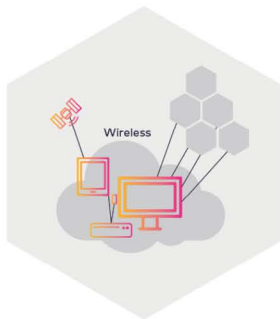


amdocs radio frequency design and planning service

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.

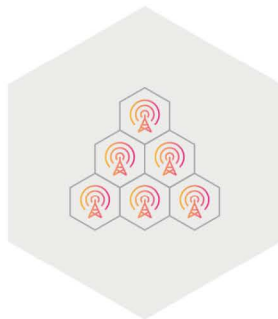
With the increasing voice and data demand on heterogeneous networks, Amdocs RF Design and Planning service helps you build strong seamless networks. To efficiently manage increasing LTE traffic capacity, the service enables you, depending on the availability of spectrum, to design multiple network layers (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 & Site Planning

- RF coverage nominal planning
- Link budget analysis
- Multi-band design (low, mid and mm wave band)
- 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 with various terrain attributes throughout the network. 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 the tuned model and link budget.

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 our available 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 (Ec/Io), 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 coordinate scoping of existing network assets and update the RF configuration datasheet in accordance with the customer requirements. 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
- eNodeB/gNodeB 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.

Amdocs strengths and expertise

Amdocs has a wealth of experience in wireless network design and planning services for all major wireless technologies – including 2G, 3G, 4G and 5G – and was involved in the model tuning, frequency and PSC/PCI planning for a range of network technologies including GSM, UMTS and LTE for multiple Tier-1 operators.

For more information, visit

[Amdocs 5G Fast](#)

www.amdocs.com

© 2019 Amdocs. All rights reserved.

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

One of the biggest challenges operators face is to identify the right time to adopt a new technology domain. There are two big transformations currently underway in the telecommunication world – **5G & NFV**.

Amdocs is the founding member of the industry-accepted NFV standard, **ONAP**. In this capacity, we support the industry's first production environments, helping transform physical networks into agile ones. This facilitates reduced time to market for new services, with increased ROI for both physical and virtual networks investments.

Amdocs has a proven track record supporting projects during all phases of network rollout and acceptance – including, but not limited to RAN, transport and core design, provisioning and troubleshooting services, pre/post-launch optimization, triage and so on, for multi-vendor, multi-technology heterogeneous networks.

As a preferred partner for Tier-1 and Tier-2 service providers across the globe, we have vast complex configuration integration experience, taking a holistic approach towards network design and management. With Amdocs, you gain a partner with a proven history in innovation and a leader in the development and delivery of industry-transforming technologies and services.

