SUMMARY: OTN SWITCHING POISED TO GO MAINSTREAM

OTN switching is gaining in popularity, and the number of carriers planning to use it is rising. In our annual survey of global service providers, 86% of respondents are planning to deploy OTN switching—even higher than the 76% in our 2012 survey. Only 3 of 21 respondents this year have no interest.

The results show a stronger preference for OTN switching in general and greater emphasis on integrating OTN switching with WDM interfaces in the same hardware platform. By 2016, 94% of respondents who plan to use OTN switching in the core want WDM interfaces integrated in the OTN switching equipment.

Coincident with interest in OTN switching, interest in moving to mesh and partial-mesh transport topologies is rising, primarily because of the better economics it provides service providers. This surge in interest is network-wide but concentrated in the core—95% of respondents are planning to use partial or full mesh topologies there by 2016. Though only 24% of respondents use mesh based protection in existing networks, 71% plan to use it by 2016—a 47-point gain, and a percentage slightly surpassing those planning to do optical restoration via ROADM.

SURVEY METHODOLOGY AND DEMOGRAPHICS OVERVIEW

Using a panel of qualified service provider decision-makers, we conducted a survey via telephone and web in March and April 2013 with 21 global service providers—this is a good sample as it represents 34% of worldwide 2012 telecom capex.

To qualify, respondents must have detailed knowledge of and purchase decision influence for their organizations’ OTN transmission and switching equipment. 76% of respondents are either the primary decision-maker or have a lot of influence.
OTN: A TRANSPORT OR SWITCHING TECHNOLOGY

OTN transport equipment uses a layer 1 framing protocol based on the G.709 standard for transmitting data between two points. OTN switching takes this much further and requires more sophisticated hardware—a central fabric that can switch multiple client signals within those frames when the traffic reaches those nodes. We asked respondents whether they have already deployed OTN equipment or plan to do so by the end of 2014 to ensure respondents were familiar with the technology. All 21 carriers we interviewed have deployed OTN transport equipment though not all have deployed OTN switching.

We then asked if they plan to deploy electrical OTN switching or if they will deploy OTN only for point-to-point transport (with G.709 FEC and performance monitoring). The results are decidedly lopsided, with 86% (18 of 21 responses) planning to deploy OTN switching. This is even higher than the 76% recorded in our survey a year prior. This is also higher than what many in the industry argue—that only a handful of carriers will use OTN switching.

The 86% (18 of 21 respondents) accounted for an outsized share of capex—93% of total respondent capex. Therefore, among our sample, the carriers avoiding OTN switching tend to have capex below the average capex of respondents.

The conclusion from our 2012 survey still applies: carriers that plan to deploy OTN switching typically have greater capex than those that do not. More importantly, the year-to-year trend shows an even higher adoption rate for OTN switching. It used to be said there was a sizeable minority who would bypass OTN switching; data from last year showed this was incorrect and this year’s sample shows that minority is dwindling.
INTEGRATED WDM AND OTN SWITCHING IN THE CORE

Some equipment vendors are building long reach optical WDM interfaces into OTN switching platforms, some are retrofitting OTN switching into WDM platforms, and some have designed machines from day one to have converged OTN and DWDM. But it isn’t clear whether carriers, which have traditionally separated some switching functions from transport, plan to use this functionality. We wanted to determine what proportion of carriers that use or plan to use OTN switching want WDM interfaces on that equipment, and where and when in the network this approach is preferred.

Service providers show a stronger preference for OTN switching in core networks with both OTN switching and WDM interfaces in an integrated platform. By 2016, all 18 of 21 respondents planning to use OTN switching plan to deploy in the core, and only 1 prefers to have the WDM transport equipment separate from the OTN switching equipment.

Source: Infonetics Research, OTN, MPLS, and Control Plane Strategies: Global Service Provider Survey, May 2013
Almost all respondents plan to move to some type of mesh-based architecture in the coming years.

**CORE OPTICAL TRANSPORT TOPOLOGY**

We wanted to understand what scheme operators identify as the primary architecture of their existing network; this would help us understand the relative magnitude of interest in mesh protection schemes and put the importance of OTN switching in more context.

We asked service providers to characterize their network as being primarily point to point, ring based, partial mesh, or full mesh. We offered respondents the ability to select only one answer as we wanted them to choose what they felt was the primary guiding principle in their network architecture.

The results show there are a wide range of deployed topologies today in the core, with all four options equally adopted — but almost all plan to move to some type of mesh-based architecture in the coming years. Just over half of respondents (52%) are looking to move from point to point or ring-based architectures to mesh-based topologies, essentially eliminating non-mesh approaches from core networks.

**OTN shared mesh protection appears on the verge of widespread adoption, with a 47-point increase in expected deployment between today and 2016.**

**APPROACHES AND MOTIVATION FOR NETWORK PROTECTION**

We sought to understand which network protection mechanisms are in use today, which are the most popular, and how service providers expect this to change 3 years from now. We asked service providers to identify all of the protection schemes they use today and which ones they expected to use three years from now.

OTN shared mesh protection appears on the verge of widespread adoption, with a 47-point increase in expected deployment (with a total of 71% in 2016 and 24% today). Optical restoration via ROADM is second with a 38-point gain to 67%. There is little change in the use of OTN 1+1 or MPLS-based protection schemes, and SONET/SDH shows an expected decline.

Overall, these results, combined with the results of the previous question asking service providers to identify what network topologies they plan to use in 2016, show a strong desire by service providers to migrate to some degree of mesh protection in their core networks.

![Protection Layers Diagram](image-url)
To 62% of service provider respondents, the greatest benefit of mesh protection is providing shared protection bandwidth for better economics and lower capex.

BENEFITS OF SHARED MESH PROTECTION

There are multiple benefits associated with mesh protection, and equipment vendors like to market all of them with equal gusto. But there is no consensus on which of the benefits is the prime benefit of this architecture.

We asked respondents what they see as the most important benefit of mesh protection; we offered the 3 most common reasons: economics, resiliency, and service differentiation.

In short, economics wins by a wide margin; to 62% of respondents, the greatest benefit of mesh protection is providing shared protection bandwidth for better economics and lower capex. Network resiliency is second with 29%. Only 2 service providers said that being able to offer different prices and service levels based on protection quality is the top benefit.

Source: Infonetics Research, OTN, MPLS, and Control Plane Strategies: Global Service Provider Survey, May 2013
Shared optical mesh protection based on OTN or optical switching competes with MPLS to some degree, and some service providers deploy both schemes. We wanted to understand the perceived benefit of using optical mesh protection compared with MPLS fast reroute. We listed 5 possible reasons, including 1 allowing the respondent to indicate MPLS Fast Reroute is superior. Again, respondents could select only 1 benefit.

Economics again rises to the top, with 38% of service providers citing this as the benefit over MPLS fast re-route. This answer is puzzling though, since MPLS fast reroute should have equivalent benefits to OTN, except the difference among respondents is that OTN-based mesh protection can be implemented less expensively than MPLS-based approaches, at least today. Guaranteed 50ms response times were the second-most popular reason at 29%, and optical meshes were perceived to support multiple cascading failures better by 14% of respondents.

Two respondents (10%) indicated that MPLS fast reroute is superior for all of these approaches; unsurprisingly, these were 2 of the 3 carriers that shunned OTN switching altogether.

CONCLUSIONS

OTN switching is desired by the majority of carriers surveyed, and it is apparent that this feature is a requirement that should be integrated into most WDM transport platforms in the metro and in virtually all higher-density DWDM systems for the core. Likewise, optical shared mesh protections plays a minor role today in carrier networks, but if operators get their way it will be dominant by 2016 along with more meshed topologies in general. It will be important to see whether vendors can build platforms that integrate OTN switching and DWDM where both functions can scale in the future without a compromise in either individual function.
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