

Amdocs HetNet Optimization Service



Network quality is key to ensuring customer satisfaction. But for service providers to keep the network operating and to maintain their competitive edge, they must evolve it to meet growing capacity and coverage demands. This requires deploying both multiple technologies (GSM, EDGE, UMTS, LTE, VoLTE, Wi-Fi – unlicensed and 5G-NR) and multi-layered cells (macro, micro & small cell), with each providing different coverage footprints at the same location.

But this creates new challenges too. While small cells can improve capacity within a heterogeneous network for example, deploying them in large numbers can lead to increased cell selection/re-selection. This triggers multiple handovers, leading to mobility and traffic balancing issues, which need to be addressed intelligently and efficiently. Furthermore, increasing subscriber demand for higher data rates creates the need for new coverage and capacity plans.

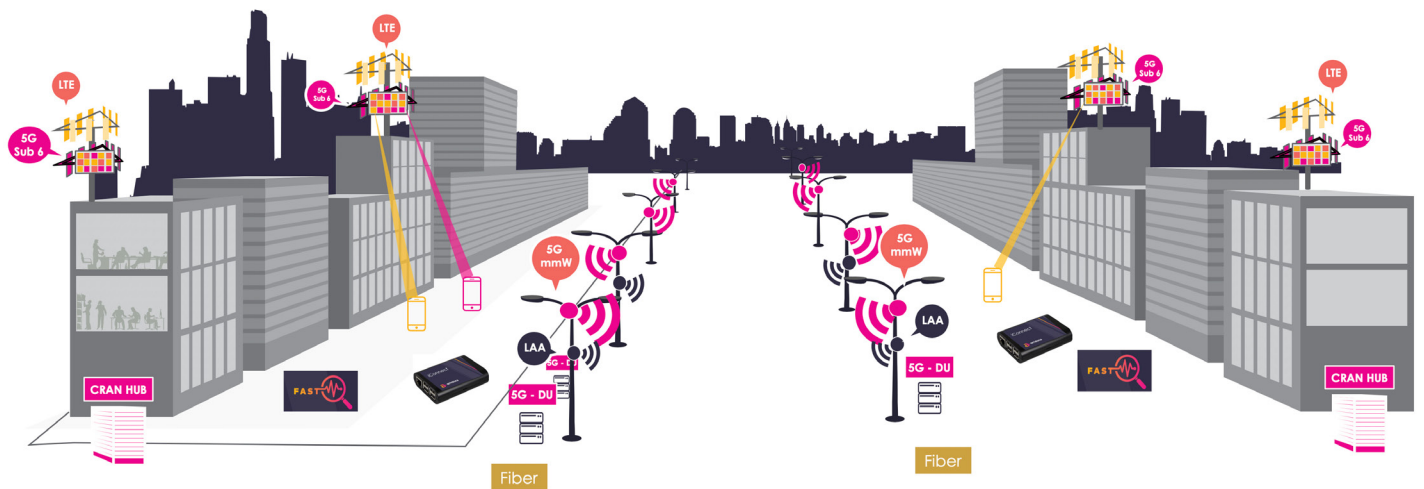


Figure 1. HetNet ecosystem

Enabled by automation

Automation is the key to 5G success. For this reason, Amdocs has developed tools that enable seamless deployment and management of the telecom network, which in turn, can be used to deploy emerging 5G technologies, including their many new features and requirements. Examples include: dual/multi RAT Connectivity, enhanced mobile broadband (eMBB) and ultra-reliable & low-latency communications (URLLC).

Furthermore, we've been involved across the globe in various tuning/optimization and deployment projects. This activity has enabled us to acquire a wealth of experience and expertise that allows us to manage and deploy networks to suit the needs of any operator – something unmatched in our industry.

Introducing Amdocs HetNet Optimization service

Amdocs HetNet Optimization service takes a holistic approach to optimizing heterogenous

networks. It does this by utilizing customer geo-located data and network KPI metrics to extract the maximum from current network assets. As a result, it enables service providers to minimize operating and capital expenditure, improve network performance and provide an enhanced customer experience.

Service capabilities:

- Capacity optimization
- Capacity maximization
- Carrier balance analysis
- Interference analysis
- Features and parameters audit
- SINR (Signal to Noise and Interference Ratio) optimization
- Massive MIMO optimization
- Beam fingerprinting

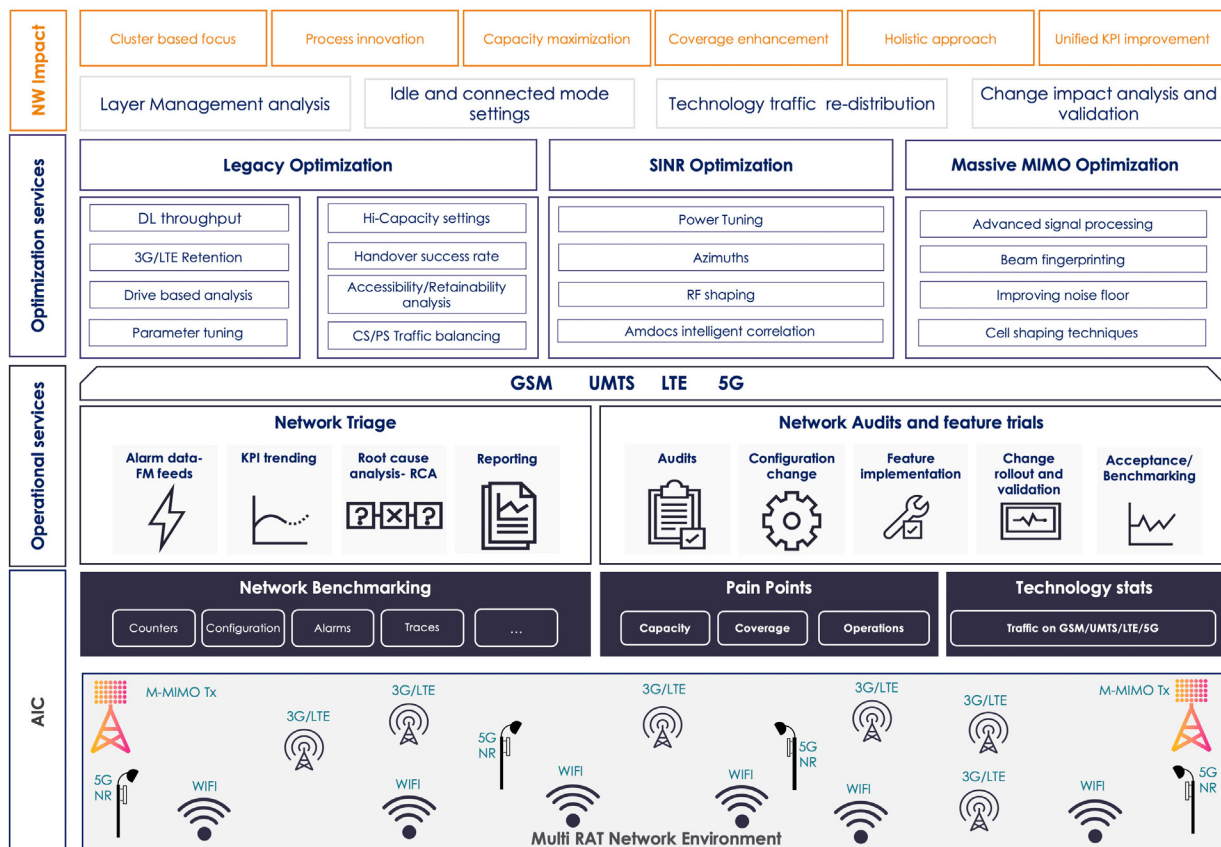


Figure 2. Optimization services approach

Coverage optimization

Coverage optimization helps mobile operators leverage their current network assets and plan new sites effectively. This is achieved by optimizing the network grid using geo-located data measurements, network performance measurements and proprietary SON coverage and capacity optimization (CCO) algorithms. Coverage is maximized by physical and parameter changes to create clear areas of dominance and reduce unnecessary overlaps. In addition, delaying excessive and premature expansion plans enables significant capex reduction.

Capacity maximization

Capacity maximization is a key strategy for addressing the increase in customer demand for data on one hand, while effectively managing network capacity and quality on the other. Using proven methods and processes, we improve the spectral efficiency of existing networks and increase network capacity. This is achieved through parameter tuning, load balancing between cells, changing site configurations, and utilizing new features to improve spectral efficiency (Kbits/sec/MHz) of the existing network before augmenting it with additional hard or soft capacity.

Carrier balance analysis

Carrier balance analysis recommends the optimal layer management strategy to maximize customer experience and improve network KPIs. This is achieved by balancing traffic (voice and data) between different carriers on the same radio access technology (RAT), as well as on underlying/overlying RAT layers.

Legacy optimization

Legacy optimization primarily focuses on hand-off optimization, DL (down-link) throughput, features/parameter tuning and interference analysis. Handoff optimization specifically, concentrates on intra, inter and IRAT neighbor optimization by identifying missing neighbors and recommending remedial actions accordingly. Using geo-data, legacy optimization identifies and optimizes ping-pong handover locations by tuning mobility parameters to improve cell reselection and handover performance.

Interference analysis

Interference analysis identifies the sources of internal and external interference. For internal interference, passive intermodulation (PIM) testing and corrective hardware changes are recommended. For external interference, we work with operators, regulators and other third parties to identify an optimal solution.

Feature and parameter tuning

Features and parameters are the backbone of any network. For the network to perform at its optimal levels, these must be aligned according to OEM/operators' gold standard settings. However, due to the many interdependent parameters and features, a smart approach using automated tools is required in order to align them. To answer this need, we have developed automated tools that perform comprehensive, detailed parameter audits against a standard baseline. These tools are standardized with respect to the individual technology and vendor.

SINR optimization

Signal to Noise and Interference Ratio (SINR) optimization is enabled by our proven, patented solution that combines power, azimuth and electrical/mechanical tilt adjustments with drive data, call tracing and crowd source data to significantly improve network quality.

After analyzing the input data, the SINR optimization algorithm runs multiple iterations to determine the optimal solution given the network outlook and restrictions. Several parameters govern the tool's behavior, including some that control physical changes and others that control success

criteria. Several failsafe criteria are employed to maintain acceptable levels of network coverage and quality, while preventing significant degradation. 5G deployments can take significant advantage of this approach given the stringent requirements for a high-quality network. For example, using this performant network shaping process, operators can finetune the network quality, starting from macro sites and progressing to small cells.

While one of the goals of 5G is to enable ultra-fast download speeds, this lies beyond the capabilities of the underlying LTE network. It can, however, be achieved using mMIMO technology over the same spectrum.

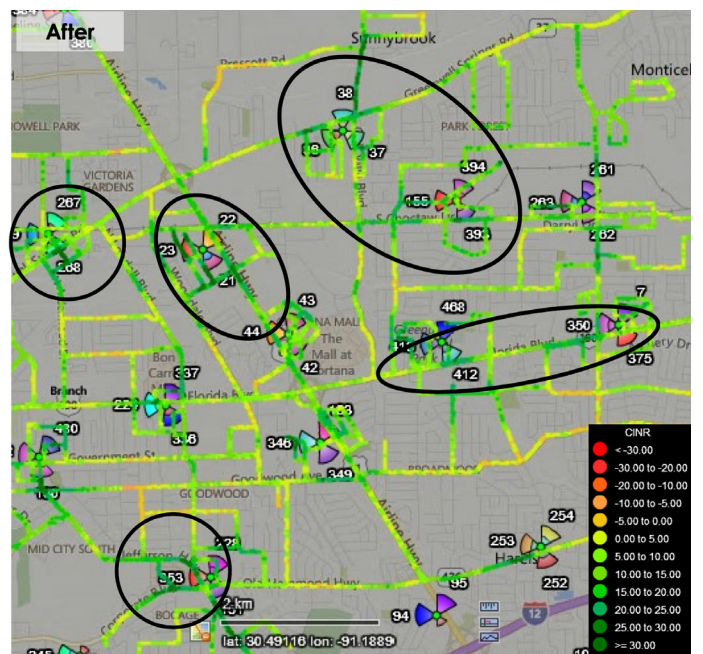
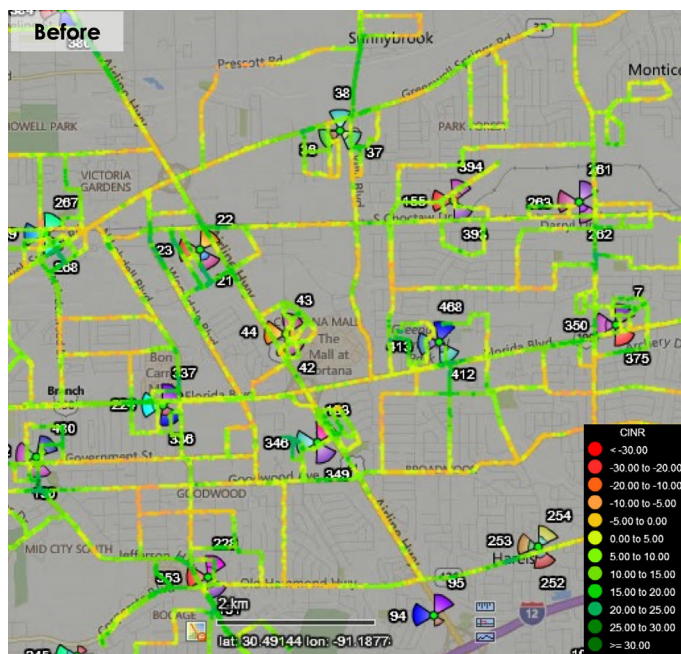


Figure 3. SINR improvement case

Massive MIMO optimization

MIMO optimization employs a combination of mMIMO antennas and LTE/5G technology to serve multiple users simultaneously using several signal layers or beams. This involves each element of the 64TR antenna serving users at different angles by focusing on them at each instance. Advanced signal processing and beamforming technologies direct coverage to where it is needed, thereby improving the noise floor (SINR) and throughput. With multiple users being served with different beams operating at right angles to each other, the overall LTE base station cell throughput is increased into the Gbps range. Meanwhile, beamforming technologies shape the radio signals through variation in phase and amplitude to target specific users, thereby increasing coverage and throughput.

Beam fingerprinting

With beam fingerprinting, every beam can be identified individually and optimized to improve throughput speeds and reduce interference. Optimizing antenna beam patterns based on clutter morphology and density is key to successfully reaping the benefits of Massive MIMO. Meanwhile, various cell shaping techniques can be combined to achieve optimum throughput, while ensuring UE pairing and orthogonality of beams enables speeds in the range of Gbps.

Another issue is limited spectrum resources, which creates a major bottleneck for operators as demand grows for high-speed data. SINR optimization offers a way to relieve some of the pressure on the spectrum. It directly translates into less noise on the network, thereby triggering higher throughput using the same or fewer resources. This, in turn, leads to increased spectrum efficiency utilization as more users are served using less spectrum bandwidth.

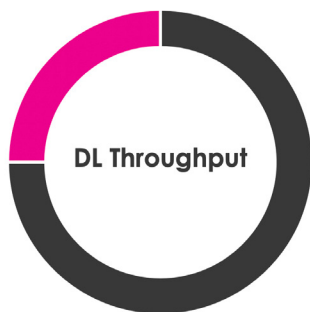


Figure 4. Actix tool window

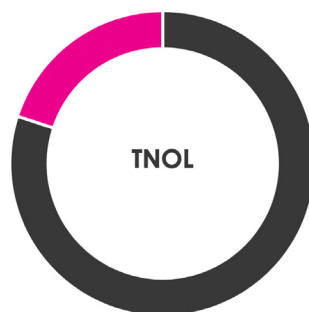
Success story

Network optimization was performed for a North American tier 1 operator, resulting in the following significant improvements:

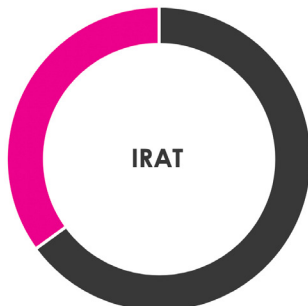
- DLTP: 25% improvement
- TNOL: 20% improvement
- IRAT: 35% reduction (resulting in rate significantly lower than other markets in the same region)
- PS drops: 20% reduction



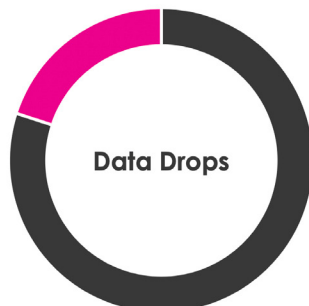
Overall market level DL Throughput Improved by **25%**



Overall market level TNOL was reduced by **20%**



Overall market level IRAT was reduced by **35%**



Overall market level data drops were reduced by **20%**

Why Amdocs

Amdocs is a 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 return on investment for both physical and virtual network investments.

In addition, we have 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 multivendor, multi-technology heterogeneous networks.

As a preferred partner for tier-1 and tier-2 service providers across the globe, our vast network of rollout and acceptance services provides scalable, fast and reliable network rollouts. This is enabled by our software-led approach, bolstered by automation and resource flexibility to support process acceleration.

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