

Intelligent Network Resource Analytics and Optimization: Crucial Ingredients for Carrier Profitability



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by Arindam Banerjee | September 2008

Executive Summary

The communications industry has become a commodity business. The only way for communications service providers (CSPs) to compete in today's economic environment is by increasing operational excellence. However, most CSPs' operational expenditure remains stubbornly high, typically consuming 45% to 50% of revenue. Network operations account for about 40% of this expenditure. The expansion of the network footprint due to organic and inorganic growth has resulted in poor capacity utilization. This leads to higher operational expenditure costs and puts extra pressure on customer service.

CFOs are facing some burning questions that might be costing their organizations money, including:

- Is the capacity within your network (where you want to minimize investment) optimized?
- Would you like to reduce the number of locations (i.e., expensive real estate) in your network?
- If you are leasing capacity, are you leasing too much? Do you really know?
- If you are a mobile operator, are your expensive backhaul costs optimized?

Supporting data is not readily available for CFOs to make such decisions. They lack firsthand visibility of their existing network capacity, service and customer profitability information, and are forced to depend on secondary data provided by network or IT systems that are usually designed for operational users.

Those responsible for product marketing/management are faced with the following types of questions that may be costing their organization in terms of lost market opportunity and customers:

- Does your network have the capacity to support new product launches and deliver new customer services?
- If you wholesale capacity, can you price bids accurately and quickly?
- If you win a wholesale bid, do you know how it will impact existing capacity? How much new capacity is required and where?

It is rare that product marketing launch plans are in synch with network planning. Data needed by product marketing during product launch planning is either inadequate or not readily available to facilitate product rollouts and market campaigns. Additionally, sales departments don't usually have easy access to information to support wholesale or corporate network bids that require calculation of service profitability or knowledge of available network capacity.

CIOs, CTOs and network operations are faced with the following or similar questions that may be increasing their operational complexity and costing their organization money:

- Is your network overengineered from a capacity viewpoint?
- Are you failing to predict capacity/congestion black spots in your network in advance?
- Does your network fail due to lack of capacity?
- If you have multiple networks, can you visualize and manage them as if they were one network?
- Are you trying to migrate to a new technology platform while wishing to sweat your current network assets?

A common thread across all of these stakeholders is the need for instant access to relevant information that is critical to their decision-making process. Usually, the operational systems and tools available to network engineering are not designed to provide readable views for business users. Also, information requests from marketing or finance are time-consuming for operations to respond to and are usually provided on an ad-hoc basis. In addition, the time lag between the receipt of the information request and delivery of the information often results in outdated data that may not accurately reflect the day-to-day changes in network utilization.

In light of these myriad operational requirements, we believe it is time for a new solution to evolve that understands network capacity utilization patterns, can forecast network trends and can interface with network inventory to optimize network resource utilization. Yankee Group defines this space as Network Resource Analytics and Intelligence (NRAI).

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Executive Summary (continued)

Addressing this problem area requires a solution that interfaces with one or more network inventory systems to enable CSPs to optimize their network capacity and utilization by predicting network resource exhaustion in a timely manner. In addition to driving capacity optimization, NRAI provides network planners the ability to create “what if” scenarios based on past utilization trends, sales forecasts and service consumption trends. Yankee Group believes that Oracle’s Network Intelligence solution, built upon its Netsure acquisition, provides a comprehensive solution that addresses all the requirements of NRAI defined in this Report.

This Yankee Group Report examines the critical components that constitute an NRAI solution, how NRAI drives the convergence between IT and business users so CSPs can adopt a just-in-time (JIT) approach to network resource planning, and how network usage analytics can enable accurate decision-making across finance, marketing and network operations.

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I. Why Is Network Optimization Imperative for Carrier Profitability?

Pervasive networks and ubiquitous connectivity are the fundamental underpinning of the next-generation networks (NGNs) that will catalyze the launch of many innovative value-added services. Accurate network planning, trending and forecasting are becoming critical for the following reasons:

- **Market and service evolution/growth:** Carriers are expanding their portfolios and networks to compete head-on across all major sectors, including voice, video, data and mobile, as well as entering new sectors such as interactive services.
- **Competitive pressures and technology** are impacting service growth and network expansion migration. As cable companies deploy voice and wireless services, and wireline companies deploy video and integrated wireless offerings, their service revenue will more closely resemble the composite revenue base depicted in Exhibit 1 (on next page).

Exhibit 1 illustrates value-added services that CSPs are currently launching and evaluating for launch in the next 12 to 24 months, as well as the effect that new service opportunities will have on Tier 1 carriers’ revenue.

Incorrect capacity planning will result in excess and incorrect subscriber provisioning, which will increase capex and opex spending, resulting in customer dissatisfaction and churn. Some significant reasons why this problem is even more critical in today’s NGN scenario are listed below:

- Next-generation technology will provide more services with more dynamic and effective data bandwidth allocation across both services and customers. Next-generation architectures and IP multimedia subsystem (IMS) promise to change the dynamics of bandwidth allocation and management. Bundled services or individual services such as rich media content, IPTV, video-on-demand (VoD), gaming and other next-generation services will need higher bandwidth allocation, which will impact IP network resources significantly.
- Some services will explode and many others will decline—the network is not static anymore. This makes planning even more difficult. The dynamism and accuracy needed to optimize the existing network infrastructure will require dedicated solutions that will provide a sufficient arsenal to business and IT users to plan, predict and optimize use of their existing resources. Hence it becomes critical to bridge the gap that exists today between fulfillment systems, planning and capacity management systems.

This rapidly-changing, highly-competitive communications market scenario presents some unforeseen challenges for CFOs and CMOs. In the next section, we look at some of the critical business challenges that the C level faces in this mercurial environment, and why it is imperative to adopt JIT principles in the context of network planning and network rollout.

II. Just-in-Time Is a Must-Have for Carrier Profitability

Intense competitive pressures, technology changes and service convergence have resulted in network growth. However, operational and capital expenditure continues to remain high, and the challenge to control and manage information for all interested parties (i.e., network operations, finance, planning) keeps increasing exponentially with time. Current operational problems associated with network planning and optimization are:

- Networks either overbuilt or underbuilt, with negative impacts for capex and opex as well as business flexibility to support service/customer growth effectively
- Lack of ongoing input from marketing on sales forecasts as well as service take-up trends
- Ongoing requests for financial data and financial modeling, which require reliance on technical staff

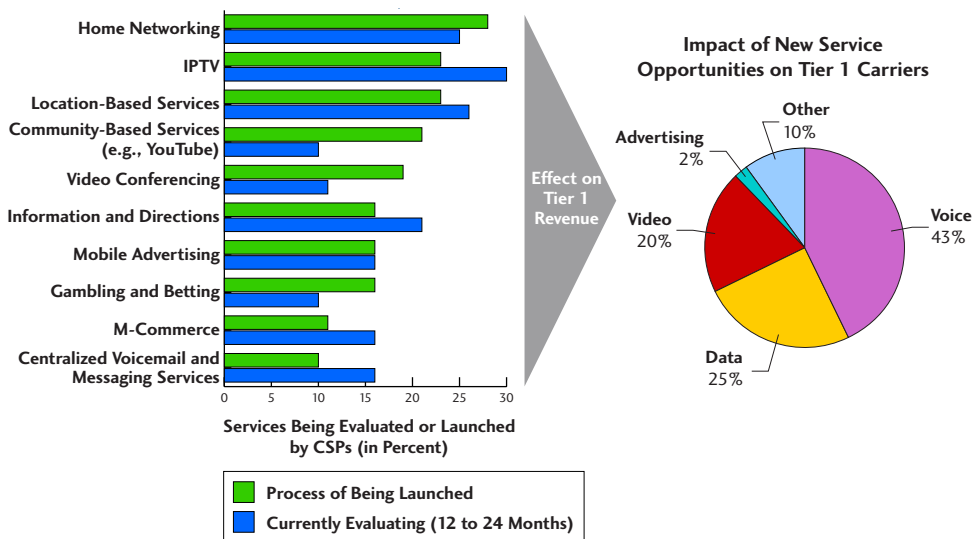
Business users like product marketing and financial teams can't use network planning or optimization tools to support their decision-making. With the blurring of lines between market categories, service providers face new opportunities and difficult challenges. The advent of IP and deregulation have removed the barriers to entry that once kept telcos, wireless, cable and IT players in their separate corners. With anchor service revenue reaching a plateau or falling—particularly in voice segments—service providers are looking toward bandwidth-intensive video, media and content-based services to offset their revenue loss from traditional services.

What kind of challenges do these new services introduce for an operator's C level?

- From a CFO's perspective, it's all about sweating existing assets—being able to accurately calculate financial impact based on network utilization and to plan for all future capital expenditure. This implies that to support CFOs' decision-making, they need solutions that can provide them with accurate reports on network growth information, help in pricing and planning major bids, and most importantly ensure that network build costs and budgets are accurate. The following problems exist today:
 - Most network operations and planning systems are designed for technical end users and cannot support the needs of business users easily.
 - Ongoing requests for financial data and modeling require a reliance on technical staff. Consequently, the information provided is usually based on an engineer's understanding of the network and is suboptimal from a costing standpoint, resulting in unnecessary waste of operational expenditure.

Exhibit 1
The Potential Impact of New Service Opportunities on Tier 1 Carriers' Revenue

Source: Yankee Group, 2008



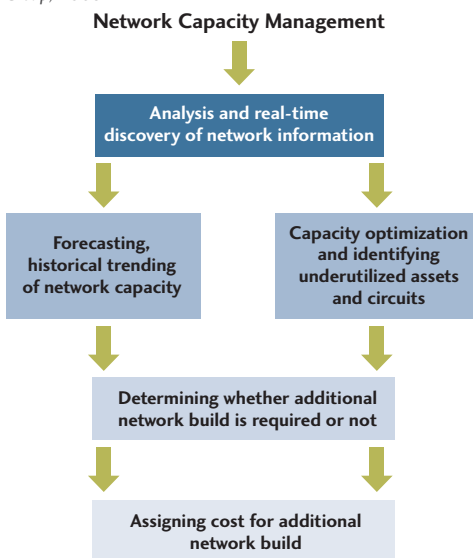
- It is critical for CMOs and product marketing directors to have accurate and up-to-date information that enables them to launch, extend or modify campaigns. The ability to get up-to-date information on whether a network footprint can adequately support a service campaign/launch is extremely critical for CSPs’ profitability. Also having the capability to accurately assess the costs to launch any service, decide whether a particular service is profitable, and make sure that the sudden surge of service demand catalyzed by aggressive promotion does not negatively impact profitability are critical areas where CSPs are looking for help from the vendor community. Similarly, such network-based information is also required to determine customer profitability either by market or service.

Unavailability of tools to support the needs of business users in the context of network utilization and capacity planning has forced them to depend on inaccurate data based on incorrect estimates and an obsolete view of network utilization.

Hence building out excess capacity when it is not needed, and the inability to forecast when network buildout is essential, can put immense pressure on operators’ capital expenditure and results in inefficient use of expensive assets. The only way an operator can remain competitive in today’s complex and hypercompetitive communications environment is by optimizing its network assets usage. Operators need intelligent analytics and reporting capabilities that can federate information from multiple networks’ data repositories and sales forecasting systems such as CRM. This will provide carriers with:

Exhibit 2
Best Practice for Streamlining the Network Capacity Management Process

Source: Yankee Group, 2008



- The ability to plan, predict and optimize their investment in network builds and rollouts, and identify potential stress points
- A prioritized and optimal network investment plan based on service forecast demands
- The ability to anticipate and implement necessary network change just ahead of the demand curve

An analogy can be drawn from manufacturing and retail companies such as Toyota and Wal-Mart. These companies maintain a very lean inventory and hence sustain their competitive advantage based on accurate resource utilization and their cost drivers. The question that begs to be asked today is why the communications industry cannot adopt the same principles and optimize their resource allocation capability. Why do CSPs still believe in creating network capacity based on the just-in-case (JIC) model rather than adopting the JIT concepts of manufacturing industry? The reasons lie in the CSPs’ traditional stovepiped approach to network planning, execution and capacity management. To be effective, all operational functions (e.g., marketing, finance, network operations and planning) need on-demand access to network resource data. To get meaningful information, this data requires ongoing input from all stakeholders as well. What is needed is a holistic approach to network resource management that takes into account all dependencies involved in network optimization and capacity planning.

Exhibit 2 illustrates Yankee Group’s vision of different scenarios and parameters that solutions must handle to streamline the network capacity management process.

We define this process as well as solutions that automate this process as Network Resource Analytics and Intelligence.

III. Defining Network Resource Analytics and Intelligence

Yankee Group defines Network Resource Analytics and Intelligence as a solution that interfaces with network inventory solutions and optimizes capacity utilization by predicting network resource exhaustion in a timely manner. It needs to drive capacity optimization and enable network planners to create “what if” scenarios based on past utilization trends, sales forecasts and service consumption trends.

Exhibit 3 illustrates the major challenges operators are facing around planning and capacity management, and key value-adds that NRAI solutions provide to alleviate CSPs' pain points.

In Yankee Group's opinion, NRAI needs to be treated as a separate solutions category and not be confused with network planning tools.

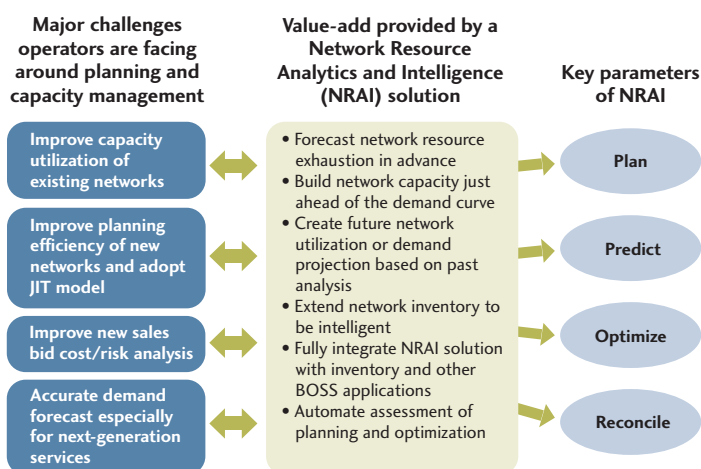
Hence it becomes important to highlight the scope of an NRAI solution:

- **NRAI provides incremental value over traditional network planning tools.** The challenge of the next-generation network is to more rapidly and accurately map network changes as they happen because of myriad complex services. Consequently, successful planning must have visibility into and control over the end-to-end processes to resolve exceptions, and have the capability to accurately plan across multilayer and multitechnology domains:
 - Accurate JIT network information will accelerate the provisioning success rate.
 - NRAI solutions should be able to provide operators with the capability to predict and optimize network investment requirements, and provide network engineers with the tools to optimally locate point-to-point routing demands from the traffic forecast.
 - Based on past capacity utilization, marketing demand forecasts and service consumption trends, NRAI provides network operations with the tools to efficiently plan, process and predict network growth. Hence in contrast to traditional network planning tools that are disconnected from service fulfillment systems, NRAI acts as a real-time bridge between fulfillment and planning.

Exhibit 3

Key Parameters of a NRAI Solution

Source: Yankee Group, 2008



- **NRAI is a real-time decision-making network operations tool.** NRAI goes well beyond an analytics or business intelligence tool as it relates to network resources, capacity planning and optimization. It is also closely linked with network inventory, supply chains and financial systems. Typical business intelligence tools cannot interpret the topological mapping and behavior of the network at a very detailed level, which NRAI does very effectively. NRAI's focus is on network data consolidation in a federated multinet environment, and it provides accurate real-time planning data for achieving JIT capacity planning instead of the traditional JIC approach. Therefore, even though principles of BI are applied here, the focus of NRAI is primarily toward active network optimization.
- **NRAI bridges the gap between network and IT users.** NRAI provides valuable information and practical tools for product managers, marketing and financial constituents of the service providers to help them make more informed decisions. NRAI transcends the traditional boundary of IT and business users and hence in its own distinctive way brings about convergence of business and IT. The following are some of the value-adds provided by NRAI:
 - Accurate data for wholesale capacity pricing and sales bids
 - Disaster recovery
 - More accurate sales forecasts by aligning market demand with supply chains
 - Sophisticated web-based reports and alerts on the utilization of all entities in a network

In the following section, we take a detailed look at some of the critical benefits NRAI can deliver as well as how it can reduce opex and capex through process automation and advanced scenario modeling.

IV. Closing the Gap Between Business Users and Network Operations

Traditional network planning tools typically work without real-time correlation with siloed underlying networks and service fulfillment systems. Network planning, operations and execution are also typically handled by network operations users who take a network-centric view of the situation.

NRAI bridges this gap. It identifies underutilized assets and circuits, and provides mechanisms to deliver JIT network capacity to anticipate and implement necessary network change just ahead of the demand curve.

Some key benefits that can be provided by adopting an NRAI-based approach include:

- **Automated, accurate and efficient bid support process:** Typically, enterprise or wholesale network bid responses have short response time frames and often need to provide detailed costing plans for proposed networks that can include various network design and customer service fulfillment options. For CSPs, an efficient bid design process relies on a combination of lower-cost designs, efficient use of existing network capacity, and the ability to present the customer with a greater level of detail in a short time frame. It is critical for CSPs to model various forecast scenarios and predict congestion points based on historical network performance data. An NRAI-based solution needs to provide accurate build costs in a very short time frame based on a detailed topological view of the network, as well as provide rapid modeling capability of requested products and services based on validated routes via existing networks. Therefore, NRAI transcends business and IT boundaries by providing tools and solutions to support the financial department's requirements around build cost and asset utilization.
- **Minimize at-risk customers and deliver high service quality:** During a disaster or natural calamity, a CSP's best approach is to minimize the impacts, and inform customers of what services are affected and when they can expect service resumption. In most instances, because of incorrect and out of synch network information, CSPs do not have end-to-end visibility of subscribers and hence they cannot automatically discover, model and correlate services with end-to-end infrastructure information. This curbs their ability to provide proactive service outage information to their subscribers and also provide subscribers with short-term or alternative traffic re-routing mechanisms. NRAI should be able to identify all at-risk customers and services and provide traffic migrations and re-route plans to aid rapid services restoration.
- **Correct forecasting for future growth:** The inability to provide network information instantly and to process and manage new forecasts accurately will curb CSPs' ability to ascertain whether the network has sufficient resources to support future growth based on marketing and field sales activities. NRAI needs to accurately forecast the effect of growth on the existing network based on traffic routing demands on network consumption extrapolation as well as up-to-date sales forecasts. This will arm CSPs with vital information that will enable them to make critical decisions such as whether to increase capacity in the network until there is a real need for it as well as renegotiate the contract for leasing network resources and identifying underutilized assets and circuits.

- **Traffic migration planning for network growth and new technology adoption:** We are in an age of network consolidation and convergence. A lot of companies have driven growth by acquisition. It is important to see how the networks are modeled and how they are connected, and to create traffic migration plans to move traffic from full topologies, individual sites or nodes with minimum impact to customer services and product campaigns.
- **Provide federated network view:** Since NGNs demand network planning to be performed holistically across multi-level network layers, NRAI should be able to provide a unified view of multiple networks across multiple inventory systems for business and network operations users. This federated view helps to capture network utilization snapshots and build historic capacity consumption and utilization trends for individual and aggregated network resources. It also helps to create future demand projections based on trending algorithms.
- **Provide an accurate financial data for timely decision support:** Implementing an integrated NRAI with financial systems is another key factor to provide an effective financial control and support timely decision-making from budget review to real-time business analysis. It also provides the ability to improve network lifecycle management in conjunction with ERP and the supply chain.

V. Yankee Group's Market Assessment

The market lacks a solution that will enable CSPs to increase the overall efficiency of existing networks and ensure that network build matches market demands to minimize capacity surprises. Today we mainly see the following scenarios:

- Traditional network planning tools that work very close to the network, and further away from business users, are suitable for network planning and operations departments. These tools are more suited for greenfield operations than a mature service provider's environment with legacy systems and services running on a heterogeneous network environment. Hence these tools fail to accurately report on network growth, provide accurate information for major bids, and identify potential stress points in the network so that it can appropriately address current and developing shortfalls.
- Because many of these planning tools are developed in-house by CSPs, they are normally suited for network operations users but not for business users. Supporting more dynamic and complex networks is always a big challenge for the traditional in-house-developed tools.

- Network planning and optimization tools developed based on IT industrial standard technologies can be very expensive to build and maintain. This puts a lot of pressure on CSPs' IT groups and smaller vendors to provide proven solutions and tools that adopt IT open standards and provide all the required integration technologies.
- Typical service fulfillment systems are focused on resource management and depend on traditional network planning tools to provide them network layout information. Unfortunately, they do not address all capacity management issues and heavily operate under network operations users' assumptions of network capacity and ad hoc resource allocation. By the same token, modeling "what if" scenarios or performing trend analysis to accurately quantify capacity demand and identify future network stress points is either not available or difficult to achieve with the massive outstanding capacity management issues.

Yankee Group identifies NRAI as a new category of software solution that aims to resolve the particular pain points of carriers that have always existed. It has the potential to exponentially grow in the near future with the advent of myriad NGN-based value-added services. This category of solution would enable carriers to create an optimum resource plan for RFPs so that revenue generation is accelerated with a better expectation of the profit margin if carriers won the business.

Yankee Group believes Oracle, with its Netsure acquisition, provides a very comprehensive solution, addressing all the requirements of NRAI solutions. Oracle's Network Intelligence (NI) solution holistically tries to address typical network optimization issues, which we have discussed in this Report. The Network Intelligence solution addition to Oracle's product portfolio is an astute tactical move, particularly in light of the growing demand for increased bandwidth across NGNs and ever-changing network requirements.

VI. Conclusions and Recommendations

Without a streamlined NRAI strategy, there is no chance of success for carriers and service providers investing heavily in NGNs and major business transformation projects. For carriers and service providers, operational excellence is the key mantra that will enable them to become more competitive. This implies that service providers need to optimize their usage of network assets and adopt a JIT approach to capacity management. Obviously, this means that principles of business intelligence need to be applied to network management, and CSPs need to be armed with accurate network information when they need it to make prudent decisions.

Traditional network planning and fulfillment solutions fail to bridge this gap and fall well short of Yankee Group's requirements for NRAI solutions. However, we believe Oracle's Network Intelligence solution, built upon its Netsure acquisition, is the only solution that is aligned with our vision of NRAI solutions. It possesses all the capabilities to effectively bridge this untapped market requirement and provide immense value to service providers.

Recommendations for Carriers

- **Adopt a JIT approach to network resource planning.** Carriers' profitability will depend on how optimally they can use their network resources, especially for leased resources. Carriers are accustomed to adopting JIC measures for network planning mainly because network data is spread across different systems, which makes correct data extraction from networks time-consuming and difficult. NRAI solutions need to provide intelligent applications to federate and provide a single planning view across technologies and data sources, and also address capex and opex issues.
- **Adopt NRAI now.** Carriers' C levels need adequate ammunition to identify profitable services and customers, and to optimally use their network resources. NRAI provides those critical analytics and information that will assist them in accurate decision making.
- **To minimize provisioning errors in the NGN environment, integrate service fulfillment, resource allocation and capacity planning.** The holy grail of closed loop service provisioning will be based on the close alignment of fulfillment, resource allocation and capacity planning. It is critical for service providers undergoing transformation projects to introduce NRAI solutions early in the transformation cycle.

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