NOKIA Bell Labs

A case study

Telecom Argentina

The new Telecom Argentina was created through the merger of Cablevision, a cable company, and Telecom Argentina, a traditional telecommunications company.
It serves more than 30 million customers in Argentina, including ~18.6 million mobile subscribers, ~4.1 million fixed broadband subscribers, ~3.5 million TV subscribers and ~3.6 million fixed voice subscribers. The company’s strategic vision for the future is to transform into a digital service provider that delivers the best customer experience for all services, across all major markets.

The primary challenge

Converge underlying networks — and transform the backbone transport network

With the merger of disparate and diverse companies, the new Telecom Argentina needed to meet two important goals: First, it needed to consolidate and converge the underlying networks. In addition, it intended to use this opportunity to re-architect and re-build the backbone transport network, making it highly scalable, efficient, reliable and 5G-ready, so it could support all future services at the required performance levels.

Objectives

- Extend market leadership in fixed broadband while growing mobile share with a scalable, consolidated network, ready for future services and technologies
- Avoid duplicated investment through optimal resource utilization
- Monetize superior customer experience with agile resiliency, simplified operations and distributed content delivery
- Execute a realistic and phased transition plan flawlessly

Network challenges

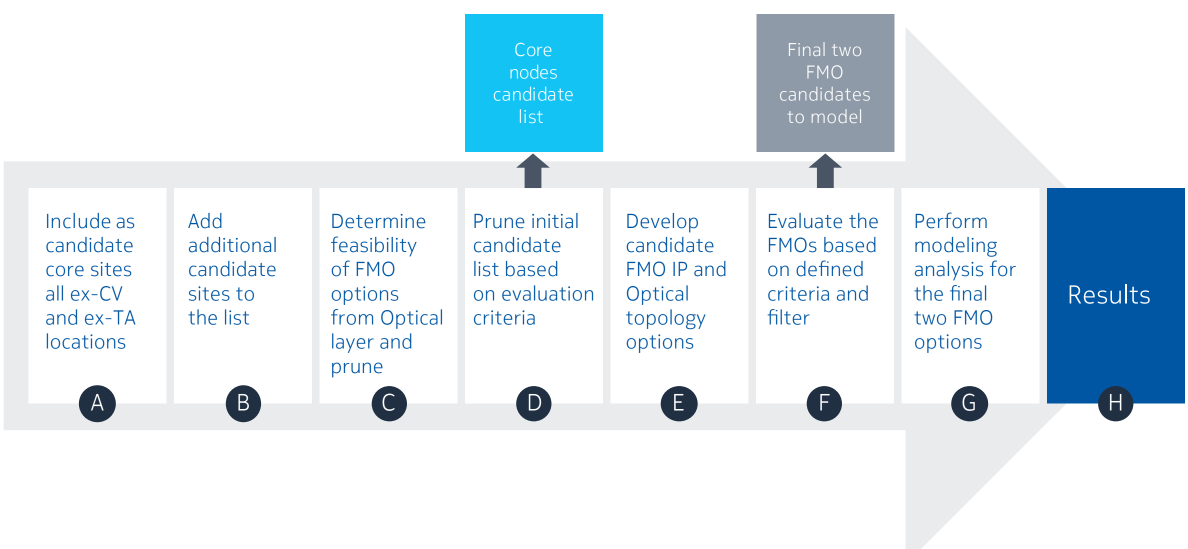
- Backbone architecture disparity: Concentrated around Buenos Aires vs. nationally distributed
- Future architecture: Unifying the networks, while simultaneously considering combined traffic growth and profile
- Convergence at the IP/MPLS layer: Unifying QoS, removing overlapping IP addresses, merging IGPs, consolidating into a single ASN, re-homing connections to peering and transit providers, etc.
- Convergence at the optical layer: Diversity of optical platforms, partitioning of the network into vendor-specific domains, type and quality of optical fiber deployed by the two companies (G.653, G.655 and G.652)

How Bell Labs Consulting helps with a proven, seven-step methodology

Finding architectures that harmonize disparate backbone networks

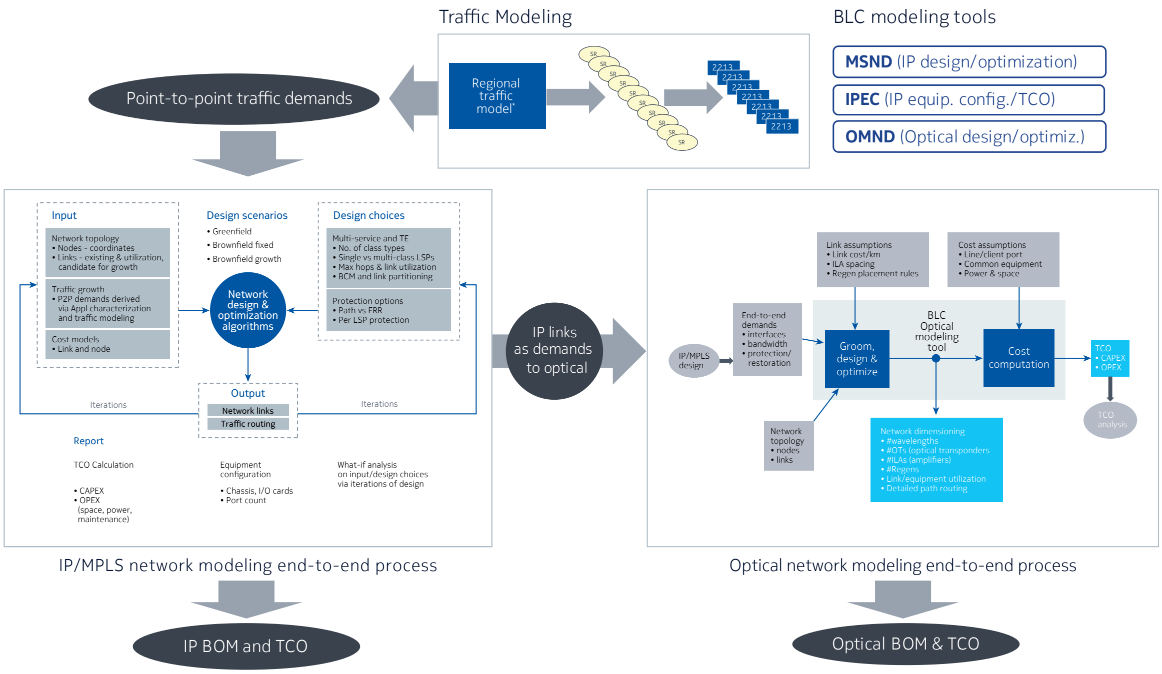
The backbone networks from the two former companies employed different core node locations, topologies (ring vs. partial meshed), CoS levels, resiliency targets and protection designs. The first step was to harmonize these differences by identifying and selecting the strategic geographical locations for the common, converged core nodes. A proven, seven-step methodology was employed to guide the selection and design process. A common set of core node locations was identified and an initial array of topology choices was created, using the following considerations: traffic densities and pattern, geographic distance, fiber footprint diversity and quality, resiliency requirements, best practices, access to transit and peering, and other business and strategic needs.

To further filter these candidate architectures, a qualitative merit assessment was conducted based on critical KPIs, including cost efficiency, resiliency, agility and simplicity, future readiness and security. This assessment was used to select the top two Future Mode of Operation (FMO) candidate topologies.



Selecting the best FMO architecture

The ideal future architecture needs to be cost optimized for the expected traffic growth. Based on a 5-year traffic forecast and detailed traffic modeling, a quantitative network design, failure simulation and equipment configuration for the IP and optical networks was conducted to derive the total cost of ownership (TCO) including CapEx and network OpEx. The top FMO candidate with the lower TCO was selected as the target architecture for the consolidated backbone.



Optimizing QoE and cost of delivery

To further optimize cost and improve service, distribution of content was considered. Then guidelines and traffic thresholds were developed to specify when and where to distribute this content toward the edge of the backbone. TCO savings achieved by distribution can be up to 18% over 5 years. This, however, is dependent on the strategic relationship and negotiation with third parties (content owners).

Implementing best practice network design

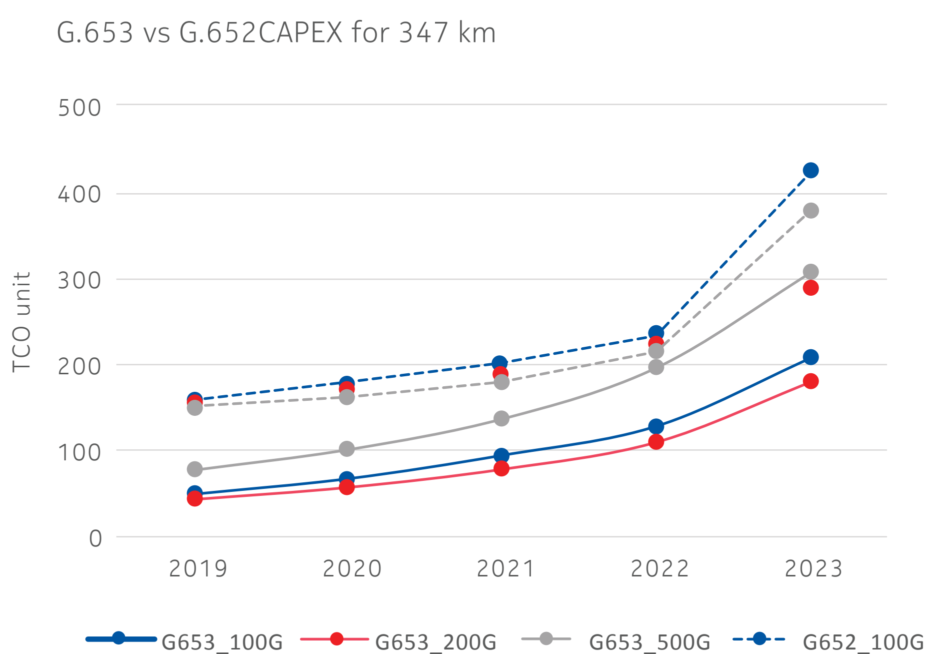
As with any network convergence and consolidation, major challenges include converging different AS domains, IGP/BGP designs, route reflectors configuration, transit and peering design, classes of service design and overlapping IP address spaces from previous networks. A best practice IP/MPLS logical design for the convergence was implemented to assure efficient, scalable and reliable routing of traffic.

Mitigating risk and meeting resiliency requirements

The converged optical backbone was faced with two main challenges to assure scalable and reliable delivery of future services: channel limitation in the vastly deployed older generation G.653 fiber, and a higher resiliency requirement, which called for three disjoint optical paths against multiple failures. To overcome G.653 limitations, two options were considered: replacement with newer G.652 fiber and upgrading existing channels to higher data rates.

This included analyzing options related to cost tradeoff and sensitivity concerning fiber distance to provide a “playbook” for further business case and strategy development for the G.653 migration.

To meet the more stringent optical resiliency requirement, CD (Colorless-Directionless) ROADM was adopted, along with a dynamic control plane with flex-grid capability. These technology choices allow flexible and dynamic creation of disjoint optical paths and fast recovery from multiple fiber cuts through optical protection and restoration mechanisms, which work together with IP layer re-convergence to achieve the desirable backbone network availability.



"Communication service providers all over the world are evolving their networks to get ready for 5G. The newly formed Telecom Argentina is not only undertaking the complex merger and consolidation of two disparate and diverse networks, but also transforming to a unified and converged next generation architecture that can support all future service and product needs. This transformation considers not only a service flexible and TCO optimized backbone topology but also features and functionalities, achieved via incorporation of new technologies such as segment routing, SDN and NFV, this network must support to meet the afore-mentioned objectives for the next 5 years and beyond.

We have been very pleased to work with Bell Labs Consulting, which advises on future technology evolution in a vendor agnostic way, to help define our strategic plans."

Gabriel Carro, VP R&D,
Technology and Architecture, Telecom Argentina

Evolving to future-proof, secure next-gen technologies

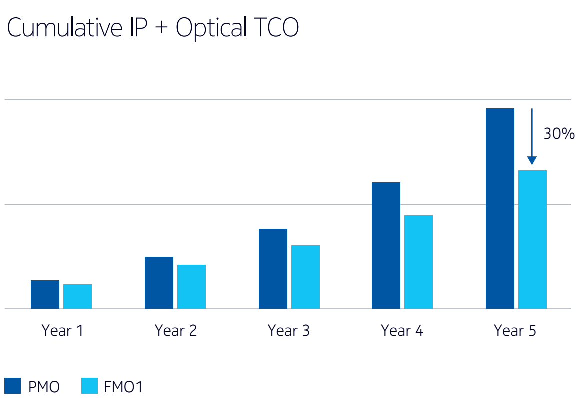
The company's converged backbone needs to evolve to a smart and programmable network fabric, which is ready to dynamically address all future needs for scalability, programmability and automation. So an end-to end architecture was developed, based on SDN/NFV, multi-domain orchestration, and emerging IP and optical technologies, such as segment routing and traffic steering. Then several feasible SDN use cases for the converged backbone were created and analyzed, including an agile IP topology optimized to changing traffic loads, differentiated multi-layer protection, and optimization of ingress/egress link utilization.

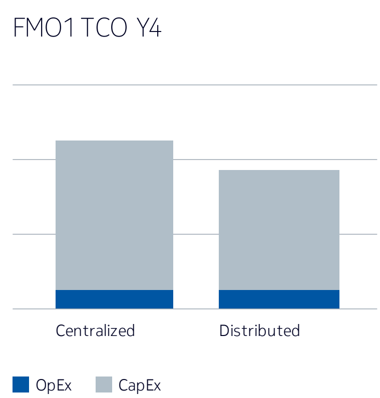
In addition, the security architecture needs to provide comprehensive protection against DDoS attacks, while meeting scalability, resiliency and performance requirements. Consolidation of existing solutions is a must, aligning with the backbone peering and transit points — while other key elements of the overall security strategy include evolution to a distributed and multi-layered DDoS architecture and virtualization, as well as use of security analytics, together with automation and implementation of SDN security.

The outcome

An optimal future architecture with substantial TCO saving

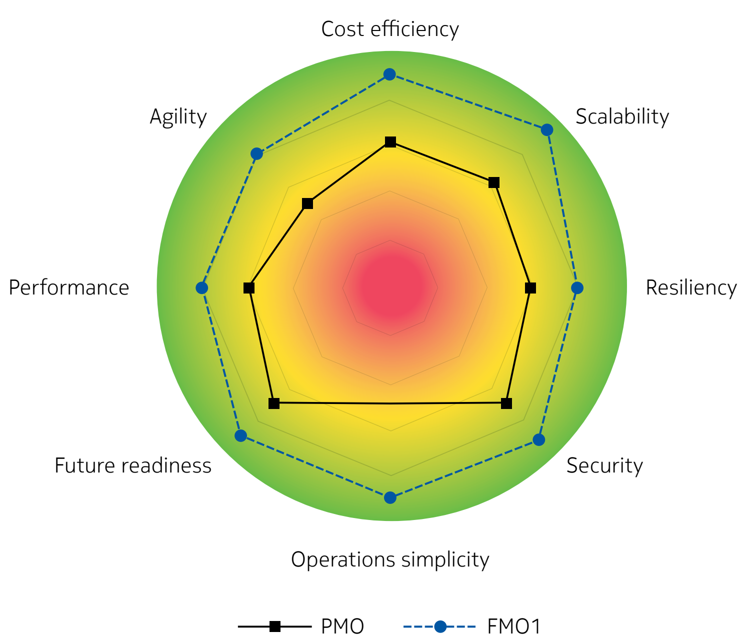
A comparison of 5-year TCO, quantified through comprehensive traffic and IP/optical network modeling, shows FMO1 is the best future architecture for the consolidated backbone.





FMO1 reduces PMO TCO by 30%, due to:

- Optimized architecture
- Improved resource utilization
- Content distribution
- Site consolidations

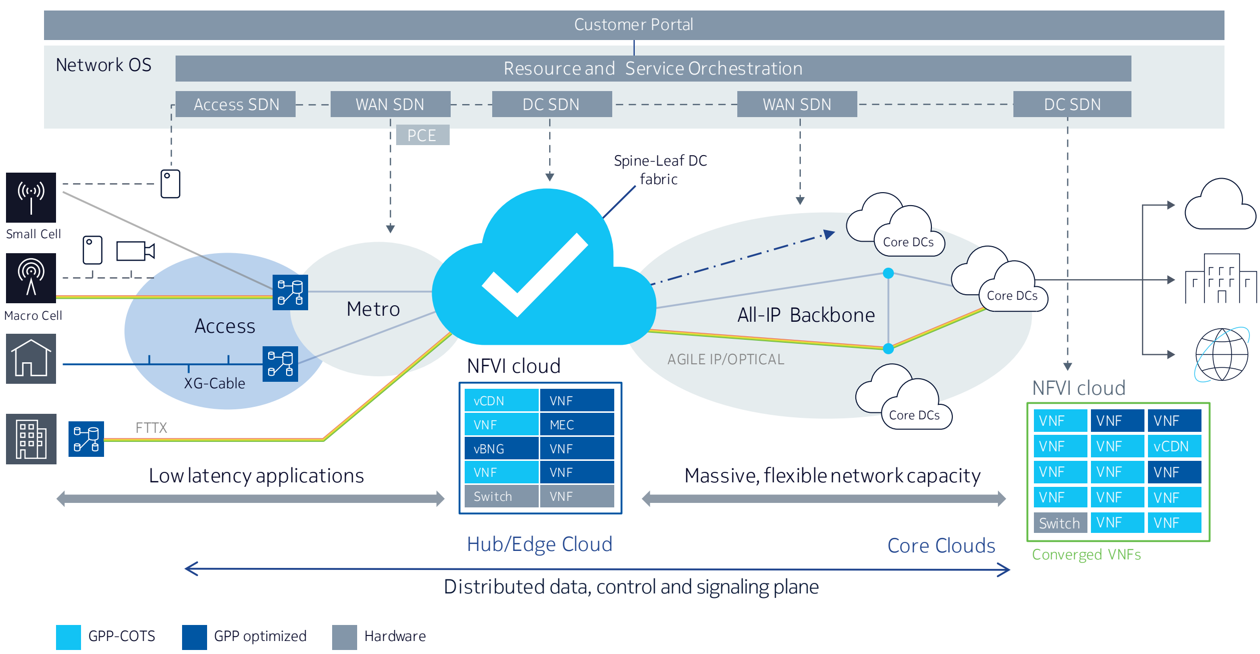


The following improvements also contribute to the TCO reductions:

- Simplified operations with a single, easily expandable backbone
- Alleviated router scalability “hot spots”
- Better resiliency with optical 1+R protection

Higher TCO savings of up to 57% can be achieved with a more aggressive distribution of content to the edge of the backbone transport network.

TECO End-to-end architecture (2023+)



Telecom Argentina, with help from Bell Labs Consulting, has developed a comprehensive strategy for consolidating, converging and transforming previously separate backbone networks. This carefully considered plan includes an optimal future state architecture, detailed logical design, a next-gen technology roadmap and quantified multi-year TCO. By assuring a cost efficient, scalable and reliable future backbone, the architecture will allow the company to maintain market leadership, continue competitive growth and monetize a superior user experience.

Bell Labs Consulting

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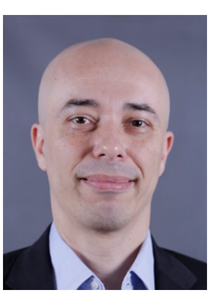

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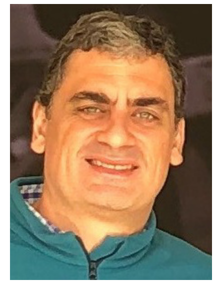

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About Nokia Bell Labs Consulting

Based on the Future X Network vision, Bell Labs Consulting leads customers on their future transformation plan, by understanding the economics of underlying technologies, emerging market dynamics and the client's specific situation. We bring a unique cross-disciplinary team of business and technology experts to each problem with a proprietary patented decision-modeling toolset and rich industry experience aiding customers in connecting deep technology insights to critical business decisions. With over 300 engagements in the past three years, it has proven very successful with an increasing number of companies relying on Bell Labs Consulting to provide independent, trusted advisory services to make their networks and operations fit for future demands. www.bell-labs.com/consulting/

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Document code: SR2002041552EN (April) CID207209