % of network OPEX	
	Benchmark	Bottom-up	Interviews	Benchmark	Interviews
High-end	11.0 %	5.95 %		29.7 %	
Average	7.6 %	4.30 %	3.0 %	24.6 %	30.0 %
Low-end	6.4 %	2.25 %		21.5 %	

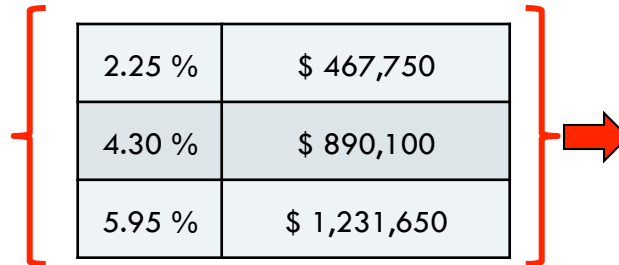
A REDUCTION IN BACKHAUL PRICING AS A RESULT OF REFORMING BDS RATES WOULD GENERATE SAVINGS THAT COULD TRANSLATE INTO LARGER NETWORK SPENDING (1 OF 2)

EXAMPLE: WIRELESS CARRIER FINANCIALS ('000)

Revenues	\$26,000
Operating Expenses	\$20,700
EBITDA	\$5,300
Tax	\$43
Net interest expense	(\$1,450)
CAPEX	\$4,300
FCF	(\$526)
CAPEX / Revenues	16.53%
CAPEX / connection	\$92.75
OPEX / connection	\$443.69

BACKHAUL AS PERCENT OF OPEX

2.25 %	\$ 467,750
4.30 %	\$ 890,100
5.95 %	\$ 1,231,650



From cost structure analysis



BACKHAUL SAVINGS SENSITIVITIES

	10% Savings	20% Savings	30% Savings
	\$ 46,575	\$ 93,150	\$ 139,725
	\$ 89,010	\$ 178,020	\$ 267,030
	\$ 123,165	\$ 246,330	\$ 369,495

A REDUCTION IN BACKHAUL PRICING AS A RESULT OF REFORMING BDS RATES WOULD GENERATE SAVINGS THAT COULD TRANSLATE INTO LARGER NETWORK SPENDING (2 OF 2)

BACKHAUL SAVINGS SENSITIVITIES

10% Savings	20% Savings	30% Savings
\$ 46,575	\$ 93,150	\$ 139,725
\$ 89,010	\$ 178,020	\$ 267,030
\$ 123,165	\$ 246,330	\$ 369,495



Analysis of historical data in the US indicate that 85% of regulatory initiated cost reduction on carrier OPEX can be transferred to CAPEX



CONTRIBUTION TO CAPEX

10% Savings	20% Savings	30% Savings
\$ 39,589	\$ 79,178	\$ 118,766
\$ 75,659	\$ 151,317	\$ 226,976
\$ 104,690	\$ 209,381	\$ 314,071

0.91 % increase in CAPEX

3.40 % increase in CAPEX

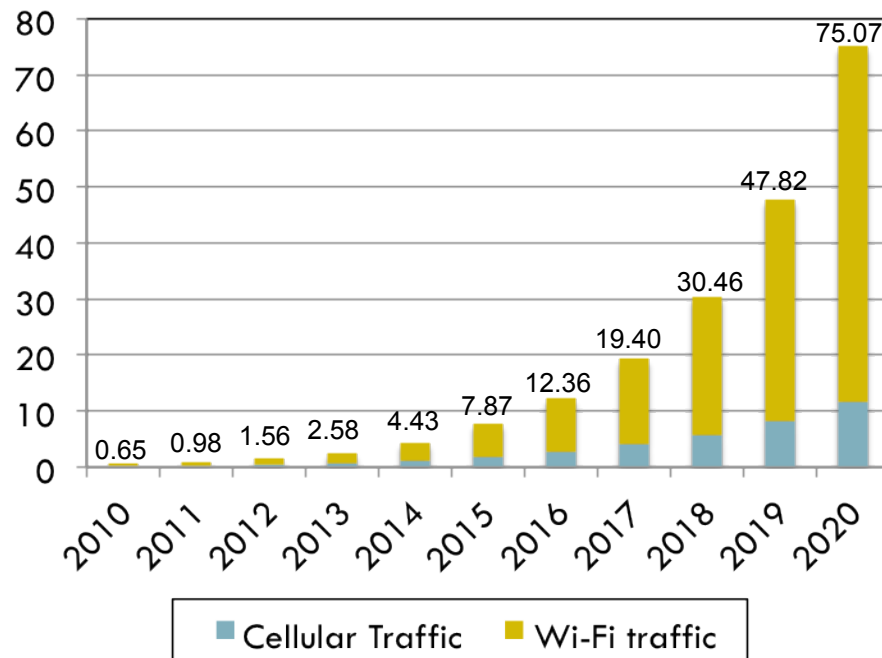
6.81% increase in CAPEX

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**WIRELESS DATA TRAFFIC IN THE US HAS BEEN GROWING AT 65% ANNUALLY
AND IS PROJECTED TO CONTINUE TO INCREASE AT 57% PER YEAR THROUGH 2020**

**UNITED STATES: TOTAL WIRELESS TRAFFIC
(Exabytes per month)**



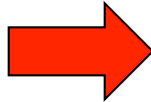
	CAGR	
	2010-15	2015-20
Cellular Traffic	57%	44%
Wi-Fi Traffic	68%	60%
Total Traffic	65%	57%

Note: 1 Exabyte = 1 million terabytes

Sources: Cisco Visual Network Index; Telecom Advisory Services analysis

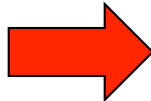
CARRIERS HAVE THREE OPTIONS TO ACCOMMODATE TRAFFIC GROWTH

1. ACQUIRE
SPECTRUM LICENSE



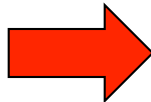
- Since 2010, the FCC has licensed 688 MHz to the wireless industry
- In the future, blocks of 200 MHz will be assigned
- Additionally, 14 GHz in unlicensed bands are available

2. MIGRATE TO
TECHNOLOGIES
WITH IMPROVED
SPECTRAL
EFFICIENCY

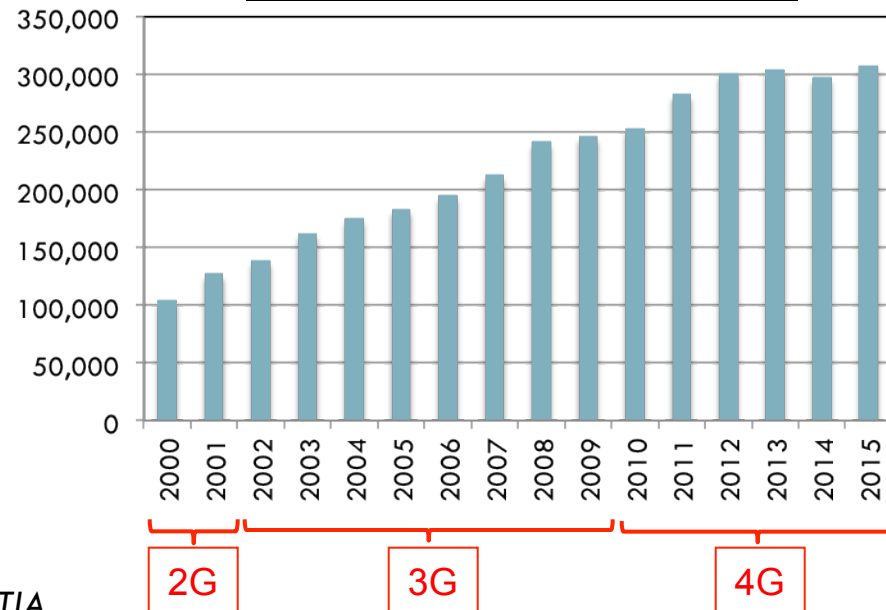


- Migration from 3G to 4G, supporting download speeds 10 times faster
- 62% of connections already 4G
- Future migration to 5G

3. CELL
SPLITTING

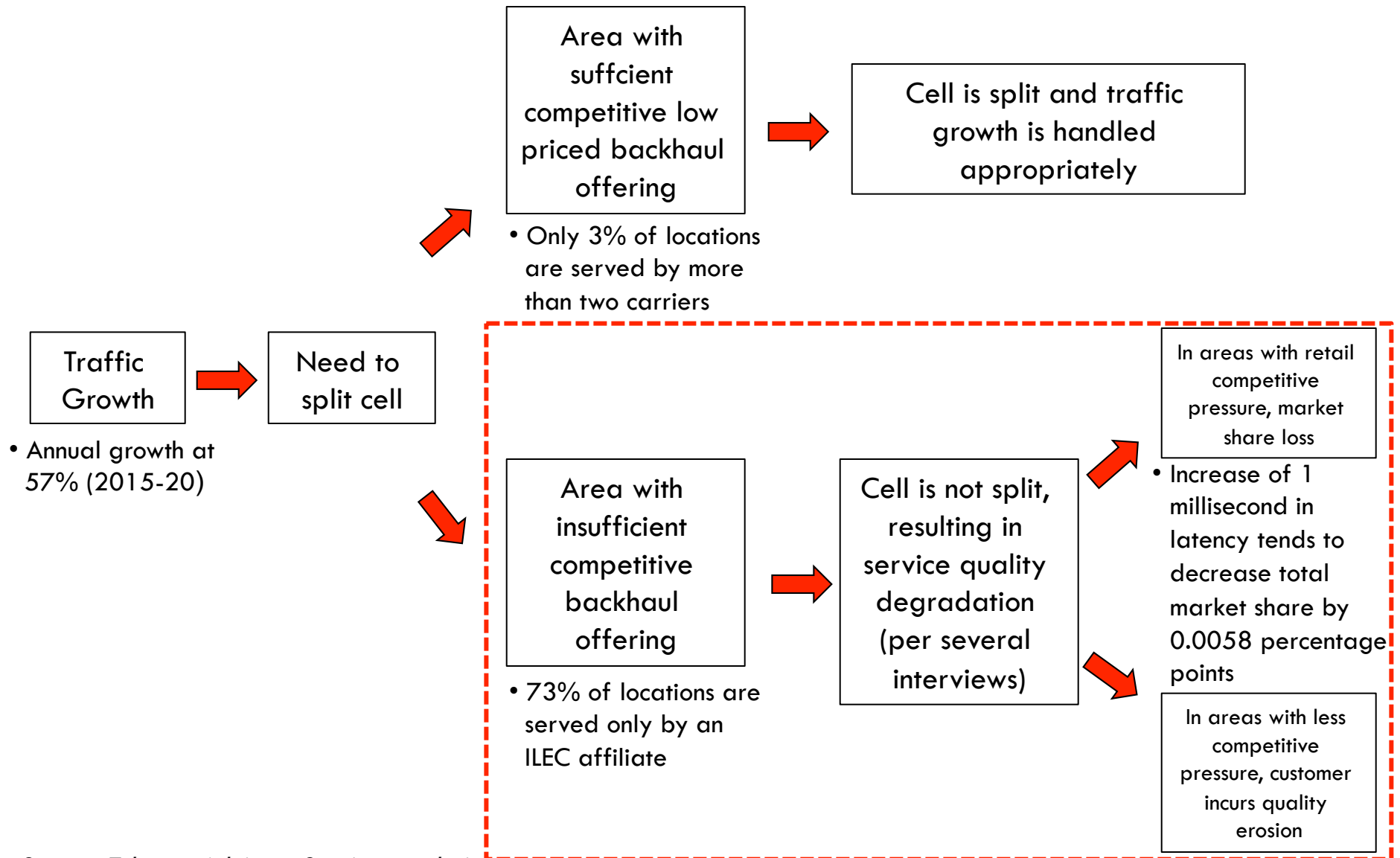


NUMBER OF CELL SITES



Source: CTIA

CURRENT BDS PRICING IS CONSTRAINING COMPETITIVE CARRIERS' ABILITY TO UPGRADE NETWORKS IN ORDER TO MEET TRAFFIC GROWTH



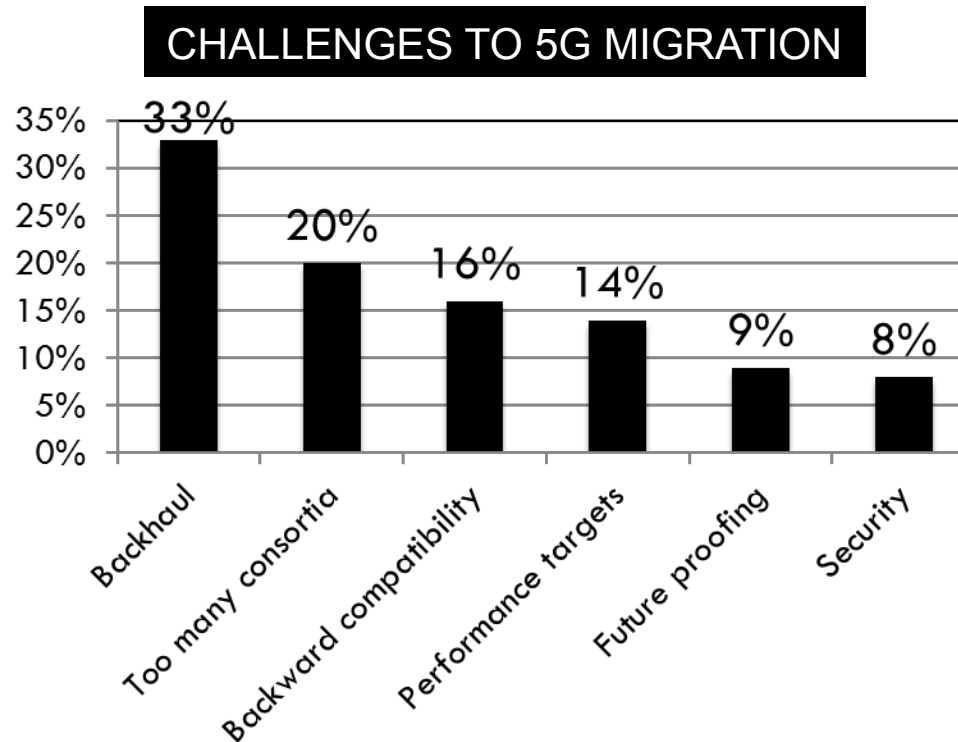
Source: Telecom Advisory Services analysis

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THE CURRENT BDS REGIME HAS A SIGNIFICANT IMPACT ON THE ECONOMICS OF 5G DEPLOYMENT, DELAYING THE MIGRATION OF COMPETITIVE CARRIERS

- Increased throughput changes the sizing requirements of the backhaul networks
- A migration based on 5G in Stand Alone (5G New Radio to 5G core) requires carriers to deploy a new 5G backhaul
- There is a consensus among carrier executives that backhaul costs are the most important barrier to 5G migration

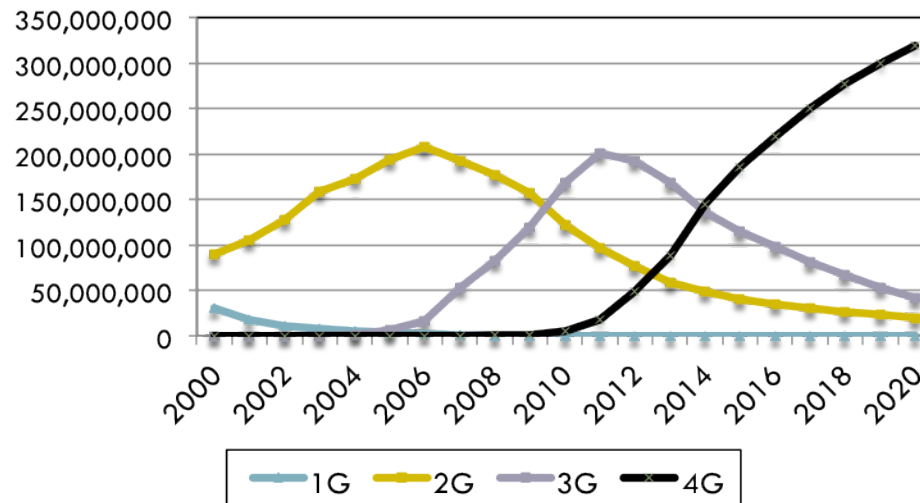


NOTE: Poll of 500 participants cited in Thomas (4/24/2015)

HIGH BDS PRICES WILL STYMIE COMPETITIVE 5G DEPLOYMENTS

- Most competitive carriers interviewed in this study indicate that, under current BDS pricing, a 5G migration will not take place either in the short or long term because of the economic constraints
- On the other hand, AT&T and Verizon have already launched 5G trials
- They expect to launch service in 2020 (Follow, 2016; Wheeler, 2016)
- By 2020, 84 % of US wireless connections will be 4G, which allows us to confirm that, from a generational standpoint, 5G would have already started to deploy

UNITED STATES: TOTAL CELLULAR CONNECTIONS BY GENERATION



Sources: GSMA Intelligence; Telecom Advisory Services analysis

HIGH BDS PRICES WILL EXACERBATE WIRELESS INDUSTRY CONCENTRATION IN RURAL AREAS

PERCENT OF POPULATION SERVED BY 1 OR 2 CARRIERS

	FCC Claimed Population served by 1 or 2 carriers (%)		
National	3.1		
	Urban Counties	Suburban Counties	Rural Counties
Kentucky	0.7	5.3	24.7
New Hampshire	2.1	5.0	16.2
Oregon	0.7	4.7	6.4
Vermont	4.8	14.1	19.7
West Virginia	12.9	20.6	33.8

Sources: FCC; National Broadband Map; Telecom Advisory Services analysis

CONCLUSION

- First, based on the estimates of backhaul costs as a percent of a competitive wireless OPEX, a decrease in BDS charges resulting from pricing limits on ILEC affiliates and reduced switching costs could result in an increase in CAPEX, yielding improved service quality, better coverage and more competition.
- Second, the lack of regulatory control on BDS pricing and contractual arrangements constrains competitive carriers from upgrading their network to face exponential traffic growth; this, in turn, results in either further industry concentration or a degradation of service quality for rural customers.
- Third, current BDS market conditions preclude many competitive carriers from even considering a 5G migration, thereby reinforcing first mover competitive advantage of AT&T and Verizon, which ultimately will further industry consolidation and less competition.
- This will impact, in particular, rural customers, further accentuating the digital divide.

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