

Setting the standard in class-leading aggregation and service richness

An Alcatel-Lucent Bell Labs 7750 SR-a total cost of ownership modeling study



This Alcatel-Lucent Bell Labs modeling study compares the Alcatel-Lucent 7750 Service Router-a (7750 SR-a) in its role as an aggregation and services platform to competing products in high-performance 10 Gigabit Ethernet (GE) and 100GE deployment scenarios. The study compares CAPEX and total cost of ownership (TCO) over a representative medium-term period through 2018.

Results indicate that the 7750 SR-a delivers CAPEX savings between 44 percent and 63 percent—in addition to TCO savings between 42 percent and 48 percent for high-density 10GE applications versus competing platforms. Where there is a need to move towards 100GE infrastructure, the 7750 SR-a delivers CAPEX savings of 54 percent and TCO savings of 55 percent versus a competing platform that lacks 100GE interfaces and is constrained to a N*10GE solution.

The Alcatel-Lucent 7750 SR-a family of edge routers provides the optimal combination of aggregation and service richness in a highly resilient, compact platform for mobile, business and residential service delivery. Powered by the FP3 400 Gb/s network processing unit (NPU) and supporting the richly featured and field-proven Service Router Operating System (SR OS), the 7750 SR-a is the newest member of the 7750 SR product family. This product delivers class-leading GE and 10GE density, as well as high-performance 40GE and 100GE interfaces for advanced IP and Ethernet services without compromising service delivery.

Background

The strong demand for high-bandwidth multimedia services, such as HD video streaming, the advent of cloud-based storage and computing services, as well as the trend to converged networks are all having a direct impact on network scalability and throughput requirements. A correctly selected aggregation platform can greatly assist the implementation of a service-rich, cost-effective and highly scalable network.

The cost-effective scaling of such platforms is crucial not only in the initial stage (when the network starts to support multiple, high-bandwidth services) but also in the near to medium term, when popularity and high growth in services demand drives the underlying network towards quick and aggressive growth.

As a feature-rich edge router, the 7750 SR-a supports a comprehensive suite of IP, Multiprotocol Label Switching (MPLS), Ethernet and synchronization protocols, enabling deployment in a wide range of IP and carrier Ethernet applications. Available in 200 Gb/s and 400 Gb/s variant options, the 7750 SR-a is ideal as a high-density IP and carrier Ethernet aggregation platform in support of Long Term Evolution (LTE) Advanced and small-cell mobile backhaul, business VPN, data center and cloud-based services, and residential broadband services for service providers – along with industries and public-sector organizations operating their own networks. The 7750 SR-a is unique in its ability to deliver dense GE and 10GE interfaces, as well as high-performance 40GE and 100GE interfaces in a compact footprint.

As a member of the Alcatel-Lucent 7750 SR product family, the 7750 SR-a uses proven Alcatel-Lucent FP3 400Gb/s network processor technology and the Service Router Operating System (SR OS), enabling a seamless, end-to-end operating model. The 7750 SR-a provides the quality of service (QoS) and OAM tools to define and deliver the most stringent SLAs for high-value, differentiated services.

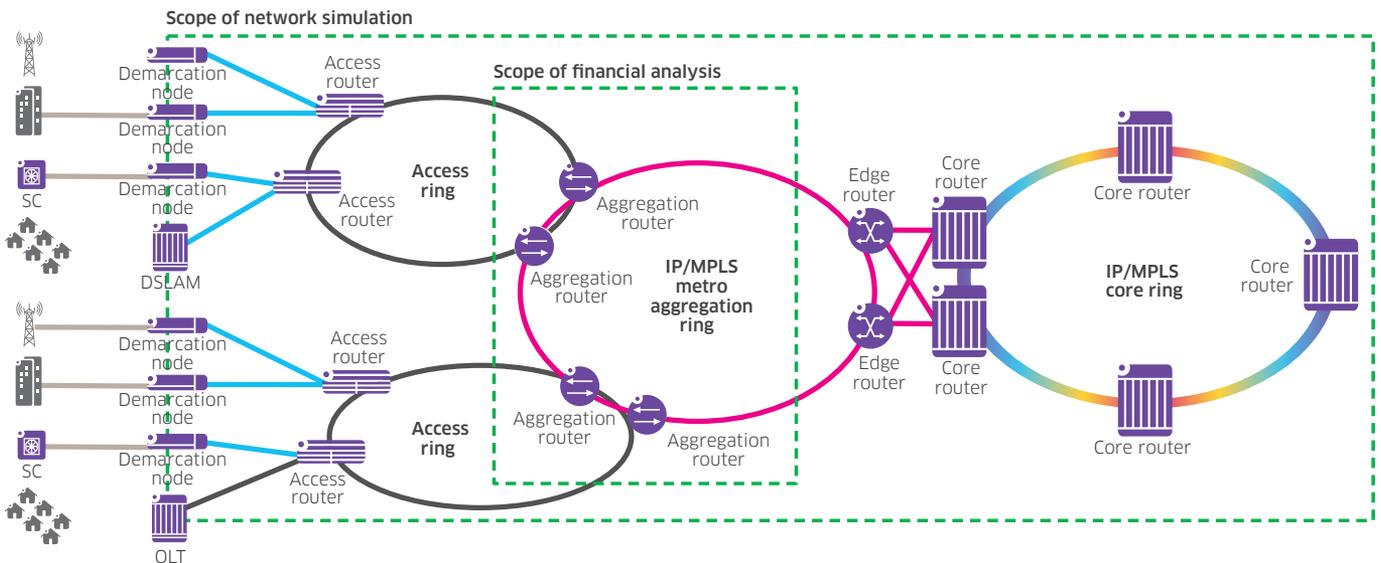
The 7750 SR-a is managed by the Alcatel-Lucent 5620 Service Aware Manager (SAM). Full integration of the 5620 SAM and SR OS ensures feature velocity, rapid provisioning and troubleshooting, extensive service assurance and seamless integration into the Alcatel-Lucent cloud-optimized routing solutions.

Modeling scenarios

To highlight the value of the 7750 SR-a in multiservice metro aggregation networks, Alcatel-Lucent Bell Labs modeled a mid-size, three-region, converged IP/MPLS network having 18 x 7750 SR-a based metro aggregation points of presence (POPs) aggregating fixed broadband services, mobile broadband and business services. A total of 900 access POPs were modeled in the analysis. The time period modeled was 42 months (3.5 years) with high growth of users/services.

As illustrated in Figure 1, the scope of this analysis is applicable to a single service, or converged services, end-to-end IP/MPLS network with an aggregation layer based on the 7750 SR-a. The long-term network behavior was driven by growth in user services. The network simulation used an engineering approach for four layers of the IP/MPLS network. This was the basis to determine the costs of all components, including power and space and

Figure 1. Modeled architecture



associated operations costs. The network simulation used a comprehensive, end-to-end engineering approach from the core to the access and demarcation devices. To ensure an accurate comparison, the results of the financial calculations were constrained to the aggregation layer.

CAPEX costs assessed included:

- Initial spending to build the IP/MPLS network
- Incremental spending to IP/MPLS network extensions as the user base and services grow
- Incremental DWDM transport layer spending required by changes in the IP/MPLS layer.

OPEX costs assessed included:

- Installation and commissioning
- Hardware and software maintenance
- Support services
- Power costs
- Space costs

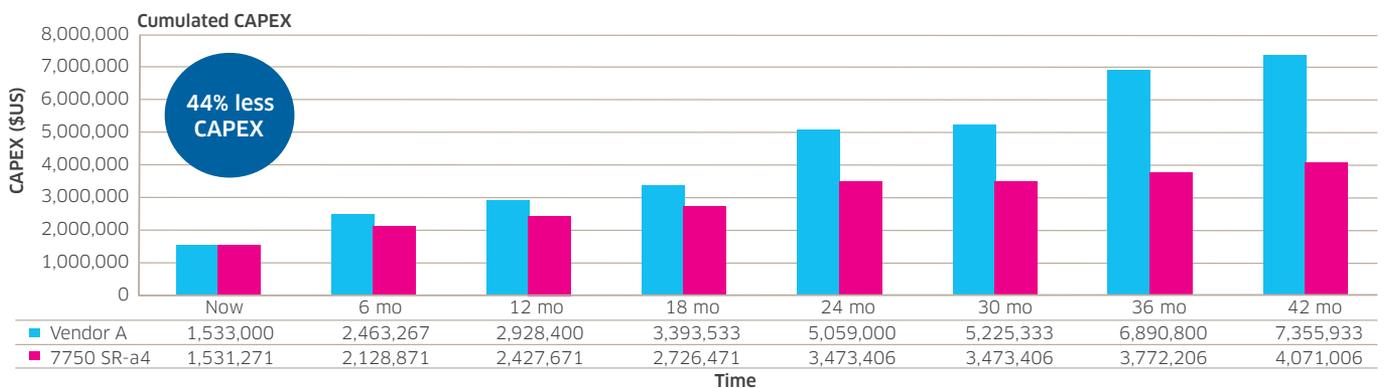
The 10G aggregation ring analysis was carried out using financial equalization. This was achieved by adjusting solution discounts, as required, to equalize the initial investment for the whole solution for both vendors. Thus both vendors started from exactly the same economic point. By equalizing the initial conditions of the model, the long-term CAPEX difference between the vendors occurs purely as a result of the difference in solution scalability under growth conditions and over the time period in question.

Comparative economic analysis modeling was carried out for two competitors: Vendor A and Vendor B. A model using n*10G aggregation rings was used for the comparison of both vendors. A model using 100G aggregation rings was used for comparison with Vendor A.

Modeling results - High density 10GE aggregation scenario

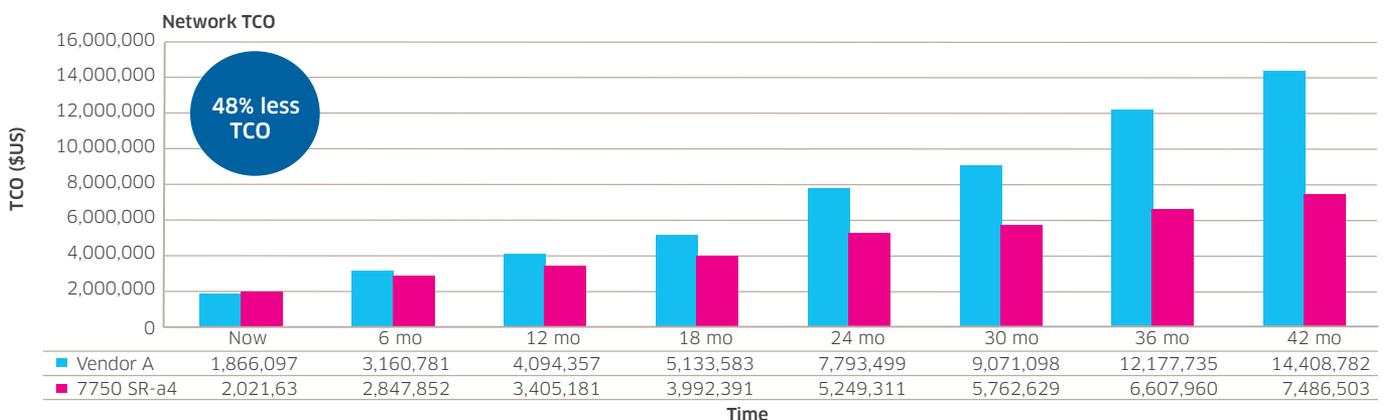
As Figure 2 illustrates, better 10G-port density and pricing structure leads to much lower incremental investment in the 7750 SR-a case. Both platforms have comparable initial CAPEX but, over time, the 7750 SR-a requires approximately 44 percent less cumulated CAPEX than Vendor A (Vendor A=7.3 M; Alcatel-Lucent =4.0M).

Figure 2. Cumulated CAPEX versus Vendor A - 10G Ring aggregation architecture



As shown in Figure 3, better scalability and the 10G density of the 7750 SR-a drives TCO savings of 48 percent (TCO for Vendor A =14.4M; Alcatel-Lucent TCO =7.5M). This represents more than 6.9M savings over 3.5 years.

Figure 3. Network TCO versus Vendor A - 10G Ring aggregation architecture



As shown in Figure 4, better scalability and 10G-ports density leads to much lower incremental investment in the 7750 SR-a case. Both platforms have comparable initial CAPEX but, in the long-run, the 7750 SR-a requires over 63 percent less cumulated CAPEX than Vendor B (Vendor B =3.1M; Alcatel-Lucent =1.1M).

Figure 4. Cumulated CAPEX versus Competitor B - 10G Ring aggregation architecture

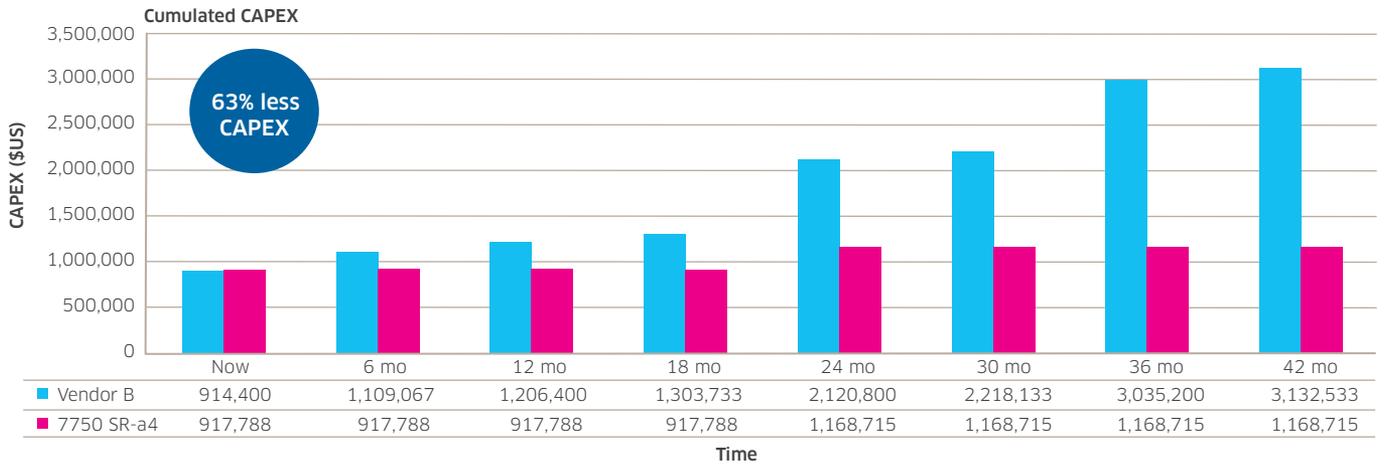
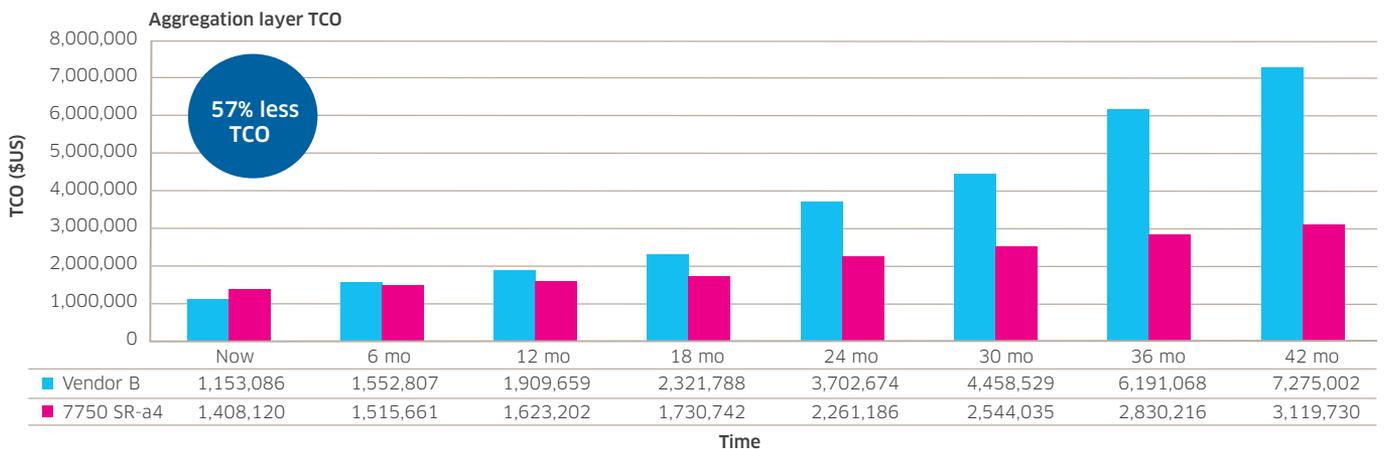


Figure 5 shows that better scalability and the 10G density of the 7750 SR-a drives TCO savings of 57 percent (TCO Vendor B=7.2M; Alcatel-Lucent TCO =3.1M). This represents more than 4.1M savings over 3.5 years.

Figure 5. Network TCO versus Vendor B - 10G Ring aggregation architecture



Considerations and modeling results for high-performance 100GE aggregation

As traffic continues to grow, many network operators are grappling with the question of exactly when to move to a 100GE infrastructure. An early deployment of 100GE has some advantages. It prevents the continued direction of investment to 10GE and the incremental, ongoing costs of continuously upgrading 10GE bundles. However, higher initial CAPEX is required for the spare capacity on a 100GE infrastructure.

Continuing to deploy 10GE and moving to 100GE later, possibly as it becomes more cost-effective is another strategy, which can lower initial CAPEX. A disadvantage of this approach is the sunk cost when the 10GE infrastructure is ultimately decommissioned.

The ability of the 7750 SR-a to uniquely support both high density 10GE infrastructure and high-performance 100GE in the same compact platform brings great flexibility to this decision making process. Alcatel-Lucent Bell Labs has modeled a number of scenarios that can bring some insight to this analysis.



One illustrative scenario that was modeled compares the 7750 SR-a using a 100GE infrastructure versus Competitor A whose router does not support 100GE. As a result, it relies on using a Nx10GE infrastructure. In this case, while the initial CAPEX is higher, the 7750 SR-a requires approximately 54 percent less CAPEX than Competitor A over a 3.5 year period. Buying spare capacity in 7750 SR-a 100G interfaces delivers benefits in the long run by preventing the need for any additional platform CAPEX during the period in question. TCO was also modeled with the 7750 SR-a showing a saving of 55 percent versus Competitor A.

Conclusion

The Alcatel-Lucent financial modeling results make a convincing case for the deployment of the 7750 SR-a in an aggregation role. Results indicate that the 7750 SR-a delivers CAPEX savings between 44 percent and 63 percent—in addition to TCO savings between 42 percent and 48 percent for high-density 10GE applications versus competing platforms. Where there is a need to move towards 100GE infrastructure, the 7750 SR-a delivers CAPEX savings of 54 percent and TCO savings of 55 percent versus a competing platform that lacks 100GE interfaces and is constrained to a N*10GE solution.