

SOLUTION BRIEF

The Unified Planning and Optimization Process

Driving Operational Efficiency and Customer Retention to satisfy your most valuable subscribers and reduce network OPEX



New priorities for mobile networks

While every mobile network is trying to cope with unprecedented traffic growth fueled by rising number of smartphone subscriptions and increasing data consumption per subscriber, the impact of this capacity crunch creates additional operational challenges for the mobile operator. Having to maintain significant investments in networks to sustain their traffic demand – all while introducing new technologies at faster pace – can result in tremendous price erosion and customer retention challenges that put operators’ business models at risk. Improvements to the mobile experience to retain and generate subscribers can secure a network’s long-term health, but successfully adopting new techniques requires an innovative approach. A proven solution is to revisit the way operators are planning and optimizing their networks by implementing a unified process to enable continuous improvements to reach business goals.

Solving the capacity dilemma

The volume of mobile data traffic across cellular networks is growing at a rate of 60 percent to 120 percent annually for almost every operator. Ericsson recently forecasted¹ that this growth will result in a ten-fold increase in total traffic for all devices by 2021, driven mainly by a growth of data traffic consumption per subscriber.

The challenge is that any breathing room brought from capacity build out is short-lived, leading to almost immediate consumption of the additional resources delivered. While higher penetration of new devices like smartphone and tablets is the foundation of this capacity crunch, the growth in mobile data traffic is mainly due the increasing data consumption per subscriber.

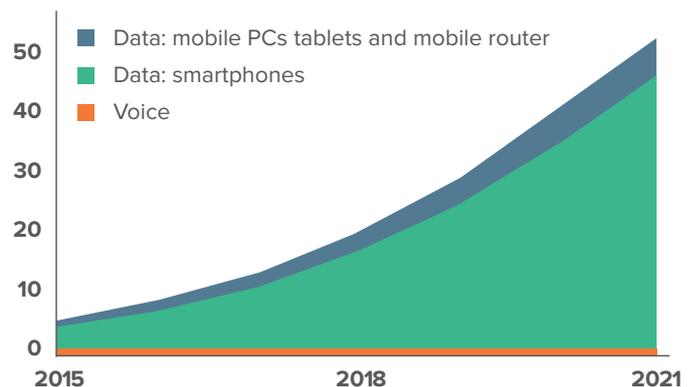


Figure 1. Global mobile traffic evolution (monthly ExaBytes).

It is obvious to mobile operators that optimizing the technology of their current mobile networks is not enough to meet the future demand for mobile data. Operators are forced to deploy new technologies, frequency bands and small cells that more efficiently utilize the available frequency spectrum.

This trend has driven global interest in LTE technology, WIFI, small cells and heterogeneous networks (HetNets). However, being under significant pressure to deliver more and more capacity despite already substantial investment forces operators to deliver capacity in a cost-efficient way for their CAPEX to be still manageable.

Determining and prioritizing technology upgrades and deployments in the RAN network to balance CAPEX with user demand is becoming key. Another important concern in capacity planning is indeed the limitations and inefficiency of current network-centric processes for planning and optimization, which does not take into account subscriber specific issues, nor large spatial and time variations of the traffic demand.

NETWORK PERFORMANCE FOR RETENTION

Many markets are increasingly saturated, with reported “mobile penetration rates” well over 100 percent.

This means that the number of active SIM cards exceeds the population in many regions, likely because so many people use several mobile subscriptions (e.g. different smart phones for work and personal, connected tablets, etc.).

Especially in saturated markets, customer retention is becoming a key issue, as the cost to acquire new customers is much higher than the cost to retain existing customers. Moreover, emerging markets have significant churn rates that can exceed 50 percent, so even relatively small changes in increasing the customer retention can have dramatic effect on profit margins.

A recent report from Nokia² found that network performance is the main driver of loyalty among mobile subscribers. Showing that 41 percent of customers globally think an operator must offer excellent network quality, even if it costs more.



LIKELIHOOD TO CHURN



DEMANDS EXCELLENCE EVEN AT A HIGHER PRICE



SEES ROOM FOR IMPROVEMENT

Figure 2. Network performance is a primer driver for subscriber loyalty

Recently, Ericsson engaged a neuroscience consultancy³ to study user reactions to varied levels of network performance by studying heart rates and stress levels of participants during a smartphone experience. The results show that delays in loading web pages and videos while completing tasks under time constraints increase heart rate and stress levels by up to 15 percent.

During times of poor network performance, both time-to-content and additional delays due to re-buffering lead to a four point drop in Net Promoter Scores (NPS) on average.

The main takeaway is that improving network quality is the most important factor for reducing churn. Mobile operators who are willing to lead in loyalty shall outperform their competition in network quality. Fulfilling customers’ expected quality of experience (QoE) is therefore becoming increasingly important for mobile operators to reduce churn and improve customer retention.

The large majority of issues related to voice and data sessions, such as high drop calls or poor throughput, are originated from the RAN layer, which is where QoE optimization efforts should be focused.

PRIORITISE AND OPTIMIZE FOR VIPS

Due to the increasing networks complexity and limited engineering resources, it is worthwhile for operators to find efficient and straightforward solutions that can deliver fast and tangible network optimization results. A smart way of achieving high optimization efficiency is to determine which group of subscribers are impacted most by network quality problems and prioritize optimization efforts for the most affected and high value customers, such as enterprise subscribers, VIP or roamers. Such methodology can rely on consolidated subscriber-centric KPIs and network intelligence data that allows engineers to quickly identify analyze and solve QoE issues for subscribers with prioritized efforts. That way, operators can ultimately maximize customer satisfaction and revenue streams, while minimizing troubleshooting efforts.

Sharing Network Data

The challenging task of planning, building and operating mobile networks is often shared between many departments, including teams that conduct cellular network planning, design, site acquisition, roll-out, drive testing, optimization, operations and more. These teams are equipped with different sets of tools, have different ways of working and maintain different focus points. One obvious issue with this structure is that network data cannot easily be shared between teams, especially in today's multi-vendor and multi-technology networks with many different data sources.

As a result, the network planning teams too often use outdated network data – perhaps even several months old – including traffic information that does not encompass the latest network traffic developments, such as the introduction of new hotspots, which can evolve very quickly with the establishment of sites like stores, cafés and restaurants.

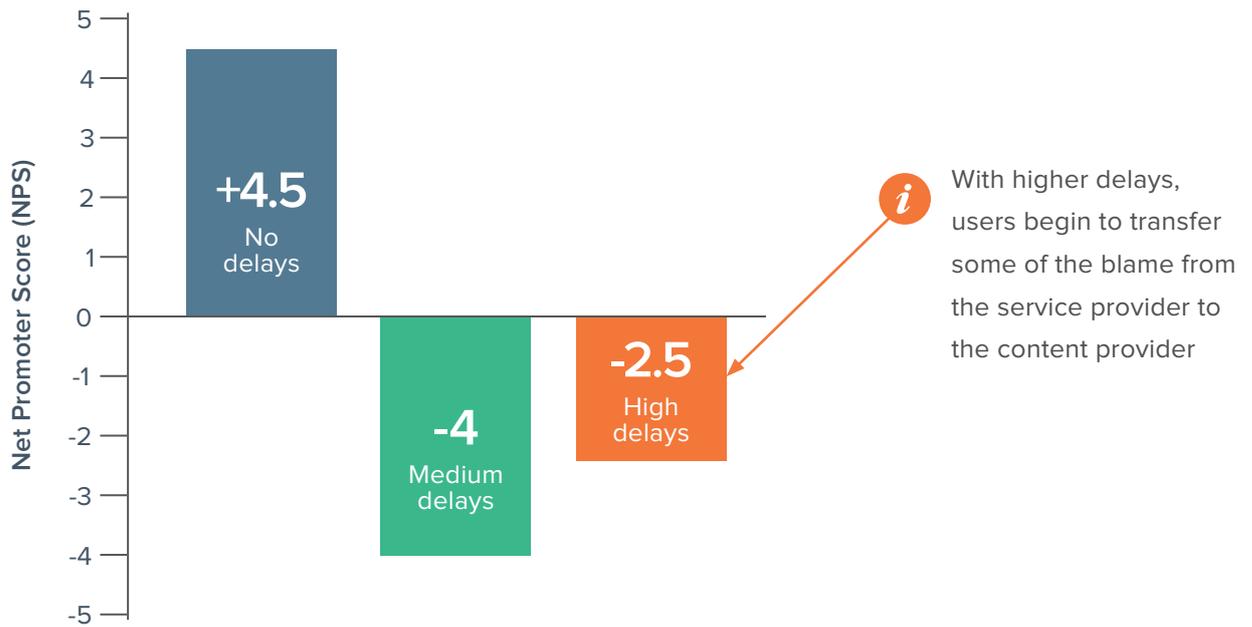


Figure 3. Change in Net Promotor Score (NPS) for mobile service providers

UNDERSTANDING TRAFFIC MORE ACCURATELY

Another challenge for engineering teams is understanding real traffic behavior on their networks – in particular, getting access to their time and spatial aspects. While up to 80 percent of network traffic in cities can originate in buildings, inaccuracy in identifying how the traffic is distributed can not only result in bad representation of real-world coverage and congestion patterns, but can also force teams to poorly target design and optimization actions on real problem areas.

Having the capabilities to capture and understand the complexity of network traffic such as distinguishing between outdoor and indoor users and identifying traffic heat maps are now essential inputs for mobile operators. Accurate traffic modeling can enable them to cost-effectively plan and deploy new sites such as small cells, manage traffic volume and increase network densification efficiency and scalability. The result is faster time-to-market for new services, overall improved network planning, accuracy and optimization, and a better QoE.

TRADITIONAL WORKFLOWS IN SILOS

The consequence of mobile operator teams using different data sets and tools is that new and more agile network planning and optimization strategies are hard to introduce if they are not supported by a set of engineering software that can smoothly interact. As a result, the current inefficient workflows are preserved, even if they are not necessarily the most effective. The teams also have different views of the mobile network as it is difficult for legacy solutions tailored independently for each engineering activity to combine information across domains.

As an example, accessing to an up to date view of the network configuration data to perform reliable planning or optimization activities is often cumbersome. Although this data can be easily accessed by the operation teams, one obvious requirement for operators is to be able to synchronize their planning data with the live network, allowing engineers to streamline their implementation processes for new or optimized radio parameters.

CUSTOMER SEGMENTATION - THE HOLY GRAIL



Figure 4. Call trace density grid around Tokyo station areas

The same issue also applies for network modeling that combines predicted network coverage with network performance management data.

In particular, the capability for network design engineers to receive direct feedback on whether planned updates or new site and technology rollouts are improving the network as planned is becoming critical to avoid unnecessary equipment investments and further costly optimization.

Traditional siloed workflows and independent sets of tools make it hard to execute well-informed and timely decisions regarding network investments and network optimization, which affects both OPEX and CAPEX. Adoption of integrated processes between planning and live operations enables more agile networks.

As the mobile market becomes more saturated and subscriber data usage continues to climb, mobile operators are shifting their focus to increase their differentiation to protect their market share and improve their bottom line. Enhancing customer experience, for both residential and enterprise customers, generating additional revenue and optimizing networks are the three main areas that are today’s operator priorities to drive values and improve their business cases⁴. However, performing these activities without considering specific subscriber profiles would not allow operators to efficiently reach their goals as they may miss the commercial picture associated with high value segments such as VIP and roaming customers.

In the QoE domain, for instance, deploying technology upgrades on a just-in-time basis to prioritize high ARPU subscribers can help to maximize the business impact by both improving CAPEX, QoS and retaining high value subscribers. Also, identifying customers that have high probability of churn by using consolidated network data and subscriber-centric metrics will help operator launch pro-active campaigns that can increase the retention of the highest subscriber percentile, which will in turn protect revenue. By focusing on the most valuable customers rather than most people, operators can then mine profitable segments that could otherwise churn to rival networks.

As shown in figure 7, an efficient approach to implement this strategy is to first identify groups of customers that operators shall mapped to some relevant business value such as data volume consumption, subscriber revenue or customer lifetime value (CLV) to find out the “most desirable” groups. A drill down to find issues that specific type of customers are experiencing among criteria they favor is then made in order to focus most of the engineering efforts – and possibility specific marketing actions to improve those priorities.

Figure 5. Streamlined workflow for efficient network planning

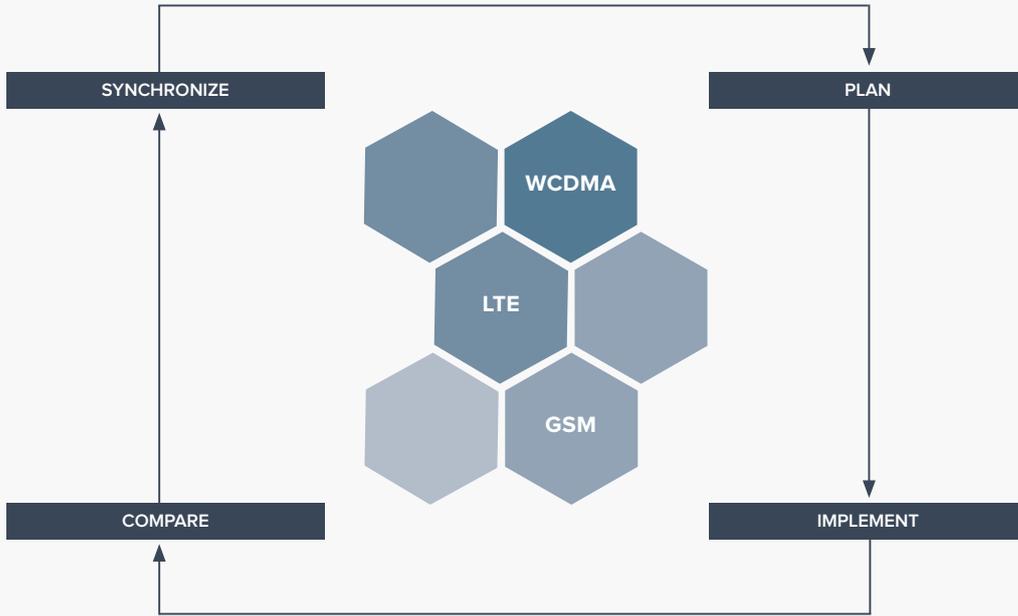
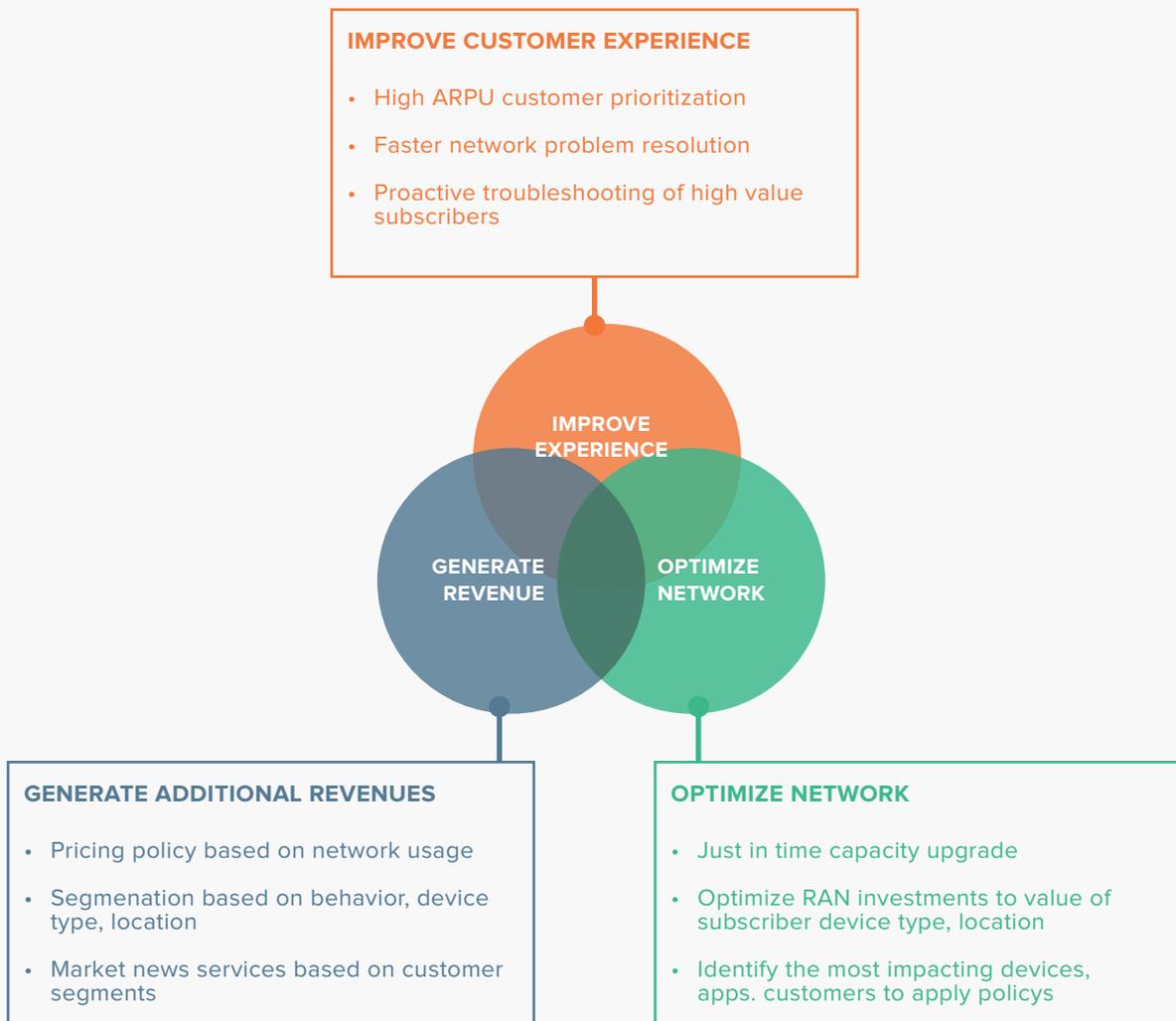


Figure 6. Key use cases driving operators' business value today



THE VOLTE OPPORTUNITIES... AND CHALLENGES

One illustration of the benefits of prioritizing valuable subscriber segment was with the introduction of voice over LTE (VoLTE) technology. VoLTE gives operators the opportunity quickly switch off legacy 2G/3G networks to save associated operational and CAPEX expenditures.

A successful VoLTE implementation is expected to be a huge benefit for operators in the long term because they will not have to operate separate networks for voice and data as they do today. VoLTE can enhance call quality and new unified communication services to counter over-the-top IP applications and potential revenue leakage.

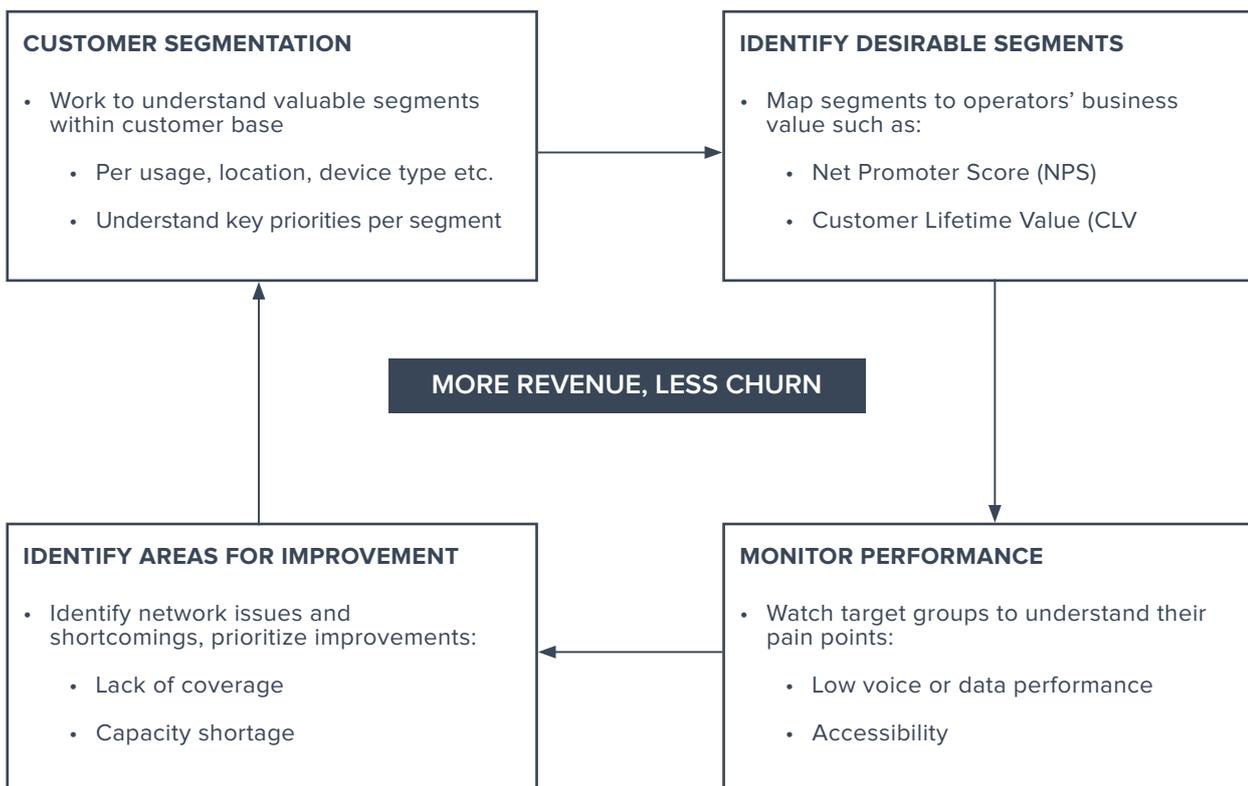
On top of additional infrastructure to implement for VoLTE service introduction, there is a fair amount of action to take behind the scene to make these promises a reality.

For example, it has been reported that after initial deployment, VoLTE performance such as call drops KPI can be significantly lowered compared to existing 2G or 3G.

Operators need to take steps to ensure the network is mapped to deliver the highest VoLTE QoE and optimized in a timely fashion if problems remain.

While the penetration of VoLTE is still relatively low, operators need to collect, correlate and analyze performance insights at both the network and subscriber level with the ability to troubleshoot aggressively and fix possible design issues for the VoLTE segment. In particular, operators need to collect useful information at a customer level, such as received quality, call events and traffic geolocation that can be easily leveraged during network design and optimization activities.

Figure 7. Improving operators' business by focusing on the right customers



UNIFIED PLANNING AND OPTIMIZATION

Unified Planning and Optimization is a set of new advanced capabilities within Infovista’s latest generation of planning software solutions that addresses concerns related to fast evolving networks.

By integrating access to live data, such as highly accurate, geolocated call traces, temporal selections of network performance data, and live network configuration and parameters, it provides RF engineers with an accurate view of the current state of the mobile network, its evolving traffic demands, and existing network issues.

The solution facilitates timely radio network planning and optimization decisions in areas of poor performance or quickly growing traffic demand. It also ensure network investments and network improvements are directed towards areas where they will have the highest return.



BENEFITS OF ACCESSING LIVE NETWORK DATA

Accessing live network intelligence from within a network planning solution provides unique feedback to the network design team.

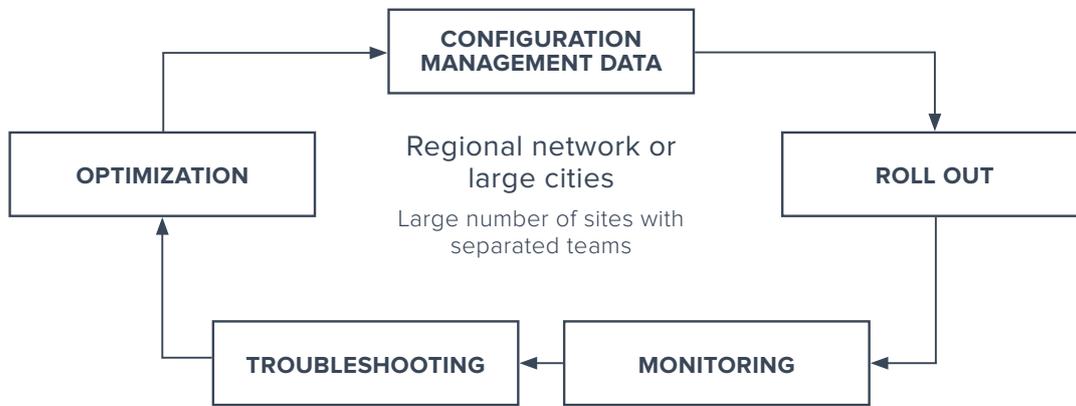
This resolves the typical issues with planning, rollout, optimization and working in isolated silos. With direct, live feedback, the network planning team avoids unnecessary mistakes that can create sub-optimal network rollout plans.

With this live data, engineers can answer fundamental questions at the deployment stage: Does the network function as planned? Moreover, if it does not, why? This information then helps RF engineers master the rollout of a new technology faster and can serve as key inputs to rectify at an early stage potentially costly mistakes.

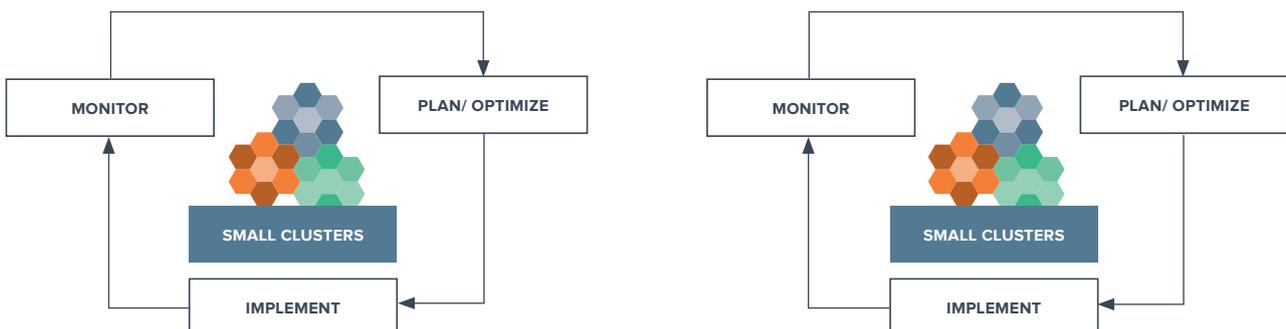
Once network traffic increases, advanced traffic forecasting based on live traffic development can be used to identify developing hotspots and other areas with potential future capacity issues, and plan accordingly new sites such as small cells and additional capacity resources that will solve.

When live network data is an integrated part of the network planning and optimization process, mobile operators can gain access to critical real-world information from the early stages of the network rollout to more mature phases and implement processes that are adapted to faster changing networks. For instance, it enables unified processes for planning and optimization such as planning, design and optimization in a single flow rather than using different teams with different tools

Figure 8. Unified Processes



Unified planning and optimization
Work per cluster with single team



USE CASES

ACCURATE TRAFFIC MAPS

As described before, the accuracy of mobile network planning is highly dependent on relevant inputs. Traffic maps, i.e. the geographic distributions of mobile data demand, are essential inputs to the mobile network analyses when determining where and when network investments are required. By using several sources of information, such as live traffic data and traffic forecasts from performance management systems, geographic distribution of social media usage patterns and geo-localized call traces from the network, the traffic maps' accuracy can be increased. Combined with high resolution geodata and scaling based on market trends and market strategies, even more precise geographic views of the traffic demand can be created.

These traffic maps, together with accurate network modelling and network analyses, are the foundation for creation of realistic coverage, capacity and quality maps.

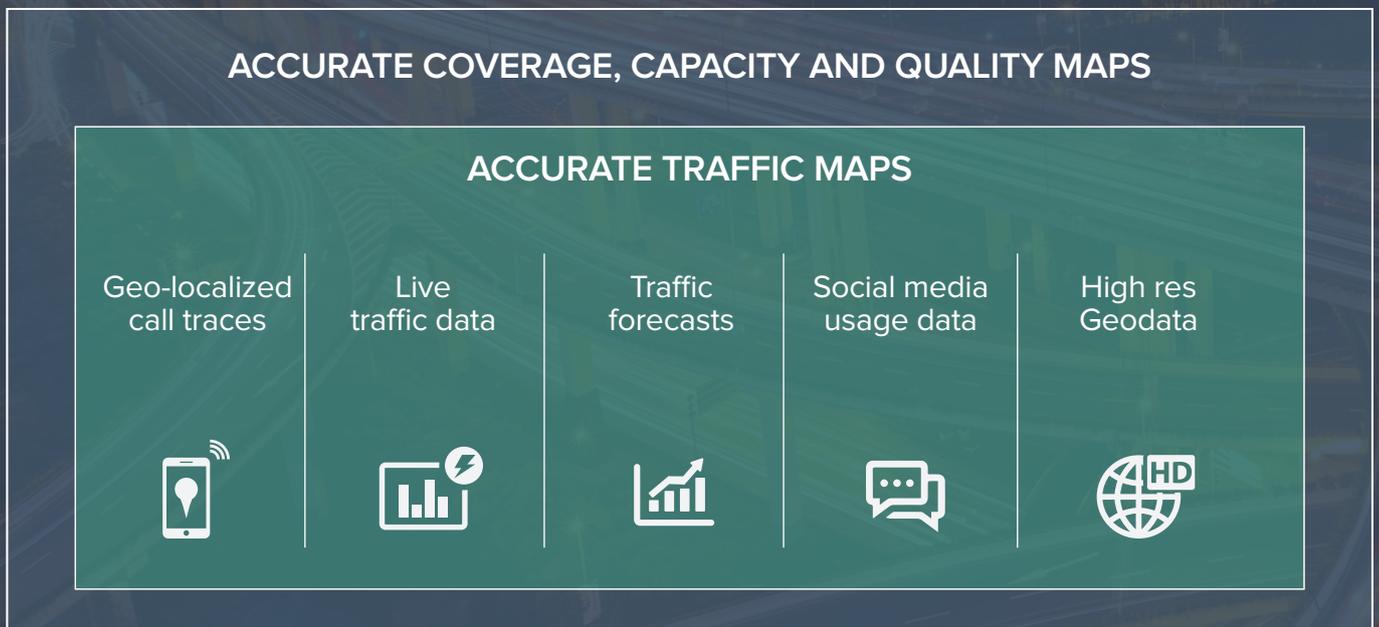
That accuracy can be translated into CAPEX when network investments decisions are made.

Current network traffic and forecasts for future traffic are both critical inputs to ensure that mobile capacity is added where it will matter the most. At the same time, denser networks mean added interference and conducting precise network planning is thus required to avoid interference and achieve an optimal utilization of the network investment.

The automated retrieval of up-to-date traffic loads and cell loads from the mobile network are necessary to ensure that the most accurate information is used during times of peak traffic, whenever they occur.

This process also requires a network planning solution with accurate network modelling and advanced analysis in 3D to address the actual locations of mobile devices (e.g. on different floors of a building).

Figure 9. Benefits of accurate traffic maps



NETWORK AND SUBSCRIBERS KPIS

Network planning and optimization teams can be more efficient with integrated access to live network data such as key performance indicators (KPIs) via their engineering software. With embedded access to multi-vendor KPIs, mobile operators’ workflow will become more streamlined. By leveraging rich performance data collected from the network, RF engineers can truly understand the dynamics of an evolving mobile network.

The first benefit can be found at early stage of new layer deployment (e.g. LTE-advanced) where performance management KPIs can help identify network configuration errors early.

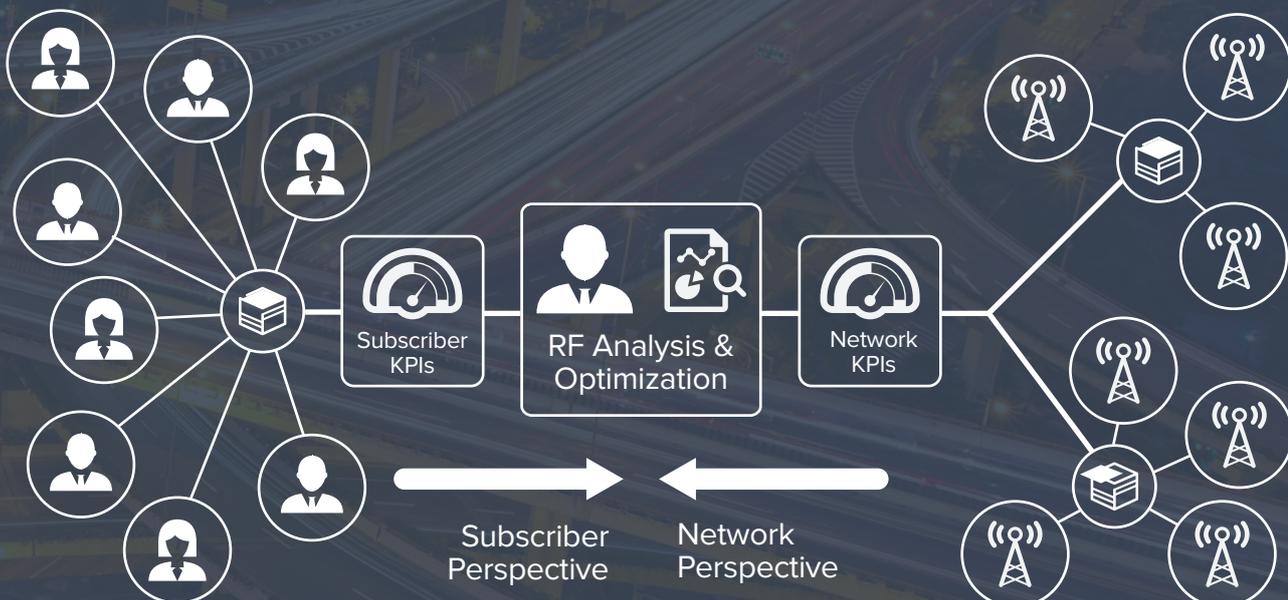
This means that they can be corrected, optimize the network configuration, and monitor performance quality and traffic development – all very important tasks for mastering a new network layer. Performance data allows mobile operators to better understand the behavior of new technology and its traffic uptake.

For instance, do customers adapt the new technology at the expected pace? Is it off-loading traffic from other network layers as expected? What is the geographic distribution of the traffic? With this very relevant input, mobile operators can adjust their network rollouts based on actual customer behavior and network performance, and avoid disappointing early adopters with a low QoE.

In case of new service introduction on the network, such as VoLTE, quality must be evaluated in the planning phase, and again in the deployment phase. Having access to the main KPIs from within the network planning solution is highly useful when comparing the expected outcome with reality.

Mobile operators need to ensure the QoE of both the newly introduced voice over-IP service and of the existing circuit-switched voice in the mobile network in order to safeguard customers’ QoE expectations.

Figure 10. Leveraging subscriber insights and network data for RF optimization



LIVE NETWORK ANALYSIS

Mobile network call traces are reported measurements of the connection between the mobile device and the network containing call events and associated layer 3 signaling. By integrating access to such highly accurate, geolocated call traces that are automatically collected from mobile network experience optimization, planning can also leverage this rich information to deliver unique live network analysis capabilities.

BENEFITS SUMMARY

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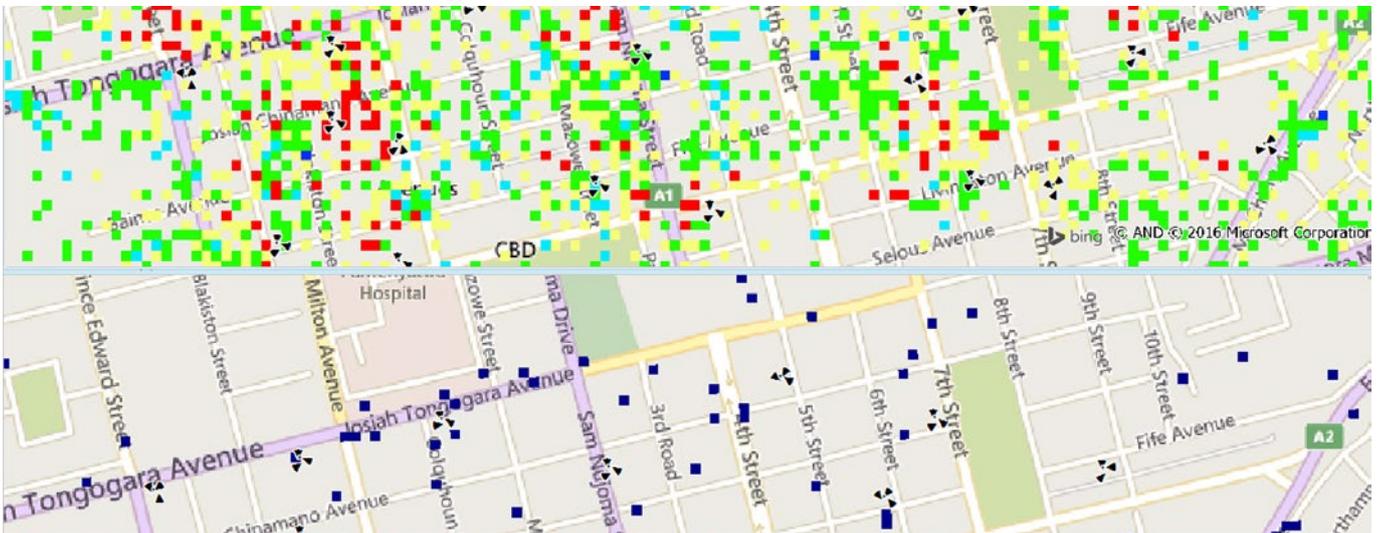


Figure 11. Live 3G pilot coverage analysis and dropped call analysis

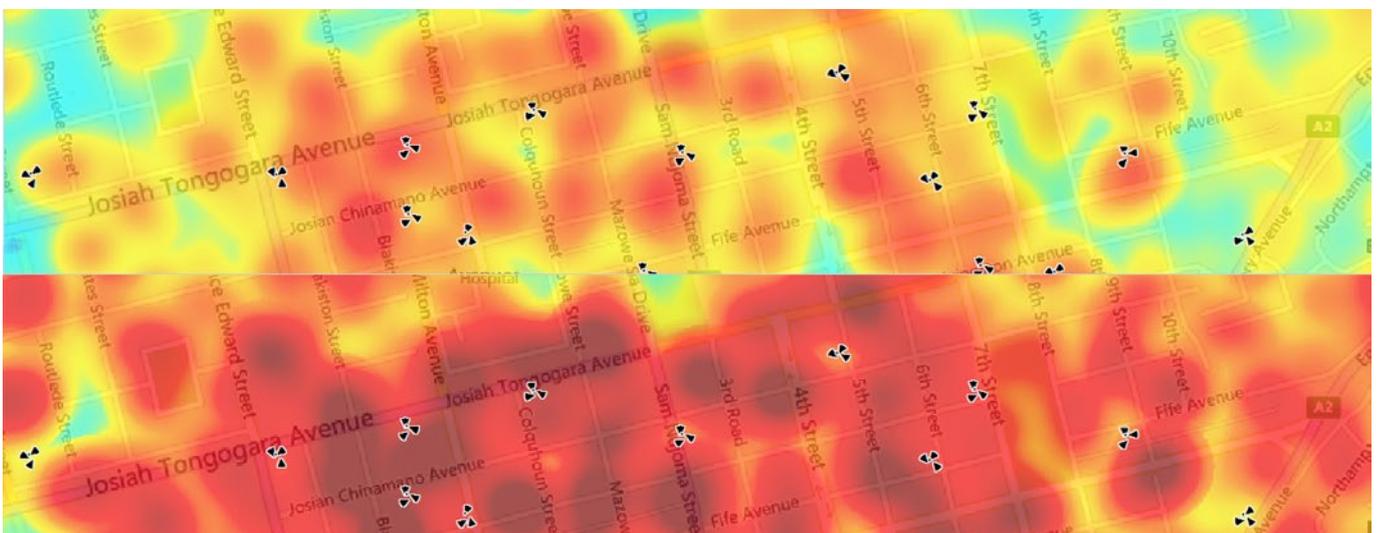


Figure 12. Live traffic maps for VoLTE and non-VoLTE traffic

SUMMARY

Mobile operators today are implementing new technologies at a robust pace by deploying spectrum-efficient pipes that are necessary to contain the exploding cost of delivering capacity. This is driving the adoption of LTE and its evolutions towards 4.5G and 5G soon, but also deployment of WIFI and small cells. While this is achieving the overall goal of balancing capacity costs, the complexity of networks is dramatically increasing, resulting in higher operational expenses and strong challenges to maintain acceptable and homogenous QoE.

Because networks are evolving at faster pace and getting more difficult to manage, there is a need for operators to streamline their engineering processes, in particular by adopting unified practices that can incorporate planning and optimization activities into a single flow. By doing so, mobile operators can quickly adapt their networks to meet capacity and coverage expectations and focus their network investments where this is really needed.

The integration of planning and network experience activities into a unified solution that can automatically collect and leverage rich live network information such as geolocated call traces, network performance data and live network configuration provides engineers with a unique capabilities to use real world measurements for designing higher performance radio networks. This allows them to target optimization activities on areas and subscriber segments that are the most valuable to improve.

Infovista is passionate about equipping mobile operators with the most advanced solutions they require to efficiently design, optimize and manage the mobile network throughout its entire lifecycle. Our innovative and advanced RF planning tools and network optimization solution – Planet 6 – helps operators to maximize investment, increase revenues, improve profitability and accelerate the time-to-market.

REFERENCES

- 1 Ericsson Mobility Report, November 2015
- 2 Nokia’s Customer Acquisition and Retention Study Report, 2014
- 3 Ericsson Mobility Report Feb 2016 – Source Ericsson ConsumerLab neuro research, 2015
- 4 Appledore Research Group, 2016

INFOVISTA - UNIFIED PLANNING AND OPTIMIZATION

Infovista offers advanced software solutions that help mobile operators cost-effectively deliver the network capacity and QoE that customers expect, and thus help mobile operators reduce churn. These integrated systems harvest useful information and make it easily available, empowering mobile operators to make the right decisions at the right times. As network complexity increases, mobile operators need unified network planning and optimization systems rather than individual tools for specific tasks. Infovista's unified network planning and optimization solution provides properly synchronized network plans and network data for multiple technologies, offering instant and accurate views of network coverage, capacity, quality of service (QoS) and performance throughout the network lifecycle.

PLANET

Planet® is an innovative network planning, design and optimization platform with industry-leading support for new technologies. Planet uniquely provides mobile operators with:

- **Full 3D-planning capabilities:** Support for 3D traffic map generation based on unique Planet 3D fingerprinting technology.
- **Visualization** of outdoor and indoor coverage and capacity in 3D.
- **Multi-technology ACP** with unique spectral efficiency improvement goals.
- **Network traffic forecasting** based on network traffic development, enabling engineers to identify evolving hotspots and most relevant small cells placement.
- **Scenario management** and what-if analysis.
- **Native integration with VistaNEO** mobile network experience optimization solution to leverage its rich call trace data for live network analysis capabilities.
- **Layer generation from call trace data:** network analysis, interference matrices and highly accurate traffic maps based on call trace data inherited from VistaNEO.
- **Advanced traffic maps** based on a combination of network traffic forecasts, geo-localized call traces, social media usage data and high-resolution geodata.
- **Direct access to real-time network performance data** through VistaInsight for Planet. Graphical and statistical visualizations of KPIs to troubleshoot problems and optimize the mobile network.

VISTANEO

A powerful scalable, carrier-grade analytics and optimization solution that enables MNOs to collect and monitor millions of subscriber-centric events across their entire mobile network. VistaNEO features the following advanced capabilities:

- **Subscriber Insights:** Includes a quick view of subscriber experience trends, including call-outs for subscribers with the most issues through Worst Performing Subscriber charts.
- **Network Insights:** Understand, analyze and optimize network performance across all the different technologies and vendors, and quickly resolve problematic areas with in-depth statistical KPIs, drill-down analysis from high-level dashboards to detailed reports.
- **QoS Insight:** Resolve network issues related to abnormal events with automated event diagnostics.
- **Live Geo-Analysis:** Powerful geolocation and visualization capabilities to understand high traffic locations and to optimize problem areas. RAN engineers can create coverage plots and display abnormal event locations based on real subscriber data, reducing drive testing dependencies.
- **Network Optimization & Troubleshooting:** built-in algorithm to trace L3 for detection of poor cell performance cause or low user QoS, including data throughput and abnormal call events, pilot pollution, overshooting cells and missing neighbors. Integrated optimization best practices and in-depth optimization analyses

VISTAINSIGHT FOR PLANET

Enables mobile operators to easily leverage the most critical network performance management data in Infovista's Planet® and Vista360®. With VistaInsight® for Planet, mobile operators have access to:

- Live and historical network intelligence data from within Planet that can be applied to network analysis or troubleshooting.
- Pre-defined, multi-vendor, up-to-date KPIs, including cell throughputs (uplink and downlink), dropped call rates, the number of active users, handover success rates, etc.
- Advanced and temporal rich traffic KPIs for minimum, average, maximum, 95th percentile and daily maximum for any selected time period, such as a specific day of the week, weekdays, weekends or event days.
- Forecasts for network traffic loads and LTE cell loads based on actual traffic development.
- A web client option, Vista360, with access to all performance management data in VistaInsight for Planet.
- A performance management solution tailored for cost-efficient network planning and optimization, as well as network roll-outs of new technology. This solution can also be upgraded to end-to-end network performance management.

About Infovista

Infovista, the leader in modern network performance, provides complete visibility and unprecedented control to deliver brilliant experiences and maximum value with your network and applications. At the core of our approach are data and analytics, to give you real-time insights and make critical business decisions. Infovista offers a comprehensive line of solutions from radio network to enterprise to device throughout the lifecycle of your network. No other provider has this completeness of vision. Network operators worldwide depend on Infovista to deliver on the potential of their networks and applications to exceed user expectations every day. Know your network with Infovista.