Wireless Congestion

Addressing coverage and capacity

T··Mobile·

Increased demand for wireless services

American's demands for mobile services shows no sign of slowing. According to a 2018 Pew Research Center survey, 95% of American's own a cellphone and most of those - 77% are smartphones.

Mobile networks have shifted from being predominately voice networks to transporting data – video, texts, photos, and live streaming events. Only 3-5% of traffic on T-Mobile's network comes from voice services. With increased data usage, all that extra data can quickly overload a cell site's capacity.

To meet customer demand, T-Mobile must increase coverage and capacity with denser networks, infrastructure, and radio technologies that solve the complex challenges of transporting vast amounts of data. Traditional macro cell sites, small cells and distributed antenna systems are a few examples of infrastructure needed to provide wireless services.

Adding capacity to relieve wireless congestion

Ever had what looks like five bars of coverage on your mobile phone but you can't send a text, make a call or access an app? That's because there is a finite amount of network capacity. Wireless congestion happens when too many people try to use the same cell site at once. Just like traffic congestion on a road, when too much information is being transmitted over a wireless network the speed of the network slows down.

Coverage and capacity have similarities to a city bus. The bus may have a route that allows you to go all over town — that's the coverage — but if the bus only holds fifty people and a hundred people want to ride then there's not enough capacity.

The same holds true for mobile service: When there is too much congestion on the network, the speed slows down. This is due to a finite amount of spectrum carrying digital traffic. Additional infrastructure and technologies may be needed to more efficiently use the spectrum and add more users to the system.

COVERAGE

Coverage is the geographic area that is served by wireless infrastructure.

CAPACITY

Capacity is the amount of data and voice traffic that can be efficiently transferred across the network for mobile use.

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Spectrum is the lifeblood of the industry

All wireless communication signals travel over the air via radio frequency, which is also called spectrum. A television broadcast, a radio program, a GPS device and even your cell phone service all use spectrum — invisible airwaves to transmit bits of data. Spectrum is a finite resource and essential for so many vital communications services, but it holds no value until it is harnessed by mobile operators, creating valued services.

A great way to relieve wireless congestion is to add new infrastructure

To improve coverage and capacity it is often necessary to build denser wireless networks. New innovations, like small cells, allow T-Mobile to add more capacity in densely populated or high traffic areas, which can mean better service for everyone. Small cell antennas are designed to be mounted on light standards or utility poles and be located along busy streets and places where people gather.

Paving the way to 5G

Most American consumers experience wireless connectivity on 4G networks. The impact of 4G on daily life is clear — this connectivity has enabled innovations in our modern digital economy like mobile broadband, and it has spurred companies to offer conveniences like ride-sharing services and smart home products.

The emerging standard in voice and data telecommunications — 5G — is poised to transform America's reliance on densely populated wireless infrastructure. T-Mobile's vision is to use 4G and 5G technologies to offer nationwide coverage and reliable capacity to bring consumers and businesses un-paralleled speeds and access to mobile broadband services.

Designed to handle current 4G wireless standards, and soon to be deployed 5G, small cells are low-power, cover a small geographic footprint, and have a smaller form factor than most traditional equipment. Small cells are needed to help with today's capacity issues and they will be important to support the proliferation of wireless-enabled devices called the Internet of Things — cars, drones, clothing, phones and more.

Meeting wireless demand requires infrastructure

MACRO SITES

Traditional macro sites are installed on rooftops, building facades, monopoles and other steel structures. These traditional antenna support structures handle many users across a general geographic footprint.

SMALL CELLS

Small cells are miniature versions of traditional cell sites. These self-contained cell sites are small, lightweight and low power. They can be used indoors or outdoors so large crowds of people can simultaneously access a wireless network. Outdoor small cells are typically found in the public right-of-way, like on street lights and utility poles.

DAS TECHNOLOGIES

A Distributed Antenna System (DAS) network is made up of a base station connected by fiber optic cable to a group of antennas placed remotely in outdoor and indoor locations. DAS networks share and receive signals with remote nodes simultaneously, creating a single large cell. DAS systems can be shared by multiple carriers and are multi-frequency.