



## Is backhaul the weak link in your LTE network?

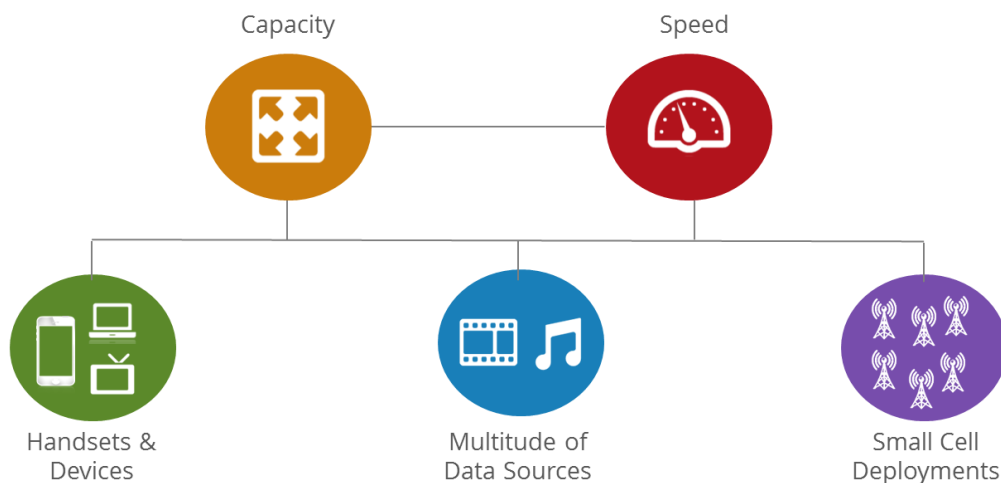
Network assurance strategies for LTE backhaul infrastructure

## The LTE backhaul challenge

Communication Service Providers (CSPs) are adopting LTE in rapid succession. In many respects, the movement to LTE is a natural 'next step' technology evolution as most previous generation systems struggle to provide consumers with the experience they are seeking. That experience entails faster data rates and quality voice services whenever and wherever the user may be, mobile or stationary. In order to satisfy these subscriber demands, operators need networks that deliver the high throughput and low latency typically associated with LTE.

**Backhaul is both at the heart of the LTE architecture, and critical to the overall performance of the network.** Without well-designed and cost effective backhaul for your LTE network, you cannot meet the bandwidth and throughput requirements of your subscribers nor will you be sufficiently well-positioned to profit from your network investment.

**The parallel shift in backhaul technology also has major impacts and implications on network infrastructure as operators move from classical TDM-based networks to packet-based IP networks.** The migration to IP technology is one of the main reasons why better visibility into the network performance is needed to ensure network investment is maximized. CSPs have the daunting task of ensuring that multi-traffic operations co-exist seamlessly and perform effectively to meet consumer expectations.



### Factors leading to the explosive demand for capacity and speed

A number of factors have contributed to what appears to be an insatiable demand for capacity and speed. At the top of the list, is the proliferation of handsets and smart devices and the requirement to run a multitude of data, voice and video applications on them — often simultaneously. Although the QoS expectation levels among users can vary from device to device and application to application, the trend has always skewed toward the demand for more

throughput and higher data volumes. Gone are the days when cellular phone usage was associated with short voice calls. Smart devices are now used to document, record, track, and manage almost every aspect of a subscriber's life.

Another contributing factor is the significant growth of indoor and outdoor small cell deployments to augment the macro-cell layer. With macro-cell towers close to saturation and the existing strain on hub-and-spoke technology, the number of cells that need to be managed per cell-site continues to grow, fueling the development of small cell base stations. Because small cell base stations are compact, energy efficient, and can be located in close proximity to actual subscribers, CSPs also gain the benefit of improved spectral efficiency and an increase in available capacity per user. From an operator's perspective, more end-points mean more subscriber coverage, but it also means more hardware investment and more room for network vulnerability if not properly monitored.

The surmounting pressure this exponential bandwidth demand places on your backhaul resources requires you to have a network assurance strategy that concretely addresses the following:

1. Is your LTE network backhaul ready to support the required capacity?
2. How are you managing network and in particular backhaul performance?
3. Are you in a position to optimize customer experience resulting in the identification of new revenue opportunities?
4. Do your network tools assist with the maintenance of SLAs (Service Level Agreements)?
5. Is your backhaul network fully optimized to help reduce total cost of ownership?
6. Does your network toolbox include fast-fault detection monitoring so that problems can be identified quickly with minimal impact to service delivery?
7. Can you easily correlate problems between the mobile network and the underlying backhaul network?
8. Can you easily investigate performance problems in a multi-domain environment?

## Optimizing LTE backhaul operations

With backhaul infrastructure now accounting for nearly 25% of the entire network cost, it is critical to determine how to cost-effectively deploy backhaul solutions that meet capacity requirements. **If you are going to leverage your LTE network to generate new revenues through new service offerings, you will need to ensure the said network and its backhaul deliver the required level of customer experience.**



### Key attributes for an efficient backhaul network

In order to achieve these objectives, you need to consider several key attributes for your backhaul network, including:

- An interoperability interface between the radio OSS and the backhaul OSS to provide correlation between the two 'networks'
- Connectivity that adequately supports wireless communications such as point-to-point or a combination of point-to-point and multipoint
- Service capacity with sufficient performance to meet SLA objectives such as delay, jitter, and availability
- Network scalability that supports various classes of traffic and differing mobile technology generations
- Sufficient capacity from physical interfaces and cards to handle provisioned services
- Network resiliency engineered with failure detection and recovery to meet SLA objectives

The distributed nature of LTE architecture creates an added level of complexity for your backhaul planning. Before you can plan and engineer optimal backhaul solutions for LTE, it is critical that you have a clear understanding of your customers' expectations for network performance as well as what portions of the network will service those expectations. Leveraging the power of your OSS and BSS systems to gain valuable insight into the network and its backhaul components is one way to determine this information.

Finally, as you look to gain deep insight into everything that touches the network, including identifying all subscribers and their service levels, network classes, applications, and devices, the need for a comprehensive service assurance solution becomes apparent.

## Meeting subscriber expectations

Overall, the challenges LTE technologies place on backhaul operations are many. However, assuring traffic performance on packet-based networks and optimization of network bandwidth must be the top priorities. Without a focus on end-to-end network performance, quality of service will suffer and customers will seek alternatives.

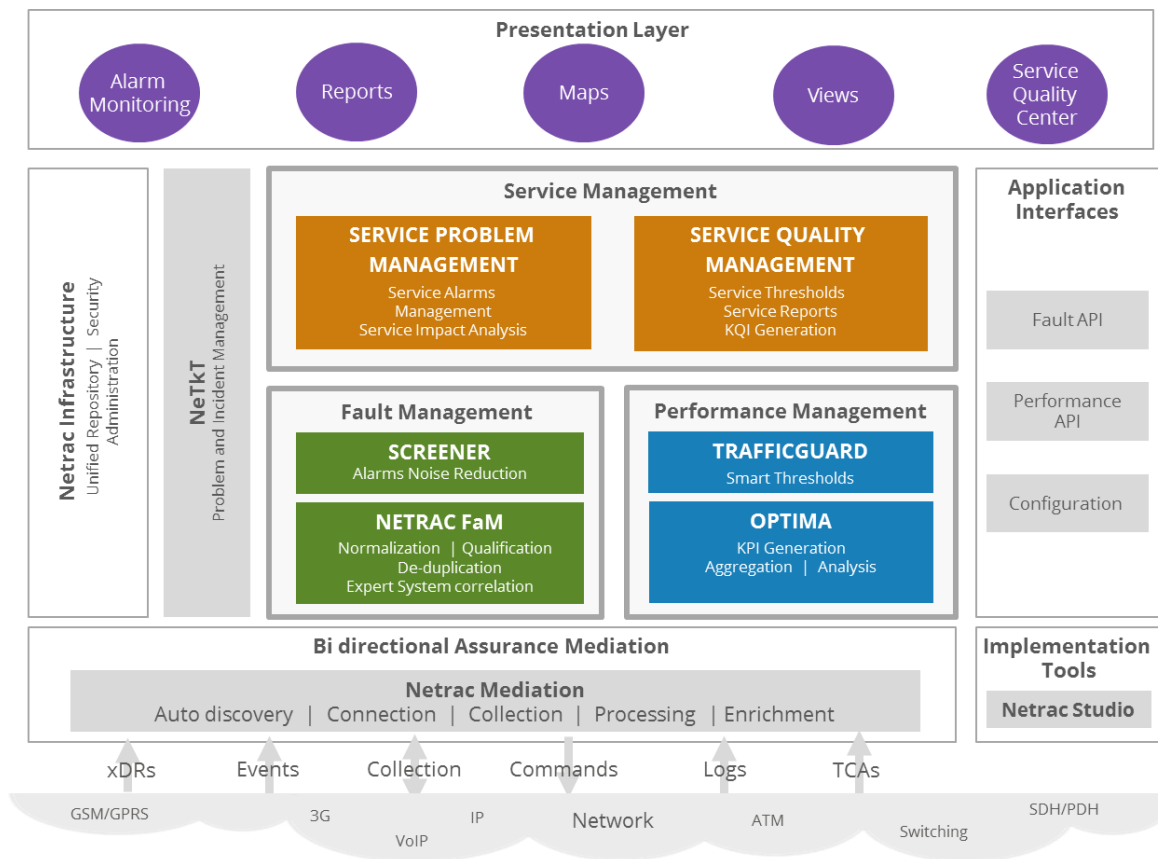
While you can't know everything about your subscribers, you can certainly glean a wealth of information about their behaviors, experiences, and requirements. That information can be used to make corrective network adjustments. As an example, current industry data indicates that LTE leads to much higher data usage rates per month than other legacy networks. To capitalize on this explosive bandwidth demand, you can no longer depend on traditional metrics and evaluative criteria associated with legacy infrastructures to properly assess the health and performance of LTE network backhaul.

**To keep the network optimized and successfully deliver new services, you need a full Service Assurance solution to assist in your daily activities, make the most out of your networks, and provide high quality services.** Indeed, demands for higher data availability are proportional to the expectations for optimal quality of services. These challenges require a powerful performance management tool, while the changing topology and network technologies used can only be managed with a fully flexible engine. Only a robust and comprehensive Service Assurance solution can deliver the performance-management functionality needed to achieve these objectives.

## A unique solution

**TEOCO's Netrac suite offers a unique solution that provides insights on the performance of your networks and the quality of the service you want to deliver to your subscribers, while handling the challenges imposed by LTE in a single platform.**

Network service assurance is increasingly viewed as a matter of strategic importance to improve levels of performance and QoS, enhance network usage, and raise the call completion rate. Accurate collection, analysis and presentation of traffic information invariably leads to more efficient network usage and improved QoS, and, in turn, can result in higher revenues and increased customer satisfaction.



### TEOCO Service Assurance

Key capabilities of TEOCO's Netrac offering includes:

- **Unified Data Collection:** Netrac's mediation layer offers a multi-vendor, multi-technology, and multi-environment platform that enables the collection of data from various sources. In addition, the mediation layer is separated from the applications for total flexibility and scalability.
- **Automatic Network Discovery:** Based on sophisticated algorithms, TEOCO's Netrac AutoDiscovery is designed for carrier-grade networks. You can discover the physical and logical network topologies and elements such as nodes, links, bandwidth profiles and more, across multiple vendors and technologies.
- **Multi-Dimension Performance Visibility:** With the activation of cell-site services, network utilization and traffic are constantly changing. The ability to readjust service bandwidth, and make configuration changes depends on a real understanding of the network. TEOCO's Performance Management solution helps operators collect the needed performance data from the backhaul network, analyze it, aggregate it, and generate key performance indicators (KPIs).

- **Smart Threshold Management:** The performance solution includes dedicated investigation tools to proactively monitor mobile backhaul, help operators pinpoint the exact degradations, and provide engineering teams with the ability to adjust bandwidth profiles based on real performance data, while ensuring SLAs are met and maximizing network utilization.
  - **TrafficGuard:** TrafficGuard facilitates simple to complex threshold definitions over all available network counters in order to analyze the network traffic. It proactively analyzes evolving network patterns, and detects network (KPI) and service (KQI) degradations before actual faults occur.
  - **Adaptive Thresholds:** Adaptive Threshold is a state-of-the-art automation tool atop TrafficGuard, which uses historical statistics and data to automate the prediction of abnormal events, even in the most complex configurations.
- **Central Fault Management:** Netrac Fault Management (FaM) is the ultimate alarm management and monitoring tool, providing a powerful engine to reduce the amount of alarms and focus NOC users on the most critical ones. FaM offers advanced correlation capacities for alarm reduction and proactive resolution.
- **Topology Maps:** Part of FaM's root-cause correlation engine includes a Topology-based Reasoning System (TRS) designed to locate and identify problems that can only be traced using network-wide topology data. These problems are common in IP, ATM, wireless, and TDM-based transport backbones, between the backbone and the access network, and between the network elements and the service platforms. The TRS provides unique insights into the health of the network to maximize efficiency.

In addition to ensuring network quality, reducing network costs and increasing the efficiency of operations are equally important attributes of a service assurance solution. Netrac has a long history of reducing network expenditure and increasing efficiencies for CSPs.

- **CAPEX avoidance:** By optimizing transmission utilization using Netrac, a mid-sized CSP customer was able to defer US\$12M CAPEX expenditure in a single year.
- **Operational efficiency:** A tier 1 European CSP estimated that replacing their existing network reporting solution with Netrac's flexible report and dashboard tool freed up approximately 10 full-time engineers worth of effort which could then be spent on network improvement exercises.
- **Reduced TCO:** The 5 year TCO (total cost of ownership) for Netrac was calculated to be 30% lower than that of their incumbent solution by a mid-sized CSP.

## Summary

The demand for ubiquitous, seamless connectivity is paramount just as the bar for quality of service continues to rise. Thankfully, CSPs can turn to the industry expert for service assurance. TEOCO helps you design and implement comprehensive service and network assurance solutions that will increase your competitive positioning and positively impact bottom line revenues.

With the demands being placed on next-generation networks, it is imperative that you seek proactive and automated performance, monitoring, optimization, fault management and service quality solutions that will identify problems and resolve them before any adverse impact can occur. Service assurance is critical to the success and longevity of your network and can play a significant role in the monetization of your network assets and your ability to retain customers.

The adoption of intelligent, high bandwidth, low latency LTE networks will continue to challenge operators for some time. TEOCO's solutions enable you to stay ahead of your competition and take on new challenges.



## About TEOCO

TEOCO is a leading provider of planning, assurance, analytics and optimization solutions to communications service providers (CSPs) worldwide. The company leverages its expertise in big-data and real-time capabilities to help over 300 of the largest service providers in over 100 countries to run their networks and businesses more efficiently, profitably and optimize the customer experience.

Our success comes from our clients' success - we help to increase profitability and create more efficient networks. It is the powerful combination of technology and experience that makes us both a leader in innovation and a true business management partner.

TEOCO's portfolio includes:

- Service Assurance – Resolve errors, maximize performance & utilization, and improve customer quality of experience across the network, services and devices.
- Network Planning and Optimization – Plan, analyze, and optimize radio access networks to reduce costs while providing wider coverage and superior penetration.
- Margin Assurance – Manage network and partner costs, provide detailed visibility into the revenue chain, and understand the profitability of every transaction and relationship.
- Analytics – Bring a customer-centric perspective and combine profitability, quality of experience and behavioral data to better understand, target and engage the subscriber base.

For more information, visit [www.teoco.com](http://www.teoco.com)