



Intelligent and agile: capex planning in the 5G era



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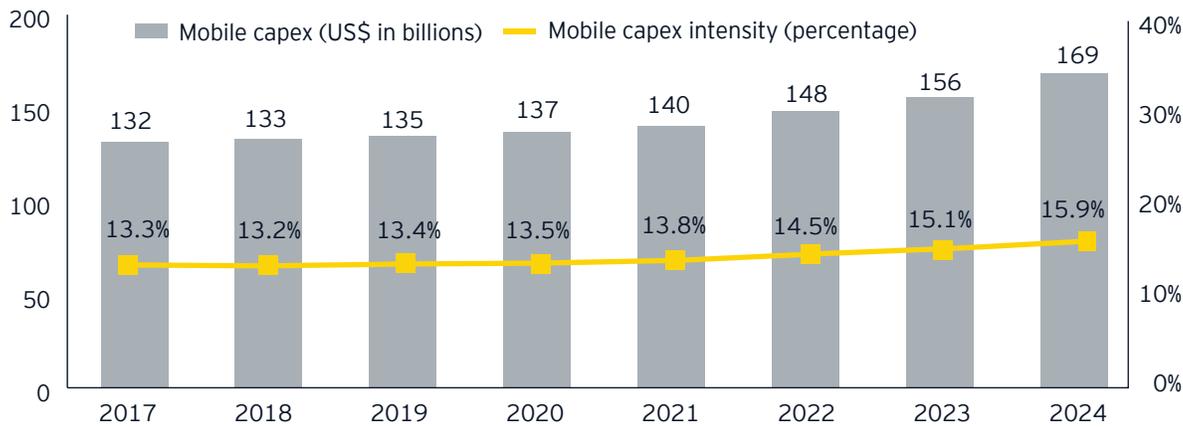
Introduction: the growing mobile capex burden

The capex challenge facing operators is increasing. Network expenditure is forecast to rise significantly into the next decade as operators deploy 5G and edge-cloud networks, recasting their consumer and enterprise value propositions in the process.

Yet modernizing their networks while contending with new disruptive forces is no easy task. Pricing pressure remains endemic, while new concepts, such as private mobile networks, may challenge traditional value chains. Meanwhile, new

frequency bands are being made available for mobile use in the 5G era, with regulatory stipulations around network coverage and spectrum re-farming evolving in new ways. At the same time, operators must balance 5G rollout with densification of existing long-term evolution (commonly known as LTE) networks, enabling levels of network quality to improve across their network estate. All told, the levels of capital intensity are set to rise, from 13.4% in 2019 to 15.9% in 2024.

Global mobile capex development forecast



Source: "Telecoms capex forecast: Worldwide trends and forecasts," Analysys Mason, March 2019.

Faced with these challenges, a smarter approach to capex planning can deliver a better experience for customers, satisfy regulators and ultimately drive improvements in return on invested capital (ROIC). For this to happen, a new approach to capex planning is essential. Realignment of people and workflows, with automation and artificial intelligence (AI) infused into network planning tools and processes, can drive a significant improvement in capex efficiency. A new mindset is needed for prioritizing the quality of network investment and its contribution to long-term value creation.

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The pitfalls of traditional capex planning

Traditional network planning typically involves top-down usage and performance guidance, translating into a waterfall of network capacity, expansion forecasts and cost estimates. Budgets are then assigned, and network engineering teams employ rule-based tools to finalize capacity and expansion plans. Considerations of investment quality are not at the center of these engineering-driven processes.

Responsibilities for different parts of the network domains – radio access network (RAN), transmission, core and service architecture elements – reside with different teams. Resulting tasks and workflows involve multiple touch points across matrix organizations and are spread across various geographies. Competing priorities, a lack of clear accountabilities, and the misalignment of budget and planning needs often result in suboptimal allocation of capital and task fallout.

Centralized control and oversight are often unable to keep pace with network demands. Interactions between capacity planning teams and other parts of the business, from customer care to procurement teams, may be inadequate. As a result of this, organizations may struggle to take advantage of a holistic set of KPIs to inform planning activities. Reliance on a range of suppliers and vendors, and an aging technology stack may further limit levels of agility and responsiveness.

Making capex planning fit for the 5G era

The advent of 5G will add to the pressures facing network planning teams. 5G rollout is prompting both site densification in urban areas and renewed efforts to bridge the digital divide in rural areas. At the same time, 5G campus networks that take advantage of network slicing represent a key departure from legacy network deployment scenarios. Other factors, such as migration to massive multiple-input, multiple-output systems or the deployment of new fronthaul and backhaul solutions, will also affect the network modernization agenda.

Embracing this new reality involves bold rethinking and retooling of network planning where business outcomes are the arbiter of success. A holistic perspective is paramount if operators are to balance a range of network investment priorities while getting the most out of available resources.

Capex planning in the 5G era needs to operate at unprecedented pace, scale and precision with seamless workflow across the entire organization on a continuous basis. Shared ownership and accountabilities are vital, as is a wider range of KPIs, including metrics relating to the quality of the customer experience and financial performance. Linear tools and scenario-based rules should give way to machine-learning capabilities supported by dynamic processes.

Capex planning in the 5G era

Planning considerations	Traditional	Fit for 5G
Ownership	Fragmented	Integrated
Operation	Manual	Automated
Accountability	Network	Business
Input variables	5 to 10	No practical limit
Tools	Linear	Machine learning-based
Planning rules and process	Static and scenario-based	Dynamic
Planning horizon	Over 12 to 18 months	Continuous
Return on investment (ROI)	Not modeled	Prioritized
Workflow	High-touch	Seamless
Budgeting	Network-driven	Business-driven
Time to market	Best effort	Accelerated
KPIs	Network	Network, customer and financial

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Key success factors for smart capex planning

Network planning processes will assume a new importance in the 5G era, by enabling the right investment decisions at the right time and in the right places. To date, planning tools have been vendor-specific and constrained by domain-specific rules. As such, a fundamental reappraisal is needed if mobile operators are to maximize ROIC and enable network planning activities to meet wider business objectives. Below are the key steps mobile operators can take to enable smart capex planning:

Place AI at the heart of the agenda

The compounding effect of previous technology cycles has led to complex and rigid legacy systems that increase the risk of inefficient investment alongside poor prioritization of capex. Standardized AI technology can deliver a step change in agility and precision, by bringing together deep learning and dynamic modeling capabilities. There is no practical limit on the amount or type of data that can be modeled, paving the way for industrialized processes that are automated, transparent and self-governing. At the same time, vendor-agnostic platforms enable more flexible ecosystem relationships. With AI at the heart of capex planning, network planners can become better network investors.

Shift from a network-centric to customer-centric planning process

Capex planning in the 5G era will need to keep customer-centricity at its core. This strategy links network planning, customer experience and business objectives. Also, it will enable communication service providers (CSPs) to allocate capital on the basis of overall increase in customer value – not just network KPIs.

With capex planning tools that can continuously ingest massive amounts of additional data from customer care functions, social media, crowdsourced apps and business support systems, operators can understand exactly how capex allocation will affect the customer experience. This will enable them to deliver better differentiated network quality to key customer segments and in specific geographic locations. Similarly, by pinpointing and prioritizing network expansion with the best ROI profile, CSPs can provide exceptional returns on limited investment funds.

This new and evolved planning process is essential if operators are to improve ROIC. CSPs that do not take advantage of customer-centric methodologies risk negatively affecting their net promoter scores over time. This impact becomes evident, especially, as enterprises increasingly leverage 5G for business-critical processes, while demanding better reliability and performance from their carriers.

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Embrace complexity across network domains

Legacy planning tools rely on fixed rules supported by linear data models supplemented by manual adjustments. Because they are specific to different network domains and associated teams, they ultimately trigger a more complex and high-touch planning process. AI-powered planning tools can help operators overcome organizational silos, by ingesting and modeling more diverse data sets, which can be informed by and adapted for different parts of the business. This, in turn, paves the way for frictionless and integrated capex planning optimized for different network domains, including:

- ▶ **RANs:** These include various access technologies from 2G to 5G, involving different cell types and ownership models across multiple spectrum bands. Point solutions won't do any more if operators are to reduce the complexity inherent in the RAN. Instead, AI can provide a single view of RAN investment profile and efficiency.
- ▶ **Backhaul:** Backhaul technologies are converging onto fiber in the 5G era, with copper and microwave technologies acting as fallback solutions. Mobile operators typically bear the capex burden of fiber-to-the-pole (FTTP) investment by fiber providers. With AI-powered tools, backhaul can be planned ahead of RAN expenditure to meet capacity-cycle intervals and potentially deflect the cost of FTTP drops.
- ▶ **Core networks:** Core networks are becoming more complex because of hybrid physical-virtual infrastructure, change management cycles exceeding the rate of change, fragmented supply chains and the increasing need for specialized competencies. In the 5G era, core network planning must be highly integrated with the overall planning processes across all domains, including RAN and backhaul.

While AI can deliver planning improvements across the network domains, operators should also consider other factors, such as device capabilities, including the internet of things (IoT). IoT and machine-to-machine connections are expected to grow exponentially in years to come, and analyzing traffic driven by these sources will become an increasingly important part of the capex planning process going forward.

To summarize, understanding and modeling usage patterns across different network and device domains is vital if capex is to be prioritized in the right way for the right customers. At the same time, operators should also form a clear view of how network capex savings can trigger greater investment in innovative and differentiated services.

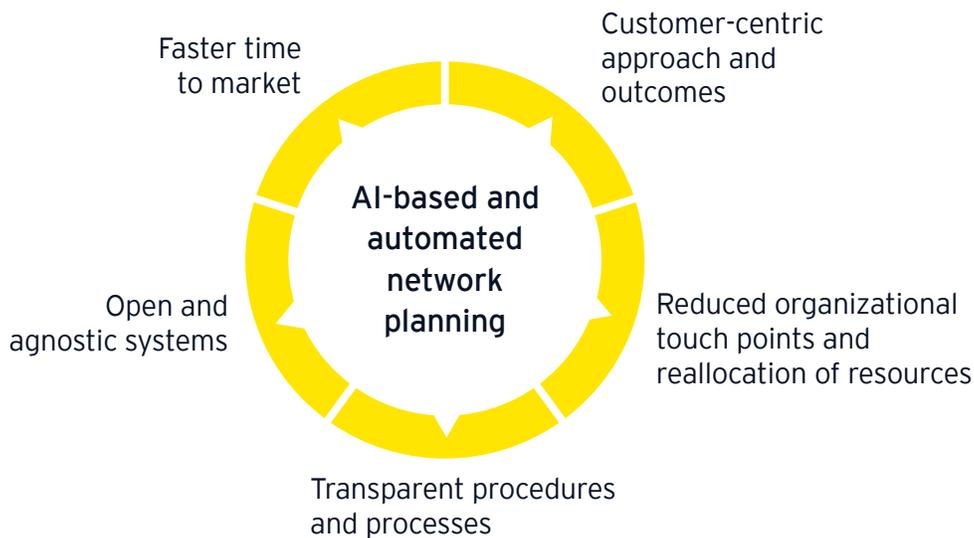
Eliminate touch points with extreme automation

As operators consider new ways to drive greater efficiency in their capex planning processes, automation has an essential role to play. The principle of extreme automation can be applied, where manual touch points are automated and eliminated, whenever and wherever possible. In this way, operators can overcome the pitfalls of legacy planning cycles, which vary tremendously across domains and where traditional waterfall models are often impractical.

By automating planning processes, operators have much to gain. Error-prone human interventions can be minimized, and the barriers presented by organizational touch points can be reduced. Harnessing automation with AI-led planning tools can drive a better balance between people and processes that delivers shorter planning cycles, greater procedural transparency and more reliable decision-making. At the same time, operators can free up resources to upskill for higher-value functions.

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Smart capex planning: the benefits of intelligent automation



Establish continuous planning

Automated and AI-infused network planning presents substantial upside for operators. However, it is vital that telcos take advantage of a new planning mindset. This will help them view capex planning as a continuous and integrated exercise, and not as a one-off process that is governed by budget cycles alone.

This is vital if network planners are to optimize their use of resources. Agile planning outputs – whether in the form of varied network scenarios or investment recommendations – demand ongoing oversight. In this way, operators will be able to make better decisions as they need them, as transformation road maps or competitor actions evolve in new ways.

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Case study: US tier-1 mobile network operator

A US tier-1 mobile network operator wanted to improve its capital allocation for 5G rollout. It had been using rules-based models but was realizing the limits of using such tools for 5G networks. In addition, there was a mandate from business to improve customer experience.

B-Yond collaborated with the carrier, comparing the performance of traditional in-house capex planning tools with an AI-based planning tool for a fixed set of sites over a fixed planning period. Benchmark test results clearly demonstrated the advantage of AI-based smart capex planning over the current in-house tools.

The results were indisputable: a 37% accuracy improvement in capacity prioritization, 72% reduction in capacity degradation, and 76% reduction in unnecessary capex and opex (over-investment). But this is just the beginning; with AI, planning rules are dynamic and continuously evolving toward zero-error tolerance. As the AI-based tool continues to learn and evolve on the basis of network and traffic patterns, significant capex accuracy can be achieved.

Cell planning	In-house tool	Smart capex	Improvement
Method	Linear	Dynamic	Machine learning
Historical data	18 months	36 months	Pattern-based
Validation period	4 months	4 months	Baseline
Correct triggers	478	550	72
Missed triggers	121	49	72
Excess triggers	213	76	137
Capex accuracy	59%	81%	37%
Underinvestment	25%	7%	72%
Over-investment	45%	11%	76%

Conclusion

Greater capex efficiency is no longer a desirable attribute, but a business-critical competitive differentiator in the 5G era. For this to happen, a major modernization of network planning activities is required on multiple fronts. AI-driven tools can help provide improved customer experience and financial benefits while also streamlining workflows and upskilling resources. In this way, smart capex planning can act as a foundation for broader strategic goals.

Greater levels of automation will be the lifeblood of a new capex planning paradigm, one where business outcomes inform overhaul of tools, processes and roles. Legacy systems and processes will not disappear overnight, but

AI-driven planning tools will provide a path to graceful attrition and retirement of aging systems without business or operational disruption.

Ultimately, network planning driven by AI and automation has the potential to deliver upside in three important ways by:

- ▶ Optimizing capex on the basis of value to customers
- ▶ Reducing customer churn
- ▶ Streamlining business processes and increasing ROIC

Taken together, these benefits will determine which operators are able to thrive as opposed to simply surviving in the 5G era.

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