Independent market research and competitive analysis of next-generation business and technology solutions for service providers and vendors

HEAVY READING

WHITE PAPER

Coherent Pluggable Optics Service Provider Survey 2025

A Heavy Reading (now part of Omdia) white paper produced for Ciena

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INTRODUCTION AND KEY FINDINGS

Demands on service provider transport networks continue to grow, driven by a combination of artificial intelligence services and the hugely increased use of cloud services and video streaming. Connecting the many data centers required across neighborhoods, regions, countries, and globally requires high capacity transport networks. Data center interconnects (DCIs) and other transport networks mostly use coherent optical interfaces and dense wavelength-division modulation (DWDM). To meet the expanding capacity requirements, many of the links have already been upgraded from 100G and 200G to 400G, and service providers are upgrading key links to 800G or higher and installing new network connections.

The first 400G coherent pluggable transceivers were developed to support edge DCI links between data centers up to 120km apart. During the six years since the introduction of the first 400ZR optical modules, the capabilities and features supported by coherent pluggable transceivers have significantly expanded. The latest 800ZR and ZR+ modules will support 800G over more than 1,000km and 400G over significantly longer distances. 400G and 800G ZR+ modules are available with the higher launch power required for ROADM applications. Most 800G ZR+ modules support long-reach interoperability using the OpenROADM multi-source agreement (MSA) probabilistic constellation shaping (PCS). Coherent pluggable transceivers are designed to deliver these capabilities at the lowest achievable power and within the constraints of the pluggable modules.

The development of coherent pluggable transceivers is having a major impact on the market by enabling two alternatives to using dedicated optical transport platforms with embedded coherent optics for 400G and 800G links in edge, metro, and many long-haul networks. Coherent pluggable transceivers can be plugged directly into routers and switches equipped with octal small form-factor pluggable (OSFP) or quad small form-factor pluggable-double density (QSFP-DD) ports. The IP traffic is transported directly over DWDM (IPoDWDM). This removes the need for an optical transport platform but requires the connections to be managed through the router/switch as part of the IP network. Alternatively, coherent pluggables can be deployed directly in optical transport platforms, allowing service providers to benefit from the advantages of pluggable transceivers and retain the demarcation between IP and optical layers. This approach is proving attractive to service providers, and it allows them to integrate their new equipment seamlessly into existing transport architectures using coherent pluggable transceivers.

Recognizing the growing importance of coherent pluggable transceivers and the impact they are having on edge, metro, and long-haul transport networks, Heavy Reading (now part of Omdia) conducted the *Coherent Pluggable Optics Service Provider Survey 2025* to investigate industry trends, identify opportunities, and understand the challenges. During July and August 2025, Heavy Reading (now part of Omdia) conducted a global survey that received 82 responses from individuals working for service providers.

This report presents the results across all three survey topics:

- 400G transceivers and 800G router/switch ports
- 800G coherent transceiver deployment and selection
- Challenges and strategy

Key findings

- **Of all respondents, 89% say they are deploying 400G coherent pluggable transceivers.** 400G coherent pluggable transceivers are being deployed in router/switch ports to support IPoDWDM and into optical transport platforms in service interface blades that retain the demarcation between IP and optical layers.
- **More respondents say they are deploying 400G coherent pluggable transceivers in optical transport platforms rather than in routers/switches.** Of all respondents, 45% say they are deploying 400G coherent pluggable transceivers in optical transport platforms on metro (100−500km) routes, and 38−39% are deploying them on shorter or longer routes. Of all respondents, 32% say they are deploying 400G coherent pluggable transceivers in router/switches on edge (10−100km) routes, with slightly fewer using them on longer routes.
- **Of all respondents, 55% say they are already deploying routers/switches with 800G ports or expect to be deploying within two years. Of all respondents,** 11% said they were already deploying routers/switches with 800G ports, and a further 44% said they would deploy routers/switches with 800G ports within one or two years.
- **Of respondents, 47% say they are already deploying 800G coherent pluggable modules or expect to be deploying within two years.** Of all respondents, 12% say they are already deploying 800G coherent pluggable transceivers, and a further 35% plan to do so within one or two years.
- **Significantly more respondents expect to deploy 800G coherent pluggable transceivers in optical transport platforms than routers/switches.** Of all respondents, 55% say they will be deploying 800G coherent pluggable transceivers in optical transport platforms for 100−500km routes, 46% for longer distances, and 41% for 10−100km routes. Of all respondents, 27% say they will be deploying 800G coherent pluggable transceivers in routers/switches on edge routes (10−100km) or metro routes (100−500km), with fewer using them on longer routes.
- **Proven multi-vendor interop, performance/longer reach with proprietary modes, and low power consumption are top priorities when selecting 800G coherent pluggable transceivers.** Of all respondents, 50% selected proven multi-vendor interop as one of the top two priorities when selecting coherent pluggable transceivers, apart from price. Of all respondents, 43% selected performance/longer reach with proprietary modes, and 41% selected low power consumption.
- **Ensuring consistent operational practices between transceivers from multiple vendors and a lack of converged organization are seen as the top challenges of deploying coherent pluggable transceivers in routers/switches.** Ensuring consistent operational practices between transceivers from multiple vendors was selected by 44% of respondents as one of the top three challenges of deploying coherent pluggable transceivers in routers/switches. Lack of a converged organization was selected by 40% of respondents.
- **Of all respondents, 89% say that support for third-party vendor optics by router vendor is mandatory or highly desired.** Of all respondents, 47% said that support for third-party vendor optics is highly desired. Of all respondents, 42% said that support for third-party vendor optics is mandatory for them.

400G TRANSCEIVERS AND 800G ROUTER/SWITCH PORTS

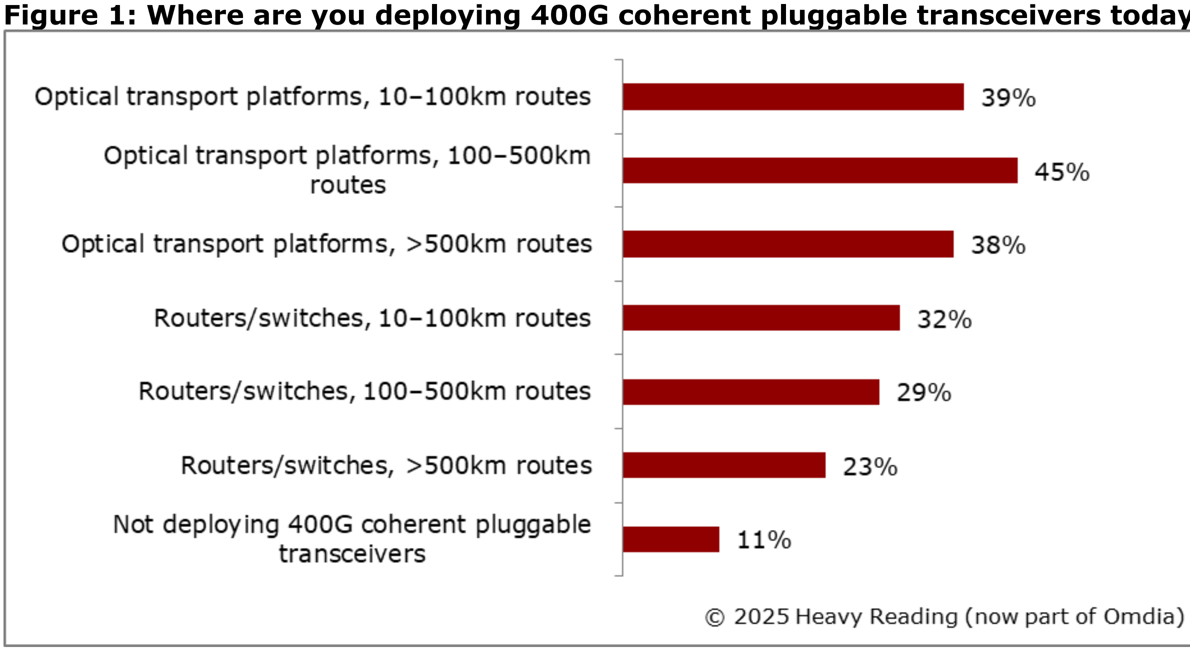
This first section covers the use of 400G coherent pluggable transceivers in optical transport platforms and routers/switches, and the deployment of routers/switches with 800G ports.

The first 400G coherent pluggable modules were designed for DCI applications, and to meet the Optical Internetworking Forum 400ZR specification supporting up to 120km routes. The same digital signal processors and upgraded versions are used in enhanced modules (400G ZR+ or OpenROADM) to support longer reaches of at least 500km, and some will support more than 1,000km. Coherent pluggable transceivers are designed to work within the space and power constraints of QSFP-DD, OSFP, or C form-factor pluggable 2 (CFP2) optical modules, and are attractive for DCI and other transport applications that have traditionally used embedded coherent transponders.

Coherent pluggable transceivers can be plugged into router/switch ports to support IPoDWDM, or into optical transport platform service interface blades to retain the demarcation between IP and optical layers and integrate seamlessly into existing transport architectures. Coherent pluggable transceivers are available that will reach each of the common distances required by service providers, including edge (10−100km), metro (100−500km), and long−distance (>500km).

Respondents were asked where they are deploying 400G coherent pluggable transceivers (see **Figure 1**). The options given cover the three common distances and the use of optical transport platforms or routers/switches. Respondents were asked to select all that apply or indicate that they were not deploying 400G pluggable coherent transceivers (11%). Of all respondents, 89% indicated that they are deploying coherent pluggable transceivers in at least one of the options.

Figure 1: Where are you deploying 400G coherent pluggable transceivers today?

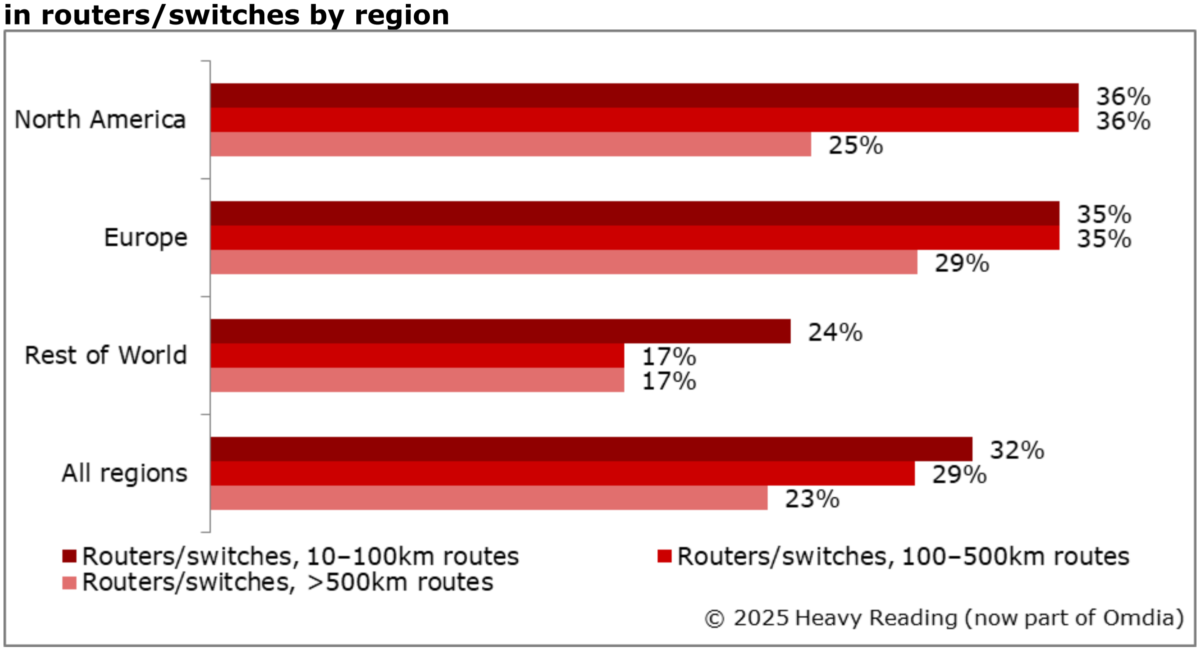


Note: Numbers in figures throughout this report may not total 100 due to rounding.
n=82; respondents selected all that apply
Source: Heavy Reading (now part of Omdia)

The results suggest that more service providers are deploying 400G coherent pluggable transceivers in optical transport platforms (38−45%) than routers/switches (23−32%). Of all respondents. 45% say they are deploying 400G coherent pluggable transceivers in optical transport platforms on metro (100−500km) routes, with 38−39% deploying them on shorter and longer routes. Of all respondents, 32% say they are deploying 400G coherent pluggable transceivers in routers/switches on edge (10−100km) routes, with slightly fewer using them on longer routes.

The survey also gives an insight into the regional deployment of coherent pluggable transceivers in routers/switches and the likely adoption of IPoDWDM. **Figure 2** shows the responses on the deployment of 400G coherent pluggable transceivers in routers/switches by region. The results suggest that the use of coherent pluggable transceivers in routers/switches is significantly higher in North America and Europe than in the Rest of World across all three route ranges.

Figure 2: Responses on the deployment of 400G coherent pluggable transceivers in routers/switches by region

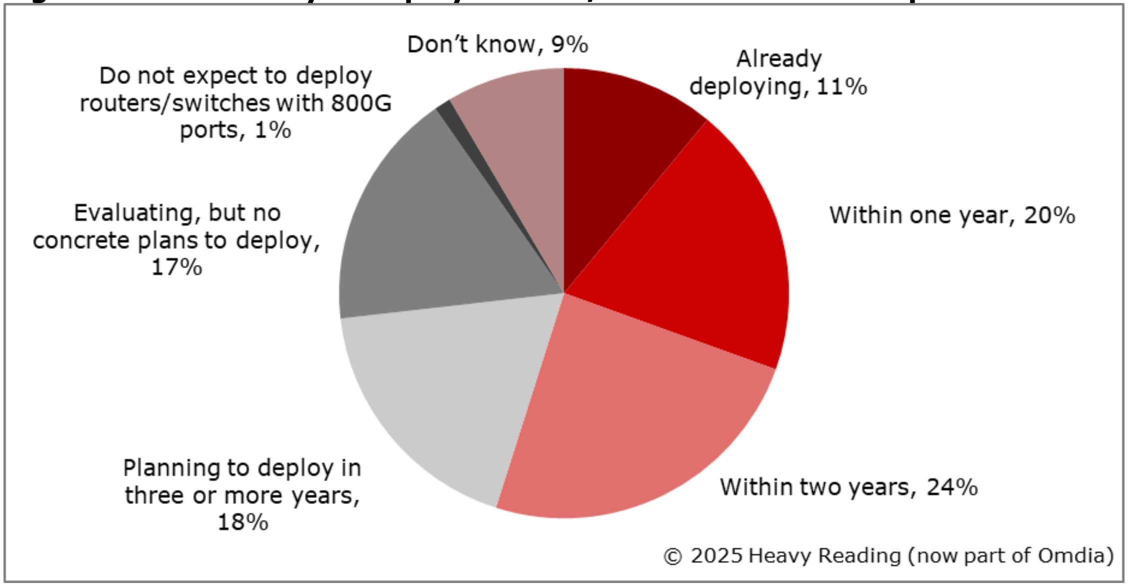


n=82; respondents selected all that apply
Source: Heavy Reading (now part of Omdia)

Service providers are now planning and deploying network upgrades to 800G using coherent pluggable transceivers and will need to deploy routers and switches with 800G ports to enable the deployment of 800G IPoDWDM networks.

For the next question, respondents were asked when they will deploy routers/switches with 800G ports (see **Figure 3**). Of all respondents, 11% said they were already deploying routers/switches with 800G ports, and a further 44% said they would deploy routers/switches with 800G ports within one or two years. A total of 73% said they have plans to deploy routers/switches with 800G ports.

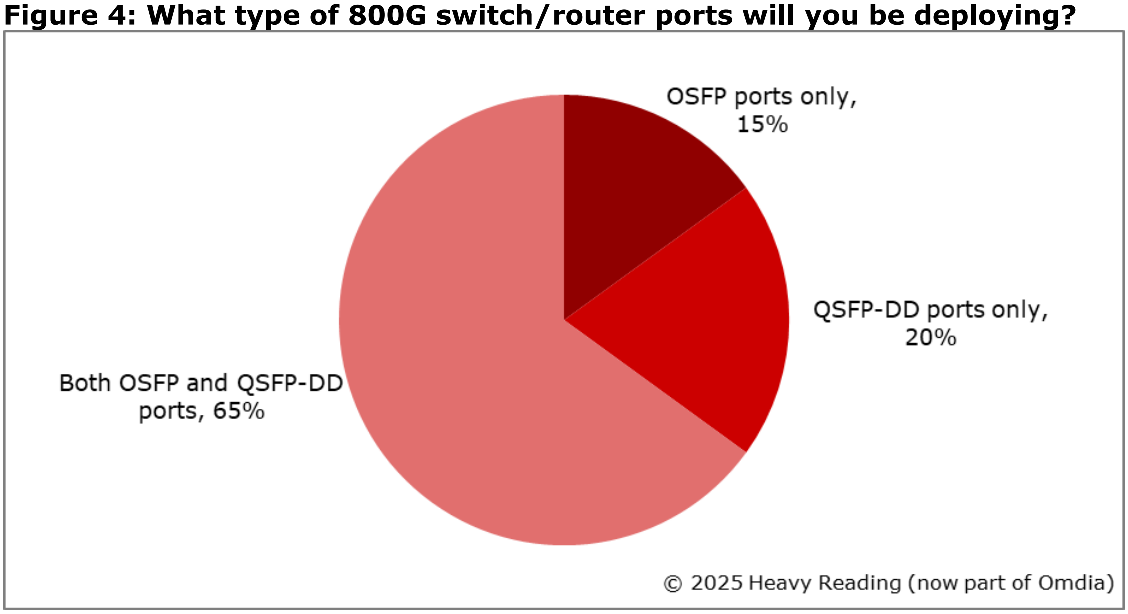
Figure 3: When will you deploy routers/switches with 800G ports?



n=82
Source: Heavy Reading (now part of Omdia)

The 60 respondents (73%) that said they had plans to deploy routers/switches with 800G ports were then asked what type of 800G switch/router ports they will be deploying (see **Figure 4**). The results suggest that there is no clear majority for either OSFP or QSFP-DD. This conclusion is in line with previous surveys. Of all respondents, 65% said they will be deploying both OSFP and QSFP-DD ports. This result suggests that service providers may be deploying switches with OSFP ports and routers with QSFP-DD ports or vice versa. Of respondents, 15% said they would deploy OSFP ports only, and 20% said they would deploy QSFP-DD ports only.

Figure 4: What type of 800G switch/router ports will you be deploying?



n=60
Source: Heavy Reading (now part of Omdia)

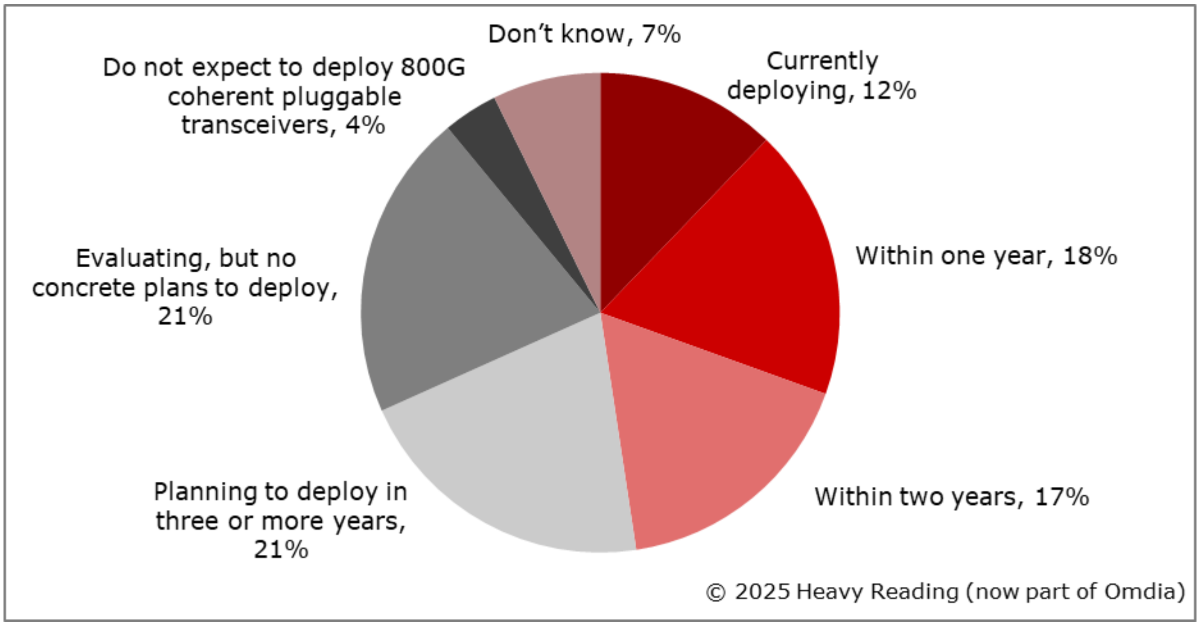
800G COHERENT TRANSCEIVER DEPLOYMENT AND SELECTION

This next section covers the selection and deployment of 800G coherent pluggable transceivers.

Respondents were asked when they will deploy 800G coherent pluggable transceivers in their network (see **Figure 5**). The results suggest significant progress toward the deployment of 800G coherent pluggable transceivers; however, it is likely that the responses include trials and other small-scale deployments.

Of all respondents, 12% say they are already deploying 800G coherent pluggable transceivers, and a further 35% plan to do so within one or two years. A total of 68% say they have plans to deploy 800G coherent pluggable transceivers.

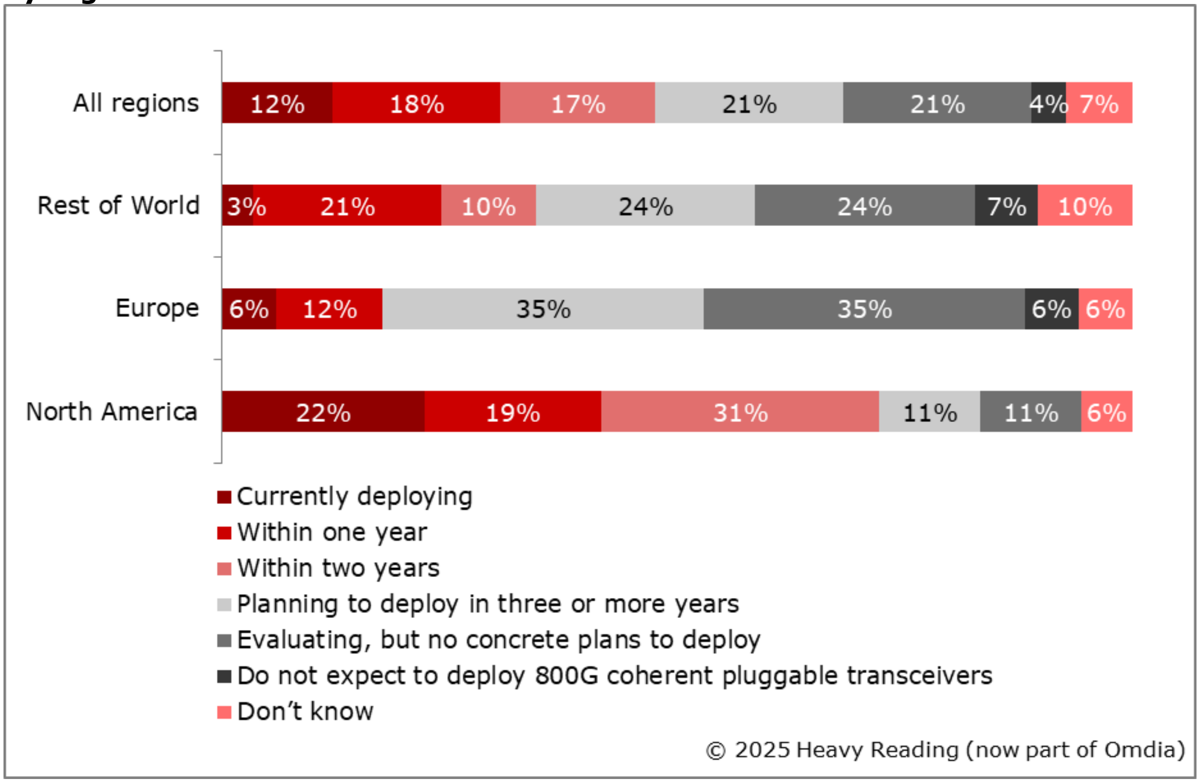
Figure 5: When will you deploy 800G coherent pluggable transceivers in your network?



n=82
Source: Heavy Reading (now part of Omdia)

Looking further into the survey responses, there are some important regional differences (see **Figure 6**). Significantly more respondents from North America (22%) than Europe (6%) say they are already deploying 800G coherent pluggable transceivers. In addition, 50% of respondents from North America say they will be deploying 800G coherent pluggable transceivers within one or two years, versus just 12% from Europe.

Figure 6: Responses on the deployment of 800G coherent pluggable transceivers by region



n=82

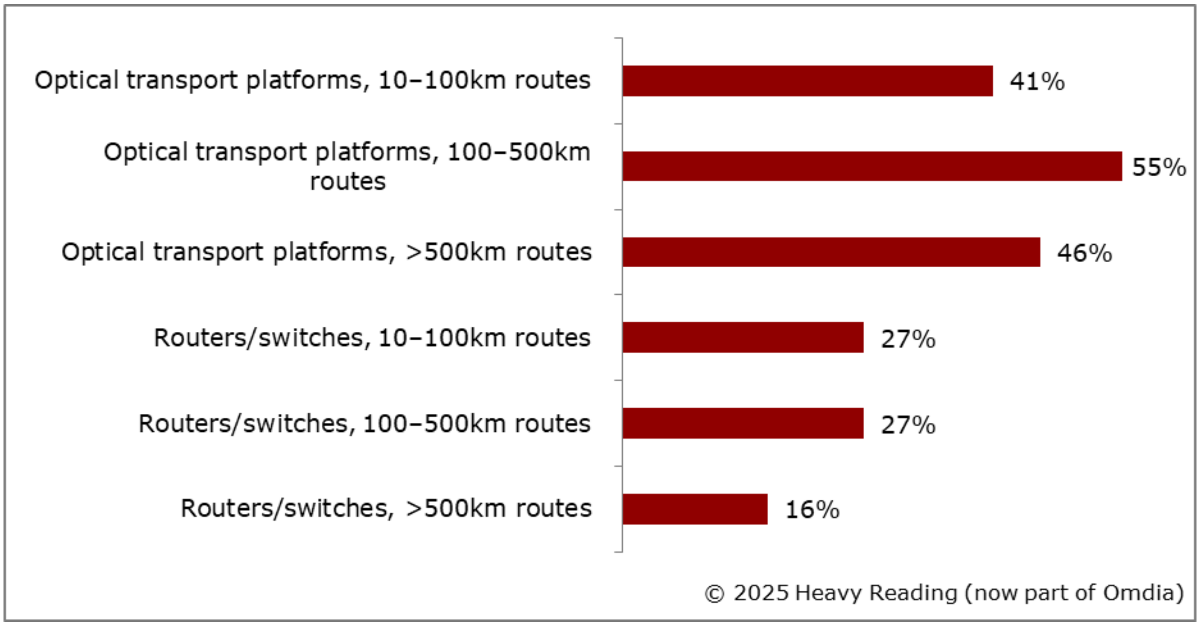
Source: Heavy Reading (now part of Omdia)

The 56 respondents (68%) that said they had plans to deploy 800G coherent pluggable transceivers were then asked two further questions about 800G coherent pluggable transceivers.

Respondents were asked where they will deploy 800G coherent pluggable transceivers in their network (see **Figure 7**). The results suggest that the use of 800G coherent pluggable transceivers by service providers in optical transport platforms (41–55%) will be significantly higher than in routers/switches (16–27%).

Of all respondents, 55% say they will be deploying 800G coherent pluggable transceivers in optical transport platforms for 100−500km routes, 46% for longer distances, and 41% for 10−100km routes. Of all respondents, 27% say they will be deploying 800G coherent pluggable transceivers in routers/switches on edge routes (10−100km) or metro routes (100−500km), with fewer using them on longer routes.

Figure 7: Where will you deploy 800G coherent pluggable transceivers in your network?

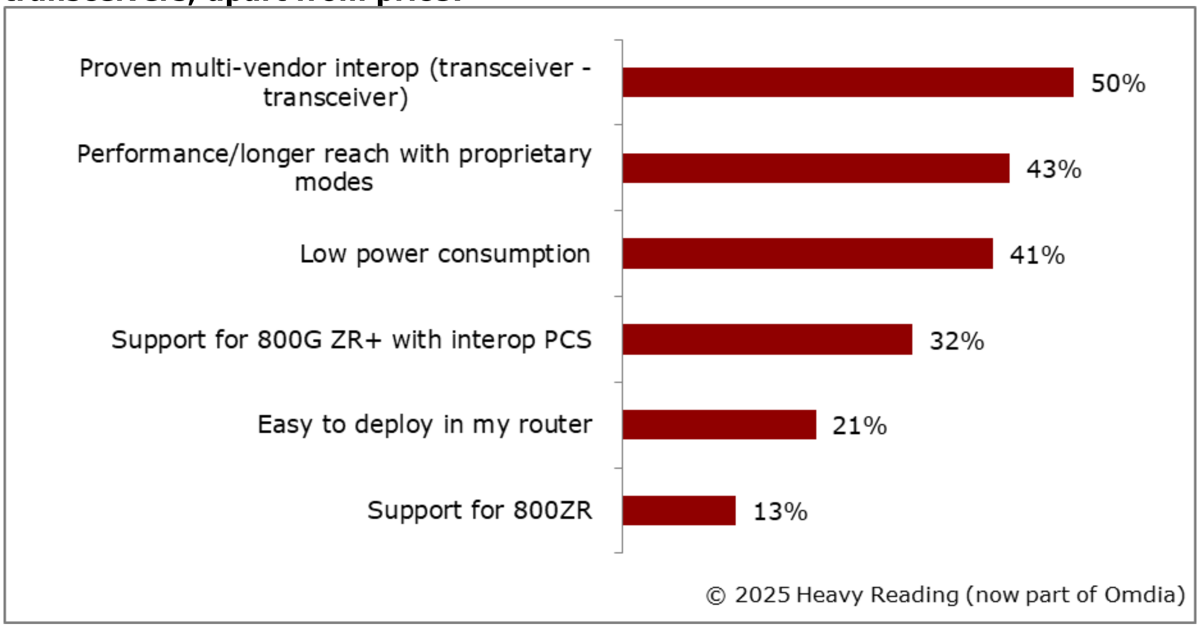


n=56; respondents selected all that apply
Source: Heavy Reading (now part of Omdia)

The respondents that said they had plans to deploy 800G coherent pluggable transceivers were also asked what their top priorities are when selecting 800G coherent pluggable transceivers, apart from price (see **Figure 8**). Respondents were asked to select their top two. Proven multi-vendor interop, performance/longer reach with proprietary modes, and low power consumption were seen as particularly important by 40−50% of respondents for each of these.

Support for 800G ZR+ with interoperable PCS was seen as one of the top two priorities when selecting 800G coherent pluggable transceivers by 32% of respondents. The interoperable PCS is defined by the OpenROADM MSA group. Easy to deploy in my router, and support for 800ZR, were seen as less important by most respondents.

Figure 8: What are your top priorities when selecting 800G coherent pluggable transceivers, apart from price?



n=56; respondents selected up to two options

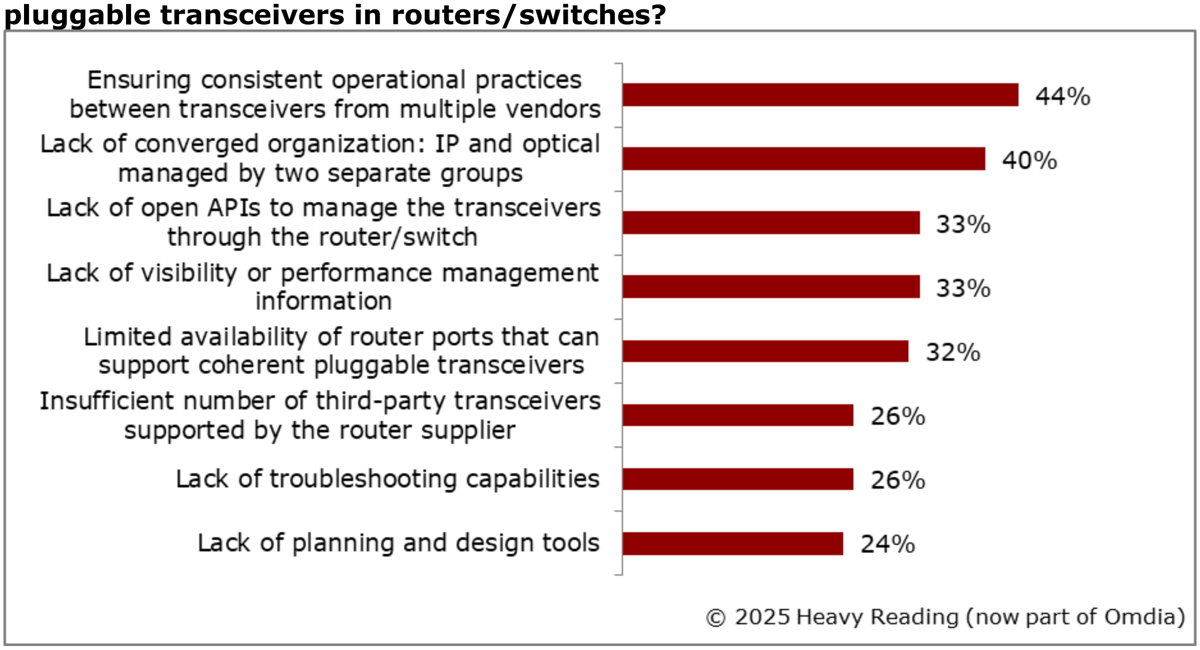
Source: Heavy Reading (now part of Omdia)

CHALLENGES AND STRATEGY

The results in this last section of the survey suggest that respondents see a wide range of challenges in deploying coherent pluggable transceivers, have varied expectations of router vendors offering support for third-party vendor optics, and have adopted different organization structures and strategies for managing coherent pluggable transceivers in routers.

Respondents were asked what they see as the three biggest challenges of deploying coherent pluggable transceivers in routers/switches (see **Figure 9**). Ensuring consistent operational practices between transceivers from multiple vendors and a lack of a converged organization were selected by 40% or more of respondents. Also seen as one of the top three challenges by approximately one-third of respondents was the lack of open APIs to manage the transceivers through the router/switch, the lack of visibility or performance management information, and the limited availability of router ports that can support coherent pluggable transceivers.

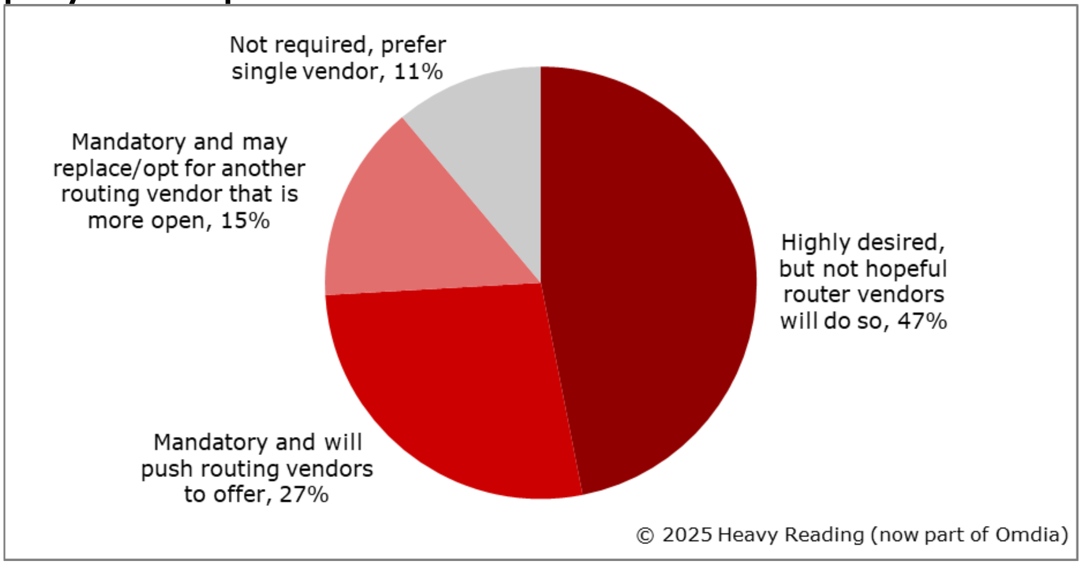
Figure 9: What do you see as the biggest challenges of deploying coherent pluggable transceivers in routers/switches?



n=82; respondents selected up to three options
Source: Heavy Reading (now part of Omdia)

When asked what their expectation is of router vendors offering support for third-party vendor optics, 47% of respondents said that support for third-party vendor optics is highly desired (see **Figure 10**). Of all respondents, 42% said that support for third-party vendor optics is mandatory for them, and of those, one-third said they may replace/opt for another routing vendor that is more open. Of all respondents, 11% said that support for third-party vendor optics is not required.

Figure 10: What is your expectation of router vendors offering support for third-party vendor optics?

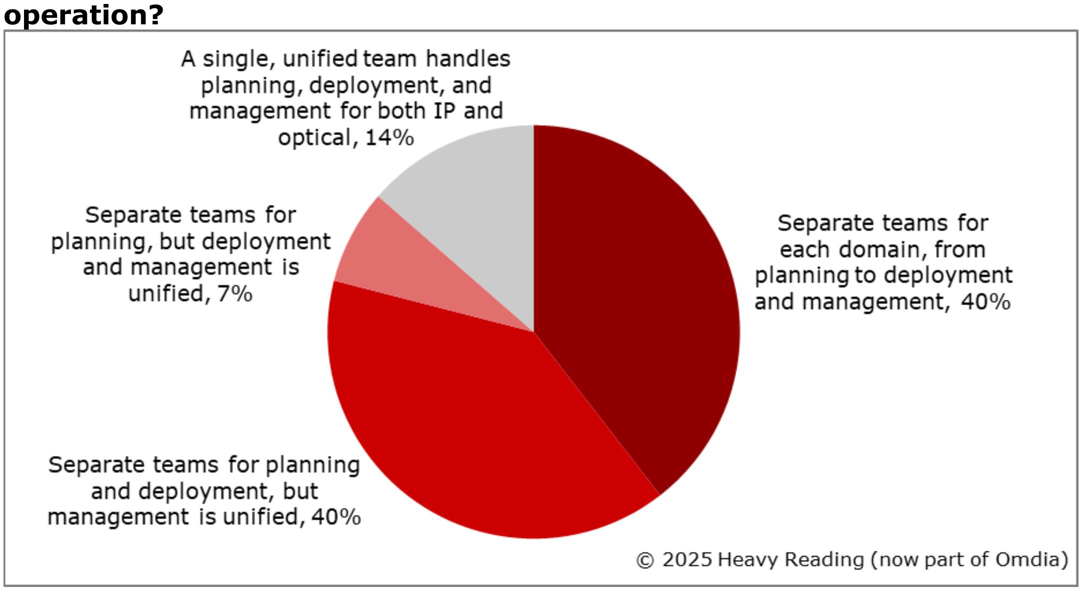


n=81

Source: Heavy Reading (now part of Omdia)

Respondents were asked how their organization's structure handles IP and optical network operation (see **Figure 11**). Of all respondents, 40% said that their organization has separate teams for IP and optical network operation. 40% also said that their organization has separate IP and optical teams for planning and deployment, but management is unified. A further 7% of respondents said that their organization has separate teams for planning, but deployment and management are unified. Of all respondents, 14% said a single, unified team handles planning, deployment, and management for both IP and optical networks.

Figure 11: How does your organization structure IP and optical network operation?

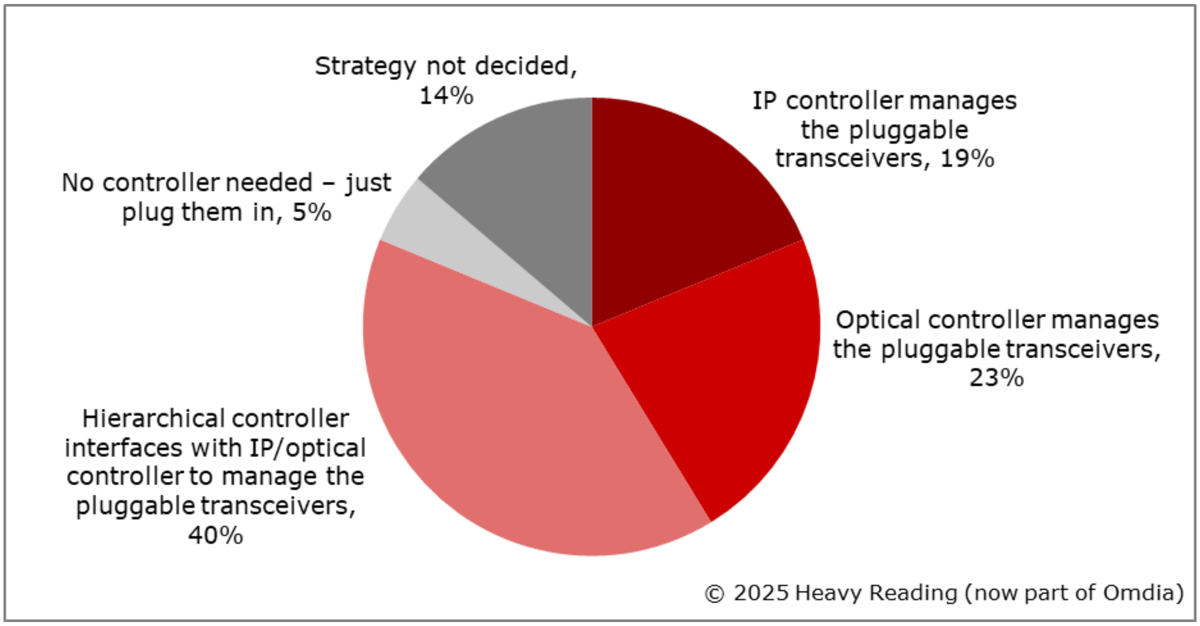


n=81

Source: Heavy Reading (now part of Omdia)

When asked what their preferred strategy is for managing coherent pluggable transceivers in routers, 40% of respondents selected hierarchical controller interfaces with IP/optical controller to manage the pluggable transceivers (see **Figure 12**). Of all respondents, 23% prefer that the optical controller manages the pluggable transceivers, and 19% prefer that the IP controller manages the pluggable transceivers.

Figure 12: What is your preferred strategy for managing coherent pluggable transceivers in routers?



n=80

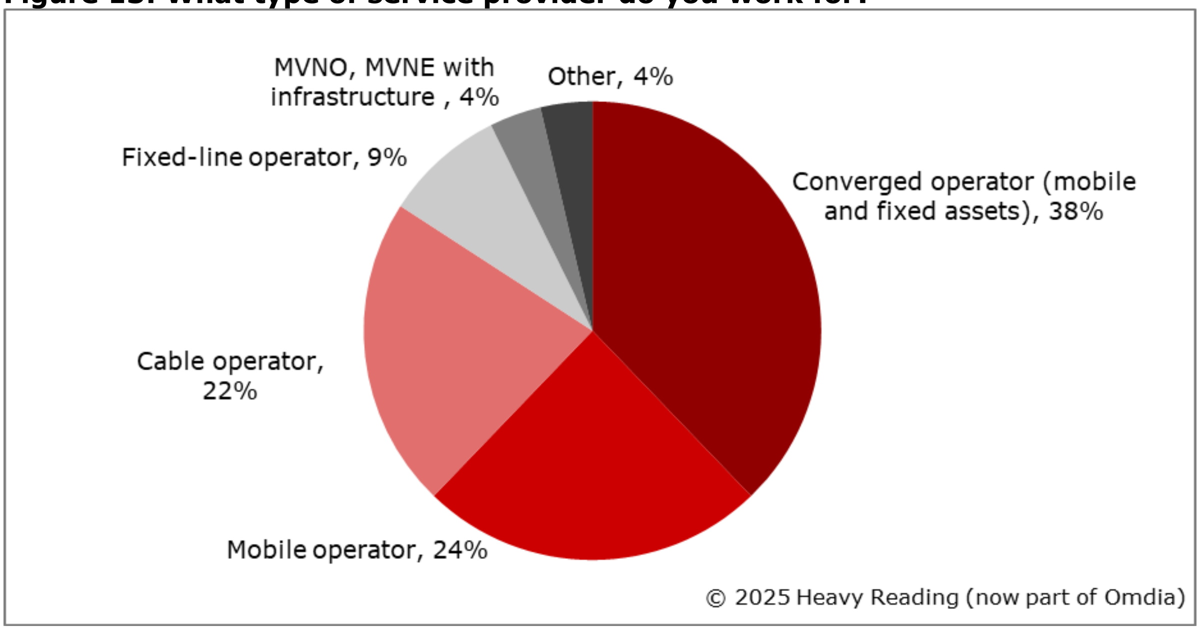
Source: Heavy Reading (now part of Omdia)

APPENDIX A: SURVEY DEMOGRAPHICS

The *Coherent Pluggable Optics Service Provider Survey 2025* was conducted online during July and August 2025. The questionnaire was written by Heavy Reading (now part of Omdia) with input from project sponsor Ciena. It was promoted to the Light Reading service provider database and received 82 responses from individuals working for service providers. Spurious, incomplete, and non-service provider responses were removed. All responses are confidential and are only presented in aggregate form. Heavy Reading (now part of Omdia) does not share individual names or company names from the survey.

Figure 13 shows the responses by operator type. Of all the respondents, 38% work for converged operators with mobile and fixed networks, 24% work for pure-play mobile operators, 22% work for cable operators, and 9% work for fixed-line operators.

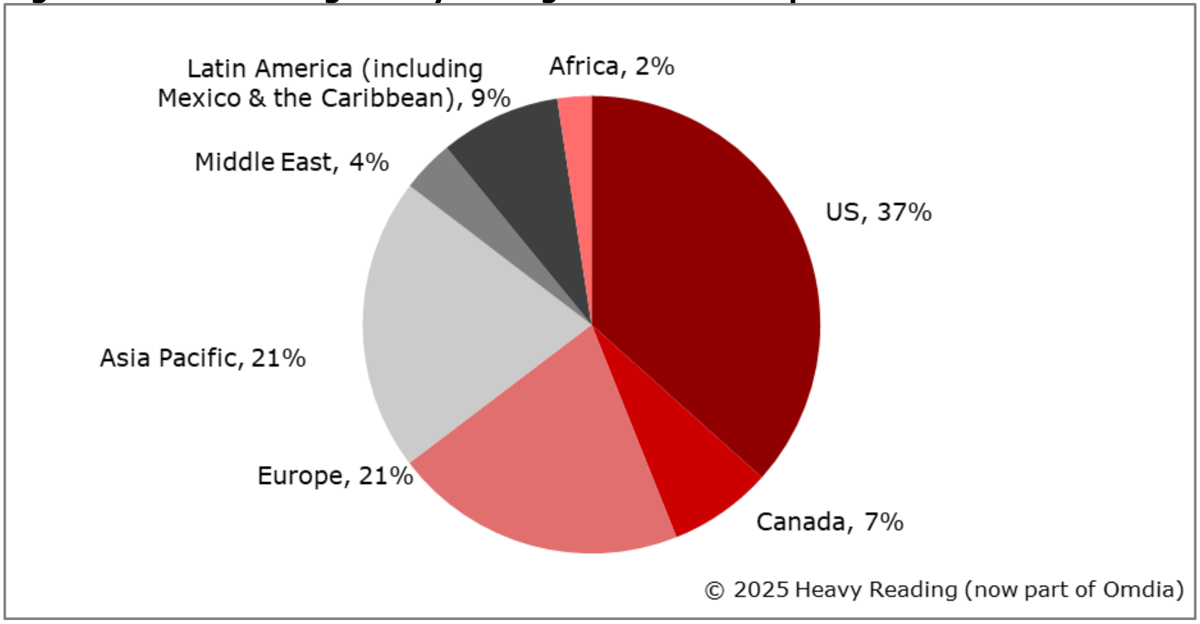
Figure 13: What type of service provider do you work for?



n=82
Source: Heavy Reading (now part of Omdia)

Figure 14 shows the responses by geography. The US is the largest market represented in the survey, with 37% of responses, followed by Europe and Asia. Of all respondents, 44% work for organizations headquartered in North America (US and Canada) and 21% in Europe. This mix allows Heavy Reading (now part of Omdia) to compare the responses from North America and Europe with reasonable confidence. Whenever the analysis in this report contrasts responses from North America, Europe, and the rest of the world, it is made clear in the text.

Figure 14: In what region is your organization headquartered?

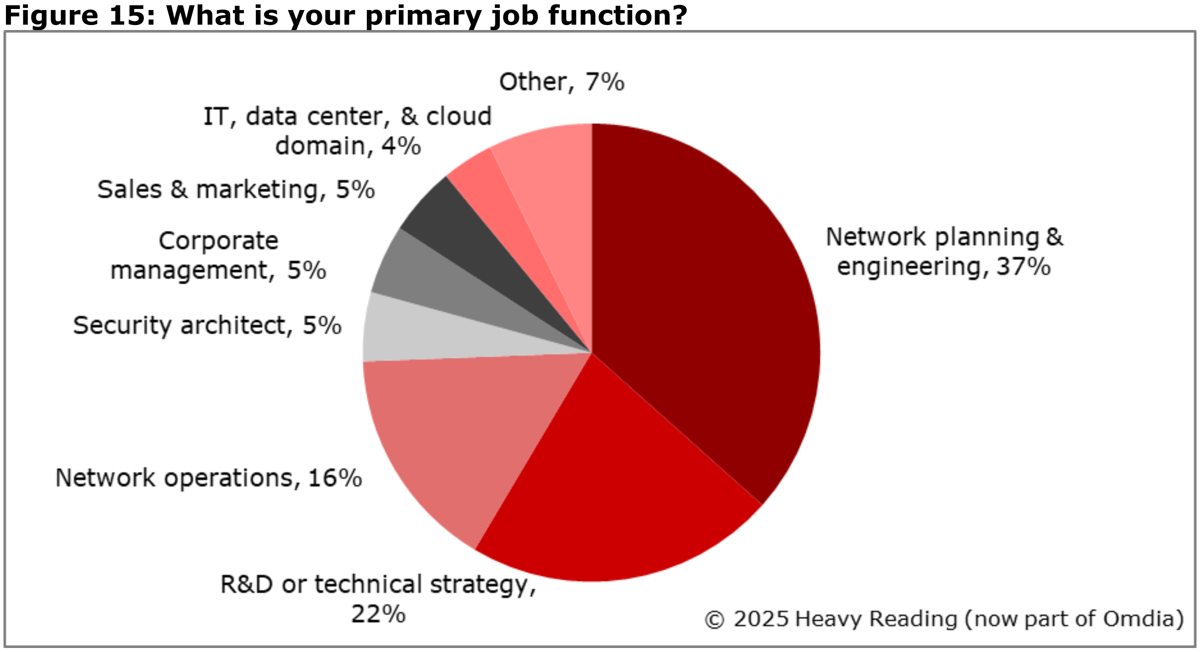


n=82

Source: Heavy Reading (now part of Omdia)

Figure 15 shows responses by job title. Network planning & engineering, R&D or technical strategy, and network operations are the largest groups (total of 75%).

Figure 15: What is your primary job function?

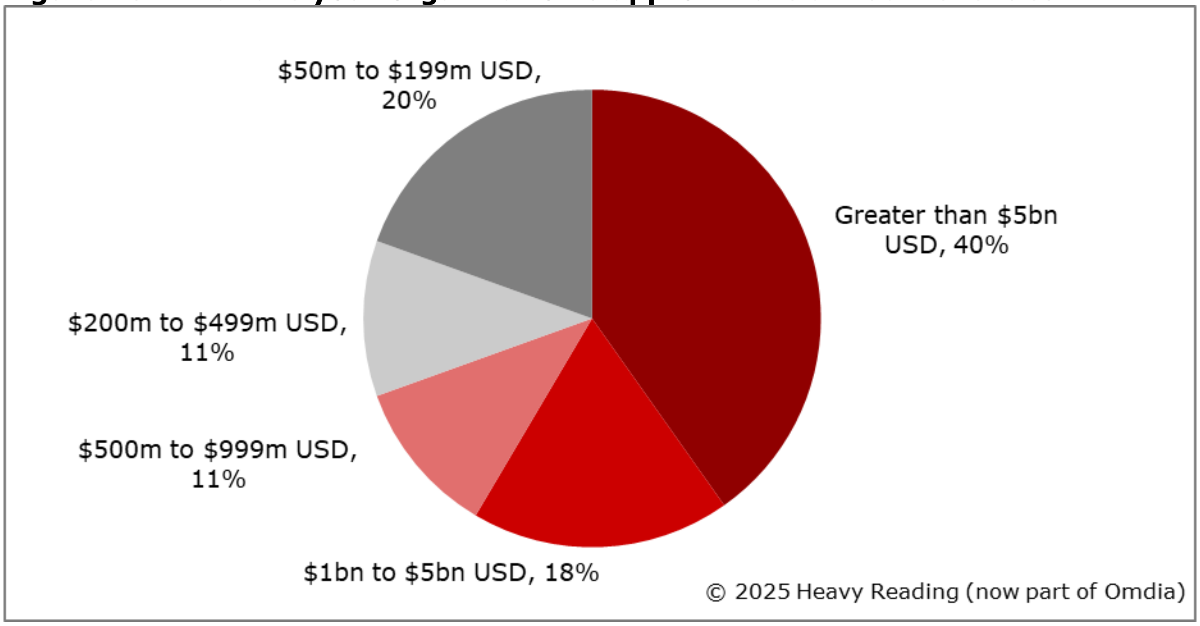


n=82

Source: Heavy Reading (now part of Omdia)

Figure 16 shows the approximate annual revenue of the organizations covered by the survey. Of all respondents, 40% are from operators with at least $5bn in annual revenue, and 58% are from operators with revenue of more than $1bn. The remaining 42% are from operators with less than $1bn in annual revenue.

Figure 16: What are your organization's approximate annual revenues?



n=82

Source: Heavy Reading (now part of Omdia)