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HEAVY READING

WHITE PAPER

Open, Automated, and Programmable Transport Networks:
2024 Heavy Reading Survey

A Heavy Reading white paper produced for Ciena, Infinera, Juniper, and Nokia

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EXECUTIVE SUMMARY

Over the past decade, the communications industry has seen a steady ramp of automation in communications service provider (CSP) networks. The transport network has historically been operated and managed statically and defined by manual processes and proprietary protocols. With its greater complexities—particularly in the optical layers—transport was not the earliest adopter of network automation. However, CSPs understand that transport is an essential component of the end-to-end network and a critical component of automation.

Heavy Reading has been tracking progress in transport automation across multiple use cases, including network performance monitoring, network planning, software feature upgrades, capacity provisioning, and others. These use cases reduce costs, increase reliability, deliver services more rapidly, and help operators differentiate their services and company.

Today, artificial intelligence (AI) and machine learning (ML) are the mega-trends dominating the headlines across virtually every industry, including communications. AI and ML have major roles to play in the transport network and, in fact, are already being used to deliver network health, predictive analytics, and other advanced functions. There is much more to come in these areas. However, amidst the hype, operators must not lose sight of the practical applications of these technologies.

Recognizing the growing significance of network automation, Heavy Reading launched the **Open, Automated, & Programmable Transport Networks Market Leadership Program** to investigate the opportunities and identify the challenges. In July and August 2024, Heavy Reading conducted the Year 3 version of the global network operator survey, building on past insights, delving deeper into existing trends, and investigating emerging areas, including the impacts of AI. This white paper analyzes the results and key findings across all survey topics, including the following:

- Transport automation use cases and benefits
- IP and optical convergence, or IP over DWDM
- Optical layer automation
- AI and ML in transport

Key findings

The following are the key findings from this study.

Use cases and benefits

- **Operators are making progress on transport automation, but it is still early**. A majority of operators surveyed (79%) are currently in the "partial automation" phase (Level 2) or earlier, based on the TM Forum autonomous network maturity framework. At 35%, the largest group is in the "partial automation" phase. In three years, 58% expect to have reached the "conditional autonomous" phase (Level 3) or higher, with 25% expected to be "high autonomous" (Level 4).

- **Many transport automation use cases resonate with operators today and tomorrow**. Network performance monitoring tops the list of automated use cases today (with 54% reporting automation), while predictive analytics, active test, and software upgrades are also strong. In three years, 80% of operators or higher expect adoption of each of the 11 use cases surveyed.
- **Cost savings from transport automation applications are relatively modest so far (including both capex and opex)**. Of respondents, 40% estimate annual opex savings of 10–20% while 31% estimate annual capex savings of 10–20%, and a surprisingly high share of operators sees little or no current savings in either spending measure. Many network automation use cases do drive savings, so it is possible these savings have not yet been quantified by operators. It is also important to understand that automation delivers benefits to network operators beyond savings.
- **Reducing human error and operational simplification top the list of automation benefits being achieved today, selected by 65% and 49% of operators surveyed, respectively.** Many also benefit from faster service turn-up and infrastructure usage optimization. While these benefits may drive cost savings, they also deliver other value to operators, such as improving reliability or driving new or faster revenue.

IP and optical convergence

- **According to the majority of operators surveyed, IP and optical teams do not coordinate tightly today, with most transport use cases coordinated "as needed."** The most coordinated are network performance monitoring (coordinated by 32% of operators), network troubleshooting (also 32%), and network optimization (31%).
- **Operator preferences for managing coherent pluggables are a mix, but hierarchical controllers stand above the rest**. Of the operators surveyed, 33% prefer a hierarchical controller to manage pluggables, while 21% prefer optical controllers, and 16% prefer IP controllers.
- **Preferences for managing coherent pluggables align closely with where respondents sit in the organization**. Those in converged roles favor hierarchical controllers, while respondents in optical roles favor optical controllers, and those in IP roles prefer IP controllers.
- **Ensuring operational practices tops the list of management challenges in IPoDWDM.** This includes operational practices across pluggable optics from different suppliers, between pluggables and traditional transponders, and across IP and optical domains.

Optical

- **Automated service activation tests are an important component of optical network service activation**. Of respondents, 74% believe that automated service activation tests are at least "important," and 22% of operators believe these tests are "critical."
- **The high cost of required infrastructure is the No. 1 barrier to adopting digital twin for optical networks**. Lack of multi-vendor support is also a significant digital twin adoption barrier.

AI/ML

- **AI/ML tools are beginning to be used in transport, but there is still a long way to go**. Of the operators surveyed, 46% are using AI/ML for some network operations and seeing some benefits, and an additional 30% are in the experimental phase with AI/ML tools. Tier 1 operators surveyed are further along compared to their Tier 2/3 counterparts.
- **Operators identify four use cases that will especially benefit from AI/ML over the next three years**. Identified by 40%-plus of respondents are predictive analytics, network troubleshooting, energy consumption optimization, and network optimization.
- **Operators want their vendors to test the operator's datasets to validate AIOps tools in two ways**. Of the operators surveyed, 31% want validation aligned with new software releases, while 14% want validation whenever AI models get updated. Preferences are remarkably consistent across geographies and operator sizes.

Vendors

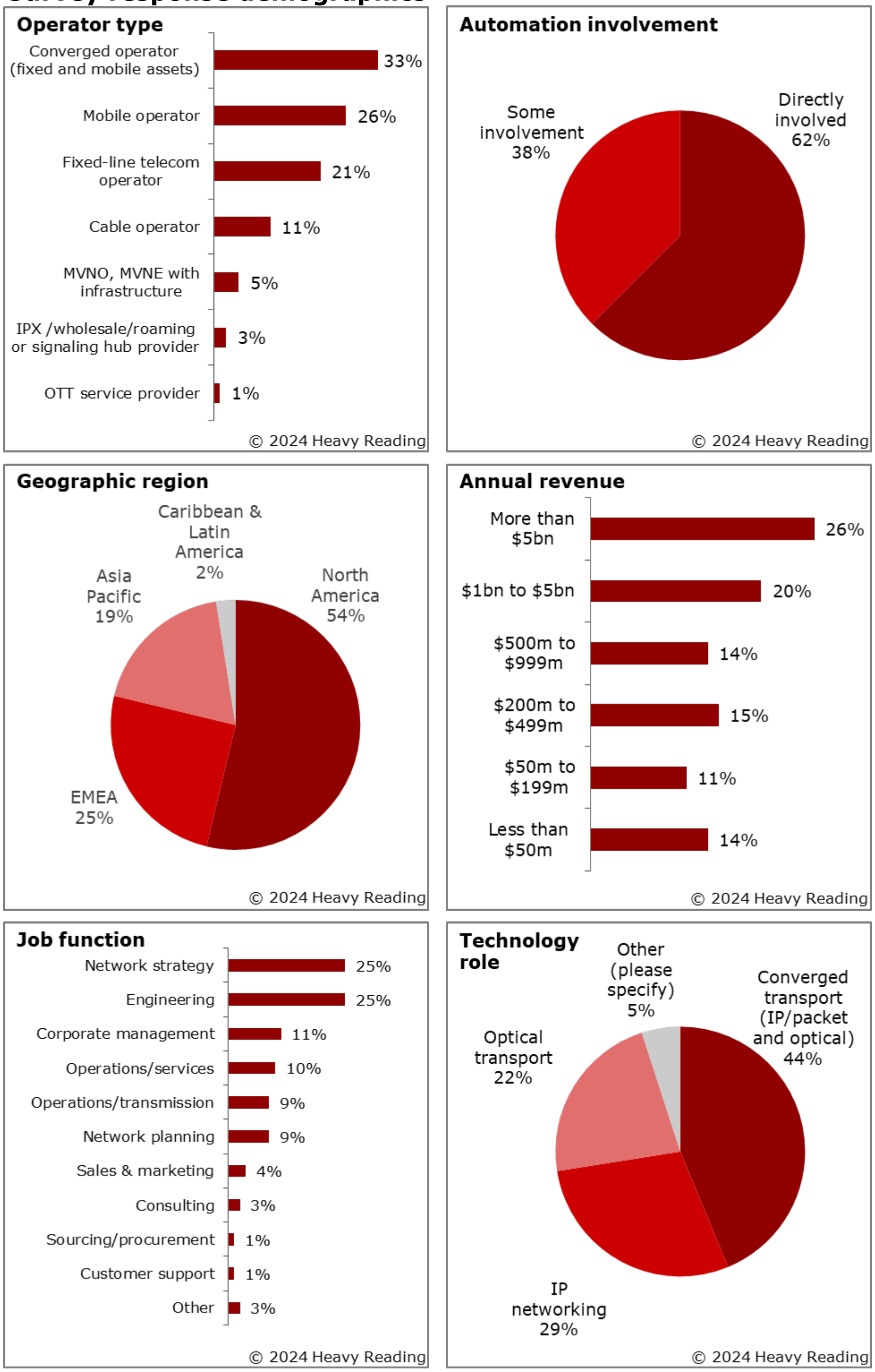
- **Open standard data models/APIs in the network elements and domain controllers top the list of vendor requirements to support automation.** Of the respondents, 61% need open APIs in the network elements, and 57% need open APIs in domain controllers. A second tier of requirements includes multi-layer support, multi-vendor support, and professional services support.

Survey demographics

This report is based on a web-based, worldwide survey of network operators conducted in July and early August 2024. Respondents were drawn from the network operator list of the Light Reading readership database. After reviewing responses, 80 were judged qualified participants and were counted in the results. To qualify, respondents had to work for a verifiable network operator and be involved in deploying, managing, purchasing, or using network automation for transport networks. Further screening was conducted to remove incomplete surveys and questionable responses.

The full survey demographics are detailed in **Figure 1**.

Figure 1: Survey response demographics



Note: Numbers in figures throughout this report may not total 100 due to rounding.
n=80
Source: Heavy Reading

USE CASES AND BENEFITS

This section addresses general transport automation use cases and benefits for network operators. Later sections explore more specific areas of automation, including IP and optical convergence, optical layer, and AI and ML. To avoid ambiguity, Heavy Reading provided the following definition for a transport network and asked respondents to answer the survey questions based on this definition:

Provides connectivity for data, voice, and video services between endpoints in the service provider network including aggregation, metro, and core. Transport broadly encompasses optical as well as packet-based network elements, including IP. It ensures efficient and reliable transmission of various types of traffic across different segments of the network.

Using the basic maturity model for autonomous transport defined by the TM Forum (which itself is derived from the Society of Automotive Engineers [SAE]), Heavy Reading has adapted an automation maturity model specific to the transport network (see **Figure 2**).

Figure 2: Transport network automation maturity model

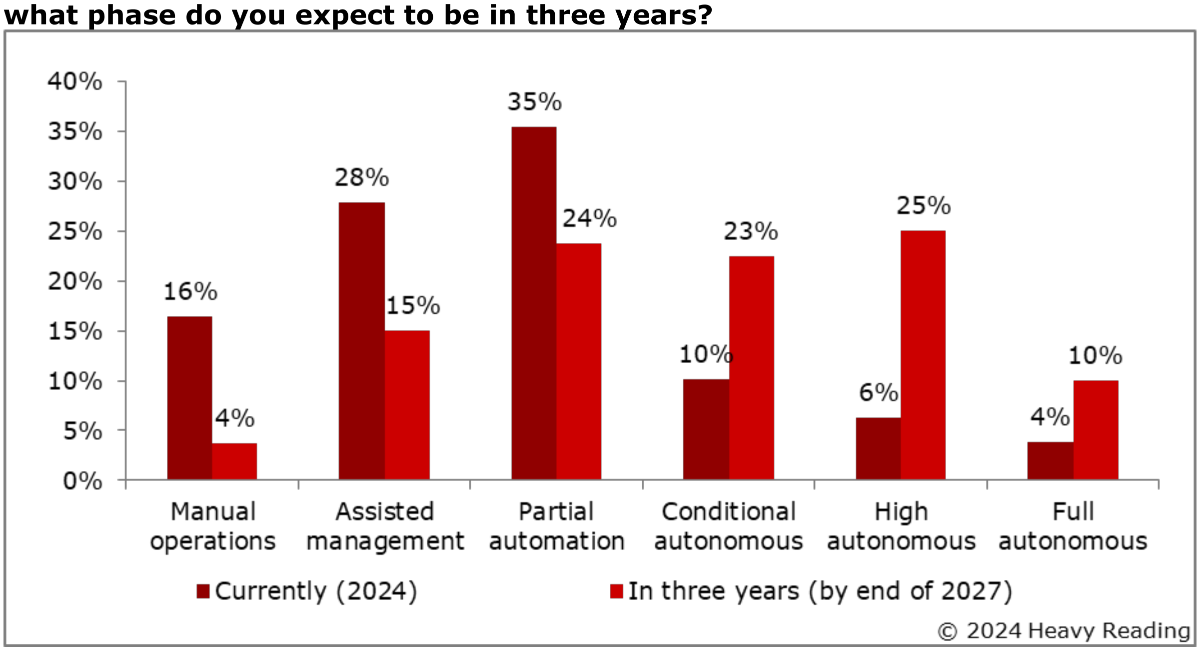
Phase	Attributes	Automation level
Manual operations	• CLI-based device configuration • Legacy OSS/NMS	0
Assisted management	• Automated daily repetitive tasks • Recommendations based on history and simple rule-based programming	1
Partial automation	• Meaningful recommendations from a wide range of real-time data • Introduction of telemetry • Introduction of AI/ML in the transport network	2
Conditional autonomous	• AI/ML use across a wide range of use cases • E2E, cross-domain applications of automation become common • Introduction of intent-based networking and closed-loop automation in certain scenarios	3
High autonomous	• Intent-based and closed-loop across a wide range of use cases • Human actions required only for specific scenarios	4
Full autonomous	• Self-configuring, self-optimizing, self-healing, self-protecting • Closed-loop operations across most services, domains, and layers	5

Source: Heavy Reading and TM Forum, 2024

Heavy Reading provided respondents with brief definitions from **Figure 2** and asked them to identify both their current phase of transport automation and where they expect to be in three years. Results show that operators are making progress, but it is still early. Of operators surveyed, 79% are currently in the "partial automation" phase (Level 2) or earlier. At 35%, the largest group is in the "partial automation" phase. Characteristics include meaningful recommendations from a wide range of real-time data, the introduction of telemetry, and the introduction of AI/ML in the transport network (see **Figure 3**).

In three years, just 43% expect to be in the Level 2 phase of automation or earlier, with just 4% expecting to be in "manual operations" (Level 0). By that time, 58% of operators expect to have reached the "conditional autonomous" phase (Level 3) or higher, with 25% expected to be "high autonomous" (Level 4). For these operators, AI/ML will be used across a wide range of use cases, cross-domain applications will be common, and intent-based networking and closed-loop operations will either be introduced (Level 3) or common (Level 4).

Figure 3: What is the current phase of your transport network automation, and what phase do you expect to be in three years?

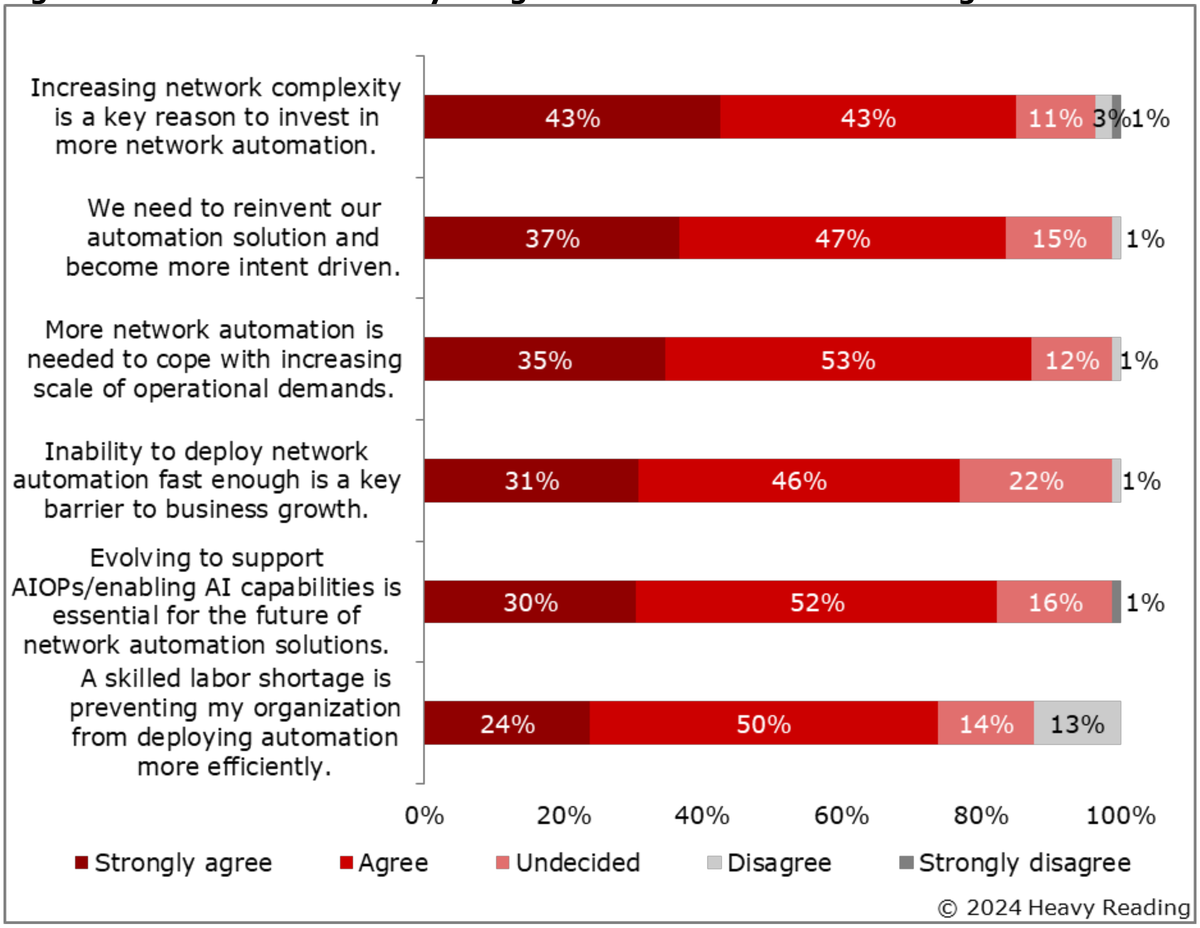


n=80

Source: Heavy Reading

When asked if they agree with a set of automation-related statements, 43% of operators say they "strongly agree" that increased network complexity is a key reason to invest in more automation. Additionally, 37% "strongly agree" that they need to become more intent-driven, and 35% "strongly agree" that more automation is needed to cope with increasing scale and automation demands. In sum, these statements point to increasing network complexity and scale driving the need for advanced automation technologies that can simplify network operation and abstract the underlying complexity (e.g., using intent-based networking to abstract complexity and drive simple operational requests directly to the network) (see **Figure 4**).

Figure 4: To what extent do you agree with each of the following statements?



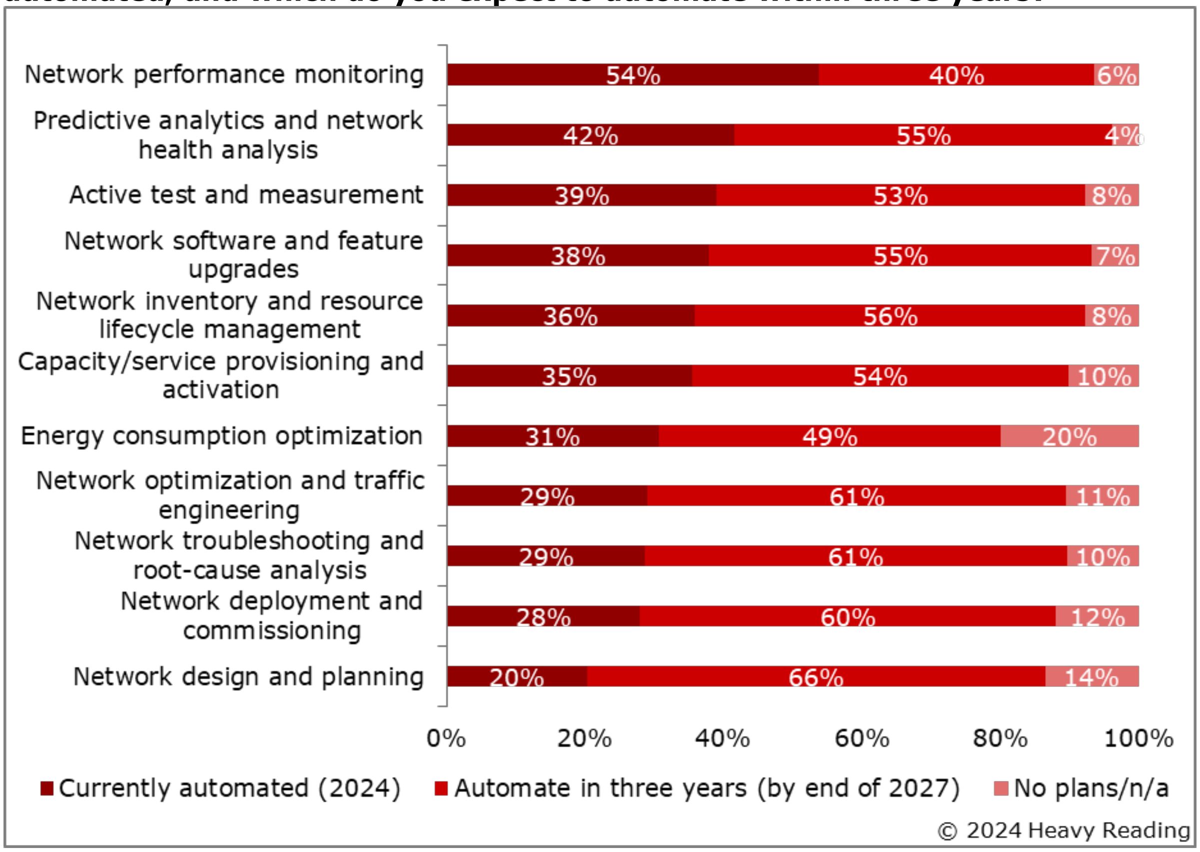
n=80

Source: Heavy Reading

Network performance monitoring tops the list of transport use cases that are automated today (selected as currently automated by 54% of operators surveyed). Predictive analytics and network health analysis, active test, and software and feature upgrades are also strong transport use cases for automation currently. These use cases address network reliability, quality of service (QoS), and customer experience and can help operators differentiate from competitors. Network reliability and customer experience are high priorities in the C-suite among operators (see **Figure 5**).

While many use cases are not automated today, operators expect strong adoption of automation in transport use cases across the board over the next three years. By the end of 2027, at least 80% of operators surveyed expect to automate each of the 11 transport use cases listed.

Figure 5: Which of the following transport use cases have you currently automated, and which do you expect to automate within three years?



n=79

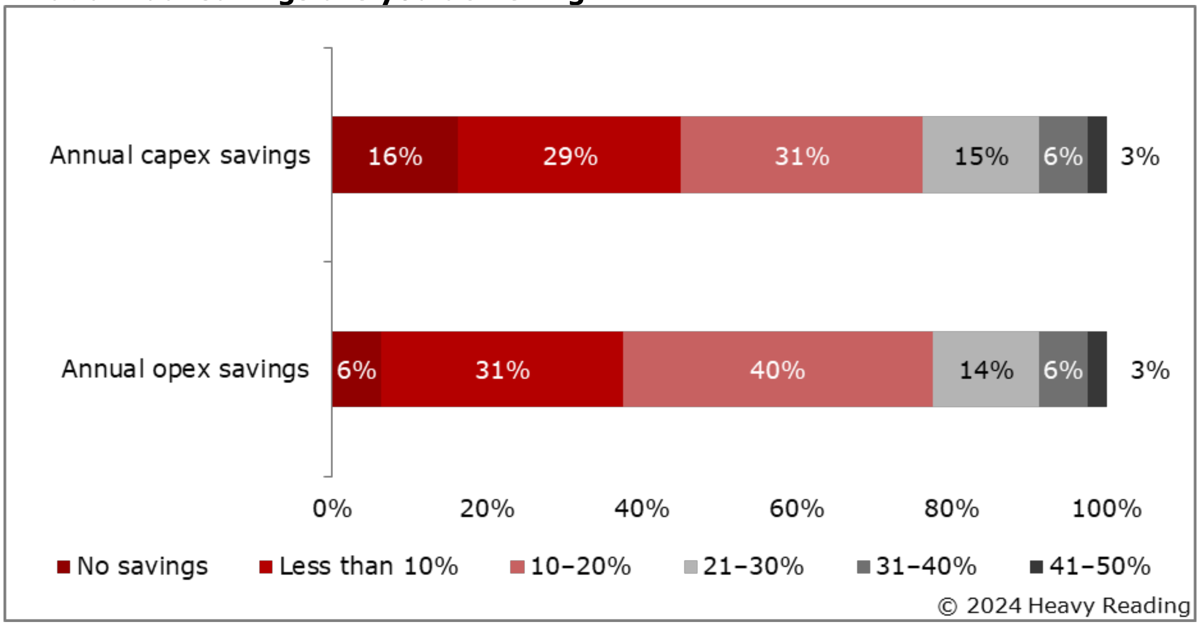
Source: Heavy Reading

Cost savings are a common thread across multiple automation use cases for transport—including savings on both opex and capex. So, it is surprising that operators report relatively modest cost savings from current transport automation applications. Of survey respondents, 40% estimate annual opex savings of 10–20% from current automation, while 31% estimate annual capex savings of 10–20%. Additionally, a high share of operators today see little or no current savings. 45% of respondents estimate capex savings of less than 10% or no savings, and 37% estimate opex savings of less than 10% or no savings (see **Figure 6**).

It is uncertain without further inquiry, but it is possible that the savings question's focus on current savings leads to a modest response. Most operators are at early stages, as evidenced by their current stages (referring to **Figure 3**) and their current level of use case adoption (referring to **Figure 5**). Savings benefits may not yet have been quantified by operators.

Another possible explanation is the fragmented nature of automation today. If a process, for example, consists of 10 tasks and only 5 of them are automated, it does not mean that 50% of the benefits are realized. One or two cumbersome, manual tasks within the overall process could greatly diminish the outcome (including cost savings).

Figure 6: For the transport network automation that you have already deployed, what annual savings are you achieving?



n=80

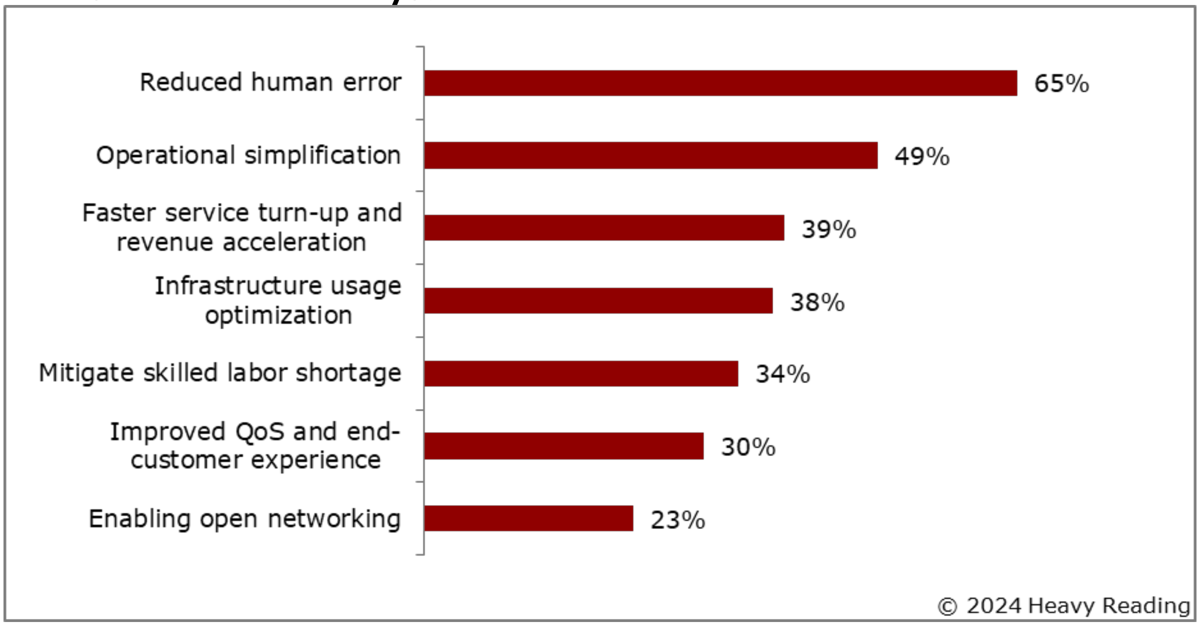
Source: Heavy Reading

Digging deeper into current networks, Heavy Reading asked operators to list the benefits of transport automation that has already been deployed. Here, two benefits rise to the top of the list: reduced human error (cited by 65% of respondents) and operational simplification (picked by 49%). Many also benefit today from faster service turn-up (selected by 39%) and infrastructure usage optimization (picked by 38%) (see **Figure 7**).

Monetization of services to end subscribers with quick time-to-market, increased reliability, and improved customer experience are top priorities among C-suite executives, and network automation helps deliver on these crucial goals.

Returning to the cost savings discussion, Heavy Reading notes that reducing human error, operational simplification, and infrastructure usage optimization are also three use cases that deliver cost savings.

Figure 7: For the transport network automation that you have already deployed, what other benefits have you realized?



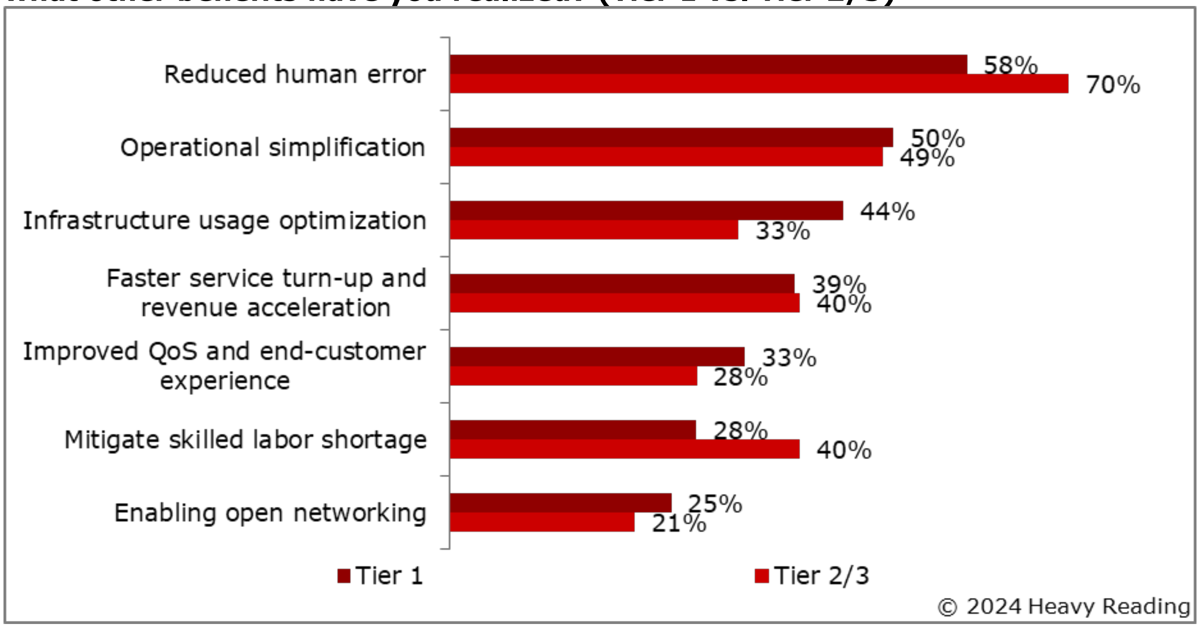
Note: Select up to three
n=79
Source: Heavy Reading

Breaking out responses by operator annual revenue yields some differences in key benefits that are being achieved. Specifically, Heavy Reading breaks out responses by Tier 1 operators (defined as annual revenue of $1bn-plus) and Tier 2/3 operators (defined as annual revenue of less than $1bn).

Tier 1 and Tier 2/3 operators both agree on reduced human error and operational simplification as the top two benefits, though reduced human error is a particularly strong benefit among the Tier 2/3 operators (selected by 70% of the group). However, while mitigating skilled labor shortage is not a top priority among Tier 1 operators surveyed, it is ranked third among Tier 2/3 operators (selected by 40% of Tier 2/3 operators vs. just 28% of Tier 1 operators).

Past Heavy Reading research has highlighted a similar trend, in which smaller operators struggle with hiring talent more than larger ones. Additionally, more Tier 1 operators see benefits from infrastructure optimization compared to their Tier 2/3 counterparts (see **Figure 8**).

Figure 8: For the transport network automation that you have already deployed, what other benefits have you realized? (Tier 1 vs. Tier 2/3)

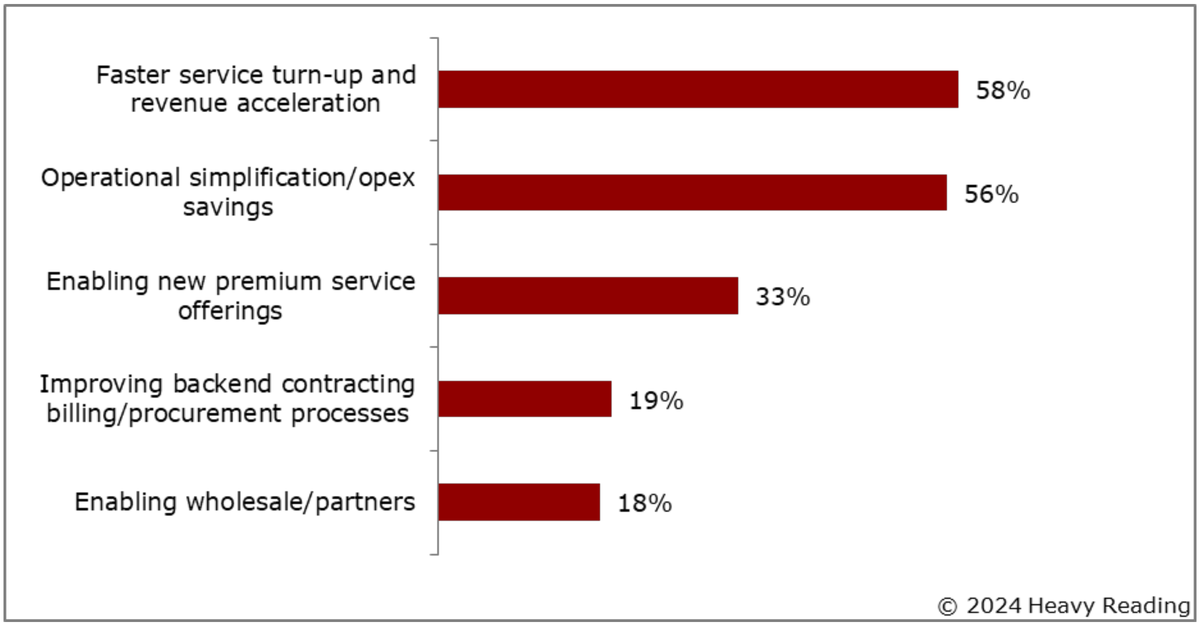


n=36 Tier 1, 43 Tier 2/3
Tier 1 = $1bn-plus annual revenue; Tier 2/3 = <$1bn annual revenue
Source: Heavy Reading

Heavy Reading also asked operators to identify their primary drivers specifically for service automation in the transport network (in contrast to the more general automation drivers/benefits question earlier). Topping the list for service automation, and statistically tied, are faster service turn-up and operational simplification, selected by 58% and 56% of respondents, respectively. Interestingly, the drivers hit both top-line revenue generation (faster service turn-up) and cost savings (simplified network operations).

In addition, a third of operators (33%) are also looking for automation to differentiate their business with premium services. In some cases, network automation will be essential for these types of services (see **Figure 9**).

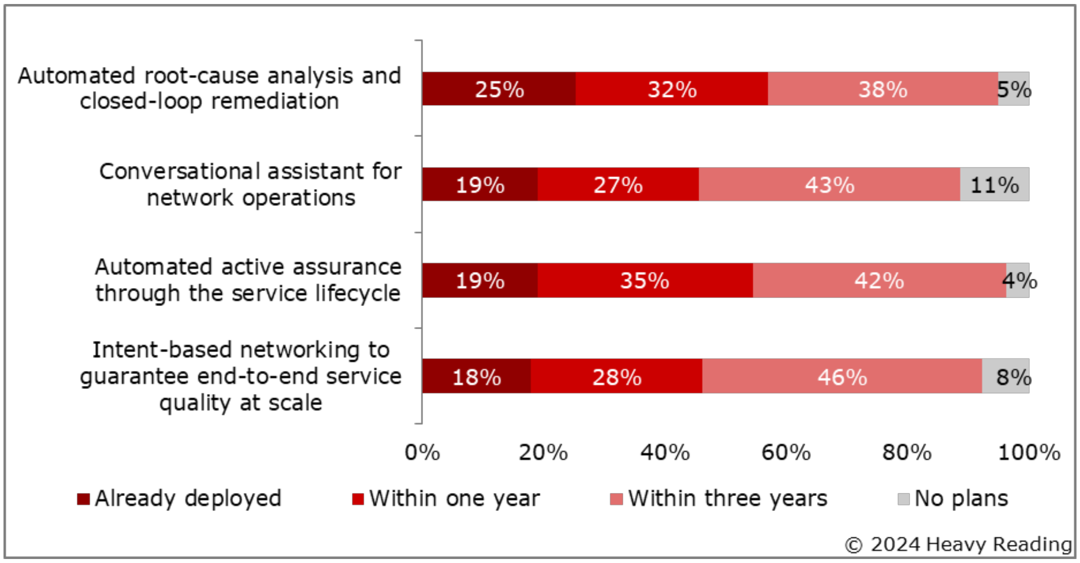
Figure 9: Which are the primary driver(s) for service automation in your transport network?



Note: Select up to two
n=78
Source: Heavy Reading

Looking at four advanced automation functions, 25% of operators surveyed have adopted automated root-cause analysis. Just 19% of operators have adopted automated active assurance and conversational assistants, and just 18% report intent-based networking for end-to-end service quality. However, expectations are bullish for all four of these functions over the next three years and even within the next year. Within one year, for example, 57% of operators expect automated root-cause analysis/closed-loop remediation, and nearly as many (54% of the group) anticipate automated service assurance (see **Figure 10**).

Figure 10: What timeframe are you planning to deploy the following networking innovations?



n=79
Source: Heavy Reading

As a summary for this section, **Figure 11** consolidates the 11 transport automation use cases identified in this survey, including listing the essential benefits of automation and where in the network lifecycle each use case resides.

Figure 11: Transport automation use case classifications

Use case	Essential benefits	Network lifecycle phase				
		Design and planning	Deployment and provisioning	Operations: Assurance	Operations: Analytics and reporting	Network modification
Network design and planning	• Faster service turn-up • Reduce human error • Cost reduction	↔				
Network inventory and resource lifecycle management	• Faster service turn-up • Reduce human error • Cost reduction	↔	↔	↔	↔	↔
Network deployment and commissioning	• Faster service turn-up • Improved QoS and CX • Cost reduction		↔			
Capacity provisioning and activation	• Faster service turn-up • Improved QoS and CX • Cost reduction		↔			
Network performance monitoring	• Improved QoS and CX • Operational simplification			↔		
Network troubleshooting and root cause analysis	• Improved QoS and CX • Operational simplification			↔		
Active test and measurement	• Improved QoS and CX • Operational simplification			↔		
Predictive analytics and network health analysis	• Improved QoS and CX • Infrastructure usage optimization				↔	
Network software and feature upgrades	• Faster service turn-up • Operational simplification • Cost reduction					↔
Network optimization and traffic engineering	• Infrastructure usage optimization • Operational simplification • Cost reduction					↔
Energy consumption optimization	• Infrastructure usage optimization • Cost reduction					↔

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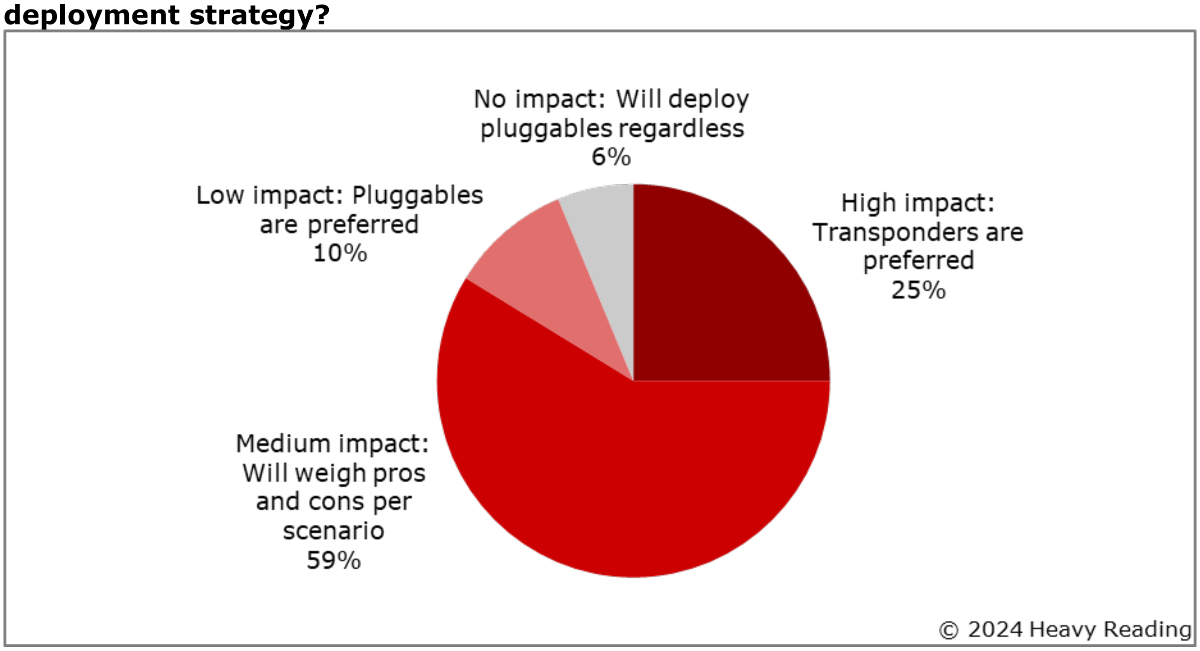
Source: Heavy Reading, Ciena, Infinera, Juniper, and Nokia, 2024

IP AND OPTICAL CONVERGENCE

IP over DWDM involves equipping coherent pluggable optics directly in network elements (particularly routers). The IP over DWDM renaissance was sparked by the commercialization of coherent pluggable optics initially at 400Gbps data rates, but IP and optical convergence entails much more than coherent pluggable optics. Convergence also requires multi-layer control and management, tight organizational coordination, open hardware and software, and extensive automation.

Figure 12 highlights the rapid ascension of pluggable optics in the transport network from niche applications to mainstream in a few short years. Most operators surveyed (59%) expect to weigh the pros and cons of pluggables and transponders on a case-by-case basis. Significantly, the performance of pluggables is improving each year. Still, for the highest-performance applications, transponders will continue to have the edge for many years to come. For operators, 25% prefer transponders for the unique performance benefits they can provide (see **Figure 12**).

Figure 12: Given that pluggable optics are generally less spectrally efficient than high performance transponders, how does spectral efficiency impact your optics deployment strategy?



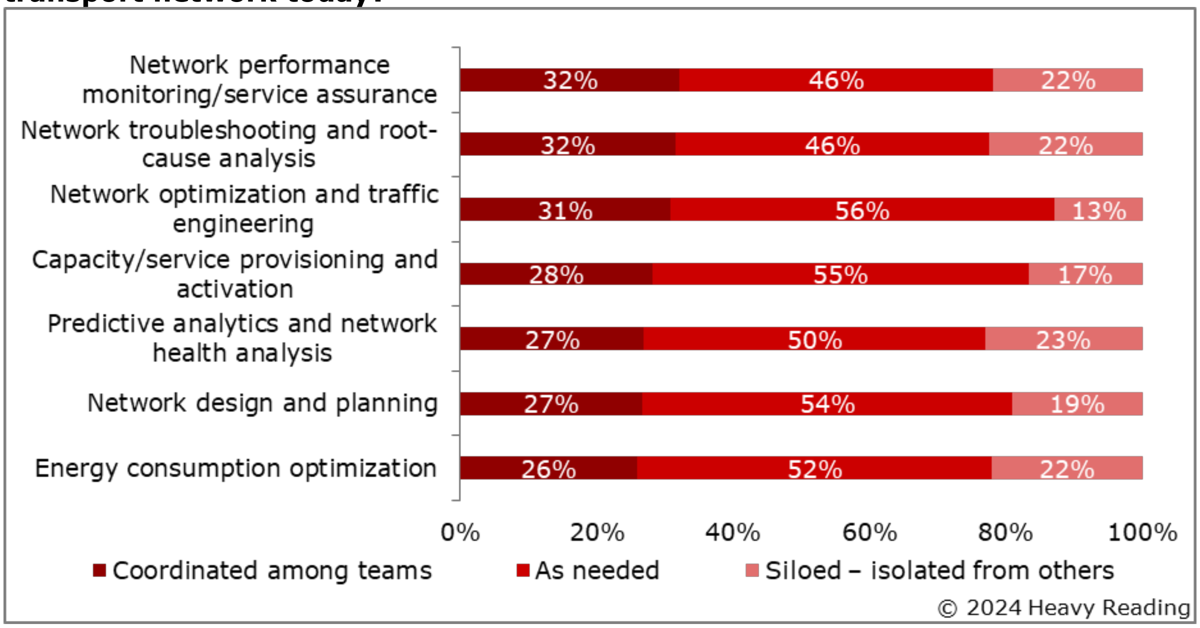
n=80

Source: Heavy Reading

Team coordination among IP and optical groups is relatively low across many of the 11 use cases analyzed in this study. For a plurality of operators (if not the majority), coordination between teams is "as needed" for all use cases. Most coordinated today are network performance monitoring (coordinated by 32% of operators), network troubleshooting (also 32%), and network optimization and traffic engineering (31%). Among the use cases given, network optimization and traffic engineering is also the least likely to be siloed (just 13% of operators selected siloed) (see **Figure 13**).

This data is important because organizational coordination is an essential step on the road to network convergence. History shows that if organizations and reporting structures do not align to support it, the convergence of network layers is unlikely to happen. This helps explain why more nimble networks—such as hyperscalers or even smaller telecom operators—are first movers in IPoDWDM adoption while Tier 1 operators lag behind.

Figure 13: How do operations teams coordinate on IP/optical use cases in your transport network today?



n=79

Source: Heavy Reading

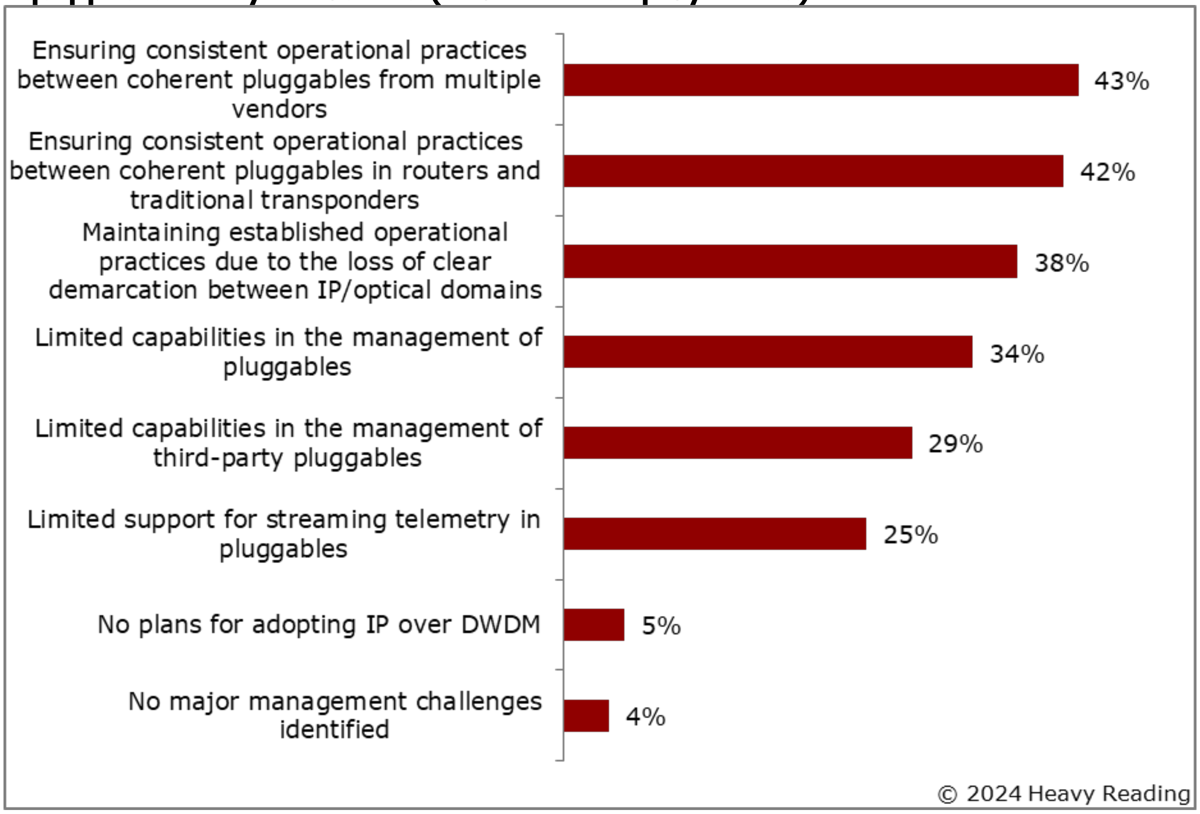
Past Heavy Reading surveys have shown that managing coherent pluggable optics is one of the biggest—if not the biggest—challenges that operators face in migrating from traditional optical networks to multi-vendor IPoDWDM architectures. In this year's survey, Heavy Reading digs deeper into the specific management challenges of IPoDWDM networks (**Figure 14**). Ensuring operational practices tops the list of management challenges in IPoDWDM in three areas:

- Across coherent pluggable optics from multiple suppliers (selected by 43%)
- Between coherent pluggable optics and traditional transponders (selected by 42%)
- Across IP and optical domains (selected by 38%)

All three challenges are multi-vendor interoperability issues (requiring standardization and open APIs). The third challenge also relates to the lack of multi-layer coordination and organizational convergence discussed earlier in this section.

Finally, it is noted that limited management capabilities in managing pluggables (including third-party optics) can be a concern, but it is secondary to addressing the operational challenges.

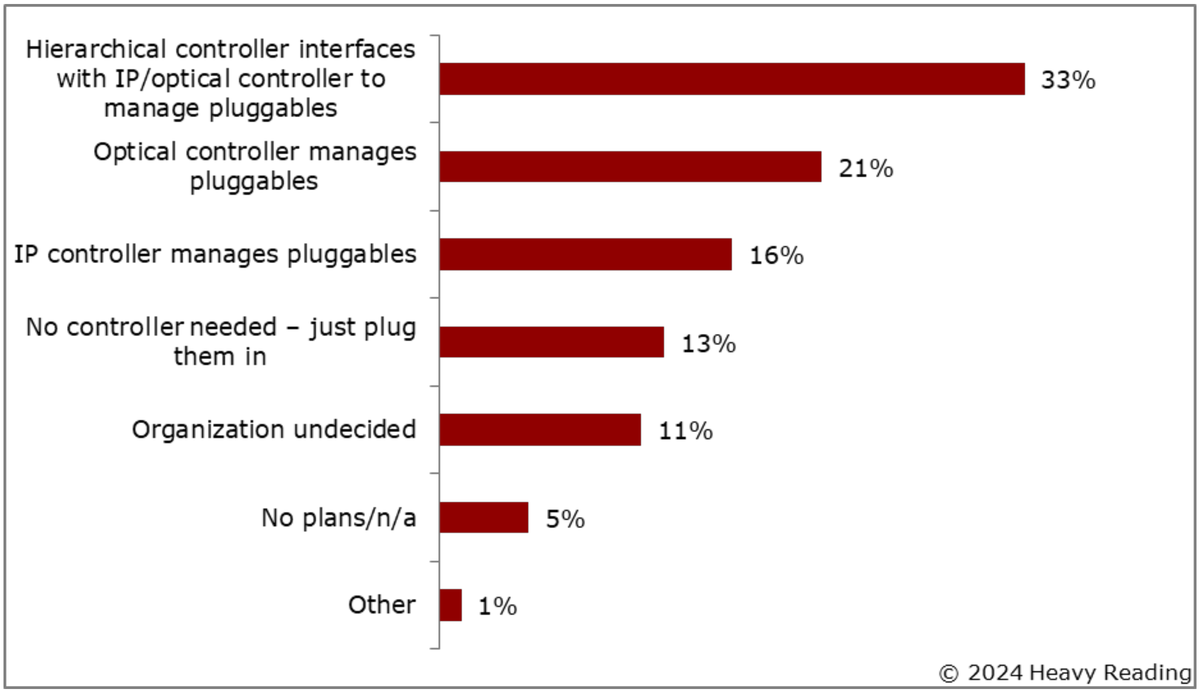
Figure 14: What are your top challenges in managing coherent pluggable optics equipped directly in routers (IPoDWDM deployments)?



Note: Select up to three
n=79
Source: Heavy Reading

Operator views vary on how they are managing, or plan to manage, coherent pluggables, but hierarchical controllers are preferred by a plurality of respondents (selected by 33%). Still, just over one in five operators (at 21%) prefer optical controllers, and 16% want IP controllers to manage their pluggables, while 13% are using no controller at all, though it is not clear if that is by preference or by necessity at this early stage (see **Figure 15**).

Figure 15: What strategy are you adopting for managing coherent pluggables in routers?



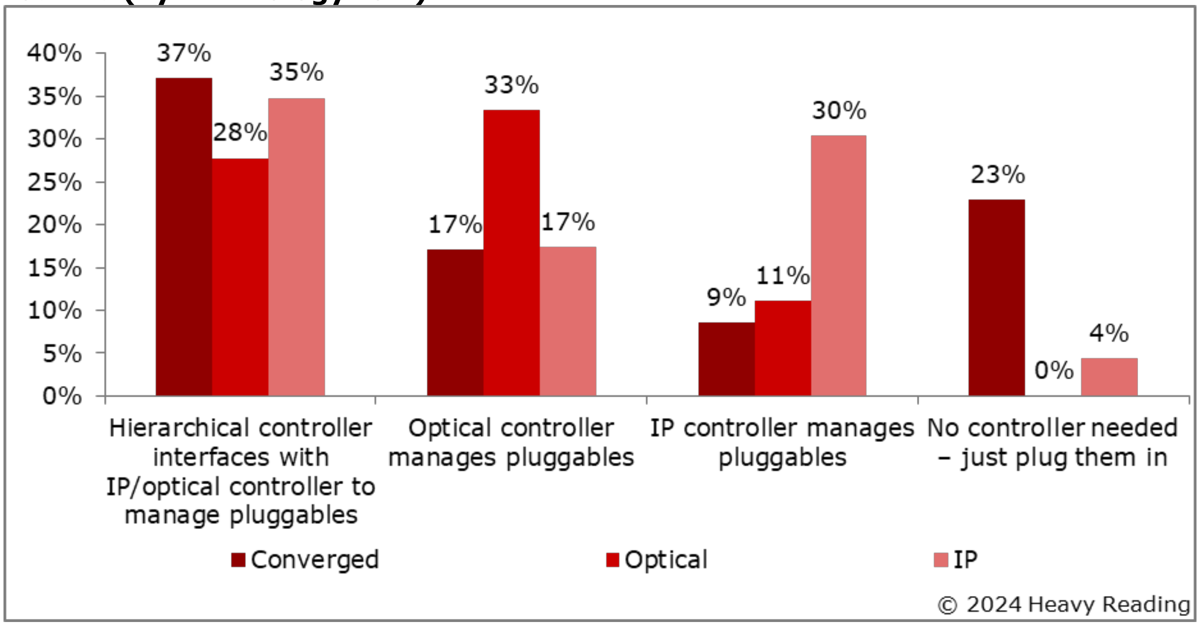
n=80

Source: Heavy Reading

Underscoring the role of organization structures in IPoDWDM strategies, Heavy Reading finds that pluggable management strategies vary greatly by where in the organization employees sit (i.e., by technology role). Respondents in converged roles within the organization selected hierarchical controllers as the top preference (37%). Those in optical roles identified optical controllers the most (33%). Respondents in IP roles prefer hierarchical controllers the most (at 35%), but a large minority (30%) also selected IP controllers for management—a much higher percentage than any other technology role (see **Figure 16**).

These results show that, while operators weigh the technical merits of different management approaches, the organizational structure will also play a crucial role in decision-making.

Figure 16: What strategy are you adopting for managing coherent pluggables in routers (by technology role)?



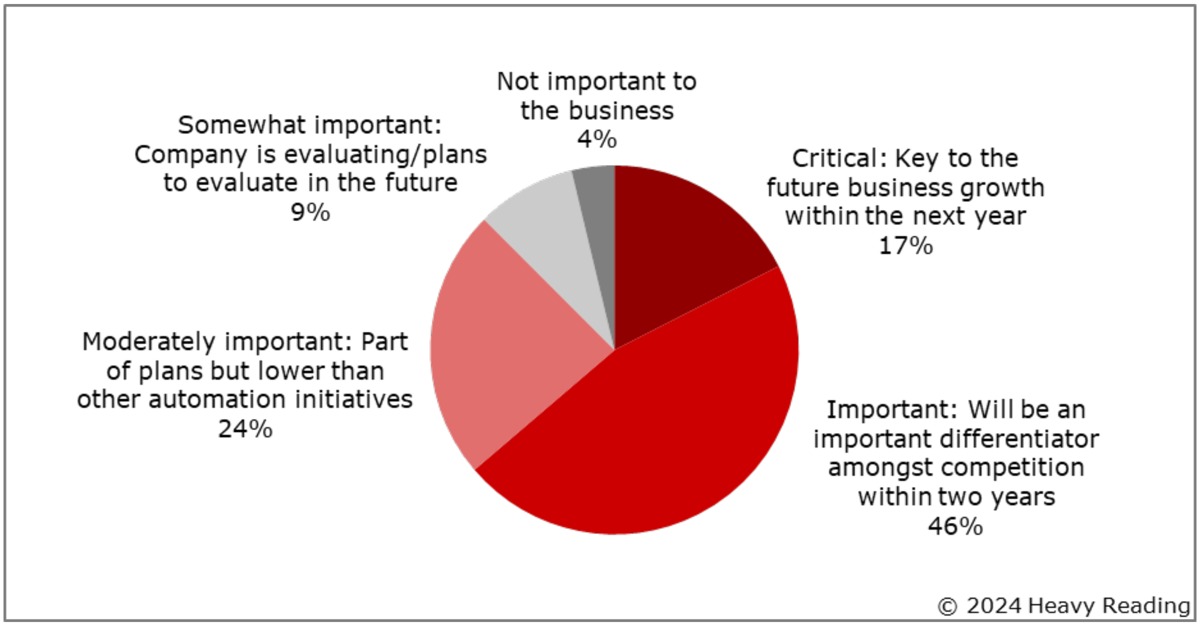
n=35 converged, 18 optical, 23 IP
Source: Heavy Reading

OPTICAL LAYER AUTOMATION

While the previous section addresses IP and optical convergence, this section focuses specifically on optical layer automation topics, including virtualizing network services for network as a service (NaaS), service activation test automation, and challenges to adopting optical layer digital twins.

Virtualizing network services/locations to support NaaS is at least "important" for 63% of operators surveyed, and 17% of operators see the virtualization of network services or locations as "critical" (see **Figure 17**).

Figure 17: How important is it to fully virtualize optical network services/locations and execute automated path computation to deliver and realize network as a service?

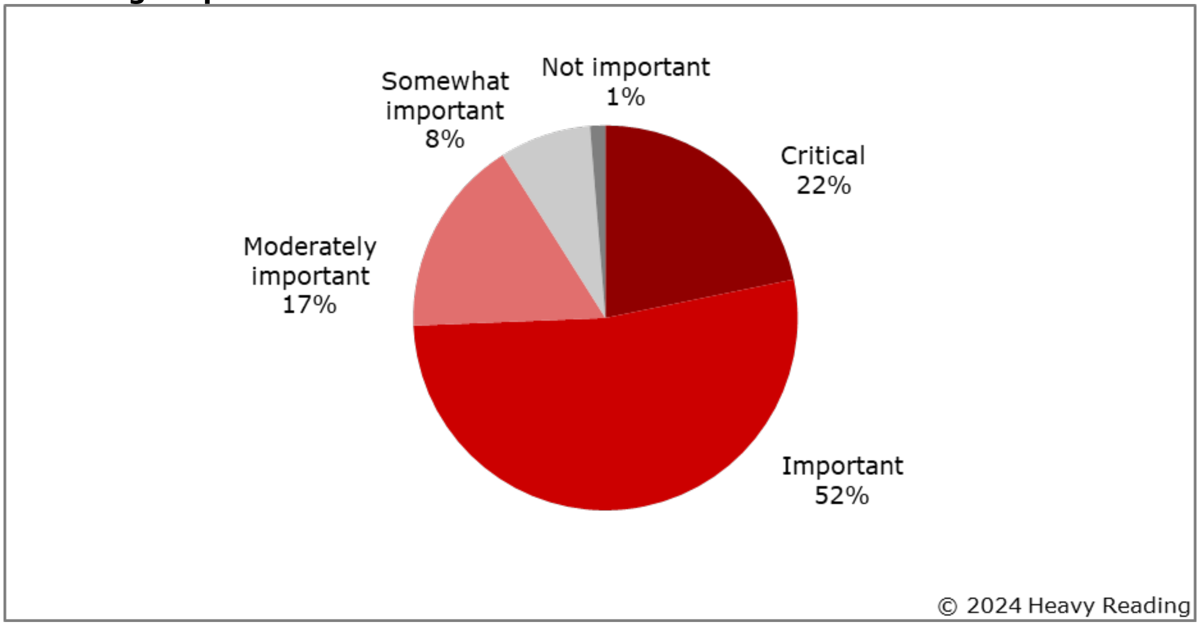


n=80
Source: Heavy Reading

Operators also largely agree that an automated service activation test for wavelengths is important, with 74% of operators surveyed responding that automated service activation tests are at least "important," and 22% of operators believe these tests are "critical." An additional 17% believe such testing is "moderately important," suggesting at least some value, and just 9% believe automated service activation tests are just "somewhat important" or "not important" at all.

Parsing the data further, Heavy Reading notes that the smallest operators (<$50m) place a slightly lower importance on automated tests compared to larger operators. Smaller operators typically have fewer complex networks and services, perhaps making automated testing benefits a bit less impactful for them (see **Figure 18**).

Figure 18: How important is it to automate service activation tests for optical wavelengths prior to service creation?



n=78
Source: Heavy Reading

Lastly in this section, Heavy Reading asked operators to rank key barriers to adopting digital twin strategies for their Layer 0 (photonic) and Layer 1 (optical) networks. Respondents were asked to rank their top three barriers from a list of five, and **Figure 19** shows the ranking and scores. High costs of required infrastructure are the No. 1 barrier to adopting digital twin for optical networks, based on the survey, and by a relatively wide margin. Ranking second, lack of multi-vendor support is also a significant barrier, according to survey results. Security concerns rank third, though scores indicate this barrier (and the others) are secondary to costs and multi-vendor issues. In addition, Heavy Reading believes that the lower scores indicate a lack of maturity in those capabilities, thus pushing them further down the deployment timeline.

Figure 19: Rank the following barriers to adopting a digital twin strategy for your Layer 0 and Layer 1 networks. (Rank top three, where 1 = the biggest barrier)

Barrier	Rank	Score
High costs of required infrastructure (e.g., VM resources)	1	141
Lack of multi-vendor support	2	103
Security concerns	3	79
Lack of fiber simulation capabilities	4	74
Lack of multi-domain support	5	65

Mean=92.4; n=79
Source: Heavy Reading

AI AND ML

The intersection of automation and AI

Heavy Reading has been tracking the progress of automation in transport networks for over a decade, including through this annual survey study. Following the launch of ChatGPT and other generative AI models based on revolutionary transformer models, AI is arguably the biggest topic of discussion across nearly every industry, including telecommunications. It can be difficult to discuss automation today without quickly getting into AI.

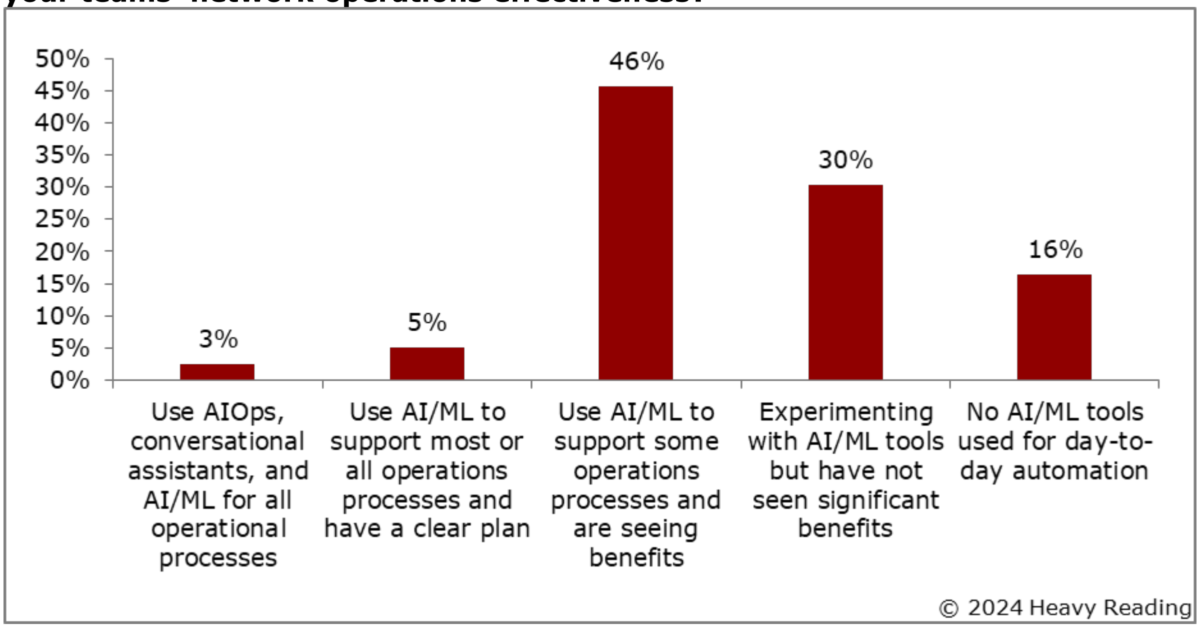
There is a relationship between automation and AI, but this relationship can cause confusion when discussing automation and its applications in the transport network. While linked and often complementary, automation and AI are not synonymous.

AI involves simulating human intelligence and reasoning to complete tasks. Alarm/network failure root-cause analysis and predictive network health are two examples of transport use cases that use predictive AI to parse large amounts of data to make diagnoses and predictions about the current and future state of the network. In these two AI-specific use cases, automation is used in data collection, analysis, prediction, and (if the operator chooses) autonomous action based on the AI algorithms' conclusions. AI and automation have a highly symbiotic relationship. AI helps improve the output of automation, and at the same time, automation aids AI in doing its job.

ML is an important subset of AI. Complex ML algorithms allow computers to learn from and make predictions or decisions based on exposure to datasets. Significantly, continued exposure to datasets over time results in data analysis and predictions that are increasingly effective and accurate.

Heavy Reading research shows that AI/ML tools are beginning to be used in transport networks, but there is still a long way to go before adoption is ubiquitous. Of the operators surveyed, 84% are currently using AI/ML in some form. Breaking this number down further, 46% of operators are using AI/ML for some network operations and seeing some benefits, while an additional 30% are in the experimental phase with AI/ML tools. As expected, very few report extensive use today (just 8% report AI/ML use in most or all processes) (see **Figure 20**).

Figure 20: To what degree have you implemented effective AI/ML tools to improve your teams' network operations effectiveness?

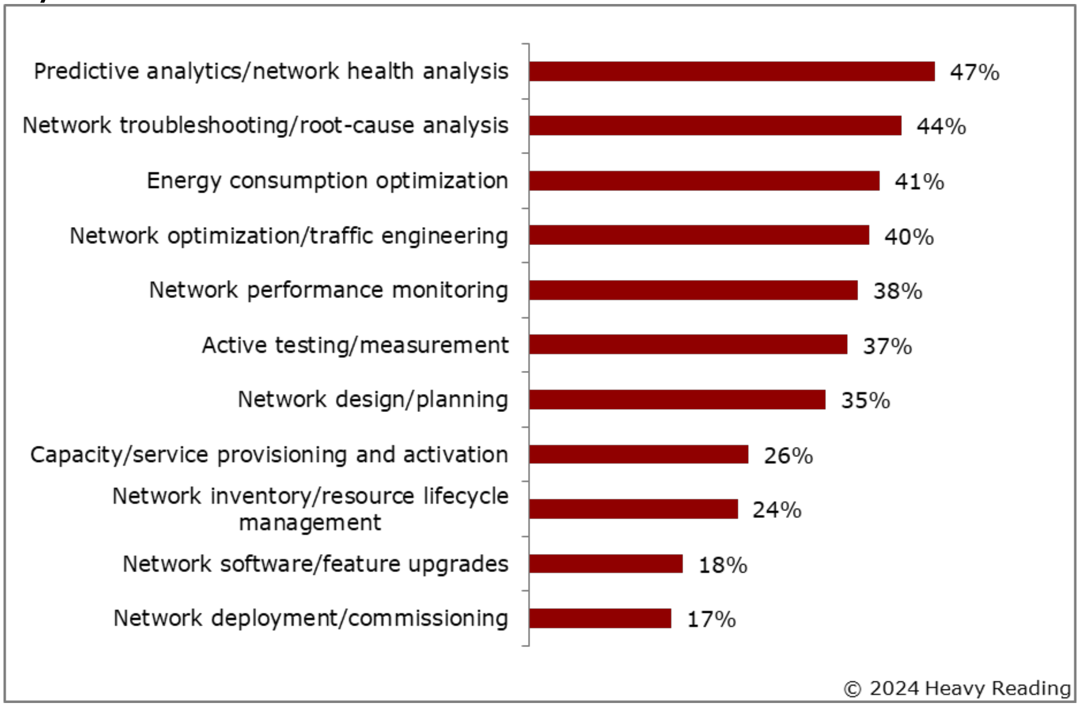


n=79

Source: Heavy Reading

Operators believe that AI/ML will highly benefit many of the 11 transport use cases that are included in this survey. Topping the list of use cases to benefit from AI/ML are predictive analytics (selected by 47%), network troubleshooting (44%), energy consumption optimization (41%), and network optimization (40%). Each of these four use cases was selected by 40% or more of the survey respondents. Each of these use cases benefits from AI's ability to rapidly analyze massive amounts of data and make decisions and predictions based on the data (see **Figure 21**).

Figure 21: Over the next three years, which use cases will benefit the most from AI/ML?



Note: Select up to five
n=78
Source: Heavy Reading

Digging deeper into AI, Heavy Reading asked operators to prioritize AI network operations according to implementation timelines. Responses were asked to rank the top three AI operations, where 1 was "highest priority." Quicker troubleshooting of network failures/issues (ranked first) and predictive maintenance (ranked second) stand out among AI operations with high scores. Maximizing ROI by running networks hotter (more efficiently) ranks third on the priorities list (see **Figure 22**). Note that predictive maintenance and troubleshooting were also identified as the two most promising use cases expected to benefit from AI/ML.

Figure 22: In what order are you implementing AI into your network operations (i.e., AIOps)? (Rank top three, where 1 = highest priority)

AI network operation	Rank	Score
Quicker troubleshooting of network failures/issues	1	112
Predictive maintenance to avoid potential issues	2	99
Maximizing ROI by having networks run hotter	3	77
Incorporating "Copilot" type assistant to automate workflows	4	55
Capacity planning of multi-layer transport	5	54
Coordinating operational workflows across multiple network layers	6	53

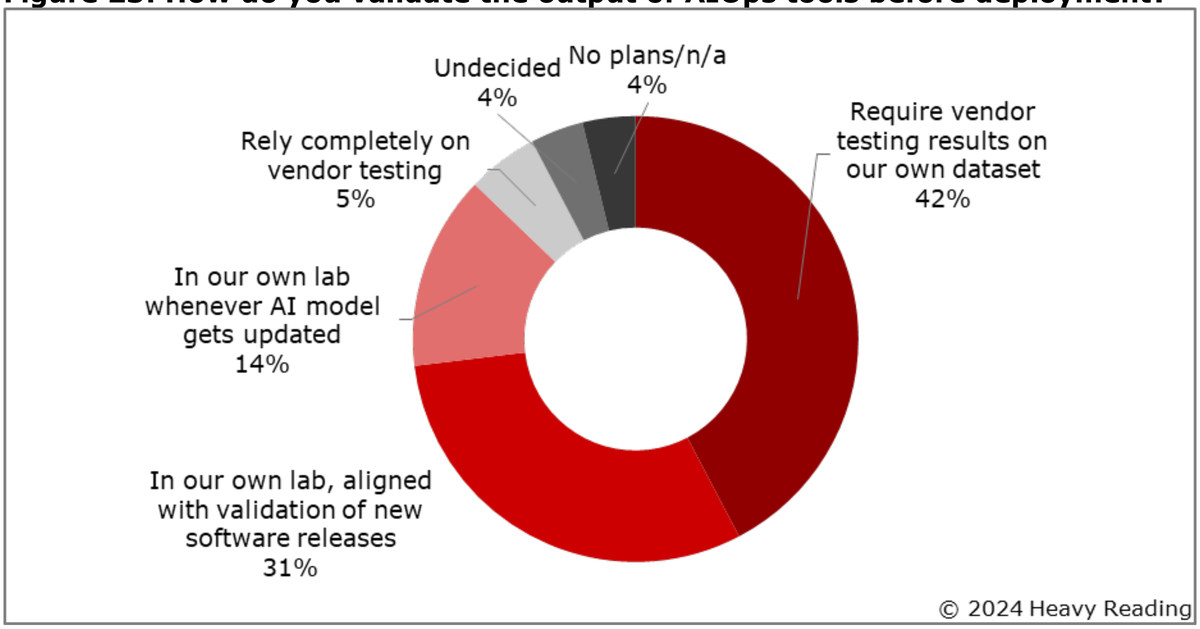
Mean = 75; n=78
Source: Heavy Reading

Validating the accuracy of AI output is crucial for operators before they can use them widely in their networks, as potential benefits are quickly erased when data is unreliable. For validation, there are two major preferences that are evenly split among respondents. Forty-two percent of operators will require their vendors to test the operator's datasets, while 45% of operators will validate AI output in their own labs (see **Figure 23**). Furthermore, when evaluating data in their own labs, there are two event triggers:

- Aligning with validation of new software releases (selected by 31%) or
- Validating when AI models get updated (selected by 14%)

Interestingly, operator preferences for how to validate AI output are remarkably consistent across operator geographies (North America vs. Rest of World [RoW]) and operator size (Tier 1 vs. Tier 2/3).

Figure 23: How do you validate the output of AIOps tools before deployment?



n=78

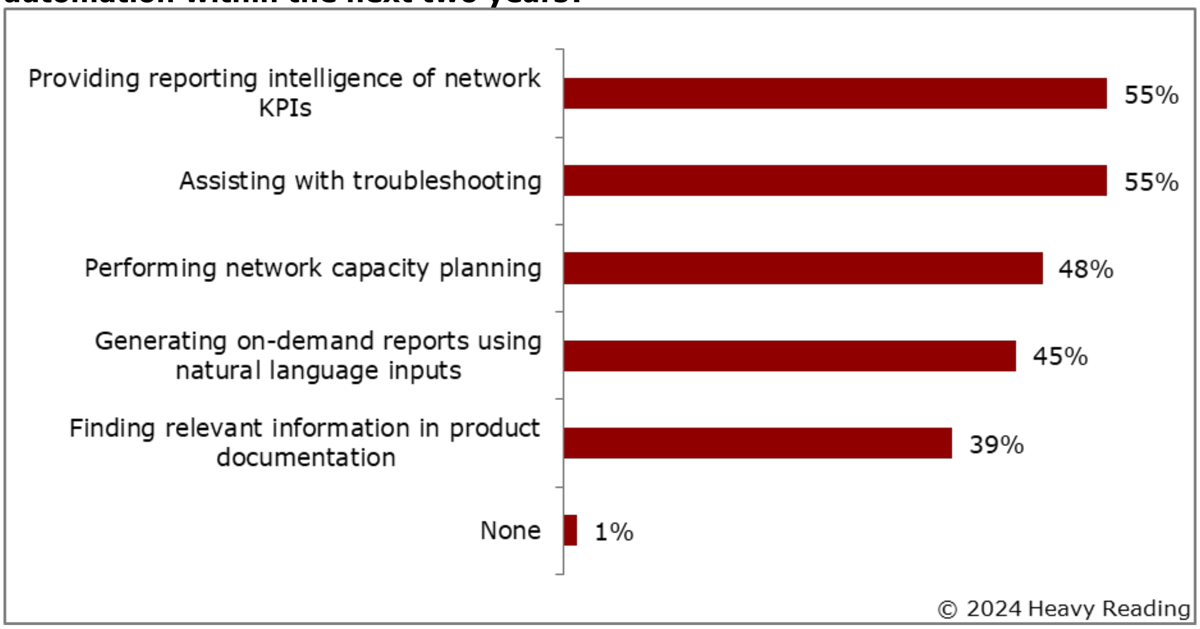
Source: Heavy Reading

Generative AI models are a subset of AI that produce content, including text, images, videos, audio, and even programming code. Generative AI models include ChatGPT, Google Bard, Stable Diffusion, GitHub Copilot, and many others.

Generative AI holds tremendous long-term potential for virtually every industry, including telecommunications. In the limited context of AI for transport networks, generative AI has not been a major priority to date, as the AI/ML technologies and use cases addressed throughout this paper take precedence.

Heavy Reading wanted to better understand which generative AI capabilities are most important for transport automation over the next two years. The data shows that most generative AI capabilities for transport networks resonate with operators at this early stage. Providing reporting of network KPIs and assisting with troubleshooting top the list of options (each selected by 55% of respondents), but all five capabilities listed resonated with respondents (see **Figure 24**).

Figure 24: Which generative AI capabilities do you want to adopt for transport automation within the next two years?



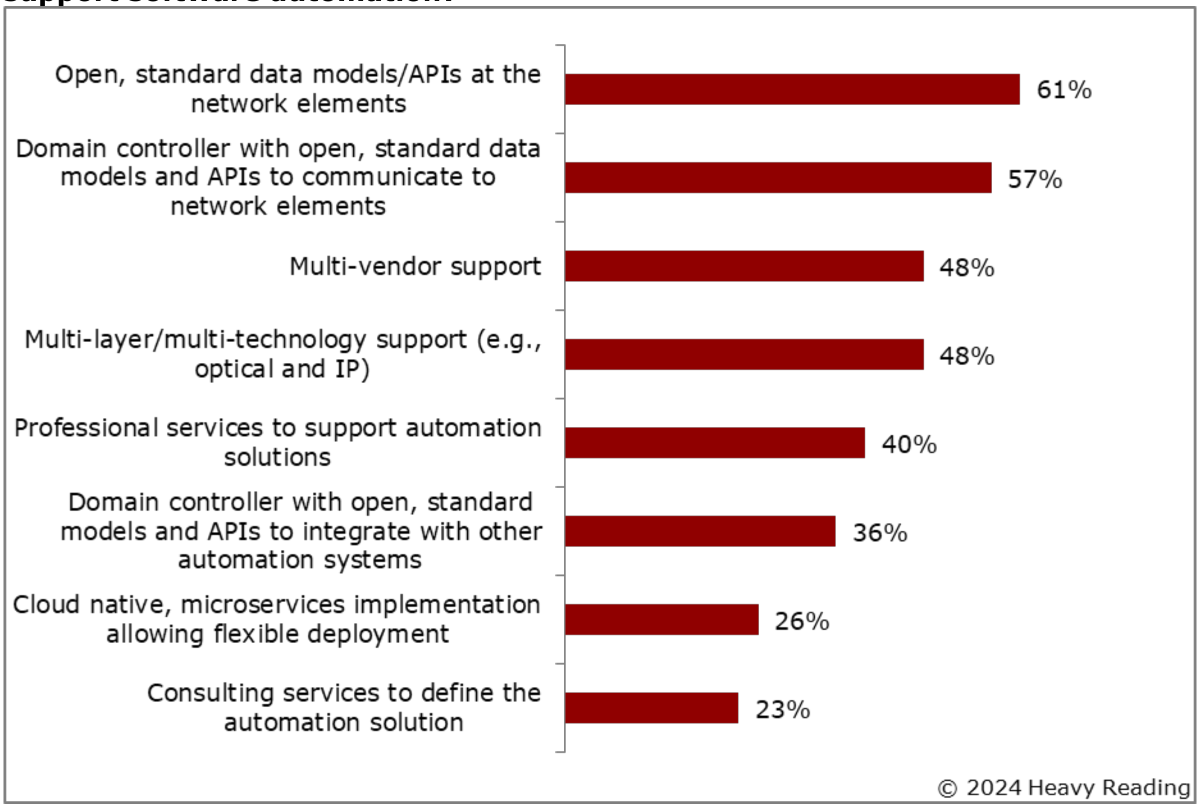
Note: Select all that apply
n=77
Source: Heavy Reading

VENDORS AND PRODUCTS

The final section of the white paper addresses vendor and product-related topics. When evaluating network infrastructure vendors for automation, operators have clear requirements for openness. This includes standardized data models and open APIs in the network elements (selected by 61% of operators) as well as in the domain controllers that must access those network elements (picked by 57%) (see **Figure 25**).

A second tier of requirements (but still important) includes multi-layer IP and optical support, multi-vendor support, and professional services support. Heavy Reading notes that cloud native functionality ranks low in transport despite its high profile in other areas of telecom automation.

Figure 25: What do you need most from your network infrastructure vendors to support software automation?



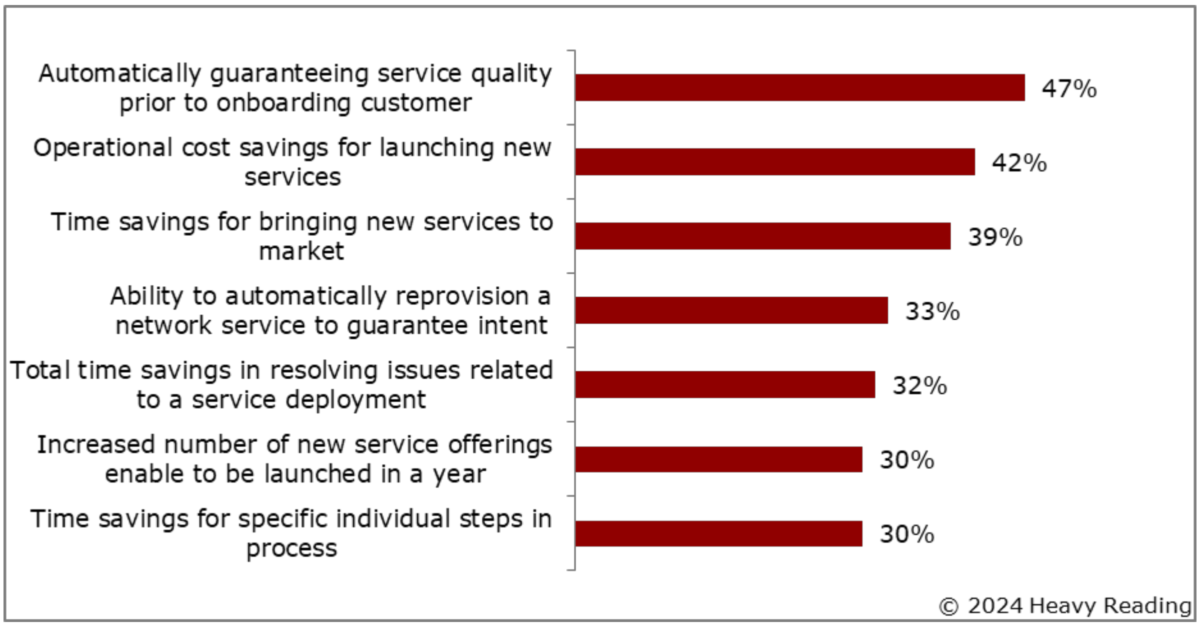
Note: Select up to five
n=77
Source: Heavy Reading

In selecting a network service orchestrator, operators surveyed identify three main priorities, as follows:

- Automatically guaranteeing service quality prior to onboarding (selected by 47%)
- Operational cost savings for launching new services (42%)
- Time savings for bringing services to market (39%)

The orchestration priorities align well with operators' general network services priorities: ensuring reliability, bringing services to market quickly, and reducing network costs (see **Figure 26**).

Figure 26: What are your top priorities in selecting a network service orchestration solution?



Note: Select up to three
n=76
Source: Heavy Reading