



Case Study

NA Tier-1 service provider 5G Design Services

About the customer

A tier 1 national North American based service provider, one of the world's largest telecommunication operators providing mobile services to many millions of wireless subscribers across the globe.

5G network design project description

The service provider planned to deploy 5G on two different bands using different technologies. mmWave TDD was planned for the 28 GHz band (100 MHz bandwidth) using 5G mmWave, while NR600 FDD was planned for the L600 frequency using the spectrum sharing technique.

The need

The service provider planned to integrate 53 mmWave sites on the 28 GHz band and 1469 sites on the NR 600 band as a first wave of deployment. Based on commercial deployment needs, all sites were required to be built within a certain time frame to meet their national build goal.

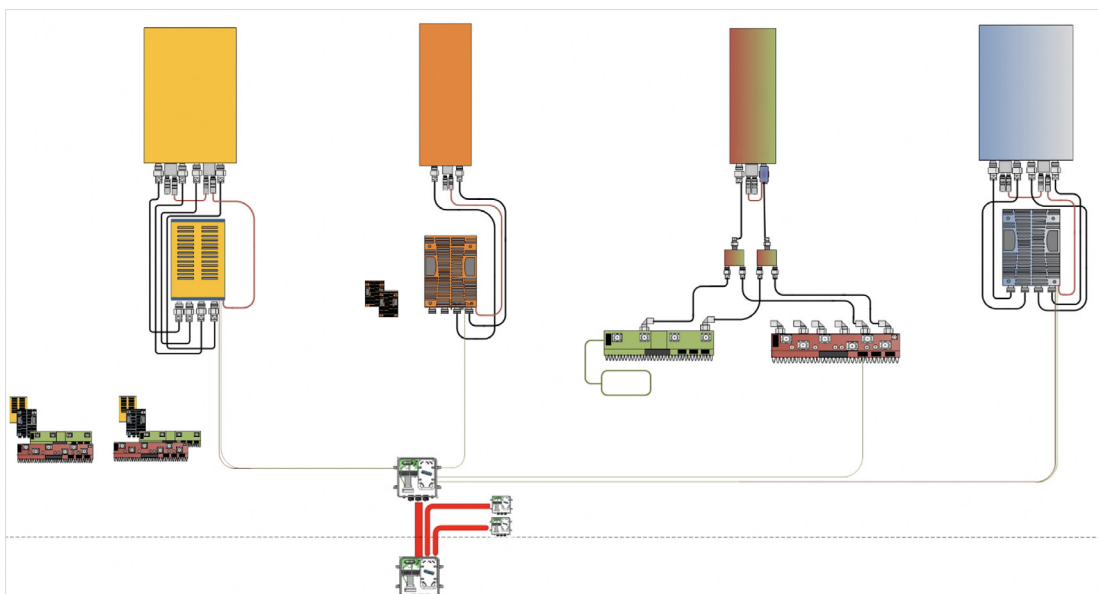
The challenges

The mmWave versions of 5G radio and integrated antenna systems faced unique coverage challenges above and beyond those operating in lower

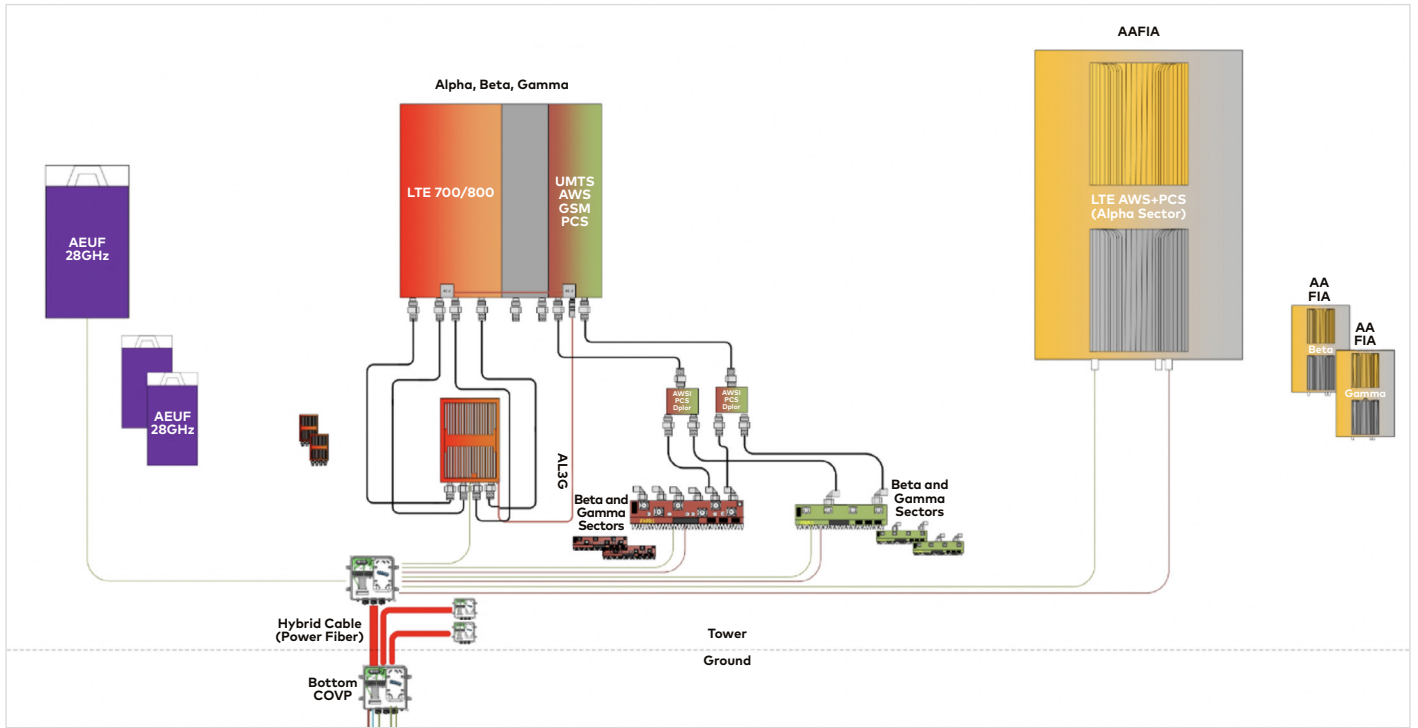
frequency bands due to higher RF propagation losses and less diffraction around solid objects. Mostly, the challenges were related to antenna additions and placements, requiring all technologies to be accommodated on a limited number of antennas. With 5G mmWave antennas requiring a clear line of sight at the ground level, mmWave 5G antenna positions had to take priority over other antennas, which required the development of custom antenna placement and siting guidelines. Moreover, since 5G mmWave antennas are radio-integrated, they could not be diplexed with any other antennas. For this reason, diplexed solutions were required as part of the design for all non-5GmmWave technologies.

The solution

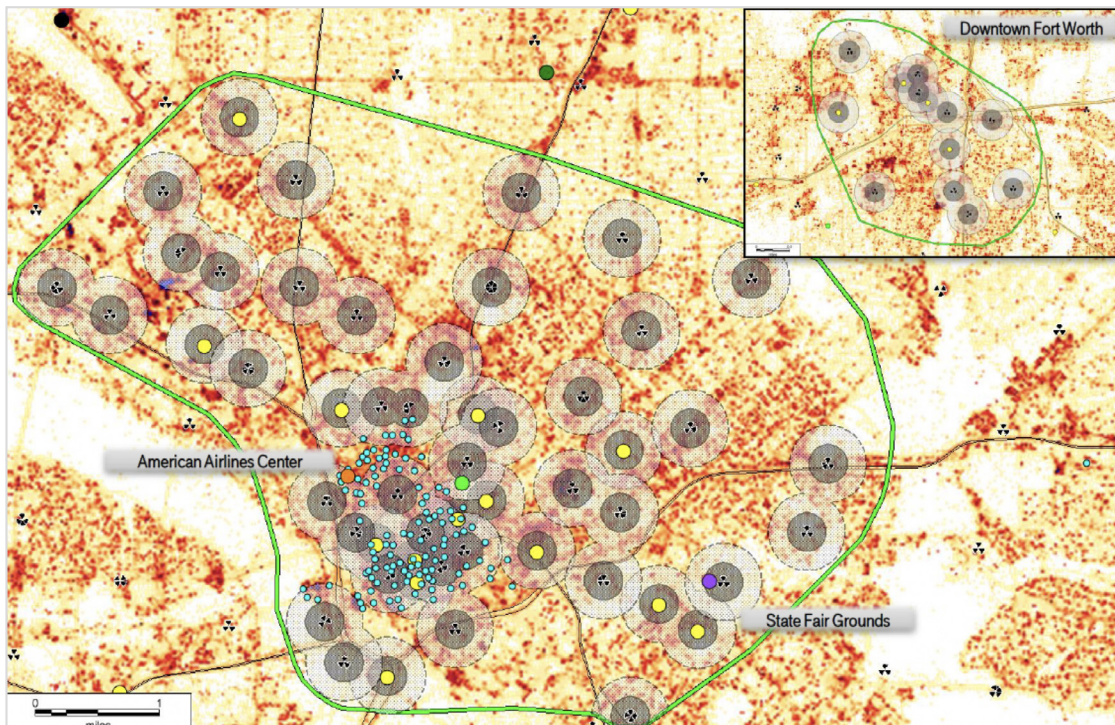
Amdocs 5G Design services were implemented to reduce the antenna count by diplexing existing LTE technologies. Alternate designs were also deployed, which involved swapping out existing antenna technology with a higher number of available ports, such as octa-port, thereby leading to a reduction in physical siting complexity, as well as improving line of sight and facilitating deployment. Since NR600 uses the same antenna as L600, it only required additional baseband on the cabinet side. Antenna positions were also swapped or optimized to accommodate the 5G mmWave antenna.



Existing 3 sector rooftop site design for LTE AWS, LTE PCS, LTE 700, GSM PCS and UMTS AWS technologies using 12 antennas, 15 RRUs and 6 diplexers



Proposed 3 sector rooftop site design with addition of 5G mmWave and LTE 600 technologies using 9 antennas, 9 RRUs and 6 diplexers



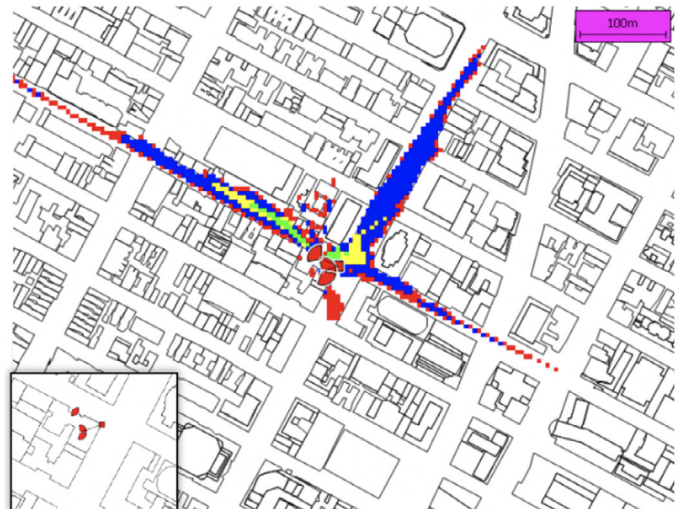
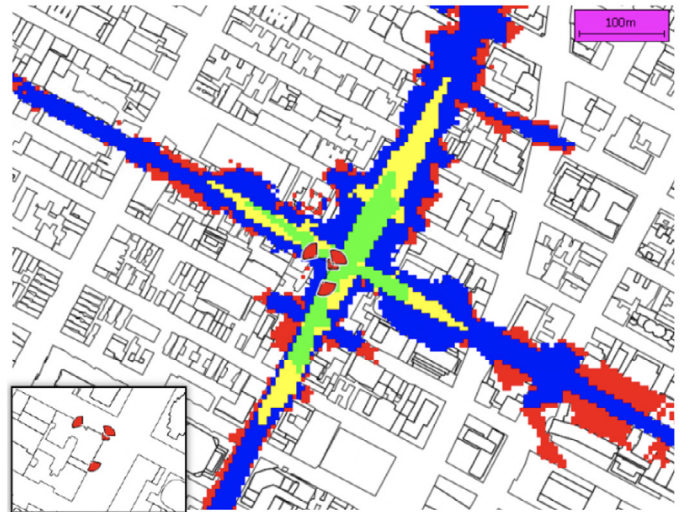
5G mmWave design service

Solution components

Amdocs 5G Design services conducted site walks to propose an optimal design that would avoid coverage loss and antenna shadowing. Detailed propagation studies were conducted to propose design configurations for deploying 5G mmWave, appropriate height and location, as well as orientation and antenna tilt. Customized design services were also provided to accommodate physical constraints, such as antenna/radio placement in some structures.

Antenna placement needs to be accurate in the design process

- Antenna height
- Antenna location

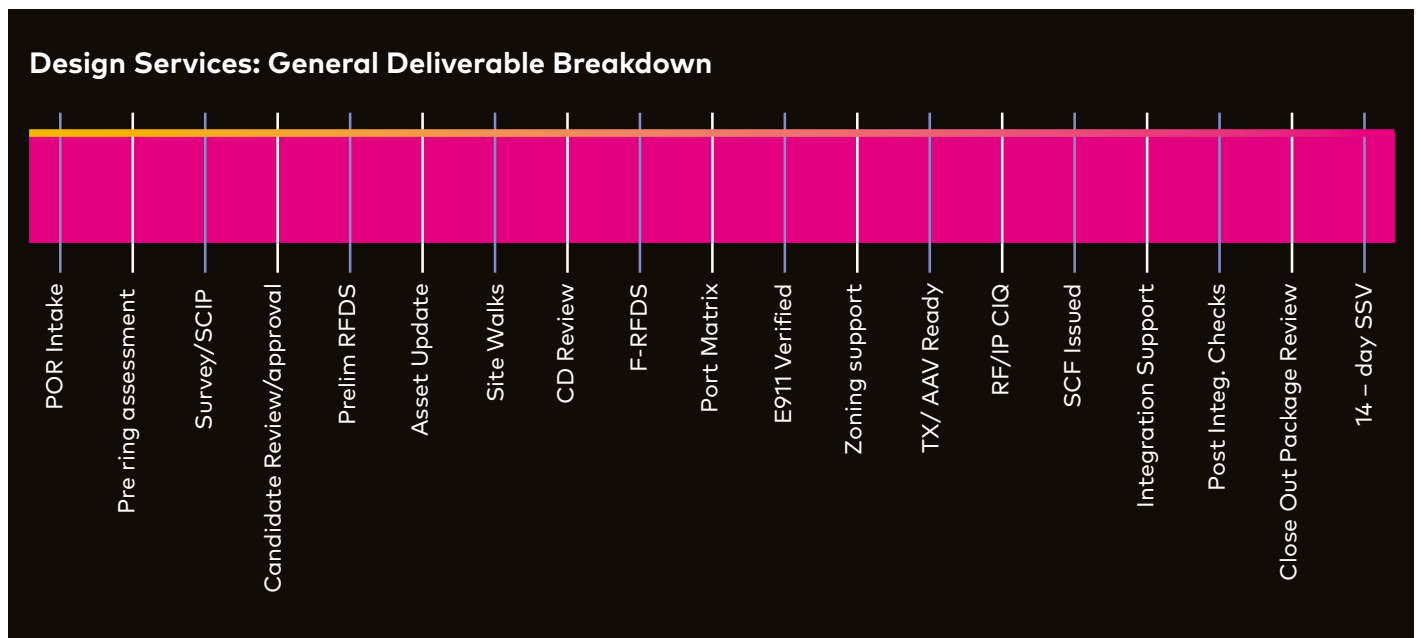


Plumbing diagram

Deliverables

Deliverables included node/site/sector physical and logical layer creation, coverage prediction plots, RF data sheet, site surveys, construction drawing review, structural analysis review, lease document review, E911 readiness tasks for new sectors, CIQ support, post-launch checks and database update. Amdocs Engineering was able to implement relevant automation and advanced analytics for these deliverables, leveraging an extensive application of the following platforms:

- Web-based RFDS hosting for RF hardware configurations
- Big data analytics and visualization with IMNOS
- Traffic layering and network congestion guided design via DNA
- Streamlined web-based program management with Dynamic Network Analyzer (DNA)



Radio Frequency Data Sheet (RFDS)

RFDS provides details of the equipment at the cell site and the plumbing diagram for each sector. This plumbing diagram illustrates how the antennas, radios, TMAs (tower-mounted amplifiers) and diplexers are connected from the tower top to the ground equipment – such as via RAN (radio access network) – as well as transport and electrical power.

CIQ – Customer Information Questionnaire OR Customer Input Questionnaire or Customer Input Query Amdocs prepares the CIQ, which usually contains configuration data from within the planning tool, which serves as the master radio network configuration database.

E911 readiness tasks

These tasks include performing a database update using cell information such as coordinates, node/site/sector, antenna information, antenna azimuth, antenna height, antenna tilt, gNodeBID, tracking area code, location area code, etc. This also requires coordination with the customer's E911 cell provisioning team, which can work with the PSAP (public safety answering point) if the PSAP database is not updated with the accurate cell information. When the data appears in the PSAP data accurately, the E911 test calls are validated.

Why Amdocs

Amdocs Design Services occupies a place of pride in the larger global telecommunications industry. Our record of innovation and solutions-based delivery has enabled operators, OEMs and segmented verticals to achieve speed in incubating technologies, quality in delivery and efficiency in results. With a record of alignment on all telecom innovations globally and an industry-leading portfolio of excellence, Amdocs supports the end-to-end needs for 5G deployment for all aspects of network strategy, planning, design, deployment, launch, integration, optimization and software-based solutions.

For more information, visit [Mobile Network Services](#).



Amdocs helps those who build the future to make it amazing. With our market-leading portfolio of software products and services, we unlock our customers' innovative potential, empowering them to provide next-generation communication and media experiences for both the individual end user and large enterprise customers. Our 28,000 employees around the globe are here to accelerate service providers' migration to the cloud, enable them to differentiate in the 5G era, and digitalize and automate their operations.

Listed on the NASDAQ Global Select Market, Amdocs had revenue of \$4.3 billion in fiscal 2021.

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