Network and Operations Planning for Telecommunications

Getting the Edge in the Network-Expansion Boom

By Jason Cook and Adam Hutchinson

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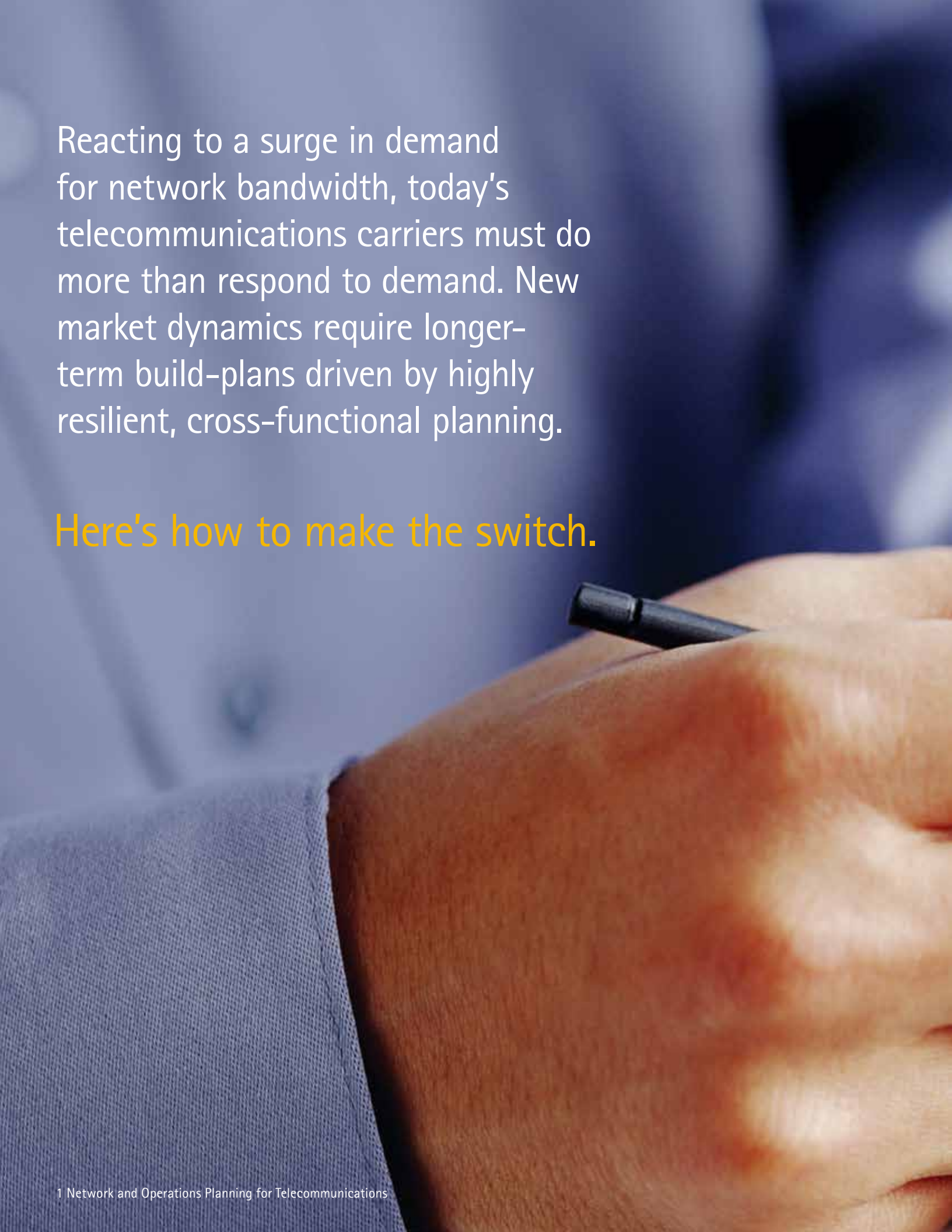


Reacting to a surge in demand for network bandwidth, today's telecommunications carriers must do more than respond to demand. New market dynamics require longer-term build-plans driven by highly resilient, cross-functional planning.

Here's how to make the switch.

Mobile telecommunications data revolution: opportunities and dangers

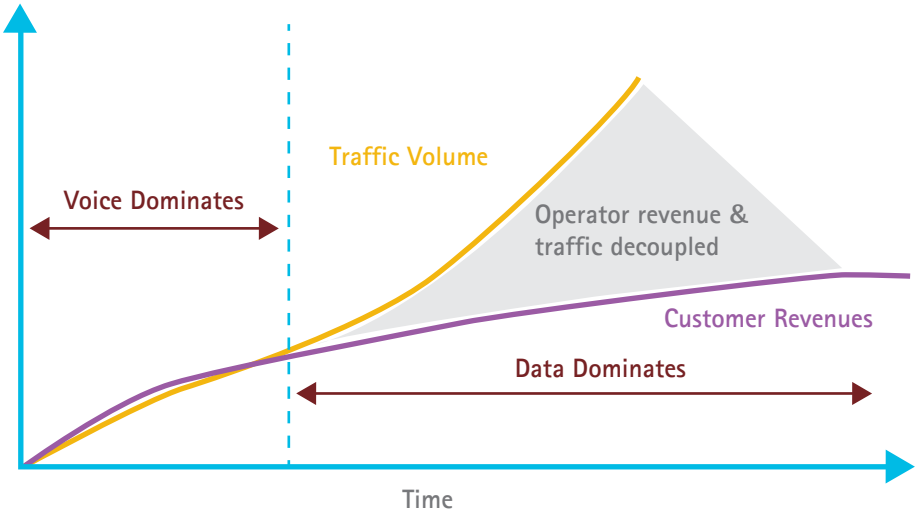
A major surge of demand for network capacity is sweeping the telecommunications industry. With increasingly versatile PCs, televisions, PDAs, smart phones and tablet computers, consumers have an unprecedented and accelerating appetite for immediate access to voice, video and data services whenever and however they want.

Meanwhile, businesses are rushing to capture new levels of enterprise productivity by offering mobile solutions, web-based services and cloud-hosted applications. Platforms are increasingly open too, supporting an explosion of new applications. Today's carriers find themselves in a race to capture market share and revenue from new services.

Carriers are responding by boosting capacity and introducing new technology as fast as they can. Network-related capital investment has risen to unprecedented levels. This includes upgrading core network backhaul and transport capacity, growing high-capacity access in major metropolitan areas, extending fiber optic lines closer to consumers, placing next-generation mobile technology, adding high-speed residential broadband technology to legacy phone networks, expanding IP-based digital cable bundles, improving content serving and distribution technologies, and much more. Global capital spending on 4G LTE technology alone is expected to triple in 12 months, from $8.7 billion in 2012 to $24.3 billion in 2013.[1]

This trend is accelerating. Some projections forecast that demand for additional network bandwidth will increase 25 fold over the next 3 years. It's a safe bet: Each major improvement in network speed and capacity generates new services, devices and applications that raise consumer expectations, using up the added capacity and creating demand for more. This is similar to what is experienced in transportation engineering, where building more highway capacity is known to lead to more driving, causing a new cycle of congestion and a need for still more capacity. In that field, the phenomenon is known as "induced demand."[2] For telecommunications, the new norm will be continuous waves of network-complex upgrade programs for the foreseeable future.

Figure 1: Bandwidth requirements are exceeding revenue growth



1. McGrath, Dylan, "LTE spending projected to boom in 2013," *EETimes*, Jan. 31, 2012. http://www.eetimes.com/electronics-news/4235566/LTE-spending-projected-to-boom-in-2013
2. Todd Litman (2001), "Generated Traffic; Implications for Transport Planning," *ITE Journal*, Vol. 71, No. 4, Institute of Transportation Engineers (www.ite.org), April, 2001, pp. 38-47.

Unfortunately, even as consumers demand more bandwidth, they have not been willing to pay higher fees for the added capacity. Revenue growth is diminishing for many services; no longer tracking directly with the rise of traffic volume. Yet carriers must move fast to keep up with consumer expectations, because as services converge, customers find it easier than ever to switch carriers to keep pace with their needs. Poor network performance, or even the perception of poor performance, quickly leads to increased churn and lost subscribers.

Speed and quality of network deployment are now key differentiators. It's critical that new technology and capacity be deployed quickly and efficiently—not only to avoid customer defections but to more quickly capture available revenue and market share. Effectively managing network growth programs at speed and scale has thus become vitally important to a carrier's long-term viability in the market. Despite the major capital investments and the focus of boards and senior leadership on network performance, network performance still struggles to keep pace with rising consumer expectations and network deployment frequently lags behind planned timelines. Today's carriers must plan and execute faster than ever before.

Impacts on the carrier's supply chain

The pace of change is forcing companies to move beyond traditional approaches to building their network. Yesterday's best practice—responding to existing customer demand and expanding capacity on a just-in-time basis—is a guarantee of failure in today's environment.

Instead, companies must now deploy their networks in anticipation of demand, using highly adaptive and well-coordinated planning, construction and engineering programs.

This change has substantial impacts throughout the enterprise, including on the supply chain. The new network dynamics require a fundamentally different approach to capital planning, network construction, engineering, technology management, capital equipment forecasting, equipment distribution, and vendor collaboration.

Most importantly, supply chain operations must be designed to provide maximum responsiveness to the network construction and engineering teams by making sure equipment is available in the right place at the right time. Fortunately, increased volume provides opportunities to change the traditional methods for procurement and distribution of network equipment.

Challenges that can't be addressed with "Business as Usual"

Frequent Plan Changes

Large network deployments rarely go according to plan, for a variety of reasons. For instance, large deployments exponentially increase demand for field engineering and construction capacity. Often, personnel tasked with construction must also take on break-fix issues and customer-connectivity orders. Because these other activities are inherently unpredictable, they often force changes to the installation plan for network deployments. Additionally, individual projects have unique aspects that cannot be anticipated before construction. While average build times can be estimated, an individual site will have unique aspects including the current configuration, the distance from the network access point, and local regulations and permitting, any and all of which can lead to substantial variance in build time. Plan changes are constant. Planning is a continuous, dynamic process.

Coordination across organizational boundaries

In most cases network-related planning is broken up into silos including OEM production planning, network capacity planning, capital planning, network design, procurement, construction, engineering and provisioning, as well as third party service providers ("turf vendors") and other carriers. Such boundaries slow down, and sometimes block, the flow of information needed to effectively plan equipment purchasing to minimize lead times. (An example would be a change in network design that affects the type and quantity of equipment that will be required.) Minimally, the design changes should be communicated to the equipment forecasting team. Ideally, the network design team should consider impacts to existing equipment inventory and OEM lead times in their design decision. It's inefficient to make network design decisions without input to or from the equipment planning organization. Yet many companies still do.

Annual planning cycles

Most companies conduct planning activities on an annual cycle with little consideration given to required lead times across functions, OEM's and suppliers. Inevitably, this cadence creates uncertainty in equipment demand and lengthens cycle times. Traditionally, annual demand for network equipment was relatively moderate and predictable. But in today's environment of greater equipment demand driven by large network deployment, annual planning cycles can lead to significant spikes in demand that contribute to equipment shortages and long lead times. Truly efficient planning function requires constant updating of the network construction plan, which maintains a 12-18 month view of equipment demand.

OEM capacity constraints

The global economic downturn has led manufacturers to cut back on capacity. Moreover, some subcomponent suppliers, hit by the economic turmoil and natural disasters, have not survived. This has limited OEMs' ability to react to unexpected surges in demand, even as those surges have become common. Manufacturers have been cautious about increasing capacity when carriers are unable to provide accurate forecasts of future equipment demand. The result: Recent quarters have seen significant increases in order fulfillment times, with some taking 60 days or more.

On the carrier side, CEO's increasingly cite vendor performance as a challenge that constrains network growth. Yet most of these same carriers fail to provide their OEM's with a reasonable prediction of demand prior as an input to production planning (which is typically takes place 6 - 9 months ahead of carrier equipment orders). Carrier and OEM capacity planning are inextricably linked – but rarely well-coordinated.

Sub-optimization of network equipment

Increased lead times incentivize hoarding of network equipment. Uncertain of whether equipment will be available when needed, construction or engineering teams may order and pick up equipment that will not be installed immediately. In the meantime, equipment shortages may be delaying other projects. This results in unnecessarily large working capital investment in non-revenue generating assets (many months of supply, large investment in WIP) and delays the overall network deployment.

Most carriers struggle to dynamically re-balance project equipment to where it's needed most. And some are entirely unable to do so. During a large build effort, it is not uncommon for carriers to have 3-9 months of equipment supply deployed to field locations where it cannot be shared, while capital projects in other locations are delayed due to equipment shortage.

Additional challenges

Capital Efficiency

The need to efficiently use capital is increasingly important. The probability of urgent unpredictable demands for capital, along with the inability to increase rates, makes it imperative for companies now to flex available funding. Undisciplined or unsystematic approaches to capital allocation effectively hide value that companies can no longer afford to miss.

Visibility and Reporting Capability

A lack of end-to-end management systems (often seen in the absence of automated reporting procedures) leads to blind spots where there should be end-to-end visibility of deployment status. In the field, inbound or in-transit supply, and third-party vendors, there are frequent gaps that limit a carrier's view of their available supply. Lack of visibility also limits the carrier's ability to measure true capital project cycle times.

All these promoters of inefficiency are legacies from a different environment and are ill-suited to today's conditions. Companies therefore face a choice: They can take a new approach to network deployments and supply-chain planning and execution, or they can limp along with "business as usual" and watch as faster competitors get to market quickly with new technology and gain the competitive edge. Bringing the best supply chain insights to network deployment presents a great opportunity to eliminate inefficiencies and thrive in today's dynamic and unpredictable environment.

To address these challenges, it is necessary to transform key aspects of the traditional network planning and building approach in 3 areas.

1. Plan all aspects of the network deployment using a common Network & Operations Planning (N&OP) process that spans organizations
2. Utilize a "command center" model to coordinate execution and manage progress against build plans
3. Take advantage of the increased volume to accelerate the way network equipment is procured and fulfilled

The Network and Operations Planning Approach

A comprehensive Network and Operations Planning approach addresses the inefficiencies and delays that plague network deployments. It enables coordination within the carrier and with external partners (e.g. equipment suppliers, turf vendors, other carriers) by providing a framework to dynamically meet the demands in crucial areas including:

- Network capacity forecasting
- Network design and deployment planning
- Vendor collaboration and forecasting
- Network equipment planning
- Network equipment fulfillment and inventory management

What is N&OP?

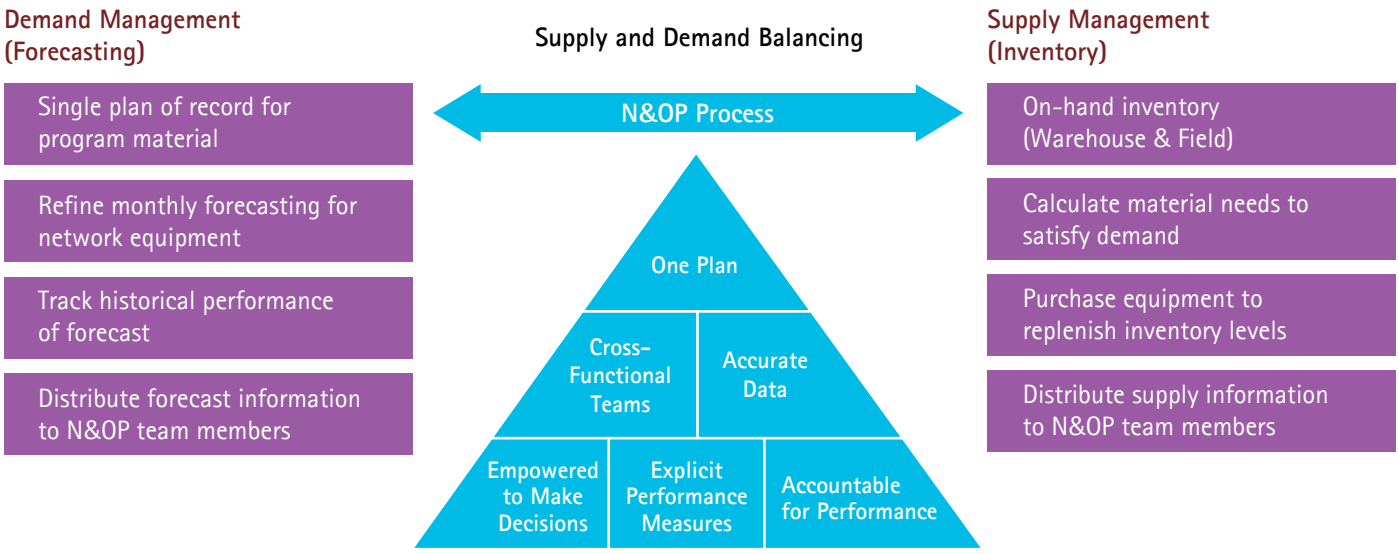
N&OP is an ongoing, iterative process that assures end-to-end visibility and timely access to the right planning information by the right people across functional areas (see Figure 2). N&OP results in an executable plan that is accurate, up to date, and coordinated across all functional areas and third-party equipment and service providers. By creating the plan, the organization can also provide an accurate forecast to its vendors, reducing cost and equipment lead time. Additionally the plan will be more realistic—based on agreed forecasts and a practical assessment of vendor capacity and other equipment constraints.

This assures that the plan is a real-world program that is actually executable, not an ideal-world vision to be put on a shelf.

To accomplish the goals of N&OP, representatives of all stakeholder organizations meet frequently to establish and maintain a twelve-month rolling view of network build operations and to react to changes in the deployment plan by reallocating equipment inventory.

To be successful N&OP requires strict adherence to requirements. This means dedicated resources to support the framework and most importantly the commitment of the executive leadership team to enforce accountability. Setting up an effective N&OP framework requires detailed definition of roles and responsibilities, open exchange of planning-related documents, and a regular meeting cadence.

Figure 2: The N&OP process balances supply and demand, resulting in an executable plan that is accurate, up to date, and consistent.



N&OP for Network Deployment – "The Command Center"

The unique demands of a complex network deployment benefit from an even more robust planning and collaboration environment. Creating a network deployment operations center, which physically brings together all key stakeholders in the design and build of a network, helps provide near real-time visibility to the deployment status across functions and shortens response time to issues. This "command center" improves many aspects of the network deployment, including supporting the supply chain mission of getting the right equipment to the right place at the right time even when a crisis demands a rapid response.

Through the command center, today's siloed information is replaced by "one view of the truth" and today's delays and hoarding are replaced by well-coordinated implementation that avoids bottlenecks. To accomplish this there must be project and workflow management systems that support near real-time visibility to project status. Often this involves an application that overlays multiple OSS/BSS systems to automatically aggregate and report detailed status of individual builds.

Network Equipment Planning

Today, "business as usual" for network operations is for each project to estimate demand and place orders for equipment. But the increased volume associated with vast deployments lends itself to a larger-scale, inventory-stocking approach.

Figure 3: The impact of better visibility on long term equipment demand.

Historical Telecom Deployment	Large Telecom Deployment
• Capital efficiency is the main driver and companies will try to hold less inventory to keep costs down	• Preemptively investing in inventory is main driver in order to keep order fill rate & maintain a higher required service rates
• Suppliers and Vendors are siloed and not part of a strategic planning process	• Coordination with suppliers and vendors is critical and increases in volume needs to be openly communicated
• Plans are made to handle rapid responses around unplanned down time	• The way to handle unplanned downtime is not by making rapid response, but by preemptively strategizing how to get equipment to the right place at the right time
• Historical inventory levels are used to benchmark network needs	• Need to change your inventory holding levels as you expand

By making the switch from project-by-project to a total-inventory approach, carriers can dramatically reduce the effective lead time for network equipment from the current 50-90 days maximum to 7-14 days.

Cutting the effective lead time for network equipment has two primary benefits, both of which remove an important constraint from the construction cycle time. First, lead-time improvement permits more flexibility in construction schedules and reduces the chance of delays in construction due to lack of equipment. This helps more efficiently to manage limited installation capacity and expense budgets, while minimizing installation cycle time. Secondly, once lead times are reduced, installation organizations are less inclined to hoard equipment in "ghost" field inventory.

Over the past few years, in working with the N&OP framework, we have found that switching to this approach can greatly accelerate network build times. In some cases, the N&OP approach has permitted companies to build network nine times faster than they were doing before. There have also been significant cost savings from accelerated retirement of outdated technology. And, as we've mentioned, effective lead time can be cut from 50-90 days to a week or two—with a minimal increase in working capital. We believe, in fact, that this lead-time improvement can be achieved with a decrease in working capital.

Financial Impact

A good example of the impact of accelerating the build of next generation networks is the current enablement of LTE for mobile telecom. For every month a cell site is not upgraded, either by a carrier or a backhaul partner, around $3000 of revenue is lost.

This means that accelerating the build of 25,000 sites by an average of 1 month can generate $62M is incremental revenue while reducing expense to build those sites. We have seen 18-20 month delivery cycles cut in half using N&OP, resulting is $750 million or more in increased revenue, with additional benefits due to improved capital efficiency. Additionally, once contracts for next generation sites are established, N&OP provides an advantage in capturing additional revenue for the next wave of technology and bandwidth upgrades.

Conclusion

There was a time when telecommunications carriers could get along fairly well by performing maintenance and responding to demand when and where it arose.

But today demand for more digital services is skyrocketing among businesses and consumers, spurring a building boom in network capacity that shows no signs of stopping. To do well in this new environment, companies are turning to a new paradigm: Build plans driven by committed, disciplined, well-executed internal planning, not external demand.

This new paradigm offers a great opportunity for carriers to change the way they acquire and deploy their network equipment. The framework we recommend can capture efficiencies throughout the process, by removing information from silos, breaking down organizational barriers, and implementing end-to-end visibility in the network-building process.

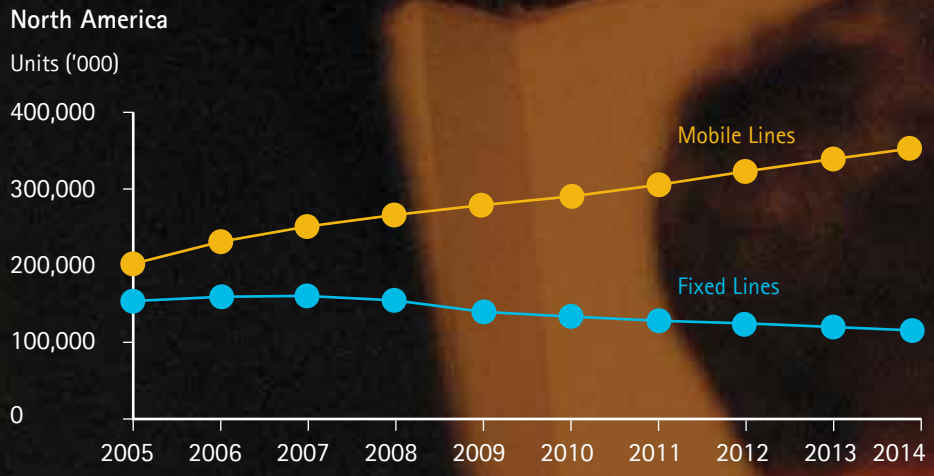
Companies that take up this N&OP approach will get an edge from better forecasts, lower working capital and the benefits to brand that come with a reputation for better quality service. Companies that stick to "business as usual," though, may find themselves left behind.

What is driving increased demand for network capacity?

Several factors are driving increased demand for capacity and new network technology:

- Consumers are moving away from traditional Wireline communication toward Mobile communications (see Figure 4).
- Development of multimedia applications, such as Pandora, Netflix and YouTube.
- Development of devices that facilitate the consumption of data heavy applications (e-books, sophisticated tablet apps, powerful games, etc.).
- Next generation mobile communications technology that increases peak device capability and consumer expectations.

Figure 4: Usage of traditional wireline and mobile communications in North America.



About the Authors

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