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Value-based network management for telecoms

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Building big-data capabilities to optimize capital and operating expenses

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Executive summary

Network capital expenses and operating expenses are primary targets for telecom operators looking to reduce their expenditures in today's earnings-pressured environment. Operators focus on optimizing their network planning, building, and operation by selectively investing in areas with the highest return on investment, negotiating with network vendors, or cooperating with other operators to share sites and equipment. Many share elements of their networks and systems with other operators; others employ convergence, exploiting synergies between their fixed and mobile networks.

Such efforts require extensive data to inform operators' decisions, including from the network, billing systems, and customer data warehouses. The resulting information is extremely useful, yet the approaches most commonly used today tend to be either excessively costly or unsophisticated and difficult to replicate. In addition, most operators don't yet fully understand how to link the enormous amounts of available data to their everyday operations or how to turn that information into insights that will lead to a true competitive edge.

To create this link, we have developed an approach called value-based network management (VBNM). VBNM harnesses big data to create an enhanced view of customers across the entire network — including granular, geo-located information — creating a comprehensive understanding of their behavior, loyalty, and value.

VBNM can be used in three primary areas: stand-alone optimization, convergent optimization, and tiered management. We recommend some combination of all three to help operators make fact-based decisions, reduce network operating and capital expenditures, and place resources in the network where they can make the greatest difference. To use the approach successfully, operators will need to develop new skills and capabilities, adapt their processes, and learn to manage their networks by fully utilizing all the information available. Those that do will find they are better able to navigate in today's competitive environment, maximizing their network return on investment to gain crucial competitive advantage.

Facing top-line pressure, operators focus on the network

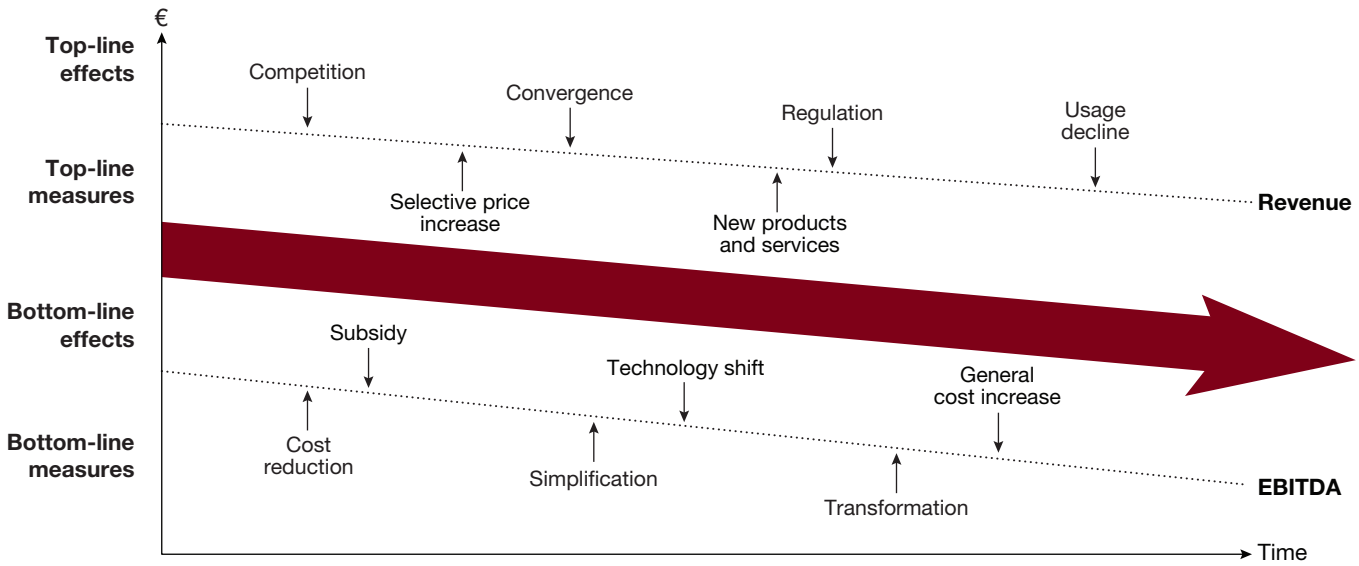
Telecom operators in most markets face increasing pressure on earnings, as a number of forces steadily reduce revenues and boost costs, including competition, convergence, regulation, and declining usage (*see Exhibit 1, next page*). Given that both fixed and mobile markets continue to mature, these forces can no longer be offset by an expanding customer base. Simultaneously, operators face an ongoing need to invest heavily in their networks, as wireless technology shifts from 3G to LTE and fixed technology moves from DSL to fiber.

Network optimization tends to be a particular focus of operators' cost transformation efforts, due to the size of network expenditures and the growing demand for network investment. Network capital and operating expenditures (capex and opex) seem to be an easy target, as they typically account for more than 20 percent of revenues, or 25 to 40 percent of the total cost base (*see Exhibit 2, next page*). Cost reductions in the network can be measured and monitored relatively easily, often without customers noticing right away (as opposed to how they would notice cuts in commercial costs such as subsidies). In fact, the effect of network costs on customer satisfaction and quality of service is often difficult to discern, particularly in secondary sites such as those in smaller cities and rural zones.

Cost reductions in the network can be measured and monitored relatively easily.

Exhibit 1

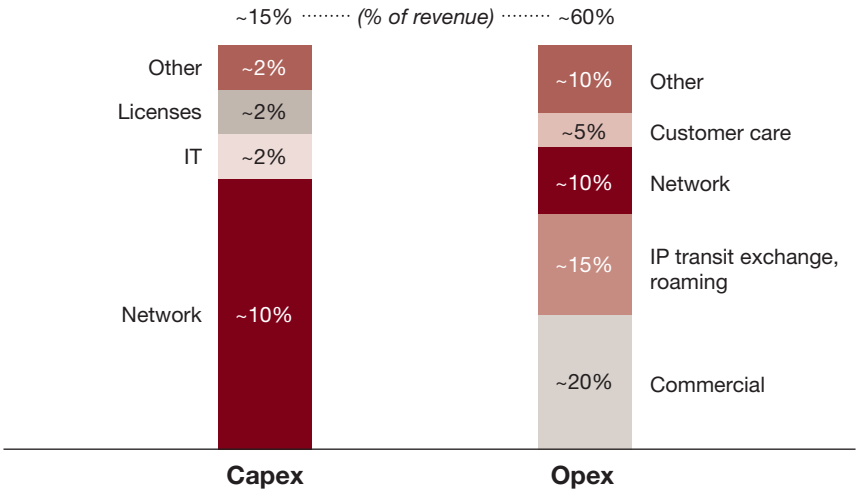
Market dynamics in the telecom industry



Source: Strategy& analysis

Exhibit 2

Cost breakdown for telecom operators



Source: Strategy& analysis

Network optimization efforts

Operators tend to approach network cost reduction in several ways, including network sharing and the optimization of key departmental activities. These activities fall into three main categories — plan, build, and run operations across fixed and mobile networks (*see Exhibit 3, next page*). Network planning ("plan") is optimized by selectively investing in the areas and technologies with the highest return on investment (ROI), while avoiding investments in those areas with low to medium ROI. To succeed, operators must work to identify the areas with the highest demand for products and services, highest usage levels, and highest average revenue per user, as well as areas with higher demand density, such as apartment buildings.

In the second group of activities ("build"), operators turn to rolling out the network, installing equipment, testing, and improving performance at the chosen sites. These activities can be further optimized by reducing capital expenditures through negotiations with network vendors, improving task force efficiency, or using alternative rollout technologies such as airFiber (rather than traditional fiber optic cable).

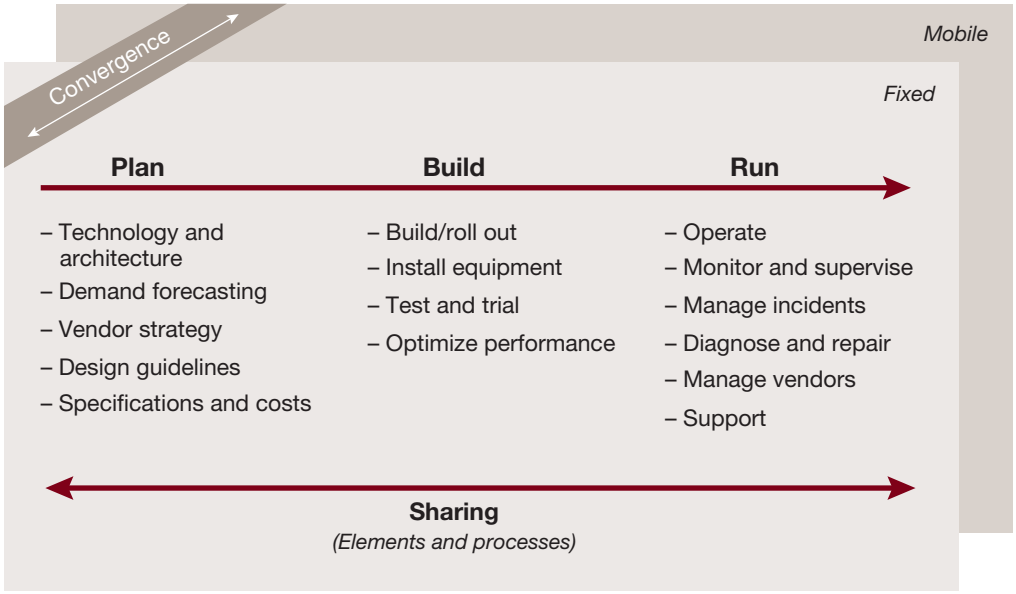
Network operations ("run") can then be optimized by reducing operating expenses in areas such as power, maintenance, and supervision. To do so, operators are increasingly relying on third parties that have sufficient scale to offer lower costs, whether through pure price reductions or comprehensive, multiyear agreements to manage the network.

Network sharing involves cooperation between operators to share elements such as physical sites and electronics, processes such as maintenance and supervision, and even spectrum. Operators can share individual sites or entire networks. More extensive sharing entails more complex operations, but it also delivers greater benefits.

Operators are increasingly relying on third parties that have sufficient scale.

Exhibit 3

Network cost optimization approaches



Source: Strategy& analysis

While plan/build/run activities and network sharing can deliver benefits across fixed and wireless networks, a third approach — convergence — improves both by applying them to fixed and mobile networks together. In this way, convergence exploits synergies between the two to cut additional operating and capital expenditures. Operators that look at both networks simultaneously can better optimize the mix of target areas, customers, and technologies over time, combining the strengths of fixed and mobile technologies. They can, for example, use parts of the fixed network to offload mobile traffic, use LTE mobile technology to delay fiber-to-the-x (FTTx) rollout in certain areas, and deploy hybrid routers to optimize traffic flow. Operators may also use this approach to redesign their organizations, realigning objectives, key performance indicators, and processes to reduce costs over the long term.

All such optimization efforts require extensive data to inform decisions. Operators typically collect this data from various sources such as billing systems, customer data warehouses (DWH), and network monitoring systems, using one of two approaches: either a network-centric approach (using probes to capture data) or the more traditional "sampled" customer analytics approach. Both have critical disadvantages, however. In the network-centric approach, extensive equipment outlays to monitor the network, as well as storing and processing the enormous amounts of data gathered by this equipment, can be costly. However, one-time efforts to gather ad hoc data samplings from a variety of sources tend to be unsophisticated and difficult to replicate over time. In addition, operators tend to focus on high-density areas such as large offices and apartment buildings. As a result, they make million-dollar investment decisions based on inaccurate approximations of demand.

Optimization efforts require extensive data to inform decisions.

The big-data opportunity

To improve network performance and reduce capital and operating expenditures more effectively, operators need an approach to data gathering that not only is inexpensive and sophisticated but also provides a comprehensive understanding of the network from a customer point of view, including usage behavior, loyalty, and spending. Operators need to understand, for example, how many additional customers sign up when they install a new antenna or improve coverage in a given area, or how many existing customers upgrade their broadband subscription when their network speed is multiplied significantly.

They can generate this understanding by leveraging big data — the explosion of data unleashed by the convergence of low-cost, high-volume computing, ubiquitous wireless telecommunication, and the Internet's continued penetration into more aspects of consumers' daily lives.[1] For the telecom operator, this means capturing all the data available to the operator's business systems, including network, billing, and DWH; analyzing it with new tools and software; and using it to support fact-based decision making.

Data can reveal how profitable a customer is to the business.

Some operators are already building big-data capabilities. They know that this approach has several benefits when compared with network-centric and sampled solutions, including the ability to gather and analyze historical data and the inclusion of granular, geo-located information about both voice and data traffic. Such data can reveal, for example, the specific network equipment each customer is using, and how much and when he or she is using it, as well as how profitable that customer is to the business. The more data sources a given operator has, the greater the operator's ability to pinpoint both revenue and cost-cutting opportunities. In addition, it is inexpensive to set up the basic software and systems required, and big data offers a powerful approach to understanding the ways in which customers behave along the network (*see Exhibit 4, next page*).

Exhibit 4

Different approaches to capturing data in order to optimize telecom networks

	Network-centric (probes)	Traditional "sampled" data	Big data
Information scope and availability	– Equipment and installation costs, depending on required coverage – Capturing 100% of data traffic is very expensive – Cannot process unstructured data	– Reduced vision of mobility and seasonality – Requires sampling of customer base – Limited data history – Includes voice and data traffic – Cannot process unstructured data	– 100% of customer base, call and data records processed – Can easily work with 12-plus months of data history – Includes voice and data traffic – Can include a wide range of sources, structured and unstructured – Ability to define campaign targets
Cost	– Does not provide immediate visibility into customer value – Needs greater detail on network – Typically does not include voice (limited to LTE, 3G, and 2.5G)	– Low setup cost – Cost of data extraction, transformation, and loading and analysis	– Low-cost setup (requires a simple standard server structure) – Lower cost of data preparation and analysis (no sampling required) – Near-linear cost escalation
Timing	– Monitoring starts on Day One… – …but performing value-based analyses requires a waiting time of 12–18 months to generate enough data history	– Low data-processing power implies longer times for data preparation and running model scenarios – Sampling is time-intensive: requires exhaustive validation and must be iterated if customer segments change – No waiting time for historical data	– Data-processing power is an enabler, not a problem – No sampling is required, avoiding delays related to data validation and sampling iteration – No waiting time for historical data
Institutionalization	– Due to volume, probes' traffic data is very difficult to manage – Handover requires setting up big-data infrastructure plus transferring elements of the network	– Low economies of scale, as the sampling process has to be crafted specifically each time – Requires a more skilled team, as members should learn how to run the sampling process and use analytical tools (higher complexity and specific sampling for each question to be addressed)	– Big-data capabilities required to handle information are embedded – Operates with various technical standards and local DWH – Extracting the full customer base simplifies institutionalization

Source: Strategy& analysis

However, even as some operators have begun to build big-data teams and capabilities and invest in the requisite equipment and software, they have struggled to create a link between big data and their everyday operations. Very few of them genuinely understand how to leverage the enormous amounts of available data to generate competitive advantages, cost savings, or revenue growth. Though big data can tell an operator exactly how many customers are using streaming video, for example, most operators do not know how to act on that knowledge in a practical and measurable way. Many believe there is simply too much data to analyze effectively, particularly as they often do not have the tools or skills in-house to holistically analyze data — and thus generate a complete picture of an individual subscriber across all of his or her activity.

Value-based network management

We believe that the tools, software, and hardware of big data can be harnessed to make informed, fact-based decisions on almost everything related to the network. Based on our experience working with telecom operators around the world, we have developed and proven a "value-based network management" (VBNM) methodology that leverages big data to optimize network capital and operating expenditures, increasing ROI along the entire investment life cycle of plan, build, and run activities across both fixed and wireless networks.

VBNM offers practical solutions with clear benefits to the business that all operators will understand. It relies on data to provide an enhanced image of customer behavior, yet it goes further, working with the entire customer base as well as all its communications, using call data records (CDRs) and extended detail records (XDRs) across the network.

VBNM increases ROI across both fixed and wireless networks.

How it works

Maximizing ROI is so complex that operators typically break the problem into pieces — such as the LTE rollout, the fiber-to-the-home rollout, handset renewal campaigns, and data upsell campaigns — so that they can focus on one piece at a time. However, this approach can lead to a misalignment among certain aspects, such as a network rollout that conflicts with the operator's commercial strategy. Worse, some elements may have a negative effect on others. For example, accelerating the LTE handset renewal for customers who work in high-demand, LTE-dense urban areas but have poor 3G coverage at home may harm the customer experience, as the LTE performance promise will not be kept.

In contrast, VBNM helps operators analyze and understand the entire network — including which customers are moving and where, which network equipment or assets those customers are using, and whether those assets have slow or fast connections, among other information. Such insight helps operators make smart

investment decisions based on a clear perception of the customer base and its interactions (via usage) with all network elements, so they can allocate network resources where they matter the most (*see Exhibit 5, next page*).

In addition, operators will be able to create heat maps that link customer segments and movements with network equipment type and placement. These and similar tools will help operators make network decisions about coverage, rollout, technology, capacity, and service areas based on the real value that these decisions — in conjunction with the company's commercial strategy — will generate. And their new big-data capabilities will help telecom operators develop and run optimization models based on alternative scenarios, leaving them better prepared as market conditions change.

Among other things, operators will better understand the following:

- Which technology mix they should use to reach which customers, and when
- What equipment to deploy
- Which areas to prioritize
- What quality of service they should deliver and in which network elements
- What marginal ROI and business value to expect for each cost incurred (capital or operating expenditure)
- Which commercial actions (such as device migration) should be taken and with which specific customers

This new understanding will also allow operators to answer key questions from their main stakeholders in the network, finance and control, or commercial realms, while ensuring higher alignment with stakeholder strategies and goals (*see Exhibit 6, next page*).

Allocate network resources where they matter the most.

Three areas of opportunity

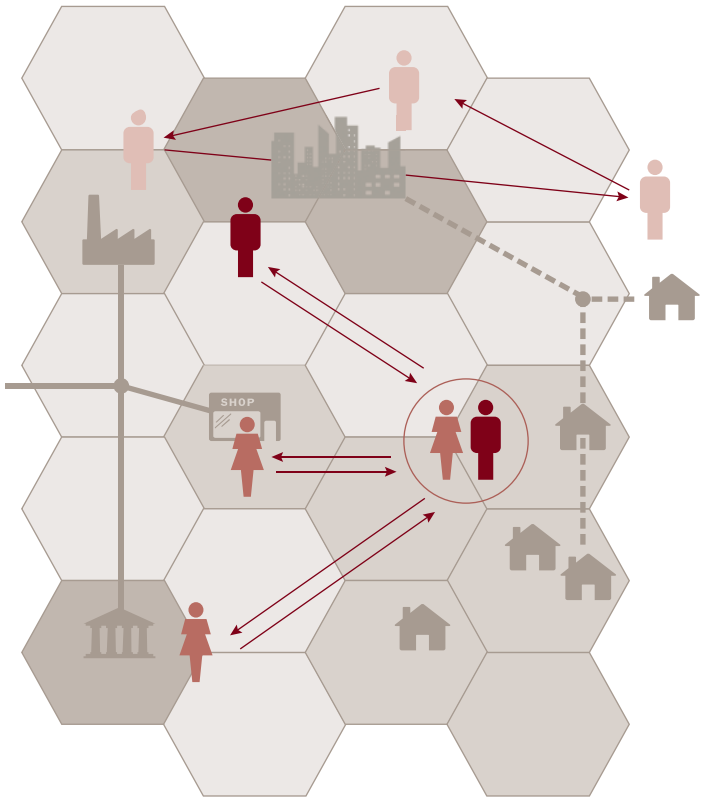
VBNM offers three primary opportunities for improving network capital and operating expenditures: stand-alone optimization, convergent optimization, and tiered management (*see Exhibit 7, page 15*). A combination of all three will generate the greatest potential gains.

Exhibit 5

Value-based network management gives operators a complete picture of customers and usage

VBNM factors in:

- **Different mix of coverage areas and technologies**
  - Different demand density and topology
- **Customers with different value**
  - Mobile-only view
  - Fixed-only view
  - Fixed-and-mobile view
- **Households and household members**
  - Different value, products and services, customers and noncustomers, and other parameters
- **Customer mobility around the network**
  - Usage at home, work, or while traveling



2G mobile cell
3G mobile cell
4G mobile cell
Fiber network footprint
Copper network footprint
High-value customer
Medium-value customer
Low-value customer
Household

Source: Strategy& analysis

Exhibit 6

Questions from key stakeholders

Network	Finance and control	Commercial
– Which technology should we deploy, and in which areas? – Where should we prioritize the deployment of new technologies based on current and potential demand? – When and where should we reduce our investment, and which areas and/or technologies should we de-prioritize? – What is the real return on specific investments?	– What is the ROI of each additional dollar invested? • In new coverage? In new technology? In improving capacity? – What alternative scenarios can we use to evaluate various investment options? – When de-prioritizing investments, how much is the revenue and value at risk of each dollar reduction? • Which investments should we deprioritize? In what order? And at what cost?	– Who are the clients impacted by new coverage? – Which deployment better serves our client base? – How can we align deployment decisions with our strategic and commercial goals? – How can we ensure realistic budgeting of revenues and alignment with capex?

Source: Strategy& analysis

Exhibit 7

Value-based network management offers three main opportunities

Stand-alone optimization	Convergent optimization	Tiered management
– Technology mix optimization – Prioritization of new technology rollout areas and client groups to migrate (3G to LTE, etc.) – Identification of areas to increase capacity vs. new technology rollout – Technical, commercial, and advertising coverage match	– Capex optimization with joint fixed-and-mobile view – Mobile traffic transport over fixed network – Mobile traffic offloading to fixed network – Hybrid network strategy – Convergent operations and maintenance (O&M) – Technical, commercial, and advertising coverage match	– Prioritization/alignment of quality and service based on segmented customers – Tiered revision of network O&M contracts – Energy cost optimization

Source: Strategy& analysis

In the first area, stand-alone optimization, VBNM can help telecom operators use big data to analyze one area at a time and optimize the network investments accordingly. This approach can vastly improve stand-alone optimization efforts in the following ways:

- Optimizing the technology mix across the entire network, taking into consideration high-value customers and customers who are ready to use a specific technology, such as those with LTE handsets who do not yet have LTE coverage
- Migrating customers from one technology to another to improve cost efficiency, identifying those to migrate based on current needs and existing (or soon-to-be-deployed) technologies in the area
- Optimizing capital expenditures for capacity increases in highly saturated areas, where the company is most likely to capture latent revenue
- Aligning network and commercial coverage by considering not only service areas but also customer profiles
- During capital expenditure reductions, minimizing the negative impact on high-value customers and service areas

In the second area — convergent optimization, or jointly working with the fixed and mobile networks to optimize investments — VBNM can help operators not only understand the overlaps between fixed and mobile, but also understand and thus adapt network capital and operating expenditures to convergent customer needs. When companies analyze data from both networks jointly, they can realize synergies in multiple ways, including the following:

Adapt network capital and operating expenditures to convergent customer needs.

- Joint planning of the existing and to-be-deployed networks to reduce total capital outlay without harming service levels; for new deployments, short- and medium-term capital expenditures can be reduced by jointly planning the rollout with both fixed and mobile technologies in mind
- Using the fixed network as a transport network layer for mobile (which is especially critical for transitioning customers to LTE)
- Using the fixed network to offload mobile data traffic
- Using LTE to delay FTTx rollout in certain areas
- Leveraging fiber optics in a given area to provide fixed broadband as a transport means for the mobile network

- Using hybrid fixed-and-mobile routers at customer sites to improve traffic routing in both networks and reduce network upgrade needs

- Consolidating fixed and mobile operations and maintenance

- Matching technology coverage to retail footprints and offerings — such as equipping shops with 4G LTE devices in areas with 4G network coverage

In the third area — tiered management — VBNM allows operators to use the data coming from their network to form a comprehensive view of the customer base and then provide resources to the most valuable customers first. For example, such data will indicate the network elements that experience the highest and lowest traffic, along with those serving higher- and lower-value customers; network areas that are 3G or 4G saturated; areas in which the majority of customers have LTE-capable handsets; and areas in which high-value customers also have high network utilization rates. With this data, operators can focus on those customers and service areas that provide the greatest return on investment.

Provide resources to the most valuable customers first.

As a result, tiered management helps operators do the following:

- Optimize their operations, maintenance, and expenditures for individual locations based on precise data regarding profitability, traffic, and customer profiles; operators might, for example, provide different levels of service to different customer value segments, or define preventive maintenance and repair policies depending on the customers served by each specific cell.

- Adjust expenditures on network equipment and fuel based on the customers served by each location.

Conclusion

Telecom operators across the globe are looking to maximize their network ROI by improving their understanding of the link between customer behavior and network usage. Yet traditional methodologies and tools have proven largely ineffective, with data-gathering measures that are expensive, simplistic, time-consuming, or difficult to replicate.

In contrast, big-data tools — together with a set of robust customer value management methodologies — have proven to be perfect for developing a fact-based approach to manage telecom networks and thus maximize ROI. A number of telecom operators are already building such capabilities today and learning to manage their networks by fully accessing and utilizing all the information available to them. To succeed with this VBNM approach, operators will need to invest consistently in people and technology to develop the right skills and capabilities, as well as adapt a number of processes to understand and take advantage of these capabilities. In the current competitive environment, their efforts will be worthwhile, and leave them better equipped to face future market challenges.

Big-data tools are the way to manage telecom networks and thus maximize ROI.

Endnote

[1] Ken Favaro, "Big Data Strategy: *s+b*'s Strategy of the Year," *strategy+business*, Jan. 8, 2014.

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