

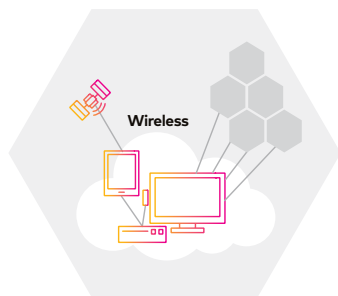
# Amdocs Radio Frequency Design and Planning service



**Effective radio network planning addresses coverage and capacity requirements, and at the same time, enables network expansion without the need for significant changes at existing sites. However, there are some technologies where it's wise to consider coverage and capacity requirements together. With wireless spectrum an expensive and finite resource, radio frequency (RF) design must ensure its optimal use.**

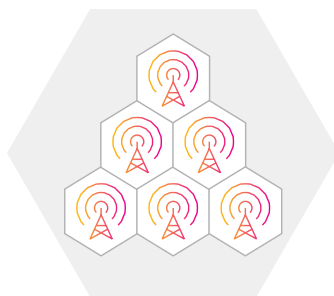
With the increasing voice and data demand on heterogeneous networks, Amdocs RF Design and Planning service helps you build strong seamless networks. To efficiently manage increasing LTE traffic capacity, the service enables you, depending on the availability of spectrum, to design multiple network layers (2G/3G/4G/NB-IOT/ 5G)

## Amdocs network planning process and service offerings



### Model Tuning

- Planning tool calibration
  - CW drive test
- Model acceptance test



### RF Design and Site planning

- RF coverage nominal planning
- Multi band design (Low, mid and mm Wave band)
- Link budget analysis
- Multi-RAT Planning (5G NR + LTE)



### Capacity planning

- Traffic modelling
- Number of sites
- Frequency/PSC/PCI/RSI planning
- Advanced bearer and service modelling



### RF Configuration Data Fill

- Plumbing diagram for site build
  - RF Design configuration
- Data fill for OSS scripting

Amdocs RF Design and Planning service provides value throughout the project lifecycle:

## RF model tuning

Propagation model tuning is one of the most important aspects of efficient network planning, with the ability to influence network quality for years to come. Proper RF model tuning helps deliver good coverage, combined with high quality of service and interference management.

The work is performed by Amdocs RF engineers, who perform continuous wave (CW) testing at various locations throughout the network that experience varying levels of clutter. This enables better insights into the radio signal's propagation characteristics at these locations. The purpose is to measure the propagation of defined radio signals (at known transmission power levels, locations, and frequencies) in order to develop a baseline model for different morphology and clutter data. The engineers then use planning and simulation tools to tune the propagation model parameters. This is an iterative fine-tuning process that analyzes the predicted data versus the measurements. The process incorporates several steps that results in a tuned model with industry standard model accuracy. At the end of the process, we deliver you the tuned model, link budget and accuracy for acceptance.

## RF design and site planning

Based on your RF link budget and coverage requirements, we then generate nominal cell site locations to achieve coverage targets. As a priority, before suggesting new locations, we evaluate your currently deployed network assets. This process also includes evaluation support to identify the best possible candidate from all the available options within the search ring to satisfy the coverage requirements. A site location survey to evaluate microwave/transmission feasibility and RF requirements is performed during field visits. For optimum coverage and minimum interference, we use the automatic cell planning (ACP) feature of the planning tool to optimize the design.

The next stage is to submit the final RF design configuration for site build, and provide plots and key performance indicators (KPIs) to support the design targets.

Based on technology, we provide the following plots and KPIs:

- Coverage (Reference Signal Receive Power (RSRP), Received Signal Code Power (RSCP), Received Signal Level (Rxlev), etc.)
- Interference (pilot pollution, Energy per chip to Interference power ratio ( $E_c/I_o$ ), Reference Signal Received Quality (RSRQ), Signal to Interference Ratio (SINR), etc.)
- Best server plots
- Design throughputs
- Max user capacity
- Antenna parameters, etc.

## Capacity planning

Increasing data and voice usage, as well as forecasted RAN and backhaul demand are forcing network operators to continually plan for capacity upgrades and expansions. Based on operator traffic forecasts for both voice and data, we assess your existing capacity, review opportunities to maximize and recommend capacity enhancements for existing technology – either network shaping enhancement, augmenting hardware or carrier expansion. Capacity planning also supports Physical Cell Identity (PCI), Primary Scrambling Code (PSC), Root Sequence Index (RSI) etc., along with tighter frequency planning.

The following factors are evaluated during the capacity planning phase:

- Configuration analysis: frequency reuse, bandwidth, carrier configurations
- Number of sites: network throughput requirement/single site capacity
- Neighbor cell/PCI/PSC/RSI/ frequency planning

## RF configuration datasheet

Leveraging the RF design configuration from the final design tool, we then populate plumbing diagrams. These diagrams consider physical and logistic constraints, while incorporating current and future expansion needs. We also co-ordinate scoping of existing network assets and update the RF configuration datasheet in accordance with constraints. The RF configuration datasheet includes final site build data, such as:

- Antenna model
- Azimuth
- Electrical/mechanical tilt
- Antenna height
- Type of structure
- Feeder cable type and length
- Plumbing diagram
- gNodeB/eNodeB/ model
- Number of hardware units
- Tower height and structure
- Other co-located operator information

If necessary, we can provide the required RF configuration data that the operational support systems (OSS) team needs to create the scripts required for integrating and commissioning the site. In addition, we use our proprietary tools to generate scripting for the field teams.

Using simulation-based tools, customer-provided site locations, capacity and quality of service requirements, the Amdocs RF Design and Planning service team provides you with a network optimized for coverage, capacity and network usage. We believe in a customer-centric approach and in continuous improvement to help you build low-cost networks, plan system expansions, re-engineer networks and improve overall customer satisfaction.

## Why Amdocs

Amdocs adopts a customer-centric approach, focusing on continuous improvement to enable service providers to build low-cost networks, plan system expansions, re-engineer networks and improve overall customer satisfaction.

With simulation-based tools and leveraging customer-provided site location information, capacity information and quality of service requirements, our RF Design and Planning service team designs networks that are maximally optimized for coverage, capacity, as well as both indoor and outdoor network usage.

Our wealth of experience in inbuilding/DAS RF network design spans all major wireless technologies, including 5G, 4G and 3G. This includes involvement in model tuning, frequency and PSC/ PCI planning for a range of network technologies – among them 5G, LTE and UMTS – for multiple Tier 1 US operators.

For more information, visit [Amdocs Network Planning](#).