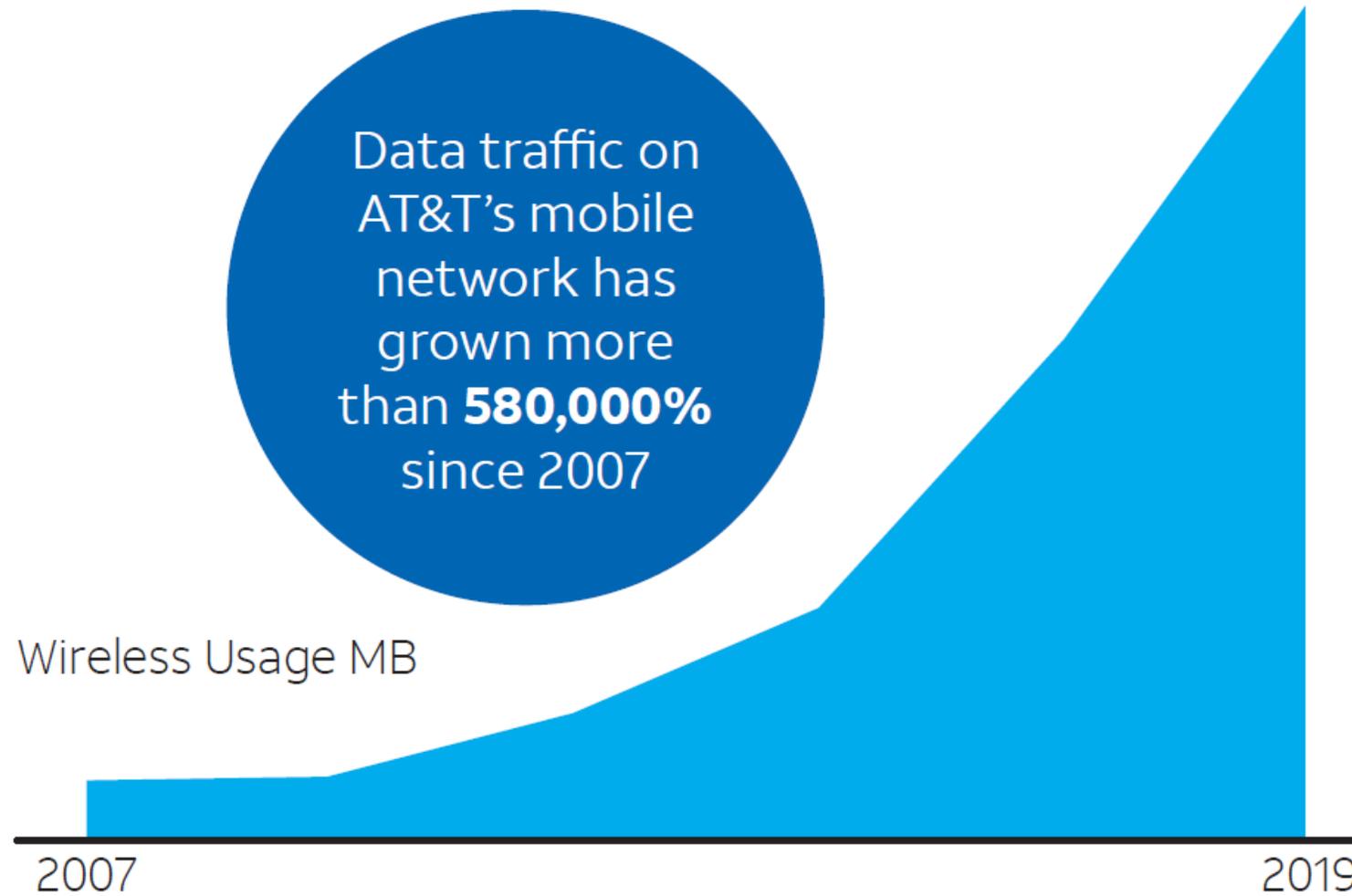


# The Need For Small Cells and AT&T's Network

Lewes, DE  
October, 2020

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



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# Small cells are helping us keep up with rising consumer and business demand and prepare our network for the future.



# Why Small Cells?

- Consumer demand for data is growing exponentially and will continue to grow as mobile video streaming becomes even more prominent. This increase in data use requires an increase in wireless network capacity—otherwise, service quality could be disrupted or decline.
- So, to keep up with these surging demands, operators must change their network architectures to more efficiently use spectrum, and the best path forward is network densification—which means small cells.
- This is why we are investing in and deploying small cells in Delaware municipalities and across the country. Small cells help us bolster network capacity, better meet surging consumer & business demand for more data and faster connectivity while preparing our network for the next generation of technologies & services—like 5G, the Internet of Things and Smart Cities.

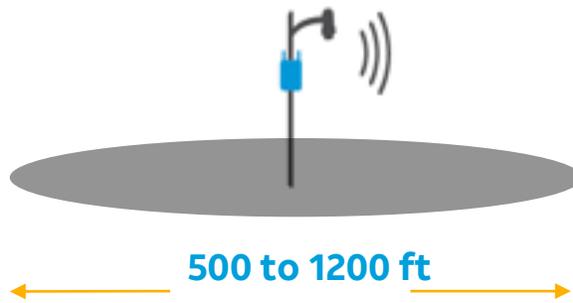
# The footprint, or service area, of a site is determined by height and by frequency band



75 to 400 feet

## Macrocell (4G LTE)

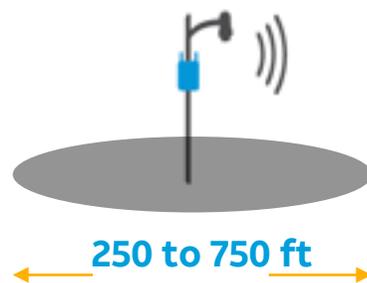
The common form factor for wireless communication. Higher height and lower frequencies used result in the larger service area.



30 to 60 feet

## 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.

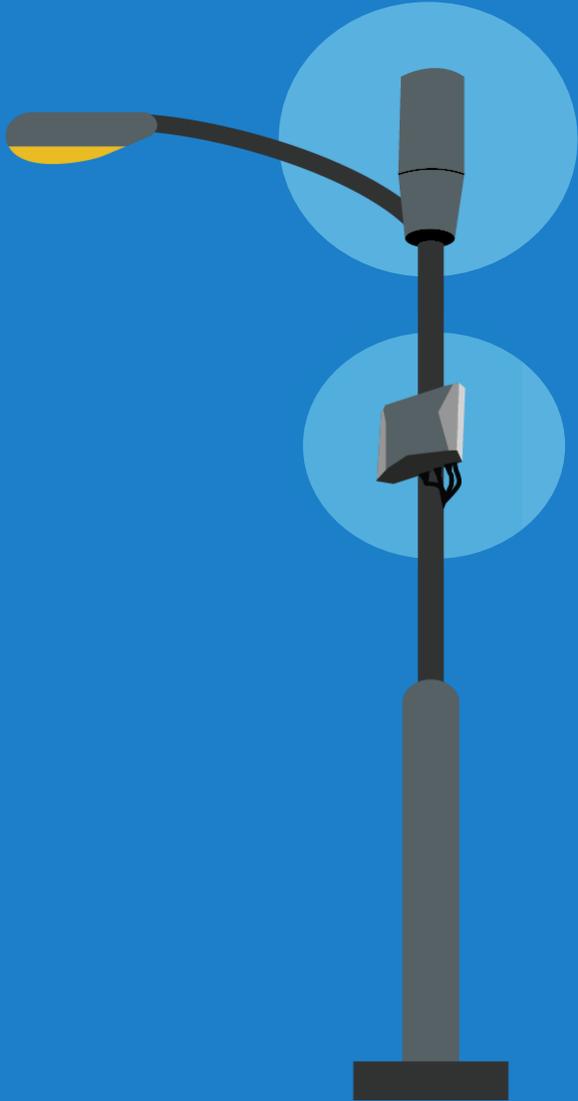


30 to 60 feet

## Future Small Cell (5G)

Very high frequencies enabled by future 5G technology will result in a smaller footprint, but can be used to meet the exponential increased capacity demand.

## What is a Small Cell?



## A New Network Architecture is Needed

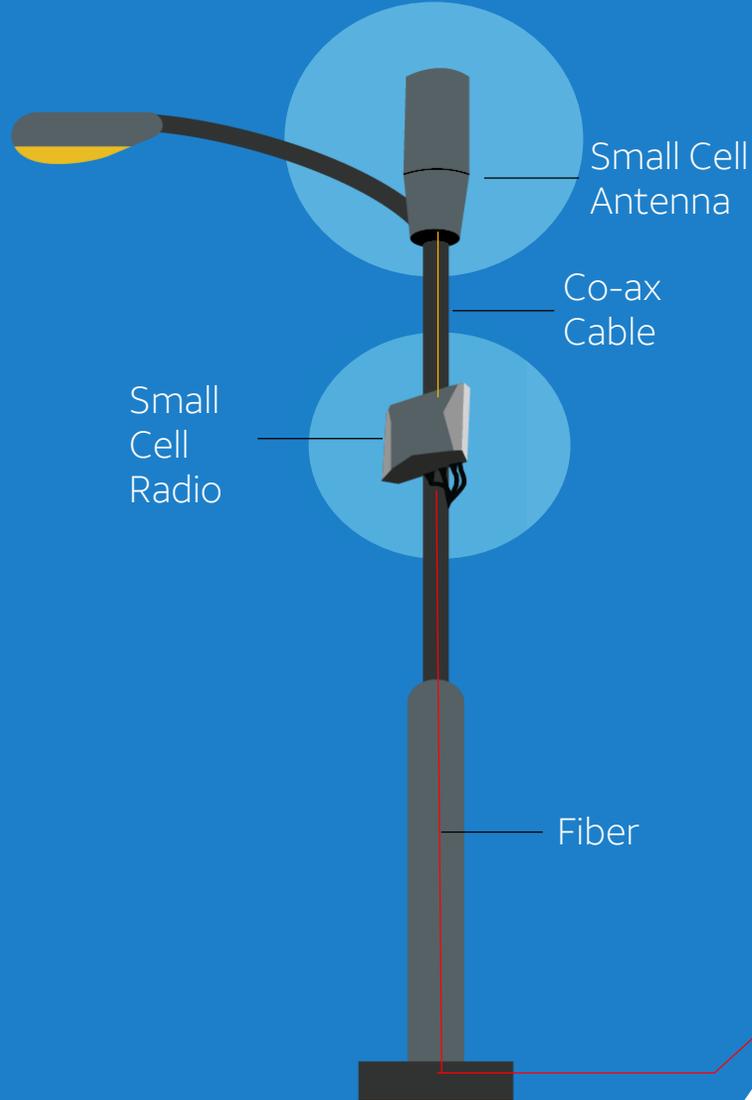
Small cells are **flexible, targeted** network solutions that cover a radius up to 250 – 1,000 feet and can be readily deployed to specific locations, including:

- Where customers are prone to experience connectivity issues
- Heavily populated areas that need more network density
- Areas that can't effectively be served by a traditional macro cell

This allows us to provide a better LTE experience today while also allowing us to prepare for the technologies of the future such as 5G, smart cities and new developments in the Internet of Things (IoT)

This illustration depicts an example of what a small cell could look like. Actual size, shape and dimensions may vary by location.

# What is a Small Cell?



The data contained on this slide are estimated averages. The length of the Co-ax and new fiber installations will vary on a case-by-case basis depending on factors like: pole height, pole type, antenna type, etc.

Average Co-ax length stemming from small cell radio to antenna:  
~20-30 feet

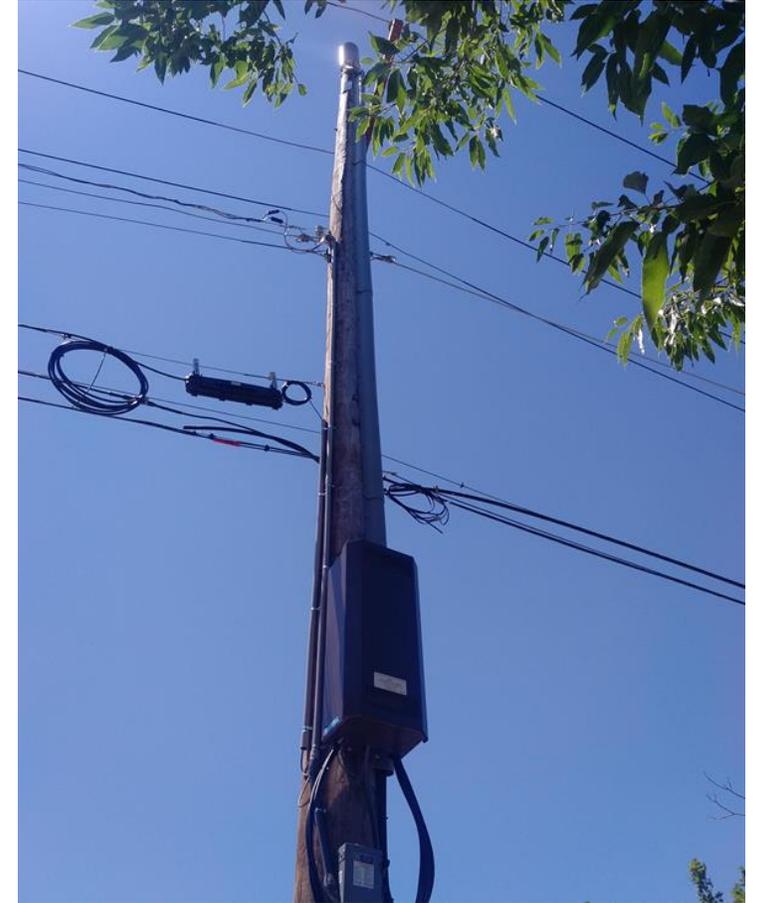
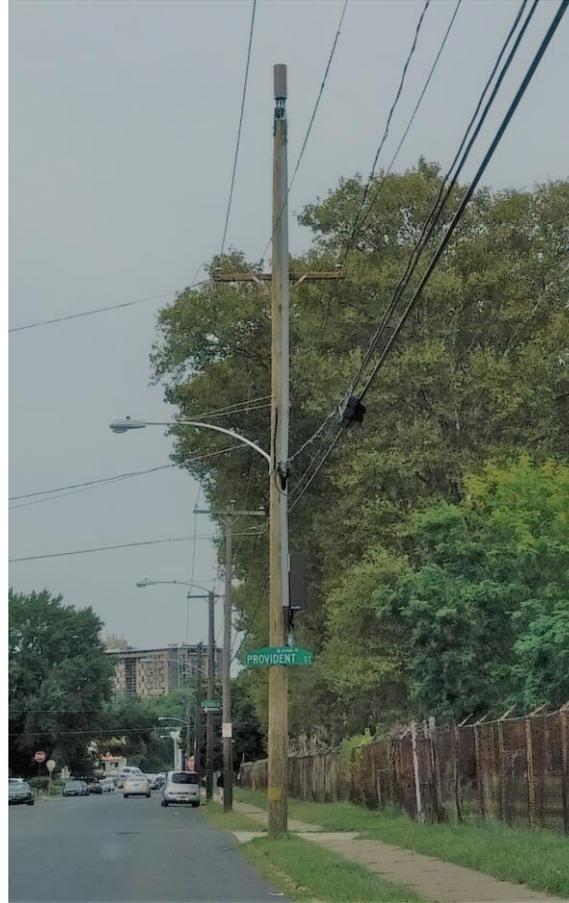
Average length of new fiber deployed connecting small cell to fiber network:  
~205 feet

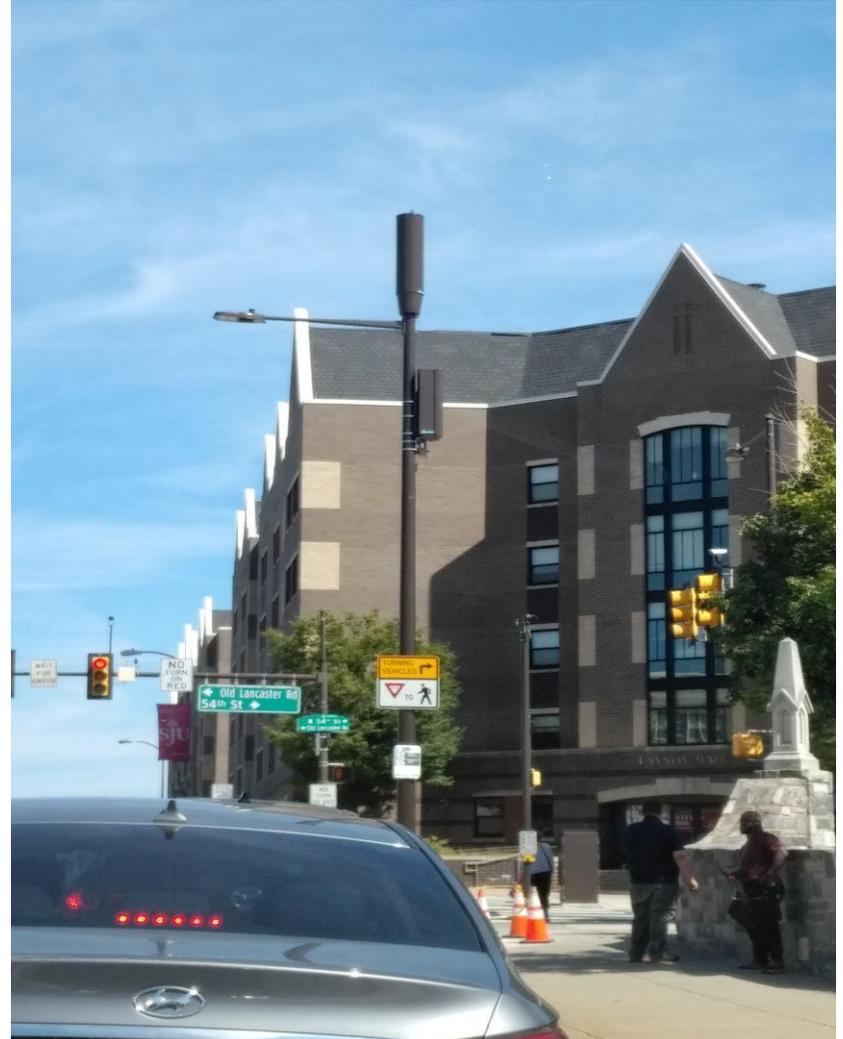
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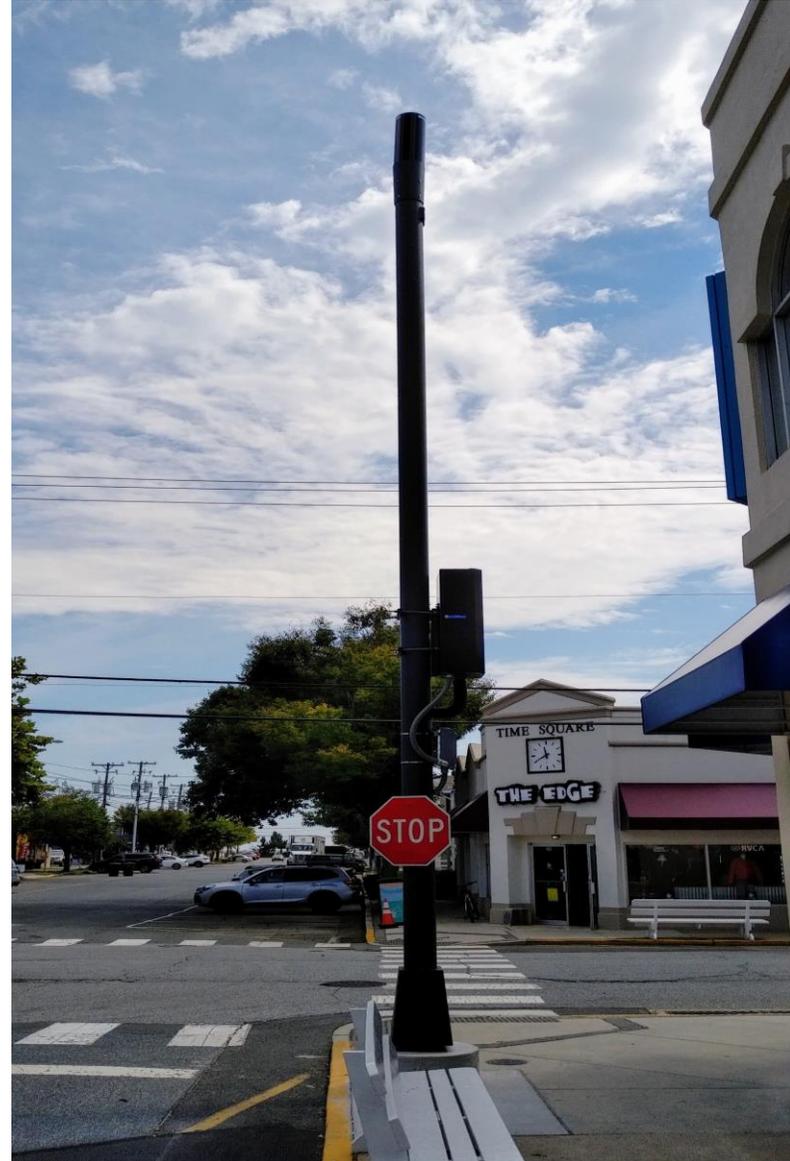
## Where are small cells deployed?

- Small cells are low profile, compact, scalable and unobtrusive. Depending on the need, small cells can be placed in buildings or outdoors. When placed outdoors, small cells can be attached to existing utility poles, light poles or exterior walls of buildings.
- Small cells are often used in environments where capacity is an issue or in places with particularly difficult geographical challenges where coverage is an issue.
- And, given the way small cells work with—or augment—macro cells, small cells can also help improve service in small geographical areas where the macro cell is further away.

# Examples of small cells – wooden utility poles, metal street-light poles, decorative poles







## Smart public policy can facilitate deployment and more quickly bring the benefits of small cells to your community.

- Local officials and leaders can facilitate the deployment of small cells to bring their citizens enhanced coverage and capacity, while helping us prepare our network to accommodate future technologies in their municipality, by:
  - ✓ Establishing streamlined permitting processes
  - ✓ Establishing universal Master Leasing Agreements (MLAs) for small cell deployment
  - ✓ Ensuring pole attachment rates and fees are reasonable