Telco Republic

The Profound Impact of Agentic AI on Telecom:

A Strategic Guide for Telecom Decision Makers

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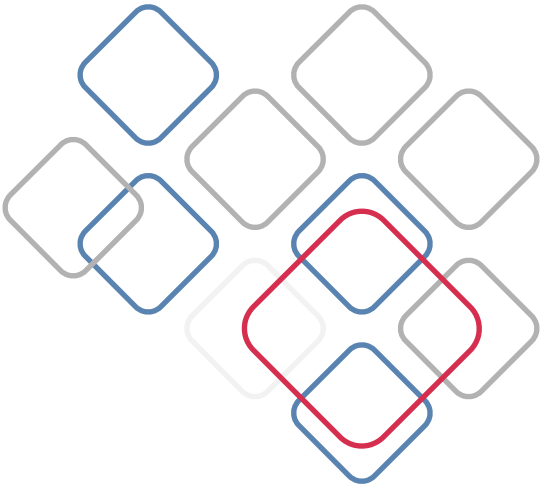

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Contents

List of Figures

Executive Summary

Agentic AI is becoming essential for communications service providers (CSPs) facing surging network complexity and rising customer expectations that exceed human management capabilities. Agentic AI agents augment decision-making in customer engagement, service fulfillment and network management.

By incorporating autonomous decision-making, proactivity and adaptive intelligence, AI agents enhance customer, service and network lifecycle management. This paradigm shift drives operational efficiency, personalized engagement and sustainable competitive advantage. CSPs must strategically adopt agentic AI to remain competitive, differentiate their offerings and generate new revenue streams. Effective adoption requires robust data strategies, phased implementation and organizational readiness.

Key Takeaways

- **Agentic AI introduces autonomous software entities** that independently perceive, reason and act, marking a decisive shift from static automation to dynamic, adaptive intelligence in telecom environments.
- **AI agents coordinate workflows across** historically disconnected systems, OSS, BSS and service platforms, delivering unified customer experiences, optimized operations and improved revenue assurance.
- **The effectiveness of agentic AI relies on high-quality, consistent data,** unified data models and robust governance. Without foundational data improvements, AI initiatives risk failure.
- **Strategic use case prioritization and phased implementation** provide quick wins, sustainable value and continuous improvement, linking technical metrics to business outcomes such as cost savings and customer satisfaction.
- **AI agents can help with closed-loop automation, predictive maintenance and dynamic resource orchestration,** driving network reliability, service excellence and cost optimization.
- **AI agents empower CSPs to shift from reactive support to predictive, personalized engagement,** enhancing customer loyalty and reducing churn by autonomously addressing issues before they escalate.
- **Comprehensive governance frameworks, security protocols and ethical standards** are essential to safeguard data, ensure regulatory compliance, and maintain trust in agentic AI operations.

Recommendations for CSPs

- **Improve your competitive differentiation** by adopting agentic AI to unify customer, service, and network management workflows, delivering personalized experiences and end-to-end operational efficiency.
- **Scale your agentic AI operations** by investing in robust data architectures, including unified data models and real-time analytics, enabling reliable autonomous decisions and seamless agent integration.
- **Continuously improve your business** by deploying agentic AI in phased projects, starting with high-impact, low-complexity use cases for immediate ROI and expanding to transformative initiatives.
- **Retain more customers and minimize churn** by leveraging AI agents to proactively predict, prevent and address churn risks, personalizing outreach and support through integrated touchpoints.
- **Maximize the resilience of your network** by deploying AI agents for closed-loop automation, predictive maintenance and intelligent resource allocation, minimizing outages and optimizing performance.
- **Become compliant and maintain trust** by implementing comprehensive governance frameworks, robust security protocols and ethical AI standards, ensuring transparency, fairness and accountability in decisions.
- **Achieve sustainable transformation** by fostering organizational readiness, developing in-house AI expertise, driving change management and securing leadership commitment, to fully realize the benefits of AI.

1. The Critical Need for Advanced Automation and Intelligence for CSPs

The telecom industry is at a critical juncture in its development. Communication service providers (CSPs) face unprecedented challenges that demand fundamental transformation in how they operate, serve customers and manage increasingly complex networks.

The traditional methods used for customer lifecycle management (CLM), service lifecycle management (SLM) and network lifecycle management (NLM) are no longer sufficient to meet the demands of the digital economy.

The Mounting Complexity Challenge

Modern telecom infrastructure has evolved into a sophisticated ecosystem that encompasses multiple generations of wireless technology, cloud-native architectures, edge computing resources and an ever-expanding array of connected devices.

The deployment of **5G Standalone (5G SA)** networks introduces network slicing capabilities that enable multiple virtual networks to operate on shared physical infrastructure, each with distinct performance characteristics and service level agreements. This technological evolution, while enabling new revenue opportunities, has created operational complexity that exceeds human capacity to manage effectively.

The proliferation of **Internet of Things (IoT)** devices compounds this challenge exponentially. In the near future, billions of connected devices will require network resources, each generating data streams that must be processed, analyzed and acted upon in near real-time. Traditional network management approaches, which rely heavily on reactive problem-solving and manual intervention, cannot scale to meet these demands.

The shift toward **Open RAN** architectures, while offering greater vendor flexibility and cost optimization opportunities, introduces additional layers of complexity through multi-vendor integration challenges. CSPs must orchestrate components from different suppliers while maintaining seamless service quality and operational efficiency.

Rising Customer Expectations

Customer expectations have evolved dramatically in response to digital transformation across industries. Today's consumers and enterprise customers expect immediate service provisioning, personalized experiences and proactive issue resolution. The tolerance for service disruptions has diminished significantly, while demands for customization and real-time responsiveness have intensified.

Enterprise customers, in particular, require sophisticated service level agreements (SLAs) that guarantee specific performance parameters for mission-critical applications. These requirements extend beyond basic connectivity to encompass end-to-end service assurance across complex, hybrid network environments. Meeting these expectations requires CSPs to transition from reactive service models to predictive, proactive approaches that anticipate and address issues before they impact customer experience.

Generative AI has also transformed customer expectations related to **digital helpers** by using natural language to interact with AI with often impressive human-like responses. Clients have come to recognize the potential of sophisticated AI interactions at home and at work have started to expect similar capabilities from the service providers they engage with. This shift presents an opportunity and a challenge for CSPs, as customers will no longer accept unreliable chatbot experiences or limited self-service capabilities.

The Revenue and Cost Optimization Imperative

CSPs operate in an environment where revenue growth has plateaued in traditional service areas while operational expenses continue to rise. **The need to optimize existing operations while investing in new technologies** creates a challenging financial dynamic.

This financial reality necessitates dramatic improvements in operational efficiency. CSPs must identify opportunities to reduce manual labor costs, minimize service disruptions that result in customer churn and optimize network resource utilization. Simultaneously, they must develop new revenue streams that leverage their unique position as providers of connectivity and data services.

The Critical Need for Agentic AI

Generative AI has demonstrated the potential for natural language interaction with complex systems, automated content creation and sophisticated data analysis. However, the primary focus of generative AI is using large language models (LLMs) on a query-response format. The models can only respond with data they are trained on which may not be accurate. In a telecom context, this limits the usefulness of the technology, as LLMs have no telecom domain expertise and no access to telecom data.

Agentic AI represents the next evolutionary step, building off generative AI and fundamentally transforming LLMs from passive response generators into autonomous decision-making systems. Unlike traditional generative AI that operates in a simple query-response format, agentic AI centers around **specialized AI agents** that can perceive their environment, reason about complex problems, plan multi-step solutions and execute actions independently.

These agents augment LLMs with crucial capabilities: Access to data that connect to BSS and OSS systems and data lakes; domain-specific telco knowledge bases that provide FAQs, guidelines, data model documentation, etc; and autonomous decision-making engines that can evaluate situations and choose optimal actions without human intervention, for example ontology models.

The architecture enables agents to access real-time telecom data through secure API connections, or Model Context Protocol (MCP) (for details, see Section 2), utilize specialized computational tools for network analysis and maintain memory systems that learn from previous interactions to improve future performance.

This agent-centric approach transforms AI from a static information provider into a dynamic problem-solving partner capable of handling complex, multi-domain workflows autonomously.

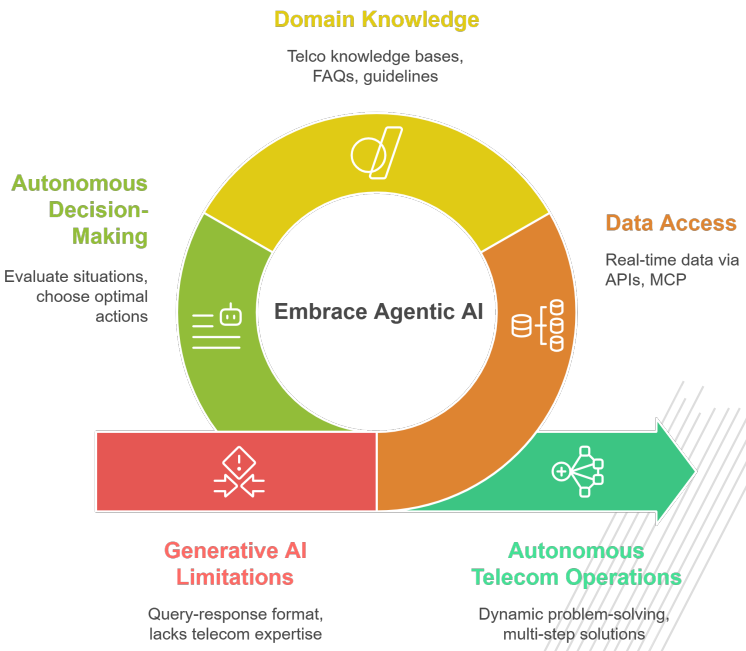
The progression from generative AI to agentic AI is essential for addressing the business and operational challenges of CSPs. While generative AI can analyze network data and provide recommendations, agentic AI can find network faults, determine the root cause and determine a resolution with the level of autonomy set by the CSP. Agentic AI can autonomously implement network optimizations, resolve service issues and orchestrate complex multi-system processes. This capability is essential for achieving the scale of automation required in modern telecom operations.

The **competitive landscape** for CSPs is evolving rapidly, with new entrants leveraging cloud-native architectures and AI-driven operations from their inception. It is imperative for established CSPs to implement advanced automation in a timely manner. Delaying this implementation could result in a competitive disadvantage, as competitors who can deliver superior customer experiences at lower operational costs may gain a significant market share.

Moreover, the **technical debt** associated with legacy systems continues to accumulate, making future transformation efforts more complex and expensive. CSPs that begin their agentic AI journey today can leverage their existing data assets and operational knowledge to create competitive advantages that will be difficult for competitors to replicate.

CSPs must adopt agentic AI, which is more than a mere operational optimization opportunity. It is a strategic necessity for long-term competitiveness and sustainability. CSPs that successfully leverage the power of AI agents will define the future of telecom operations and customer experience.

Figure 1. The Critical Need for Agentic AI



Source: Telco Republic, 2025

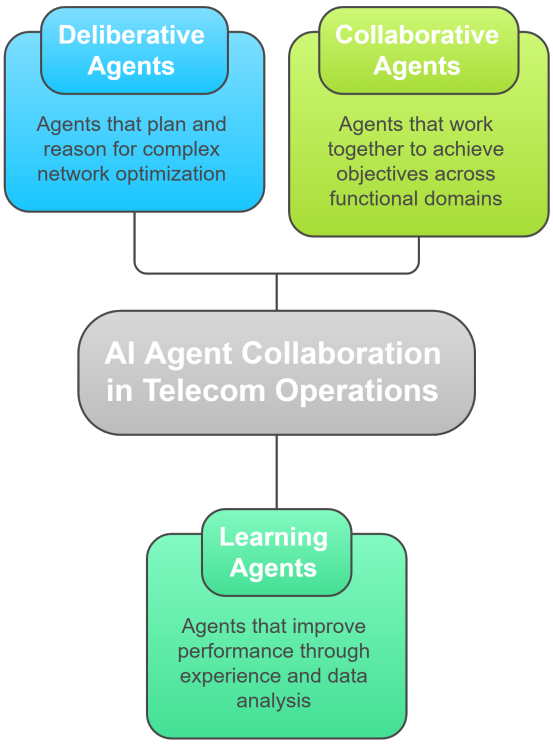
Classes of AI Agents in Telecom

The complexity of telecom operations necessitates agent organization, where agents with different capabilities and responsibilities work together to achieve operational objectives. CSPs require various classes of AI agents, each optimized for specific operational domains and complexity levels.

Critical to successful implementation is the principle that AI agents should maintain a narrow scope of responsibility. Broad-mandate agents are prone to hallucinations and failures because they lack the specificity needed to operate reliably within limited context windows.

Rather than deploying large, complex agents that attempt to handle multiple diverse tasks, CSPs benefit from hierarchical architectures composed of smaller, focused agents that excel within clearly defined domains. Each agent should concentrate on a few specific tasks, working collaboratively with other specialized agents to build comprehensive use cases from these foundational components. This modular approach ensures reliability, reduces error rates and enables effective scaling as operational requirements evolve.

Figure 2. Classes of AI Agents in Telecom



Source: Telco Republic, 2025

Deliberative agents incorporate planning and reasoning capabilities, enabling them to consider multiple possible actions and select optimal approaches based on current conditions and anticipated outcomes. These agents are valuable for complex network optimization tasks that require consideration of multiple variables and trade-offs. Examples include the following:

- *Network Optimization Agents:* These agents must deliberate when optimizing a network. They analyze multiple factors, including traffic volume, latency and available bandwidth and then calculate the most efficient path for data to travel. This process involves complex reasoning and planning to balance network load and maintain service quality.
- *Predictive Maintenance Agents:* They deliberate by analyzing historical data to identify patterns that precede equipment failure. They use this information to create a plan for preventative maintenance, considering factors such as the cost of repair versus the cost of downtime and scheduling maintenance activities at the optimal time.

Learning agents continuously improve their performance through experience, making them well-suited for environments where optimal strategies are subject to change over time. Learning agents can optimize network configurations, refine customer interaction approaches and improve service delivery processes based on historical performance data and changing conditions. Examples include the following:

- *Personalization Agents:* They continuously analyze customer behavior, such as call history, data usage or plan changes, to learn what customers value. Based on this learning, they can then recommend more relevant plans or services, improving their recommendations over time.
- *Data Analysis Agents:* These agents learn from massive datasets to identify trends and patterns. For example, a data analysis agent can learn to predict periods of high network demand based on historical data from holidays or special events, allowing the company to allocate resources proactively.

Collaborative agents work together to achieve objectives that exceed the capabilities of individual agents. These multi-agent systems can orchestrate complex operations across different functional domains. For instance, they can orchestrate network optimization with customer service delivery to ensure that network changes do not adversely impact customer experience. Examples include the following:

- *Sales and Marketing Agents with Personalization Agents:* A personalization agent can identify a customer who is a good candidate for an upgrade and a sales and marketing agent can then initiate a targeted campaign to offer a personalized deal, coordinating efforts to increase sales.
- *Network Management and Customer Service Agents:* A collaborative system could have a network agent detect a localized service outage and then inform a customer service agent. This customer service agent could then proactively send a message to all affected customers, providing a status update without the customer having to call in. This collaboration ensures a seamless experience for the customer.

2. Core Characteristics and Architecture of Agentic AI

Agentic AI is a paradigm shift from traditional automation approaches, introducing autonomous software entities that can perceive their environment, make decisions and take actions to achieve specific objectives without continuous human oversight.

Conventional automation systems are characterized by their ability to adhere to predefined rules and workflows. In contrast, agentic AI stands out for its capacity to exhibit adaptive intelligence, empowering it to respond promptly and effectively to evolving conditions and unanticipated scenarios.

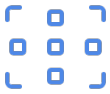
Core Characteristics of Agentic AI

The key characteristics that distinguish agentic AI from traditional automation systems are autonomy, proactivity, adaptability and goal-oriented behavior.

Autonomy enables AI agents to operate independently, making decisions based on their understanding of current conditions and predefined objectives. This capability is essential for telecom operations where rapid response to network anomalies or customer issues can prevent service degradation and revenue loss.

Proactivity differentiates agentic AI from reactive systems by enabling agents to anticipate future needs and take preventive actions. Rather than waiting for problems to occur, proactive agents continuously analyze patterns and trends to identify potential issues before they impact operations or customer experience. This characteristic is particularly valuable in network management, where proactive maintenance and optimization can prevent costly outages and service disruptions.

Adaptability allows AI agents to modify their behavior in response to changing environmental conditions, new information or evolving objectives. In the dynamic telecom environment, where network conditions, traffic patterns and customer demands fluctuate continuously, adaptability is essential for maintaining optimal performance. AI agents can learn from experience, incorporating new knowledge to improve their decision-making capabilities over time.



Goal-oriented behavior ensures that AI agents maintain focus on specific objectives while navigating complex operational environments. Rather than simply executing predefined tasks, goal-oriented agents can develop and execute strategies to achieve desired outcomes, even when faced with unexpected obstacles or changing conditions.

AI Agents Add Value at Any Level of Automation

AI agents can deliver significant value regardless of the existing automation maturity level, provided appropriate data infrastructure and tools are in place. This capability enables CSPs to implement agentic AI incrementally, building upon current operational foundations rather than requiring comprehensive system overhauls.

AI agents' ability to process diverse data formats, including structured databases, unstructured documents, real-time telemetry and historical analytics, gives them universal applicability. This enables them to eliminate manual tasks across all operational domains. Whether they are enhancing basic automation workflows or supporting advanced autonomous operations, AI agents adapt their capabilities to the available infrastructure, providing immediate productivity gains while establishing the foundation for the evolution of future operational maturity.

At the most basic level of **workflow orchestration**, AI agents can automate the creation of service catalogs by analyzing existing service components, business requirements and operational constraints to generate optimized workflow configurations. Instead of manual service design processes, agents can interpret declarative business intents and automatically construct workflow sequences that integrate billing systems, provisioning tools and quality assurance processes.

AI agents can **transform labor-intensive processes**, such as product catalog management and sales assistance. For example, a common pain point for CSPs is the manual, time-intensive configuration of new products or service bundles within the product catalog, which even with templates, can take business experts many hours to fully define and launch.

An AI agent can ingest high-level product definitions and business rules, then automatically configure all necessary technical specifications, pricing models, eligibility criteria and regulatory requirements across the catalog. Similarly, an agent acting as a quotation assistant can analyze a customer's specific needs, historical data and the current catalog, and then generate a complex, optimized sales quote in minutes, ensuring accuracy and compliance.

AI agents excel at **sophisticated tasks** related to managing the network, including automated root cause analysis and service design optimization, thanks to intent-based automation and closed-loop capabilities. They can correlate multi-domain data sources, analyze complex failure patterns and provide actionable insights for resolving issues. They also continuously learn from resolution outcomes to improve future performance.

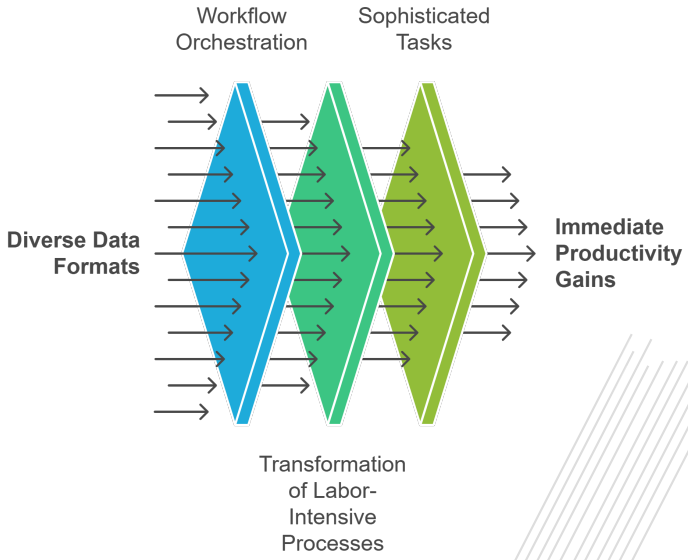
Breaking Down Automation Silos

Traditional CSP automation initiatives have often resulted in isolated solutions that address specific functional areas without comprehensive integration. Network management systems, customer service platforms and billing systems frequently operate as distinct, standalone systems, each with its own automation capabilities but with limited ability to coordinate across functional boundaries.

Agentic AI, with the right data and tools can provide the intelligence and coordination capabilities necessary to bridge these silos.

AI agents can orchestrate workflows across multiple systems, making decisions that consider the full context of customer relationships, network status and business objectives. This comprehensive approach to automation is crucial for achieving optimal operational efficiency and ensuring customer satisfaction.

Figure 3. AI Agent's Universal Applicability



Source: Telco Republic, 2025

Key Requirements for Agentic AI

The successful deployment of agentic AI for CLM, SLM and NLM requires a mature data strategy and a sophisticated agentic AI platform that supports agent creation, deployment, management and coordination.

A Mature Data Strategy is the Foundation for Agentic AI

A mature data strategy is a critical factor influencing the success of agentic AI adoption. CSPs with comprehensive data governance, a common data model, high-quality data assets and mature analytics capabilities are significantly better positioned for successful AI agent implementation than those with poor data management practices.

Data quality and consistency issues create fundamental barriers to AI agent effectiveness by limiting the reliability of automated decision-making. CSPs with significant data quality problems must invest in data improvement initiatives before AI agent implementations can be successful.

To develop a mature data strategy, CSPs must modernize their inventory systems to establish a single source of truth; unify their product catalogs; and integrate their back- and front-office systems, including billing and customer management.

Data integration capabilities determine the feasibility of providing AI agents with comprehensive information required for effective decision-making. CSPs with robust data integration platforms and APIs are better equipped to support AI agent requirements, while those with limited integration capabilities face significant implementation challenges.

Many AI agent use cases require **real-time data availability**, which may exceed current infrastructure capabilities. This may require investment in streaming data platforms and real-time analytics capabilities. CSPs without these capabilities must evaluate the cost and complexity of infrastructure upgrades against the expected benefits of AI agents.

Data governance and compliance frameworks must address the unique requirements of AI agent operations, including data lineage, audit trails and privacy protection. CSPs with mature data governance practices are better positioned to extend existing frameworks to support AI agents, while those lacking governance capabilities face additional complexity.

It is imperative for telecom decision-makers to comprehend these architectural foundations and strategic approaches when evaluating potential agentic AI solutions and developing implementation strategies that align with their operational requirements and strategic objectives.

Elements of an Agentic AI Platform

Agentic AI architecture relies on a foundation of agent creation, lifecycle management, communication protocols, data access frameworks and governance mechanisms. These components ensure that agents can operate securely and effectively in dynamic network environments while adhering to regulatory and ethical standards.

- **Agent creation** focuses on designing specialized, goal-driven AI agents that handle specific, well-defined tasks – such as network fault detection, customer support automation or predictive maintenance – and can be orchestrated for broader use cases. By keeping agents small in scope, their performance, reliability and explainability improve, enabling higher-quality outcomes and easier lifecycle management. The platform should provide a playground environment where teams can prototype, test and refine these agents safely, connecting to any underlying LLM to evaluate behavior, optimize prompts and validate use cases before deployment.
- **Agent lifecycle management** encompasses the processes for creating, deploying, monitoring, updating and retiring AI agents. This capability is crucial for dynamic telecom environments where operational requirements continuously evolve. The system must support version control, rollback capabilities and seamless updates to ensure operational continuity. For example, agents tasked with network optimization may need to adapt to new 5G standards or regulatory requirements for spectrum usage.
- **Agent Orchestration** manages and coordinates multiple autonomous AI agents to work together on complex, multi-step tasks. It acts as a central command to ensure agents communicate, share information and collaborate effectively. This enables the system to handle processes that are too complex for a single AI agent. This coordination is essential for creating reliable, efficient and scalable workflows where each agent performs a specific role, such as verifying documents or checking credit scores, and passes its output to the next agent in the sequence.

Communication Protocols

Communication protocols enable agents to interact with each other, external systems, such as OSS, BSS, network management systems (NMS) and customer experience management platforms (CEMP) and human operators. These protocols must support synchronous and asynchronous communication patterns while adhering to strict security and reliability standards.

While various protocols are relevant for CSPs, the Model Context Protocol (MCP) is currently the most significant due to its ability to integrate real-time operational data with LLMs.

Model Context Protocol (MCP)

The Model Context Protocol (MCP) is a framework that allows LLMs and AI agents to securely access real-time operational data. For CSPs, this protocol is crucial. It enables AI to connect to internal systems such as OSS, BSS, NMS and CEMP. By integrating this live data, AI agents can make more accurate network management decisions, deliver personalized customer service and proactively resolve issues. This capability is essential for AI applications that need an up-to-the-minute understanding of the network environment and customer behavior.

Other Relevant Protocols and Standards

- Agent Communication Protocol (ACP): A general-purpose protocol that defines the syntax and semantics of messages exchanged between agents, ensuring interoperability.
- Agent Negotiation Protocol (ANP): A standard for agents to negotiate tasks, resources and agreements with each other in a decentralized manner, which is critical for complex network management scenarios.
- Agent-to-Agent (A2A) and Agent-to-System (A2S): These are broader categories of protocols that define how agents communicate with one another and with external systems, respectively. A2S protocols often involve integration with APIs of telecom systems for functions such as service provisioning or network configuration.

Governance

Governance mechanisms ensure that agent behavior aligns with organizational policies, regulatory requirements, security and risk management as well as ethical guidelines.

- **Observability** is a critical component of these governance frameworks, providing comprehensive traceability through real-time monitoring of agent decision-making processes, performance metrics and behavioral patterns. This includes tracking LLM interactions, tool usage, reasoning chains and execution paths to understand how agents solved specific problems.

  Robust observability enables complete end-to-end tracing of agent workflows, from initial perception through reasoning to final actions, ensuring accountability and transparency in autonomous decision-making. These mechanisms include decision audit trails, behavior monitoring and intervention capabilities that enable human operators to override or modify agent actions when necessary. For CSPs, this is particularly important for tasks that could affect critical infrastructure, such as network configuration changes or subscriber data management.

- Governance frameworks must also support **compliance reporting and risk management processes**, ensuring that agents adhere to regulations such as GDPR and other regional telecom-specific mandates. This includes the ability to trace an agent's actions and decisions back to the initial policy or input, providing accountability and transparency.

- **Robust security and privacy measures** safeguard data and systems from unauthorized access, misuse and sophisticated cyber threats unique to agentic AI. They address specific AI attack vectors, such as adversarial attacks and model poisoning, with robust, autonomous cybersecurity defenses. They also ensure compliance with data privacy regulations via data minimization, anonymization and consent management.

Given the autonomous decision-making and extensive data access of AI agents, it is essential to apply **data isolation** that restricts agent access to only data segments for their specific tasks, preventing unwarranted data exposure. **Access control, access enforcement and authentication mechanisms**, such as role-based access controls and secure protocols, along with comprehensive audit logging to track agent activities further enhance AI agent security.

Integration with Existing Telecom Systems

The integration of agentic AI with existing telecom infrastructure presents a unique set of challenges and opportunities. Telecom operations depend on numerous specialized systems including OSS, BSS, NMS and CEMP. Each of these systems has distinct data models, interfaces and operational characteristics that must be considered in the integration design.

Agentic AI does not entirely replace existing integration methods. Instead, it works alongside them to enhance functionality. While modern APIs remain crucial, integrating with many legacy systems requires a multi-faceted approach. In order to create the necessary integration layers to bridge the gap between older interfaces and modern AI agent protocols, it is essential to utilize established tools such as middleware and data buses, as well as new ones such as MCP.

For large-scale data transfers that do not require real-time updates, batch processing is a reliable method for data synchronization. Robotic process automation (RPA) can automate repetitive tasks by mimicking human interaction with systems, all without requiring extensive changes to the legacy software's interface. This **layered approach** ensures that existing operational reliability is maintained while new intelligent automation capabilities are enabled.

Cloud-native architectures offer advantages for agentic AI deployment, such as scalable compute resources, standardized APIs and modern development frameworks. However, many CSPs must support **hybrid environments** that combine cloud resources with on-premises infrastructure and edge computing capabilities. The agentic AI architecture must accommodate this diversity while maintaining consistent performance and reliability across all deployment models.

Architectural Strategies for Agentic AI: Hierarchical Vs. Distributed

The increasing complexity of telecom networks requires a thorough examination of architectural strategies for implementing agentic AI. CSPs must consider two primary paradigms: hierarchical and distributed architectures. Each paradigm offers distinct advantages for different operational contexts.

Hierarchical architecture concentrates intelligent decision-making at higher organizational levels, where powerful foundational models manage coordination and delegate specific tasks to specialized lower-level agents. In this model, a central coordination agent processes high-level intents while distributing execution tasks across domain-specific agents managing radio access networks, core networks and customer service domains. This approach leverages existing telecom organizational structures and provides clear accountability chains while enabling gradual intelligence distribution as capabilities mature

Distributed architecture embodies decentralized autonomous decision-making, where intelligence is pushed closer to data sources and operational contexts. Each agent operates with greater autonomy, communicating peer-to-peer to achieve collective objectives through emergent behavior rather than central control. For CSPs, this means placing intelligent agents at network edges, enabling local optimization decisions based on real-time conditions without requiring constant communication with centralized systems.

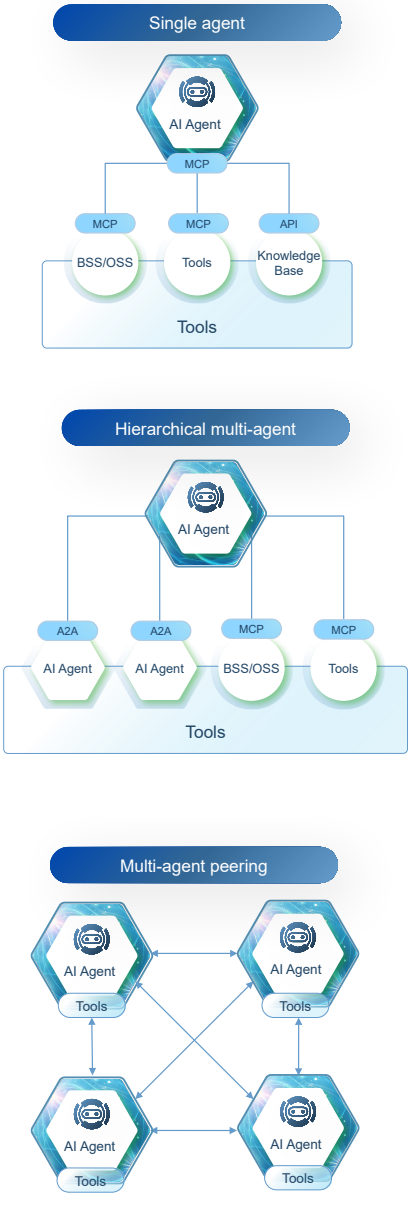
Future agentic AI deployments will likely adopt **hybrid approaches** that combine hierarchical coordination for strategic decisions with distributed execution for operational responsiveness. This evolution supports the principle that specialized agents with narrow responsibilities deliver superior performance compared to broad-mandate systems, while enabling scalable intelligence distribution as telecom networks become increasingly complex and dynamic.

The Evolution Toward Multi-Agent Architectures

CSPs' AI agent architectures are evolving toward sophisticated coordination models that balance specialization with collaborative intelligence. These architectures come in three flavors: cooperative simple agent systems, distributed multi-agent systems and self-organizing systems.

This architectural evolution aligns with broader telecom transformation initiatives, including network disaggregation and edge computing deployment. It provides a future-ready framework that can adapt to emerging technologies and operational requirements while maintaining modular scalability.

Figure 4. AI Agents' Increasing Level of Complexity and Autonomy



Cooperative simple agent systems represent the immediate implementation pathway, featuring hierarchical intelligence with a centralized coordination layer directing specialized agents across domains. This approach enables CSPs to realize agentic benefits using current technological capabilities while building foundational experience with agent orchestration and management.

Hierarchical multi-agent systems will emerge as agent capabilities mature, enabling more autonomous decision-making where agents contribute to collective goals through sophisticated inter-agent communication and coordination. Task allocation will be dynamic, based on agent capabilities and availability. Communication patterns will include negotiation protocols and knowledge-sharing mechanisms that enhance the collective problem-solving capacity.

Self-organizing multi-agent systems represent a paradigm where agents autonomously adapt system structure and behavior to optimize efficiency and responsiveness. These systems will employ feedback loops to evolve organizational patterns, prioritizing adaptability through self-regulation, competition and cooperation mechanisms that enable continuous optimization without external intervention.

Source: Netcracker, 2025

3. Realizing a Sustainable Return on Investment (ROI)

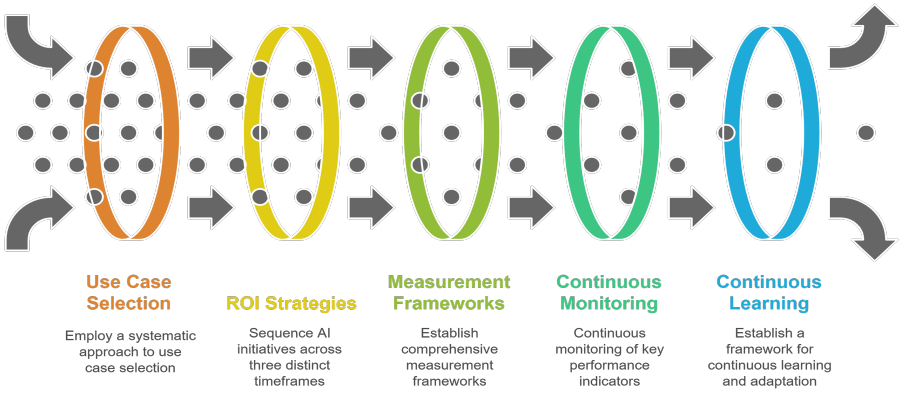
Achieving meaningful ROI from AI agent implementations represents a critical inflection point for CSPs. However, selecting the right use cases that deliver measurable positive returns remains one of the industry's most significant challenges. The telecom sector faces mounting pressure to justify substantial AI investments amid margin compression and increasing operational complexity, making strategic use case prioritization essential for sustainable value creation.

Many CSPs struggle to quantify the impact of agentic AI because many benefits are intangible, such as enhanced employee productivity or customer satisfaction. It is often hard to isolate AI's impact from other business factors, making it difficult to prove a direct cause-and-effect relationship.

The technical metrics of a "good" AI model, for example, accuracy and latency, are rarely the same as the business metrics that define success, such as cost savings, productivity gains, churn reduction or revenue uplift. The key is to bridge this gap by creating a measurable correlation between technical model performance and tangible business outcomes. For example, a 15% improvement in predictive maintenance model accuracy can be directly linked to a 20% reduction in network outages and lead to a 3% reduction in lost revenue and a 1.6% reduction in customer churn.

Successful CSPs employ a **systematic approach to use case selection** that balances ease of implementation with short- to medium-term impact potential. High-value opportunities typically emerge in areas where AI agents can automate routine processes while delivering immediate operational benefits. Customer service automation, predictive maintenance for network equipment and AI-powered network optimization represent prime candidates due to their relatively straightforward deployment requirements and quantifiable cost reduction potential.

Figure 5. AI Agents Use Case Selection Funnel



Source: Telco Republic, 2025

The most effective ROI strategies sequence AI initiatives across three distinct timeframes:

1. Immediate quick wins that require minimal investment but yield substantial returns;
2. Medium-term capability building initiatives
3. Long-term transformational projects that fundamentally reimagine business operations.

Quick-win implementations, such as AI-powered chatbots handling tier-1 customer support queries, typically demonstrate payback periods of 3-6 months while providing compelling proof-of-concept validation for broader AI adoption.

To ensure long-term sustainability, CSPs must also consider the evolution of their AI models beyond initial deployment. This includes **establishing a framework for continuous learning and adaptation**, ensuring that the AI remains relevant and effective as business needs and customer behaviors change.

CSPs achieving superior ROI outcomes establish comprehensive measurement frameworks that link direct financial benefits with business improvements and operational efficiency gains.

For example, Netcracker reported the following results from its Agentic AI deployments:

- 40% less time to resolve call center calls
- 70% less time to resolve complex B2B billing issues
- 12 x faster to make catalog changes
- 7 x faster to create a service design

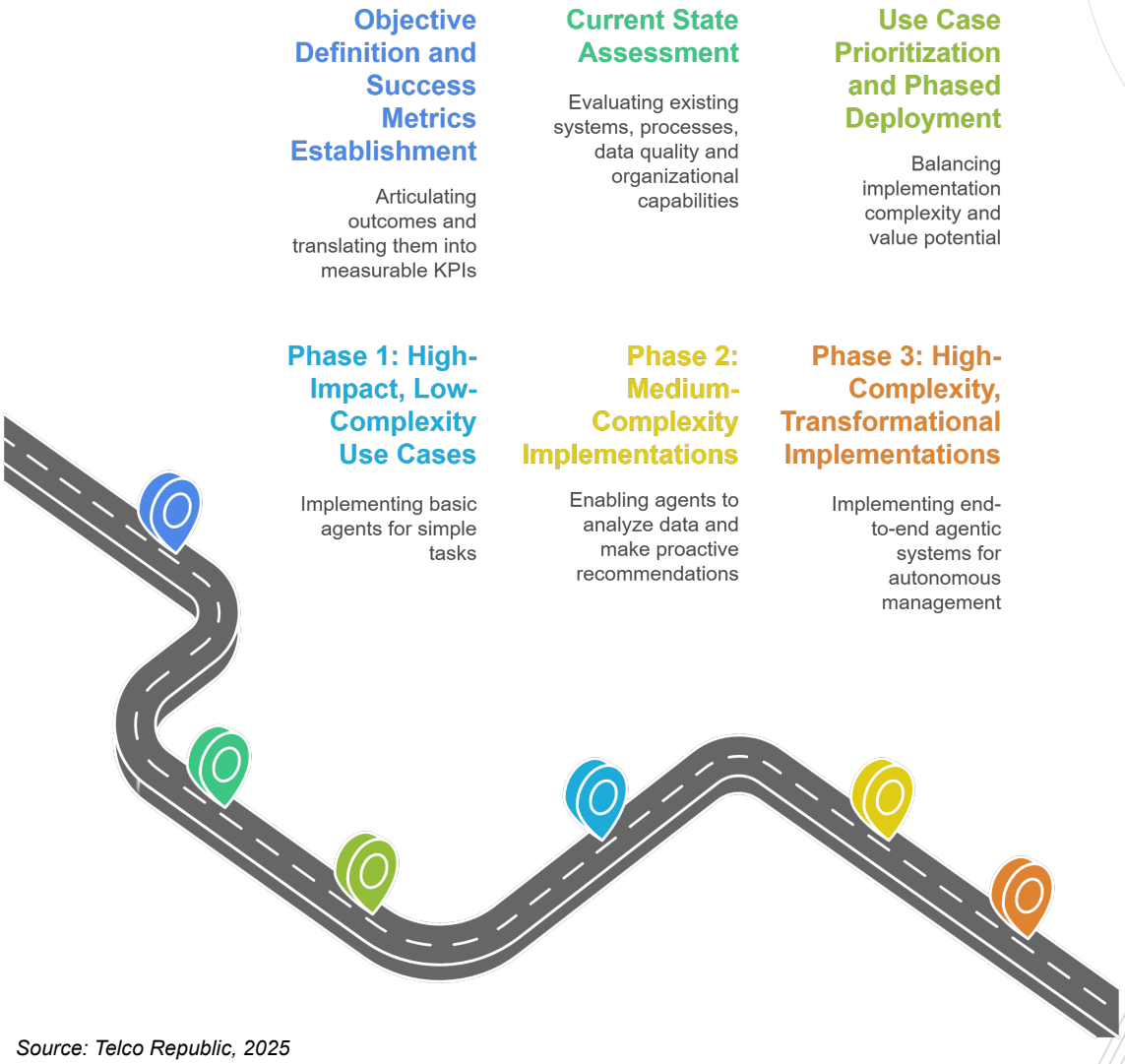
Success requires **continuous monitoring of key performance indicators** including cost savings from automation, productivity gains, customer satisfaction improvements and revenue enhancement from new service capabilities. The real value, however, lies in using these metrics to iteratively refine AI strategies, moving from simply proving ROI to building a cycle of continuous improvement and innovation.

4. Implementation Roadmapping and Best Practices

When developing a strategic plan for the implementation of agentic AI, it is essential that CSPs align their technology capabilities with specific business objectives across customer lifecycle management (CLM), service lifecycle management (SLM) and network lifecycle management (NLM).

The planning process requires a comprehensive assessment of current capabilities, the identification of priority use cases and the development of phased implementation strategies. This approach ensures incremental value realization while building toward comprehensive transformation.

Figure 6. Key Considerations for the Deployment of Agentic AI



Source: Telco Republic, 2025

Key Considerations for the Deployment of Agentic AI

01 Objective Definition and Success Metrics Establishment

This is the foundation of a successful agentic AI implementation. CSPs must clearly articulate the specific outcomes they seek to achieve and translate them into measurable KPIs. This applies to quantitative and qualitative outcomes.

Quantitative Metrics

- CLM: Reduce churn rate by X% within Y months. Increase ARPU from targeted upsell/cross-sell campaigns by Z%. Decrease customer acquisition cost (CAC) by A%.
- SLM: Increase the time-to-market for new services by B%. Improve the lifetime value of a service offering by C% by optimizing its entire lifecycle.
- NLM: Reduce network asset acquisition costs by D% through predictive planning. Improve network upgrade efficiency by E% by automating key lifecycle stages.

Qualitative Outcomes and Measurement

- CLM: Improve customer satisfaction (CSAT) and Net Promoter Score (NPS) by automating personalized service and support, which requires sophisticated feedback mechanisms and sentiment analysis.
- SLM: Enhance business agility and competitive positioning by enabling the rapid design, deployment and optimization of new services in response to market demands.
- NLM: Strengthen brand reputation by ensuring a superior, reliable network that is consistently optimized for future demands.

02 Current State Assessment

A comprehensive evaluation of existing systems, processes and data quality, as well as organizational capabilities is essential to identify readiness factors and potential implementation barriers. This assessment must extend beyond operations to include strategic planning and asset management.

Technical Assessment

- Data Architecture Maturity: CSPs should evaluate the maturity of their data lakes and data warehouses to determine if they can easily access and integrate vast amounts of data from all lifecycle stages, such as service design data, asset inventory, technology roadmaps, as well as call detail records, billing data and network performance logs.
- API Availability and Quality: CSPs should assess the quality and security of APIs across key systems. It is essential to determine whether an agentic system seamlessly interact with their planning and inventory systems to initiate network upgrades or with their service catalog to launch a new service.
- Security and Compliance: A critical consideration is data privacy. CSPs should assess how agentic AI systems will handle and protect sensitive customer data and strategic business information in compliance with regulations such as GDPR or local data protection laws.

Organizational Readiness Assessment

- Change Management Capabilities: The successful deployment of agentic AI is as much a human challenge as a technical one. CSPs should assess the organization's ability to manage this change and retrain employees whose roles will be augmented or changed by automation, from network planners to service designers.
- Technical Skill Availability: CSPs should determine if they have the necessary in-house talent in data science, machine learning and prompt engineering, or if they need to partner with a third-party vendor.
- Leadership Commitment: The success of such a transformative initiative depends on strong, consistent leadership support that champions the vision and allocates the necessary resources.

Achieving Maximizing Transformation Momentum with Agentic AI Quick Wins

The sheer number of potential applications of AI agents across CLM, SLM and NLM can make strategic implementation daunting. A critical challenge for leadership is determining which use cases to pursue first to ensure a clear ROI and build momentum for broader transformation.

An effort-benefit matrix presents a robust framework for making these decisions. By systematically evaluating potential use cases based on their implementation complexity (effort) versus their potential business impact (benefit), CSPs can create a prioritized roadmap. This approach minimizes risk by focusing on quick wins – high-benefit, low-effort use cases – that deliver immediate value, justify further investment and lay a solid foundation for more complex, long-term agentic AI initiatives.

Prioritizing AI Agents in Customer Lifecycle Management

The transformation of CLM through agentic AI presents a substantial opportunity for CSPs to differentiate their services and optimize revenue generation.

Traditional customer management approaches, characterized by reactive service models and manual intervention points, are no longer adequate for the expectations and complexity of modern telecom services. Agentic AI facilitates a fundamental shift toward proactive, personalized and intelligent customer engagement that spans the entire customer journey.

The transformation of CLM through agentic AI creates opportunities for CSPs to enhance customer experiences optimized revenue generation and improve operational efficiency.

However, realizing these benefits requires careful integration with existing systems and processes, along with appropriate governance mechanisms to ensure responsible AI deployment.

There are dozens of use cases that can benefit CLM. CSPs must diligently assess the ease of implementation and the short- to medium-term impact of each use case to gain maximum benefits. They should start with use cases that offer significant benefits and are relatively straightforward to implement. While use case selection will differ depending on each CSP's technical environment and strategic goals, **according to Telco Republic's analysis, the typical CSP will initially prioritize the following use cases.**

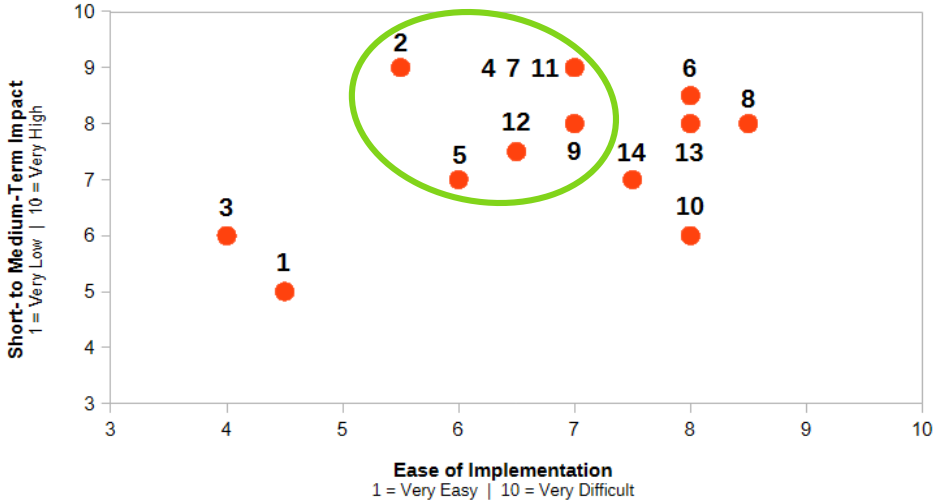
- Churn Prediction and Prevention
- Cross-Selling and Upselling Optimization
- Customer Communications
- Fraud Detection and Prevention
- Intelligent Orchestration of Customer Touchpoints
- Personalized Offer Generation
- Proactive Customer Engagement

For example, ***churn prediction and prevention*** is a well-established application of analytics. Churn models are technically mature, so the difficulty is moderate. An agentic AI system would continuously monitor and trigger automated retention actions, which adds complexity. Ensuring data quality and connecting predictions to real-time retention campaigns involves some **effort**, but telecoms often have historical data for this.

The **business impact** is significant. Early identification of at-risk customers allows targeted retention strategies, which directly increases revenue. AI can detect subtle usage or complaint patterns that signal potential churn and enable personalized interventions. By using AI agents to automate this process, a CSP can prevent revenue loss and increase customer lifetime value.

For a detailed list of CLM use cases, see the Appendix.

Figure 7. AI Agents Use Case Prioritization in Customer Lifecycle Management



1 Billing Exception Handling
2 Churn Prediction and Prevention
3 Credit Management and Collections Optimization
4 Cross-Selling and Upselling Optimization
5 Customer Communications
6 Dynamic Pricing Optimization
7 Fraud Detection and Prevention
8 Intelligent Mediation and Rating
9 Intelligent Orchestration of Customer Touchpoints
10 Partner and Wholesale Management
11 Personalized Offer Generation
12 Proactive Customer Engagement
13 Real-Time Charging and Policy Enforcement
14 Revenue Assurance

Source: Telco Republic, 2025

Prioritizing AI Agents in Service and Network Lifecycle Management

The management of telecom services and networks has evolved from relatively simple voice-centric operations to complex, multi-layered ecosystems. These ecosystems must support diverse applications, guarantee specific performance characteristics and adapt dynamically to changing demands.

Traditional approaches to service and NLM, which rely heavily on manual processes and reactive problem-solving, are inadequate for addressing the scale and complexity of modern telecom infrastructure. Agentic AI provides the intelligence and automation capabilities necessary to transform these operations into efficient, self-managing systems.

While use case selection will differ depending on each CSP's technical environment and strategic goals, **according to Telco Republic's analysis, the typical CSP will initially prioritize the following use cases.**

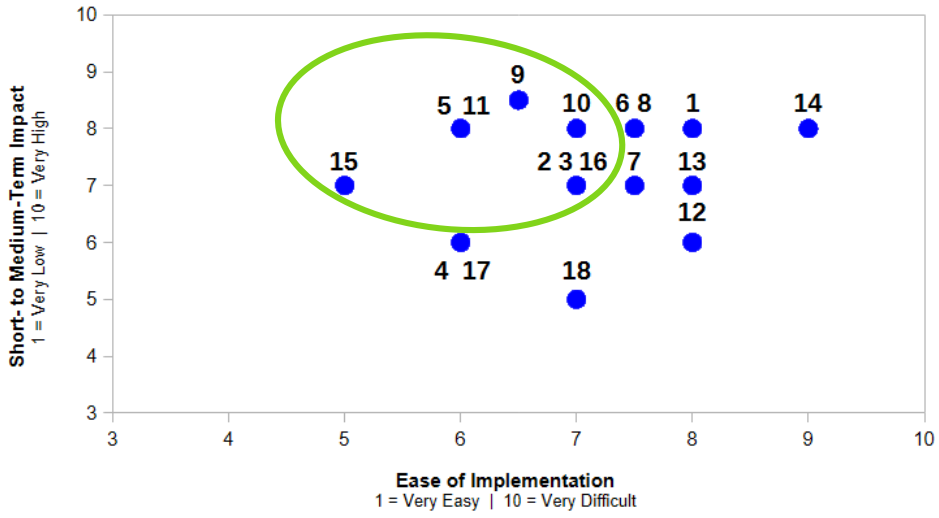
- Capacity Planning and Network Optimization
- Closed-Loop Automation
- Intelligent Resource Allocation
- Intelligent Service Fulfillment
- Performance Monitoring and Optimization
- Quality of Service Management
- Root Cause Analysis
- Technical Service Design

For example, AI can streamline ***service fulfillment*** by orchestrating the various backend steps. This requires integrating order management, inventory and provisioning systems, which is complex but achievable. Many OSS tools already have automation. Adding intelligence means an agent decides the optimal provisioning sequence or detects errors. The **difficulty** is moderate because the interfaces exist, but coordinating them requires careful design.

The **business impact** is high. Faster, error-free provisioning improves customer experience and reduces time-to-revenue. An intelligent agent that can orchestrate fulfillment end-to-end means fewer manual handoffs and quicker service activation. This can translate to higher orders processed per period and lower costs of operations. In the near term, customers get their services faster, and the operator can ramp up sales capacity.

For a detailed list of CLM use cases, see the Appendix.

Figure 8. AI Agents Use Case Prioritization in Service and Network Lifecycle Management



1 Automated Provisioning and Activation
2 Capacity Planning and Network Optimization
3 Closed-Loop Automation
4 Intelligent Inventory Management
5 Root Cause Analysis
6 Dynamic Service Assurance
7 Edge Computing Resource Management
8 Fault Management Transformation
9 Technical Service Design
10 Intelligent Resource Allocation
11 Intelligent Service Fulfillment
12 Multi-Cloud Resource Management
13 Autonomous Network Rollout
14 Network Slicing Management
15 Performance Monitoring and Optimization
16 Quality of Service Management
17 Service Catalog Management
18 Service Onboarding

Source: Telco Republic, 2025

The Synergy of Agentic AI Across Customer, Service and Network Lifecycle Management

The true transformational power of agentic AI in telecom lies not from isolated improvements within individual operational domains, but from the intelligent coordination and synergy across CLM, SLM and NLM. Traditional telecom operations have been characterized by functional silos, where BSS and OSS operate largely independently, creating inefficiencies, inconsistencies and missed opportunities for optimization and customer value creation.

The synergy created by integrating agentic AI across all operational domains presents a significant opportunity for transformation in telecom operations. However, realizing these benefits requires careful planning, comprehensive integration strategies and appropriate governance mechanisms to ensure successful implementation and operation.

Breaking Down Silos

The historical separation between BSS and OSS pertains to the distinct technical requirements and operational responsibilities of each domain. BSS focused on customer-facing processes including billing, customer service and product management. Conversely, OSS concentrated on network management, service assurance and technical operations. This separation created organizational boundaries that limited the flow of information and coordination of activities between customer-facing and network-facing operations.

Agentic AI provides the intelligence and communication capabilities necessary to bridge these silos, enabling comprehensive coordination that considers the full context of customer relationships, service requirements and network capabilities. AI agents operating across these domains can share information, coordinate activities and optimize outcomes that consider customer satisfaction, service quality and operational efficiency simultaneously.

The elimination of functional silos through agentic AI creates opportunities for optimization strategies that were impossible within traditional organizational boundaries.

Customer service agents can access real-time network performance data to provide accurate service restoration estimates and proactive communication about potential issues. Network optimization agents can consider customer value and service priorities when making resource allocation decisions. Billing agents can incorporate actual service delivery quality into pricing and credit decisions.

Synergies Extend to the Following Four Areas:

Integrated Customer Experience Management addresses the entire customer context, encompassing service history, current network conditions and predicted future needs. This integration transforms customer interactions from reactive problem-solving to proactive value delivery that anticipates and addresses customer needs before they become issues.

End-to-End Service Lifecycle Integration enables comprehensive coordination from service design through deployment, operation, optimization and retirement. This integration ensures that service development considers operational requirements, network capabilities and customer needs while optimizing the entire service lifecycle for efficiency and customer value.

Network-Aware Customer Management enables sophisticated decision-making that considers customer requirements and network capabilities. This integration transforms customer management from reactive problem-solving to proactive value creation. It leverages network insights to enhance customer experiences and optimize resource utilization.

Revenue Optimization Through Operational Excellence enables sophisticated strategies that consider customer value, service quality, operational costs and market positioning to maximize revenue potential while maintaining competitive positioning.

5. Addressing Challenges

Developing agentic AI comes with unique and significant challenges that span across multiple domains. CSPs must address key hurdles involved, including the complexities of managing vast amounts of data, the difficulties in scaling operations, the critical need for robust security and privacy measures and the day-to-day operational and management issues. Each of these challenges presents unique hurdles that can impact the effectiveness and reliability of AI agents, making careful planning and robust solutions essential for successful implementation.

Data Challenges

Data quality and governance challenges are among the most significant barriers to successful agentic AI implementation in telecom environments. **The effectiveness of AI agents depends fundamentally on the availability of high-quality, consistent and comprehensive data that accurately represents operational conditions and customer relationships.** Legacy telecom systems often contain data quality issues, inconsistent formats and incomplete information that can significantly impact AI agent performance.

The data used by AI agents must be of high quality, consistent and well-managed. These challenges are foundational, as poor data will directly lead to poor AI agent performance.

- **Data integration complexity** stems from the diverse systems, vendors and data formats that must be reconciled to provide comprehensive intelligence for AI agents. Network management systems, billing platforms, customer service applications and external data sources each maintain distinct data models and update cycles that must be synchronized to support real-time decision-making.
- **Master data management strategies** must establish consistent definitions, formats and governance processes across all data sources that support AI agent operations. This includes customer data, network asset information, service definitions and operational metrics that must be maintained consistently across multiple systems and organizational boundaries.
- **Data lineage and audit trail requirements** ensure that AI agent decisions can be traced back to source data and decision logic for compliance, debugging and optimization purposes. Telecom operations require comprehensive audit capabilities to support regulatory compliance and operational accountability, particularly for decisions that impact customer billing or service delivery.

Scalability Challenges

Scalability challenges refer to the technical and operational demands of growing an AI agent system from a small deployment to a large, widespread one. They addresses the resources and management required to handle a large number of agents.

- **Technical scalability** encompasses compute resources, storage capacity and network bandwidth required to support AI agent operations across large-scale telecom infrastructure.
- **Operational scalability** addresses the organizational capabilities required to manage, monitor and optimize large numbers of AI agents across diverse operational scenarios.
- **Infrastructure scaling** requirements must consider the computational demands of AI agents, particularly for complex decision-making scenarios that involve real-time analysis of large data volumes. Cloud-native architectures provide advantages for scaling AI workloads, but telecom operations often require hybrid deployments that combine cloud resources with on-premises and edge infrastructure.
- **Agent lifecycle management** at scale requires sophisticated orchestration capabilities that can deploy, monitor, update and retire large numbers of AI agents across diverse operational environments. This orchestration must handle version management, configuration distribution, performance monitoring and failure recovery across distributed agent populations.
- **Performance monitoring and optimization** at scale requires comprehensive visibility into agent performance, resource utilization and business impact metrics. This monitoring must identify performance bottlenecks, optimization opportunities and scaling requirements to maintain optimal performance as agent deployments expand.

Security and Privacy Challenges

Protecting data and systems from unauthorized access, misuse and malicious attacks is a critical consideration. This includes compliance with regulations that protect customer information.

- **Security and privacy considerations** for agentic AI implementations must address unique challenges related to autonomous decision-making, data access and system integration. AI agents require access to comprehensive operational data to make effective decisions. However, this access must be managed carefully to prevent unauthorized data exposure or system compromise.
- **Access control and authentication mechanisms** must ensure that AI agents can access required data and systems while maintaining appropriate security boundaries. This includes implementing role-based access controls, secure communication protocols and audit logging that tracks agent activities and data access patterns.
- **Data privacy protection** must ensure that AI agent operations comply with regulatory requirements while enabling effective automation. This includes implementing data minimization principles, anonymization techniques and consent management processes that protect customer privacy while enabling intelligent automation.
- **Cybersecurity considerations** must address potential attack vectors that specifically target AI systems, including adversarial attacks, model poisoning and data manipulation attempts. The autonomous nature of AI agents requires robust security measures that can detect and respond to sophisticated attacks without human intervention.

AI Governance and Ethical AI Frameworks

The autonomous decision-making capabilities of agentic AI create unique governance requirements that extend beyond traditional IT governance frameworks. AI agents can make decisions that have a significant impact on customer experience, operational efficiency and business outcomes without direct human oversight. This creates **accountability challenges** that must be addressed through comprehensive governance frameworks.

The implementation of comprehensive governance frameworks requires significant organizational commitment and technical capabilities but is essential for realizing the full potential of agentic AI while managing associated risks. CSPs that invest in robust governance capabilities will be better positioned to scale AI agent deployments and achieve sustainable competitive advantages through intelligent automation.

Ethical AI principles must guide the development, deployment and operation of AI agents to ensure that automated decisions align with organizational values and societal expectations. These principles include fairness and non-discrimination, transparency and explainability, accountability and responsibility and privacy protection that must be embedded into AI agent design and operation.

- **Fairness and non-discrimination requirements** ensure that AI agent decisions do not create inappropriate bias or discriminatory outcomes for different customer segments or operational scenarios. This requires a thorough examination of training data, decision algorithms and outcome patterns to identify and address potential bias sources.
- **Transparency and explainability capabilities** enable stakeholders to understand how AI agents make decisions and the factors that influence their recommendations. This is particularly important in telecom environments where decisions can impact customer billing, service quality or regulatory compliance.
- **Accountability frameworks** must clearly define responsibility for AI agent decisions and establish processes for oversight, intervention and correction when necessary. This includes defining escalation procedures, human override capabilities and audit processes that ensure appropriate governance of autonomous decision-making.

Decision audit and compliance capabilities must provide comprehensive tracking of AI agent decisions, including the data sources, algorithms and business rules that influenced each decision. This audit capability is essential for regulatory compliance, operational debugging and continuous improvement of AI agent performance.

Risk management frameworks for agentic AI must address technical risks related to system performance and business risks related to decision outcomes. This includes implementing monitoring capabilities that can detect anomalous behavior, performance degradation or unintended consequences that require intervention.

Continuous monitoring and improvement processes must ensure that AI agent performance remains aligned with business objectives and ethical requirements over time. This includes regular performance reviews, outcome analysis and model updates that optimize effectiveness while maintaining compliance with governance requirements.

Human oversight and intervention capabilities must provide appropriate mechanisms for human operators to monitor, modify, or override AI agent decisions when necessary. This includes defining clear escalation criteria, intervention procedures and fallback processes that ensure human accountability for critical decisions.

Operational and Management Challenges

CSPs must address the practical, day-to-day challenges of running an agentic AI system. These challenges cover the full lifecycle of the AI agents, from initial deployment to ongoing maintenance and optimization. Managing these challenges is crucial because they determine how to manage the system and its components efficiently over time.

Agent lifecycle management at scale requires a robust system for their entire lifecycle. This includes deploying, monitoring, updating and retiring a large number of agents across various operational environments.

Continuous performance monitoring and optimization is essential to ensure that agents are performing as expected after they have been deployed. This involves tracking key metrics such as resource utilization and business impact to identify bottlenecks and areas for improvement.

Sophisticated orchestration and coordination of multiple AI agents ensures that they act in unison. This is essential for managing complex tasks and preventing conflicts or redundant actions among the agents.

Human oversight and intervention is necessary even for agentic AI systems. Establishing clear processes for humans to monitor agent decisions, provide feedback and take control when necessary is critical for trust and accountability.

6. Conclusion and Next Steps

The telecom industry is currently undergoing a period of significant transformation that will shape its competitive positioning and operational sustainability for years to come. Agentic AI is not just an incremental improvement to existing automation approaches. It represents a fundamental paradigm shift that will reshape how telecom services are conceived, delivered and optimized. CSPs that recognize this transformation and act decisively to leverage the power of AI agents will define the future of the industry.

The Imperative for Action

The compelling case for agentic AI adoption in telecom stems from the convergence of multiple industry pressures that cannot be effectively addressed through traditional operational approaches. The **rapid increase in network complexity**, driven by 5G deployment, edge computing proliferation and IoT expansion, has created operational challenges that exceed human management capabilities. At the same time, **customer expectations have evolved dramatically**, demanding personalized experiences, proactive service delivery and seamless integration across all touchpoints.

The **financial imperatives** are equally compelling. With global CSP operational expenses representing the majority of industry revenues, even modest efficiency improvements through intelligent automation can generate substantial value. The ability to convert these costs into competitive advantages through superior operational efficiency and enhanced customer experiences is a strategic imperative that CSPs cannot ignore.

The **competitive dynamics** of the telecom industry are evolving rapidly as new entrants leverage cloud-native architectures and AI-driven operations from inception, creating operational advantages that established players must match or exceed to remain competitive. The timeframe for proactive transformation is rapidly narrowing as the industry shifts toward autonomous operations becoming the standard rather than a differentiating capability.

Strategic Implementation Guidance

The successful implementation of agentic AI requires strategic approaches that balance transformation ambition with practical constraints and risk management requirements. **CSPs must develop comprehensive implementation roadmaps** that address technical architecture, organizational readiness and change management requirements while maintaining operational continuity.

The phased implementation approach strikes the optimal balance between transformation speed and risk management by enabling CSPs to build capabilities incrementally while demonstrating value at each stage. Early implementations should prioritize high-impact, lower-complexity use cases to establish organizational confidence and technical capabilities for subsequent, more ambitious phases.

Partnership strategies play a crucial role in implementation success, offering access to specialized expertise, proven solutions and implementation support that may not be available internally. CSPs should evaluate potential partners based on telecom industry experience, AI technical capabilities and cultural alignment with transformation objectives.

Investments in data foundations are essential for the successful implementation of agentic AI. CSPs must address data quality, integration capabilities and governance frameworks to ensure optimal performance of AI agents. These foundational investments provide benefits that extend beyond AI initiatives to improve overall operational effectiveness.

Telco Republic

Netcracker Agentic AI: Scaling AI in Telecom with Precision and Trust

Delivering the Digital Future
Netcracker
An NEC Company

Agentic AI promises to redefine how telecom operators run their businesses – moving beyond basic automation towards intelligent systems that can reason, act and continuously adapt to the changing environment. In an industry known for complexity, from multi-layered networks to intricate billing and customer processes, the potential for autonomous agents to handle real-world tasks is immense.

The challenge, however, is not vision but execution: how to design agents with the right data access, contextual understanding, toolset and human oversight to take on meaningful, end-to-end tasks of increasing sophistication.

Netcracker Agentic AI Solution addresses this head-on, giving telcos a practical path to scale – from targeted automation to orchestrated, self-optimizing operations.

The Foundation: The Platform Powering AI Agents

At the heart of Netcracker's solution is the Agentic AI Platform – an open, multi-agent environment that connects AI reasoning to real-world telecom operations. The platform creates, manages and orchestrates AI agents to deliver immediate business value incorporating:

- **Agent Design Studio** – a low-code environment where operators can rapidly design, test and deploy high-value agentic use cases across any domain, from product catalog to service assurance.
- **AI Trust & Control Layer** – a built-in framework that enforces governance, security and observability for every agent, ensuring transparent, compliant and auditable AI operations at scale.

The platform integrates with any large or small language model (LLM/SLM), giving agents access to the most appropriate model for each task. It also supports MCP and A2A protocols to access relevant data sources, operational tools and other agents needed to collaborate, reason and execute tasks effectively across the telco ecosystem.

From Pilots to Profit: Turning AI into Measurable ROI

Most telcos have experimented with agentic AI in isolated pilots, but few have been able to translate those trials into measurable business results.

Netcracker's solution leverages a structured ROI framework and comprehensive performance analytics to build the right use cases and measure them. Each agent is linked to clear KPIs such as:

- Reduced time-to-market for new offers
- Faster resolution of billing exceptions
- Higher NPS through proactive service assurance

By quantifying value from day one, operators can scale confidently - with metrics that justify investment and demonstrate tangible return.

Designing Agents that Work: The Power of Domain Intelligence

AI agents need access to the right telco domain data, tools and autonomy to execute meaningful tasks. Netcracker's Agentic AI approach equips each agent with the context and capabilities it needs – securely connecting it to operational data, trusted tools and the most suitable LLM to reason and act within defined boundaries. Agents continuously learn from past interactions, adapting to new data and environments to drive ever-higher performance.

Netcracker designs agents to be focused and traceable, limiting complexity to minimize the risk of hallucinations and maintain consistent quality. When orchestrated together, these specialized agents can take on more complex tasks – achieving high levels of automation and accuracy without compromising trust or operational integrity.

60 AI Agents are ready-to deploy with minimal configuration and designed to deliver immediate business impact.

Figure 9. Netcracker Agentic AI Solution

Source: Netcracker, 2025

Scaling with Trust: Governance by Design

As AI takes on more autonomy, operators must balance innovation with oversight. Netcracker embeds AI governance, security and compliance within its solution – covering data sovereignty, auditability and human-in-the-loop control. This 'governed autonomy' model gives operators the confidence to deploy AI across mission-critical domains without sacrificing control or accountability.

Netcracker Agentic AI connects telco systems to measurable outcomes through orchestrated, governed agents.

Netcracker Agentic AI: A Blueprint for Commercializing and Scaling AI

Agentic AI in telecom is a business transformation. Netcracker Agentic AI Solution delivers the structure, trust and scale that operators need to move from experimentation to enterprise-grade automation. By combining domain intelligence, measurable ROI and governed autonomy, it provides a clear blueprint for how telcos can make AI a business asset.

Appendix: Agentic AI Use Cases

Agentic AI is poised to transform telecom operations by automating critical functions across the entire customer and service and network lifecycle. AI agents autonomously manage a wide range of tasks, from customer engagement and monetization to complex network orchestration and service assurance.

- For **Customer Lifecycle Management**, AI agents enable sophisticated monetization strategies, such as dynamic pricing and personalized offers, while also proactively preventing churn and optimizing customer engagement. This leads to improved revenue, customer satisfaction and operational efficiency.
- In **Service and Network Lifecycle Management**, AI agents are crucial for enhancing resource orchestration, automating complex service fulfillment and establishing self-healing networks. By modernizing legacy operations support systems (OSS) functions, agentic AI streamlines everything from automated provisioning to predictive fault management. AI agents allow CSPs to effectively manage the complexity of modern networks, reduce costs and deliver superior service quality in highly competitive markets.

CSPs should prioritize these use cases when planning to boost operational efficiency, reduce costs and provide superior, reliable services in a competitive and complex market.

Customer Lifecycle Agents

Revolutionizing Monetization and Customer Management with Agentic AI

Modern telecom monetization strategies must address the evolving needs of diverse customer segments while optimizing revenue potential in increasingly competitive markets. Agentic AI transforms monetization approaches by enabling dynamic, context-aware pricing strategies, personalized service offerings and intelligent upselling mechanisms that respond to real-time customer behavior and network utilization patterns.

Churn Prediction and Prevention Mechanisms leverage advanced pattern recognition to identify customers at risk of termination before traditional indicators become apparent. AI agents analyze communication patterns, service usage trends, payment behaviors and interaction sentiment to develop comprehensive risk assessments. These agents can automatically initiate retention strategies tailored to the specific factors contributing to churn risk for individual customers.

Cross-Selling and Upselling Optimization through AI agents analyzes customer behavior patterns, service utilization and business or personal context to identify opportunities for additional service offerings. These agents consider timing, relevance and customer receptivity to maximize the likelihood of successful expansions while minimizing customer friction. The sophisticated analysis capabilities enable identification of subtle patterns that indicate readiness for service upgrades or additions.

Dynamic Pricing Optimization through AI agents considers multiple variables to establish optimal pricing strategies in real time. These variables include network capacity, customer usage patterns, competitive positioning and market demand. These agents continuously analyze market conditions and customer behavior to identify opportunities for revenue enhancement while maintaining competitive positioning. The ability to adjust pricing strategies dynamically enables CSPs to maximize revenue during peak demand periods while offering attractive incentives during lower utilization periods.

Intelligent Orchestration of Customer Touchpoints ensures consistent, contextual interactions across all communication channels. AI agents maintain a comprehensive customer context that includes recent interactions, service history, current issues and preferences. This allows them to provide coherent experiences, regardless of whether customers engage through digital self-service, contact centers or retail locations. This orchestration capability eliminates the frustrating experience of repeating information across different touchpoints while enabling more sophisticated service delivery.

Personalized Offer Generation leverages comprehensive customer data analysis to create tailored service packages that align with individual customer needs and preferences. AI agents analyze communication patterns, service usage, payment history and demographic information to identify the most relevant products and services for each customer. This personalization extends beyond simple demographic targeting and incorporates predictive modeling that anticipates future needs based on life events, business growth patterns and technology adoption trends.

Proactive Customer Engagement is a significant departure from traditional reactive customer service models. AI agents continuously monitor customer usage patterns, service quality metrics and satisfaction indicators to identify opportunities for proactive outreach. Rather than waiting for customers to report issues or request assistance, proactive agents can identify potential problems, recommend optimizations and offer relevant services before customers recognize the need.

Transforming Billing and Revenue Management

The growing complexity of modern telecom services has placed significant strain on billing and revenue management systems, exceeding their designed capabilities. Usage-based pricing models, complex service bundles, partner revenue sharing arrangements and real-time service modifications require sophisticated automation to ensure accuracy and efficiency. Agentic AI provides the intelligence necessary to manage this complexity while minimizing revenue leakage and improving operational efficiency.

Billing Exception Handling, which has historically been a manual and time-consuming process, can be largely automated through the use of AI agents. These agents analyze exception patterns, apply resolution logic and escalate only truly complex scenarios to human operators. This automation significantly reduces processing time while improving accuracy and customer satisfaction.

Credit Management and Collections Optimization through AI agents considers multiple factors including payment history, customer value, economic conditions and communication preferences to develop personalized collection strategies. These agents can determine optimal timing for collection communications, select appropriate communication channels and recommend payment arrangements that maximize recovery while preserving customer relationships.

Customer Communications regarding billing, service changes and account management can be personalized and optimized through AI agents that consider customer preferences, communication history and content effectiveness. These agents can generate appropriate messaging, select optimal delivery channels and time communications to maximize customer engagement and satisfaction.

Fraud Detection and Prevention capabilities leverage sophisticated pattern recognition to identify potentially fraudulent activities in real time. AI agents analyze usage patterns, geographic information, device characteristics and behavioral indicators to distinguish between legitimate usage variations and potential fraud. The real-time nature of this analysis enables immediate response to prevent revenue loss while minimizing false positive impacts on legitimate customers.

Intelligent Mediation and Rating processes through AI agents ensure the accurate processing of usage data from diverse network sources. These agents can identify and resolve data quality issues, apply complex rating logic and handle exceptions that would traditionally require manual intervention. The ability to learn from historical patterns enables these agents to improve accuracy over time while adapting to novel service types and pricing models.

Partner and Wholesale Management involves complex revenue sharing calculations, service level monitoring and reconciliation processes that benefit from intelligent automation. AI agents can manage partner relationship workflows, monitor service delivery compliance and optimize revenue sharing arrangements based on actual performance metrics. The ability to handle complex calculation scenarios while maintaining audit trails ensures accuracy and transparency in partner relationships.

Real-Time Charging and Policy Enforcement enable dynamic service delivery that responds to network conditions, customer preferences and business rules. AI agents can modify service parameters, adjust charging rates and apply policy controls in real-time based on comprehensive context analysis. This capability is essential for advanced 5G services that require dynamic resource allocation and pricing.

Revenue Assurance processes benefit significantly from AI agent capabilities in anomaly detection and pattern analysis. These agents continuously monitor revenue streams, comparing actual performance against expected patterns to identify discrepancies that may indicate system malfunctions, process failures or fraudulent activities. The comprehensive analysis capabilities enable identification of subtle revenue leakage that might escape traditional monitoring approaches.

Service and Network Lifecycle Agents

Enhancing Resource Orchestration with Agentic AI for Better Network Lifecycle Management

NLM through AI agents encompasses automated provisioning, configuration management, maintenance scheduling and retirement processes. These agents can predict infrastructure failures, schedule preventive maintenance and coordinate replacements to minimize service impact. The comprehensive understanding of infrastructure dependencies enables intelligent maintenance planning that optimizes resource availability while ensuring service continuity.

In modern telecom environments, resource orchestration involves the coordination of computing, networking and storage resources across distributed infrastructure. This infrastructure may span data centers, edge locations and cloud environments. The complexity of this orchestration increases exponentially with the incorporation of network slicing, containerized network functions and dynamic service requirements. Agentic AI agents provide the intelligence necessary to manage this complexity while optimizing resource utilization and service delivery.

Autonomous Network Rollout represents the highest maturity level of network autonomy, for example, TM Forum Level 5, where AI replaces human decision-making and takes complex actions with no human supervision. Autonomous network rollout involves the continuous, goal-driven orchestration of the entire network lifecycle. Agents autonomously generate optimal routing paths, dynamically allocate resources based on real-time factors like bandwidth demand and latency and continuously adapt to changing network conditions to maintain operational efficiency and reliability. This moves AI from an augmentation tool to an intrinsic component of the network architecture.

Edge Computing Resource Management poses unique challenges due to the distributed nature of edge infrastructure and the need for local decision-making capabilities. AI agents deployed at edge locations can make autonomous decisions about resource allocation, traffic routing and service placement while coordinating with centralized management systems. This distributed intelligence is essential for supporting ultra-low latency applications and ensuring optimal performance across diverse edge environments.

Intelligent Resource Allocation through AI agents considers multiple variables including current utilization patterns, predicted demand, SLAs and cost optimization objectives. These agents continuously analyze resource usage across the infrastructure to identify optimization opportunities and automatically implement allocation adjustments. The ability to predict future resource needs based on historical patterns and current trends enables proactive resource provisioning that prevents service degradation while minimizing overprovisioning costs.

Multi-Cloud Resource Management requires orchestration across various cloud providers, each with distinct APIs, capabilities and pricing models. AI agents can optimize workload placement across multiple cloud environments based on performance requirements, cost considerations and availability needs. The ability to automatically migrate workloads between cloud providers in response to performance issues or cost optimization opportunities provides significant operational advantages.

AI-Driven Service Orchestration and Closed-Loop Automation for Service Lifecycle Management

SLM encompasses the entire journey from the initial design of services to their deployment, operation, optimization and eventual retirement. AI agents can optimize each phase of this lifecycle by analyzing usage patterns, performance metrics and customer feedback to inform service improvements and evolution strategies. The comprehensive view of service performance enables data-driven decisions about service enhancements, pricing adjustments and retirement planning.

Service orchestration extends beyond simple workflow automation, incorporating intelligent decision-making that considers customer requirements, network conditions, resource availability and business policies. The rise of complex service ecosystems, particularly in 5G environments, requires orchestration capabilities that can adapt dynamically to changing conditions while maintaining service quality and operational efficiency.

Closed-Loop Automation through AI agents creates self-healing networks that can detect problems, analyze root causes, implement solutions and verify resolution effectiveness without human intervention. This capability is essential for managing the complexity of modern networks while maintaining the service availability expectations of customers. The closed-loop approach ensures that automated actions are verified for effectiveness and that unsuccessful interventions are appropriately escalated.

Dynamic Service Assurance is a significant advancement over traditional monitoring approaches by providing proactive issue detection and autonomous remediation capabilities. AI agents continuously analyze service performance metrics, customer experience indicators and network health data to identify potential issues before they impact customers. These agents can automatically implement corrective actions, coordinate with other systems and escalate issues that require human intervention.

Intelligent Service Fulfillment through AI agents transforms the traditional service activation process from manual, error-prone procedures to automated workflows that can handle complex service configurations and dependencies. These agents understand service requirements, resource capabilities and configuration relationships to automatically provision services while ensuring compliance with technical and business constraints. The ability to handle exceptions and adapt to unexpected conditions ensures reliable service delivery even in complex scenarios.

Network Slicing Management for 5G networks involves creating and managing multiple virtual networks on shared physical infrastructure, each with distinct performance characteristics and resource requirements. AI agents can optimize slice resource allocation, monitor slice performance and dynamically adjust configurations to maintain service level agreements while maximizing infrastructure utilization.

Quality of Service Management in complex network environments requires continuous monitoring and adjustment of network parameters to maintain service level agreements across diverse traffic types and network conditions. AI agents can analyze traffic patterns, predict congestion scenarios and automatically adjust quality of service policies to optimize performance while maintaining fairness across different service categories.

Service Catalog Management through AI agents enables dynamic service offerings that can adapt to market conditions, customer demand and technical capabilities. These agents can analyze service performance, customer adoption patterns and competitive positioning to recommend service modifications, pricing adjustments and new service offerings that optimize revenue potential.

Service Onboarding Automation streamlines the process of provisioning and activating new customer services. This involves automating the entire lifecycle from the point of sale through to provisioning, activation, real-time know your customer (KYC), compliance, rating, billing and collection. Agentic AI acts to unify the typically siloed processes of network provisioning (OSS) and transactional/revenue management (BSS). The desired outcome is achieving real-time, near-zero turnaround time (TAT) or time-to-activate (TTA) for new services, which is essential for rapidly provisioning and monetizing dynamic offerings, such as customized 5G/6G experiences and on-demand network slicing.

Technical Service Design utilizes agentic AI to automate the complex configuration and resource allocation necessary for deploying advanced services, particularly end-to-end network slicing in 5G and future 6G environments. Intelligent agents translate high-level business requirements, or intent, into detailed, low-level network configurations. This process includes automatically determining optimal resource allocation, setting QoS parameters and guaranteeing SLAs. The function of technical service design is to customize network functions and computing/communication resources in an end-to-end fashion, decreasing the cost and complexity of slice customization for tenants.

Modernizing Operations Support Systems (OSS) Functions

OSSs have served as the backbone of telecom operations for decades, providing essential functions for inventory management, provisioning, performance monitoring and maintenance coordination. However, these systems were designed for simpler network environments and operational models, limiting their effectiveness in modern telecom operations. Agentic AI provides the intelligence necessary to modernize these functions while maintaining operational continuity.

The modernization of OSS functions through agentic AI creates opportunities for significant operational efficiency improvements while enabling new capabilities that were impossible with legacy approaches. However, implementing these changes successfully requires careful consideration of integration requirements, governance mechanisms and change management processes to ensure a smooth transition from existing operational models.

Automated Provisioning and Activation processes through AI agents eliminate manual intervention points that introduce delays and errors in service delivery. These agents can understand complex service requirements, identify appropriate resources and coordinate configuration activities across multiple systems and vendors. The intelligent handling of exceptions and edge cases enables reliable automation even for complex service scenarios.

Capacity Planning and Network Optimization through AI agents leverage comprehensive data analysis to inform infrastructure investment decisions and operational optimization strategies. These agents can analyze traffic patterns, predict growth scenarios and recommend infrastructure modifications that optimize performance while minimizing costs. The long-term perspective enabled by predictive analytics supports more effective strategic planning.

Fault Management Transformation through AI agents enables predictive maintenance and autonomous problem resolution that significantly reduces service disruptions and operational costs. These agents can analyze fault patterns, predict equipment failures and coordinate preventive maintenance activities to minimize service impact. The integration with repair processes and vendor management systems enables comprehensive fault management automation.

Intelligent Inventory Management through AI agents transforms static inventory tracking into dynamic asset optimization that considers utilization patterns, maintenance requirements and strategic planning needs. These agents can predict inventory needs, optimize procurement timing and coordinate asset deployment to minimize costs while ensuring availability. The ability to analyze complex asset relationships and dependencies enables more sophisticated inventory optimization than traditional approaches.

Performance Monitoring and OPTIMIZATION through AI agents provide comprehensive network visibility that extends beyond simple threshold monitoring to include predictive analytics and autonomous optimization. These agents can identify performance trends, predict degradation scenarios and automatically implement optimization strategies to maintain service quality. The ability to correlate performance data across multiple network layers and systems enables more effective problem identification and resolution.

Agentic **Root Cause Analysis** is an evolution of AIOps, focusing on moving beyond simple alarm correlation toward predictive network reliability and autonomous fault remediation. Agents are designed to analyze extensive network data to predict potential issues, such as congestion or hardware failures, before they manifest, and then initiate autonomous countermeasures. The architecture involves a crew of specialized agents working collaboratively, such as a Cell Anomaly Detector Agent, an Anomaly Root Cause Explainer (ARE) Agent, and an Anomaly General Optimizer (AGO) Agent, all supervised by a monitoring entity. The outcome is a coordinated, cross-domain resolution capability, enabling automated responses across the Radio Access Network (RAN), transport, core and even triggering updates to customer service systems.

About Telco Republic

We are the go-to, thought-provoking market research and advisory firm for the new telecom software market.

Our mission is to track ongoing disruption and innovation related to telecommunications business and operations.

As a boutique firm we focus specifically on emerging management systems and applications that allow operationalization and monetization of emerging technologies, operating models and market value creation ecosystems.

- We advise technology vendors on their strategic positioning and messaging. This includes innovation start-ups.
- We advise communications service providers on their strategic purchasing decisions.
- We advise investor clients regarding their strategic investment decisions.

Our Commitment

Within three months, we can help you define a new strategic technology vision and guide you on initial execution of this vision.

We provide rigorous, in-depth benchmarking analysis of the players in this market. Our services center on rigorous, well-vetted market ranking & capability assessments, based on a proven, fact-based rating methodology of respective companies in a given market. In this context, we advise technology vendors on their strategic positioning and messaging, and we advise communications service providers regarding their strategic purchasing decision making.

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