



**Strengthening connections today, while
building for tomorrow.**

Wireless broadband, small cells and 5G



Our Georgia communities are increasingly turning to wireless networks and mobile technology to operate smarter and more efficiently.

Georgians are rapidly abandoning landlines in favor of mobile phones making reliable wireless connectivity at home an important consideration for home buyers and renters.

- >50% of Georgia households have moved away from landlines and are wireless-only.
- The average North American home had 14.7 connected devices in Q2 2016.
- 67% of Americans moving to a new community rank reliable wireless as more of a must-have than good schools (65%) and affordable housing (60%).

The Way Georgia Communicates is Changing...

Georgians are increasingly turning to wireless networks and mobile technology

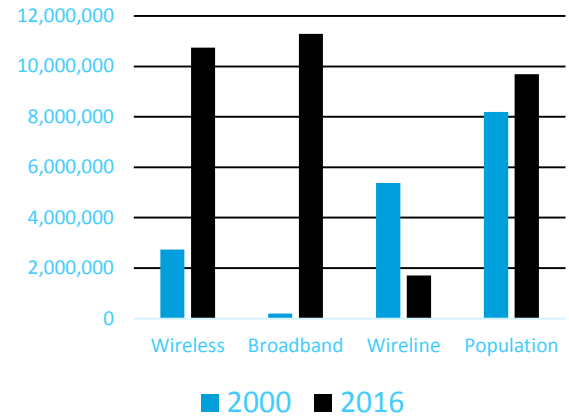
From 2000-2016, Georgia has seen:

292% increase in wireless phone subscribers¹

5,440% increase in broadband subscribers²

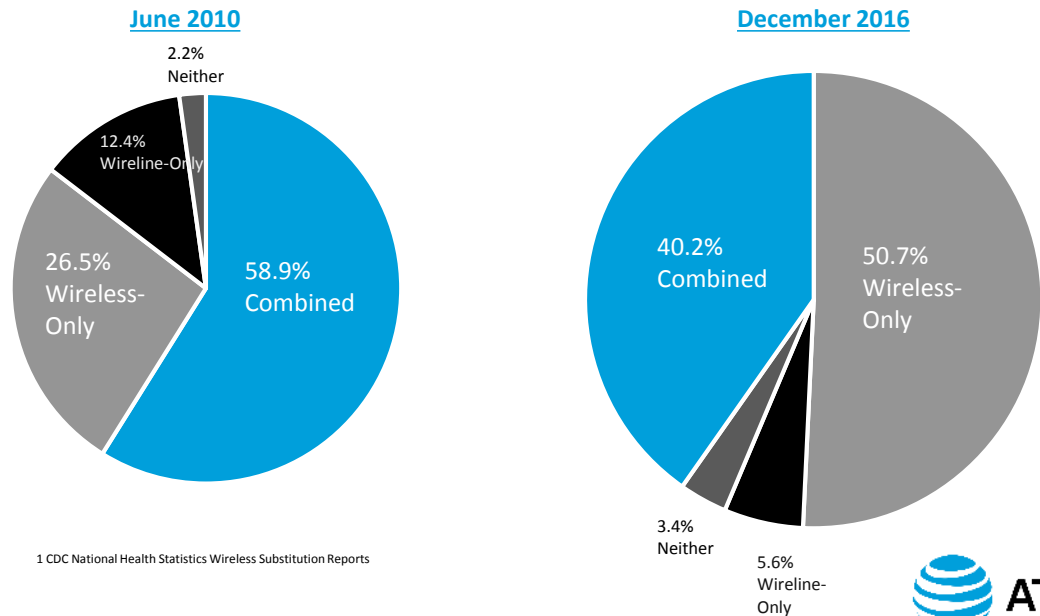
68% decrease in switched access lines³

18% increase in population⁴



¹ FCC Local Competition Report May 2001 (as of 12/31/00), Table 9; FCC Voice Telephone Services Report February 2018 (as of 12/31/16), Supplemental Table 1.
² FCC High-Speed Services for Internet Access: Status as of December 2000 (Table 7); FCC Internet Access Service Report February 2018 (as of 12/31/16) *Connections/lines over 200 Kbps.
³ FCC Local Competition Report May 2001 (as of 12/31/00), FCC Voice Telephone Services Report April 2017 (as of 06/30/16), Supplemental Table 1.
⁴ U.S. Census Bureau Quick Facts 2016 (July 1) Estimate Nevada; U.S. Census Bureau Nevada 2000.

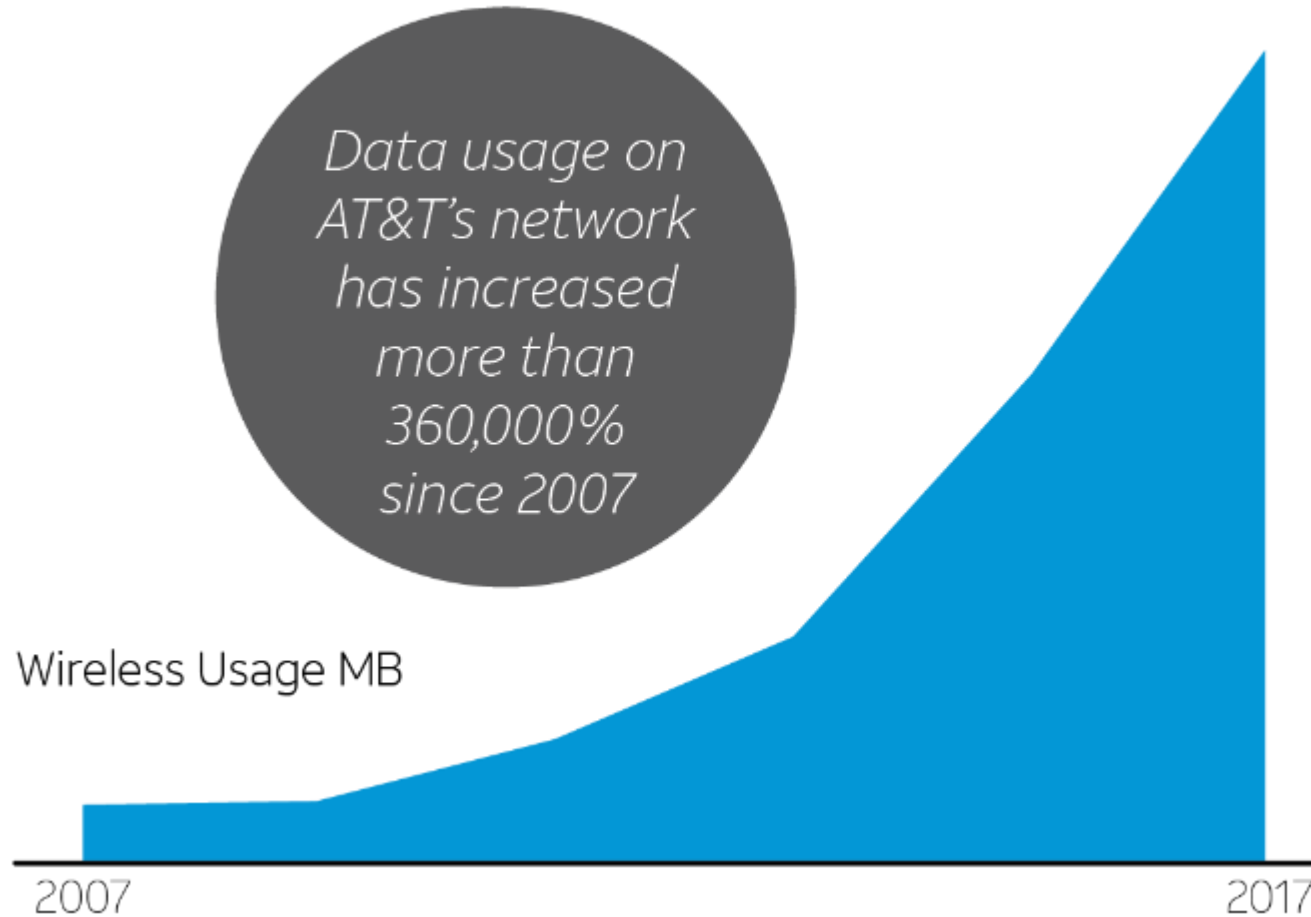
Growth of Wireless-Only Households in Georgia¹:



¹ CDC National Health Statistics Wireless Substitution Reports

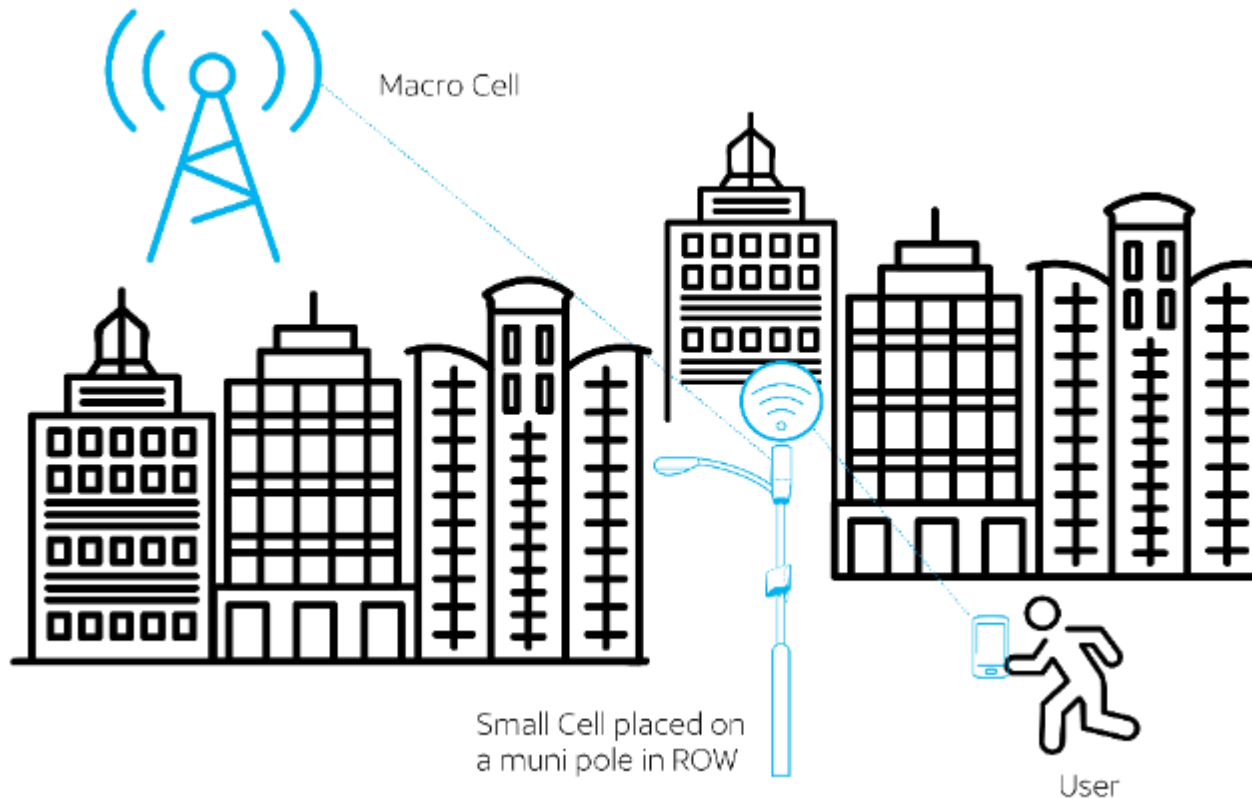


What the demand looks like on AT&T's network

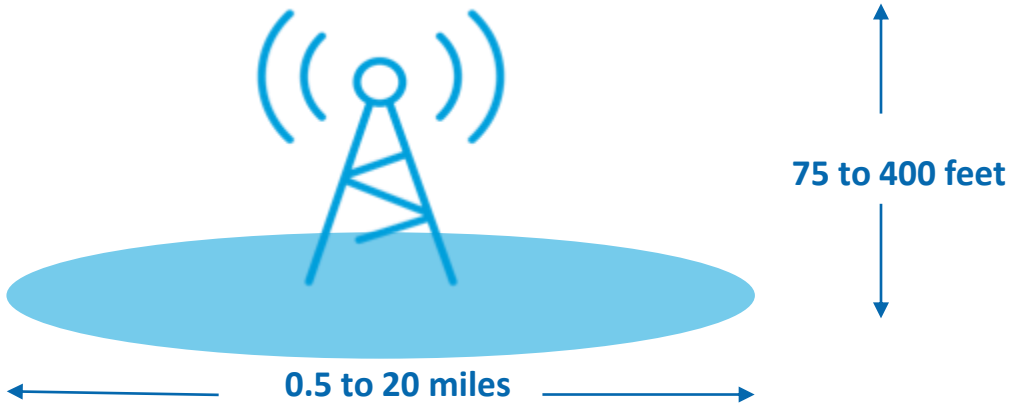


Why Small Cells?

- Support rapid increases in data usage and mobile applications;
- Handle the growing number of new connected devices in marketplace;
- Prepare our network for the next generation of technologies and services – like 5G, AirGig, the Internet of Things and smart cities; and,
- Position Georgia as a leader in connectivity and help ensure the state has the 21st century infrastructure needed to remain the #1 state to do business.

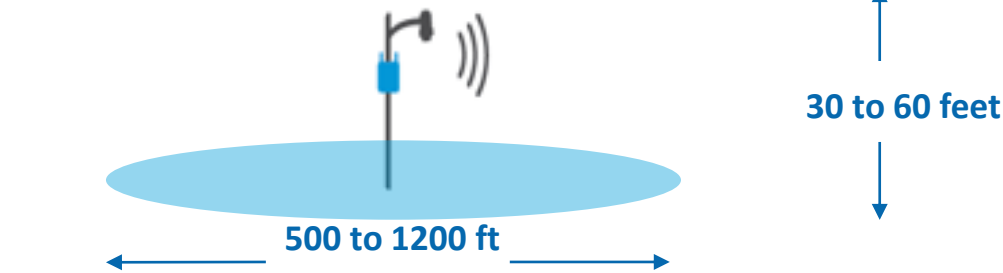


The footprint, or service area, of a site is determined by height and by frequency band



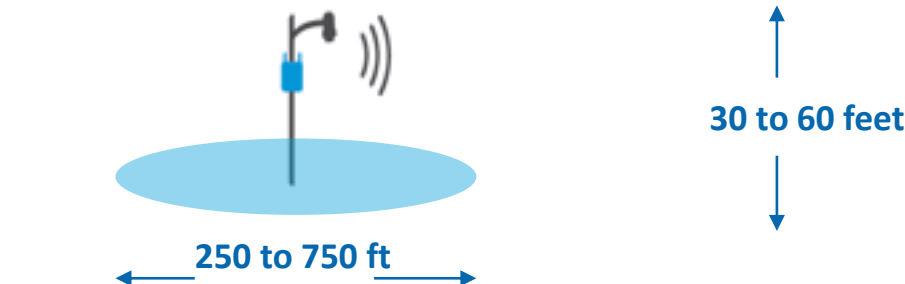
Macrocell (4G LTE)

The common form factor for wireless communication. Higher height and lower frequencies used result in the larger service area.



Current Small Cell (4G LTE)

Uses the same frequencies as macrocells, in addition to utilizing unlicensed spectrum. Due to lower height, footprint is smaller. Increases capacity or coverage in target areas.



Future Small Cell (5G)

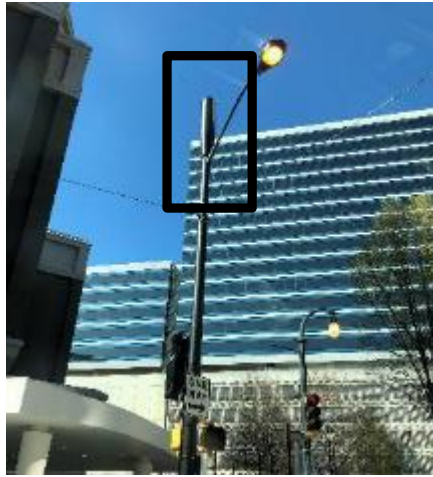
Very high frequencies enabled by future 5G technology result in smaller footprint, but can be used in future 5G in order to meet the exponential increased capacity demand. These frequencies are not used for wireless service today.

- Heights and service areas are approximations
- Small cell sites supplement vs. replace macrocell sites

Illustration: Leveraging Common Infrastructure to Implement Small Cells

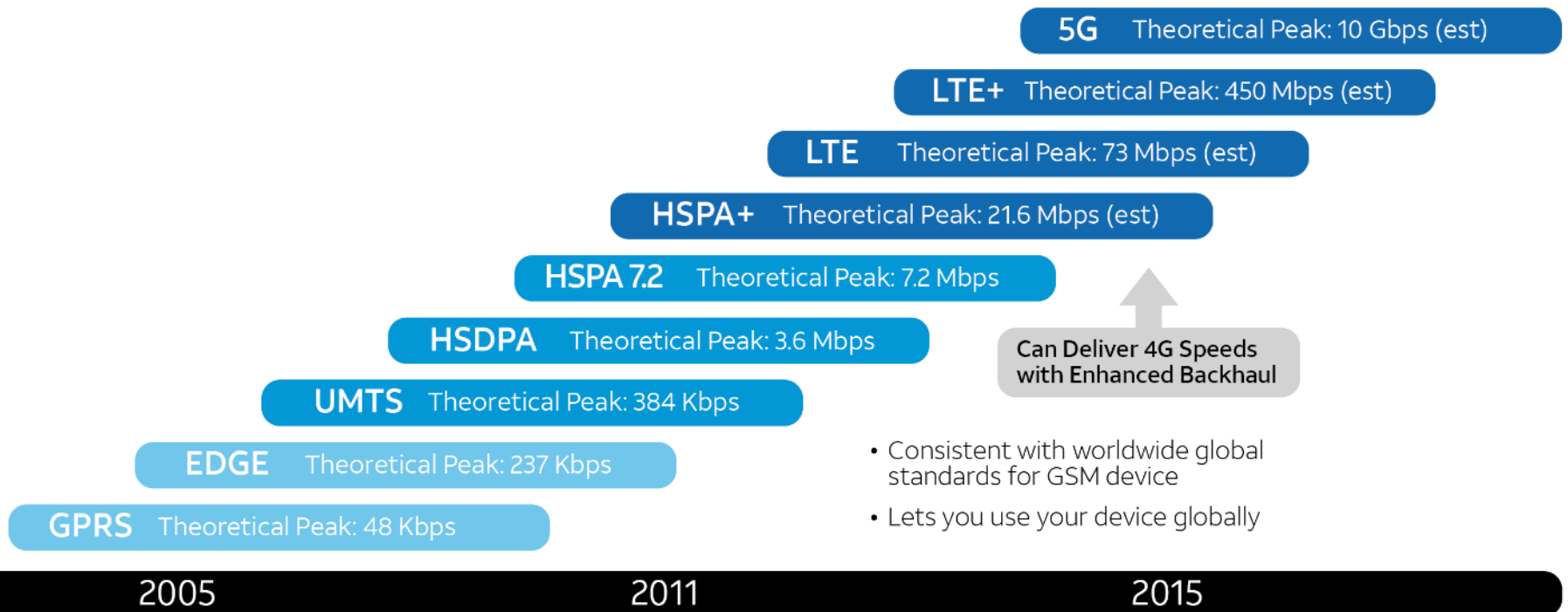


Examples of Small Cells deployed in our communities



Mobility speeds – faster...faster...faster.

Cell sites are often supporting various generations of wireless technology. As new generations of technology are deployed, customers migrate over to the newer technology over time requiring their continued support. These cell sites help provide you with the fast network coverage you've come to expect from AT&T.



AT&T's Leadership Roles in Delivering the Value of 5G to Transportation : *at a glance*



17.8M Connected Cars on AT&T Network

25 Major Global Auto and Truck Brands

2.7M Connected Fleet Vehicles



Global Solutions in 200+ Countries and Territories

Driving
Innovation



Global Alliances –5GAA, NGMN, ITSA, GSMA, Auto ISAC, TSR



Exclusive Carrier for the American Center for Mobility



AT&T Drive Studio – Development and Research Center

* as of 3Q2017

But Where is That Intersection of 5G and Automotive?

Software and
Firmware
Over-the-Air
(SOTA/FOTA)



“Remote”
Driving +
Vehicle
Assist



HD Mapping +
Vehicle
Navigation and
Path Planning



Augmented +
Virtual Reality
Entertainment
Services



Mobility speeds – faster...faster...faster.

- Ongoing advancements in wireless technology are crucial pieces of the economic development puzzle.
- Accenture estimates the telecom operators are expected to invest about **\$275 billion** in infrastructure over the next 7 years, creating up to 3 million jobs.
- **500 new construction jobs** will be created each year over the estimated 7 year buildout.
- **120,000 new jobs** will be created each year over the first 7 years of deployment.

In Georgia cities, Smart City technology and 5G investments are expected to have the following economic impact:

Atlanta

Pop: **456,002**
Jobs: **4,256**
GDP growth: **\$694M**
Network investment: **\$375M**
Smart Grid & Transportation: **\$263.21M**

Albany

Pop: **73,801**
Jobs: **689**
GDP growth: **\$112M**
Network investment: **\$61M**
Smart Grid & Transportation: **\$42.6M**

Athens

Pop: **123,371**
Jobs: **1,152**
GDP growth: **\$188M**
Network investment: **\$101M**
Smart Grid & Transportation: **\$71.21M**

Blue Ridge

Pop: **1,391**
Jobs: **13**
GDP Growth: **\$2M**
Network investment: **\$1M**
Smart Grid & Transportation: **\$0.42M**

Valdosta

Pop: **56,474**
Jobs: **527**
GDP Growth: **\$86M**
Network investment: **\$46M**
Smart Grid & Transportation: **\$32.6M**

Augusta

Pop: **197,081**
Jobs: **1,840**
GDP growth: **\$300M**
Network investment: **\$162M**
Smart Grid & Transportation: **\$113.76M**

Columbus

Pop: **197,485**
Jobs: **1,843**
GDP growth: **\$301M**
Network investment: **\$162M**
Smart Grid & Transportation: **\$113.99M**

Dahlonega

Pop: **6,437**
Jobs: **60**
GDP Growth: **\$10M**
Network investment: **\$5M**
Smart Grid & Transportation: **\$1.92M**

Dublin

Pop: **16,104**
Jobs: **150**
GDP growth: **\$25M**
Network investment: **\$13M**
Smart Grid & Transportation: **\$4.81M**

Macon-Bibb

Pop: **152,555**
Jobs: **1,424**
GDP growth: **\$232M**
Network investment: **\$125M**
Smart Grid & Transportation: **\$88.06M**

Gainesville

Population: **40,000**
Jobs: **373**
GDP Growth: **\$61M**
Network investment: **\$33M**
Smart Grid & Transportation: **\$11.96M**

Rome

Pop: **36,407**
Jobs: **340**
GDP growth: **\$55M**
Network investment: **\$30M**
Smart Grid & Transportation: **\$10.88M**

Savannah

Pop: **146,763**
Jobs: **1,370**
GDP growth: **\$223M**
Network investment: **\$121M**
Smart Grid & Transportation: **\$84.71M**

Snellville

Pop: **19,738**
Jobs: **184**
GDP Growth: **\$30M**
Network investment: **\$16M**
Smart Grid & Transportation: **\$5.9M**



What is a Smart City?

The integration of technology with a strategic approach to sustainability, cost reduction, citizen well-being and economic development.

Utilities



Supply chain



Vehicles



Homes



Metering



Health



Security

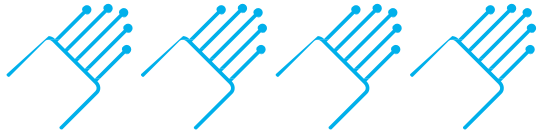


Equipment



Source: International Electrotechnical Commission, 2014

AT&T in Georgia



More than 4million

strand-miles of fiber-optics in Georgia.

Approximately 1,250 upgrades made in 2017, including 30 new cell sites, addition of wireless and wired network capacity and new broadband network connections in Georgia.



1,168

Wi-Fi hotspots
in Georgia as of
March 2018.



99.7%

of Georgia covered
by the AT&T mobile
broadband network
as of January 2018.



*More
than
17,400*

employees working in
Georgia as of June 2018.

More than 5 billion

invested in our Georgia wired and wireless networks during 2014 – 2016.



AT&T