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Transforming Network Service Assurance: The Role of AI Agents and Machine Learning

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Abstract: *The integration of Artificial Intelligence and Machine Learning has fundamentally transformed network service assurance by enabling unprecedented capabilities in network management and optimization. This transformation addresses critical challenges in managing increasingly complex network infrastructures while meeting escalating service demands. AI agents and ML algorithms revolutionize multiple aspects of network operations, from proactive fault detection to automated service optimization. These technologies dramatically improve network reliability, operational efficiency, and customer experience through enhanced predictive maintenance, real-time monitoring, and automated issue resolution. The evolution extends to edge computing integration, 5G network management, and advanced analytics, creating more resilient and adaptive network infrastructure. Despite technical and operational challenges, including integration complexity and skill gaps, the adoption of AI-driven solutions continues to accelerate, promising significant advancements in network service assurance and paving the way for future innovations in telecommunications infrastructure management. The implementation of specialized agents for monitoring, diagnostics, prediction, remediation, and optimization enables autonomous operation with minimal human intervention, fundamentally changing how networks are managed and maintained.*

Keywords: Network Service Assurance, Artificial Intelligence, Machine Learning, Edge Computing, Network Automation

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