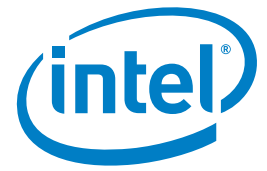


CASE STUDY

Intel® Xeon® Processor E5 Family

Telecom/Service Provider

Performance for Data-Intensive Computing



Unleashing Network-based Service Innovation

Telefónica I+D and Intel explore how to evolve telecom network edge infrastructure with software-defined approach

While the general trend in IT has been away from fixed hardware, telecom service providers still rely on expensive, purpose-built hardware to perform essential network processes. Using the Intel® Xeon® processor E5 family, Telefónica I+D and Intel have collaborated to convert processes in the network edge infrastructure into software-based solutions that can be virtualized and run on general Intel® architecture-based hardware. By removing its reliance on dedicated, proprietary technologies, Telefónica I+D has seen increased opportunities for service innovation, faster development cycles, and reduced costs for network operation and evolution.



“Our work has shown that it is possible to run intensive, highly specialized network edge processes on Intel® architecture. Changing to software-oriented solutions should become a key leverage to reduce operation costs, improve time to market and boost the pace of innovation in this area.”

Enrique Algaba Montellano,
Transversal Projects & Innovation Director,
Global CTO Unit – Telefónica I+D

CHALLENGES

- **Flexibility:** Telefónica I+D found that the current paradigm for the network edge elements, relying on many hardware-based functionalities, becomes complex to operate and often limits service innovation and development
- **Specialized:** Telefónica I+D wanted to test whether Intel architecture-based hardware could perform the intensive processes previously carried out by specialized hardware while preserving service quality
- **Software:** It aimed to shift to a software-oriented approach, enabling a more open ecosystem of software collaborators to develop compatible networking solutions based on x86 architecture

SOLUTIONS

- **Collaboration:** Telefónica I+D collaborated with Intel to convert network edge processes to run on Intel architecture
- **Performance:** Telefónica I+D harnessed the high performance of the Intel Xeon processor E5 family to handle the data-intensive requirements for network equipment, including data plane switching and processing
- **Optimization:** Telefónica I+D optimized applications for Intel architecture using the Intel® Data Plane Development Kit (Intel® DPDK) to maximize output quality

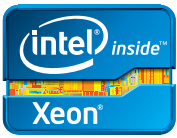
IMPACT

- **Choice:** By moving from fixed hardware to a software-oriented approach, Telefónica I+D can develop a more flexible, scalable network, avoiding being locked in to completely different hardware for each particular node
- **Economical:** With network applications running on commercial Intel architecture-based hardware, it can benefit from lower operating and maintenance costs
- **Innovation:** With hardware restrictions lifted, engineers can focus on developing and enhancing services, resulting in a better experience for customers

Renewing the infrastructure

Telefónica is one of the leading integrated operators in the telecom sector, with operations in 25 countries and a customer base that amounts to more than 309 million accesses around the world. Telefónica I+D is the research and development company within the Group which contributes to Telefónica's competitiveness and modernity through technological innovation. For this project, Intel has worked together with a team from Telefónica I+D dedicated exclusively to support the Telefónica's Global CTO Unit.

An essential part of Telefónica's network infrastructure is the network edge, which is the key insertion point for residential and corporate services, including data, IPTV and voice. This segment is responsible for providing the best treatment for each traffic type according to the service characteristics, the subscription profile, and any other relevant attributes. Not only is adequate processing and forwarding performance required, but appropriate protocols for authentication and self-provision are also a must. In this environment, a number of data-intensive processes — in existence now or in the future — will demand large amounts of processing power and analysis. At the same time, the infrastructure will need to provide greater flexibility to adapt the environment to upcoming services of a different nature.



Telefónica I+D boosts service innovation with network edge solutions based on Intel® architecture

A legacy approach

The heavy processing demands on network edge devices has meant that telecom service providers have traditionally relied on specialized, proprietary hardware solutions to support this part of the network chain.

This approach, based on purpose-built hardware, has proven adequate in terms of per-box performance but increasingly difficult to operate and evolve, particularly in multi-vendor environments. Tying every network role to a dedicated physical box makes evolution and optimization decisions more difficult than in other environments, such as cloud computing or computation in general. Additionally, the nature of the purpose-built hardware approach sometimes makes the addition of new features difficult, requiring long maturation periods, with long design and implementation cycles. These evolutions may also bring incompatibility issues among different nodes, making the hardware-led ecosystem more complex to evolve in fast-changing scenarios, where the pace of innovation might be critical.

A new approach

Telefónica I+D wanted to explore alternatives to the existing hardware-oriented approach to network edge solutions. With the performance advances in the latest Intel Xeon processor E5 family, it saw an opportunity to test whether network edge processes could be ported to run on Intel architecture.

This approach offered a number of potential advantages. By delivering network edge processes using software that can run on generally-available Intel-based hardware, Telefónica I+D could significantly increase

the range of hardware and software options for supporting this part of its operations. As a result, it would achieve more flexibility in the way it operates its network edge platform, with a positive impact on service delivery and operating expenses.

Collaboration

Telefónica I+D began working with Intel on a joint project to convert its network edge processes to software solutions that run on Intel architecture, using Intel Xeon processors E5 family to evaluate the performance on the new hardware.

A primary challenge was to ensure that the new software processes could deliver the same level of performance on the new hardware as on the existing, proprietary devices. When running on Intel architecture, the solutions needed to be able to quickly process dynamic, fluctuating traffic workloads while simultaneously performing processor-intensive packet analysis.

To achieve this, Telefónica I+D worked closely with Intel engineers to optimize its network processes for the new hardware environment, using the Intel DPDK, which is specifically designed to support packet processing on Intel architecture.

As part of this collaboration, Intel provided guidance and support for benchmarking application performance and compatibility testing in the new hardware environment. As a result, Telefónica I+D was able to maximize the output of the network edge processes on the Intel Xeon processor E5 family, ensuring high performance and stability in the face of high traffic workloads.

Spotlight on Telefónica

Telefónica is one of the largest telecommunications companies in the world in terms of market capitalisation and number of customers. From this outstanding position in the industry, and with its mobile, fixed and broadband businesses as the key drivers of its growth, Telefónica has focused its strategy on becoming a leading company in the digital world.

The company has a significant presence in 25 countries and a customer base that amounts to more than 309 million accesses around the world.¹

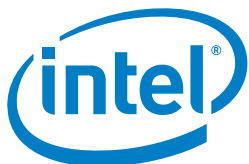
A better approach

Telefónica I+D's tests have confirmed the advantages of the software-oriented approach to network edge processing. Using Intel processors, it has been able to maintain the same service levels as before, while opening up greater possibilities for innovation and reducing operating costs.

By decoupling the network processes from specific hardware devices, Telefónica can benefit from the economies of scale that can be achieved with commercial off-the-shelf hardware. It is now easier to scale up solutions and consolidate multiple processes onto a single server. Total cost of ownership (TCO) can be reduced as a result of accelerated development cycles, shorter time to market for new services, and lower operating costs from simplified maintenance. The greater choice of available hardware solutions can also help reduce power consumption.

With a more open, flexible operating environment, engineers can devote more time to developing new and existing services. For Telefónica's customers, this could translate into a higher-quality and richer experience of using the service.

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