

NEC's Traffic Management Solution (TMS) Can Help Increase the Profits of Communication Service Providers (CSPs)

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Abstract

As smartphones continue to proliferate, communication service providers (CSPs) today must deal with constantly growing volumes of communications traffic that vary both in quality and quantity, making it much more difficult to assure the performance of applications and services, while maintaining stable and reliable quality. To address this, NEC has developed Traffic Management Solution (TMS), a specially configured suite of products that optimally controls communications traffic to provide end users with dependable, high-quality smartphone usage environments. By optimizing and streamlining traffic flow to assure user satisfaction, NEC's TMS helps maximize return on investment (ROI) by enabling communication service providers to increase average revenue per user (ARPU), capital expenditure (CAPEX) and operating expenditure (OPEX), as well as making it possible to create new revenue-generating services.

Keywords



traffic control, QoE, throughput acceleration, traffic reduction, monetize, visualization, improved ARPU, reduced OPEX, ROI

1. Introduction

The explosion in smartphone usage over the past few years has led to a huge increase in the volume of traffic on mobile networks. With the number of users and the amount of traffic expanding so rapidly, mobile network operators (MNOs) and mobile virtual network operators (MVNOs) find it increasingly difficult to profit from communication services for end users inherent in the increased traffic, while holding down the costs generated by those services.

NEC's Traffic Management Solution (TMS) has been designed to provide network operators with the tools they need to deal with the negative impact of increased traffic, while leveraging the optimal control over communications traffic that NEC's TMS provides to create new value streams.

In this paper, we will introduce you to the features of NEC's TMS, describe the key solutions, and give some practical examples of the system in action.

2. Overview of NEC's TMS

2.1 Summary of the Solutions

An overview of NEC's TMS is shown in **Fig. 1**. TMS is a suite of solutions deployed in the interface connected to CSP's LTE/3G system via the Internet.

These solutions offer three major values - namely, throughput acceleration, traffic reduction, and monetiza-

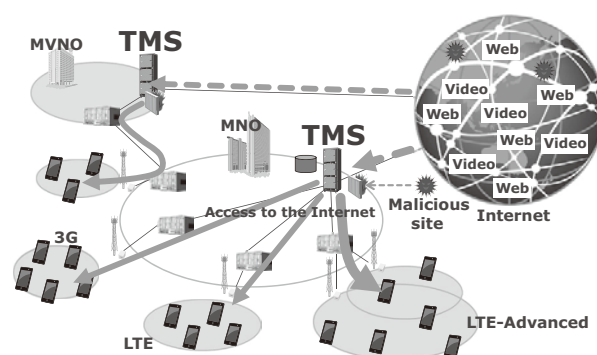


Fig. 1 Positioning of TMS.

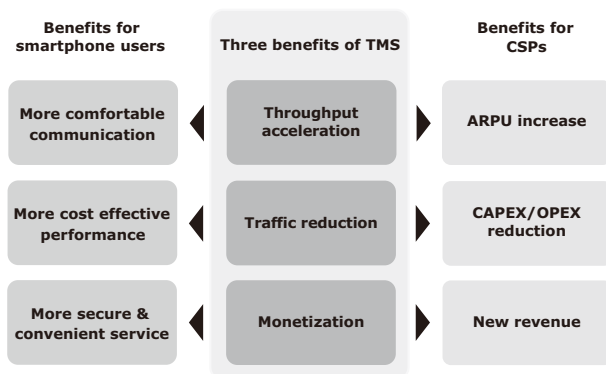


Fig. 2 Values offered by TMS.

tion (as shown in **Fig. 2**). By controlling the traffic flowing into the CSP's network, TMS enables smartphone users to enjoy such benefits as a more reliable communications environment, superior cost performance, and access more secure, more convenient services.

TMS also offers CSP's significant benefits, including increased use of these services by end users, reduced CAPEX and OPEX, and increased profit resulting from the creation of new services.

2.2 Main Features

The main features of TMS are as follows.

(1) Traffic optimization function for agile adjustment to changing traffic trends

Uses a variety optimization functions to improve network performance. For example, it improves throughput by enhancing compatibility with increased speed across a radio access network (e.g., LTE-Advanced) and reduces traffic in order to control rapidly increasing bandwidth and data volume. Also, as shown in **Fig. 3**, the proportion of encrypted content (HTTPS traffic) in all communications traffic has been increasing in recent years. This means that conventional traffic control measures designed for ordinary conventional HTTP communication are no longer adequate to the task.

Incorporating an original algorithm developed by NEC, TMS is able to accurately detect the type of content - even if it is encrypted - and control the traffic flow rate appropriately, while maintaining a high quality of experience (QoE) for end users.

(2) Visualization of network performance and optimization effects

This function analyzes the usage tendencies of end users by determining, in real time, the types of services currently in use and traffic characteristics

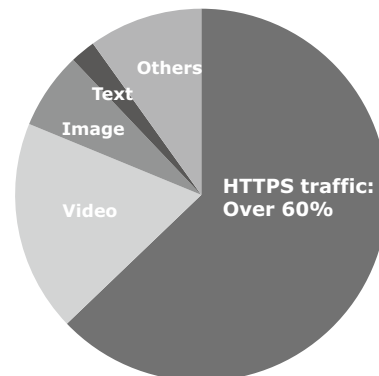


Fig. 3 Breakdown of all communications traffic (based on NEC's research).

such as usage time and location. It is also possible to quantify the QoE with a standardized objective indicator called mean opinion score (MOS) and visualize it on the map.

MVNOs who wish to effectively utilize network bandwidth leased from MNO can also simulate the reduction in line usage fees (OPEX reduction effects) based on the reduced volume of traffic.

(3) Starting small and ensuring scalability

It is now possible to quickly and easily configure a virtualized system inside a single IA server, allowing CSPs to start out on a small scale without having to make a large investment. Later, the system can be scaled out as required by combining virtualization and appliances. Moreover, since no changes need to be made to the core network system, introducing these services is a simple matter of adding TMS.

(4) Flexible customization

NEC's TMS is a modularized system that allows CSPs to pick and choose only the functions they need. For example, an MNO might wish to select only those solutions that support a more reliable communications environment for end users, while MVNO would likely opt for solutions designed to improve usage efficiency within network bandwidths leased from MNO.

NEC's TMS is also flexible enough to work in conjunction with existing traffic optimization systems from other providers. For example, adding TMS solutions for HTTPS communications would enhance the network's traffic control measures, while continuing to take advantage of the existing system.

3. Outline of TMS Solutions

The outline of TMS solutions is shown in **Fig. 4**.

As shown in Fig. 4, NEC'S TMS offers four key solutions: (1) throughput acceleration, (2) traffic reduction, (3) monetization, and (4) traffic analysis/visualization. Solutions can be provided separately or in a combined package, with each solution tailored to solve the specific problems faced by individual CSPs.

3.1 Throughput Acceleration

Applied to the communication routes between terminals and servers to minimize impact on end-to-end quality and minimize the need for retransmission due to packet loss, TCP optimization improves throughput and maximizes end user QoE.

Parameters can be optimized for each session according to network characteristics and conditions, making it possible to improve QoE by reducing packet jamming in congested areas and congested time zones, thereby minimizing any decline in throughput.

3.2 Traffic Reduction

TMS enables MNOs to reduce CAPEX and MVNO to

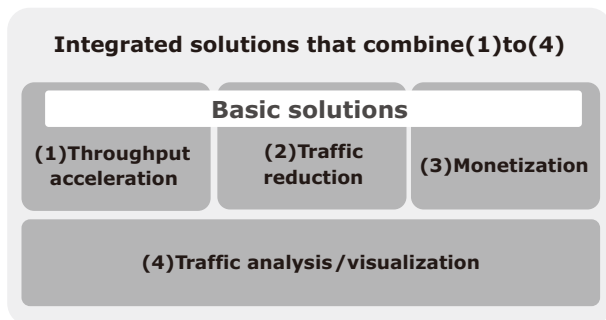


Fig. 4 Outline of TMS solutions.

save on fees paid to MNOs by using various techniques to reduce the volume of traffic, such as pacing and caching, as well as by compressing movie, still image, and text content.

Moreover, by taking advantage of the predictive pacing technology developed by NEC Central Laboratories, which adjusts transmission volume according to traffic conditions, it is also possible to significantly improve QoE during video playback at congested points.

3.3 Monetization

NEC's TMS also makes it possible to offer URL filtering that blocks access to specific sites and to insert ads when websites are being accessed. By providing users with a safe, reliable environment, as well as information targeted at their needs, you can build a new business model while improving customer satisfaction.

3.4 Traffic Analysis/Visualization

Traffic passing through TMS can be aggregated, providing a data source that can be used to visualize the current traffic conditions in the network. Analysis of the visualized data makes it possible to determine what aspects of network operation need to be improved. The data can also be used for service and facility planning.

NEC also offers a solution that digitizes QoE and shows the results on a map. This helps improve operational efficiency by showing network operators where communication quality is poor so that they can strengthen the base stations in those locations.

4. Case Studies

NEC's TMS has been adopted by numerous CSPs in

Table TMS usage examples.

	Company A	Company B
Type of business	MNO	MVNO
Pricing system	Tiered usage-based pricing	Flat-rate pricing
Background and reason for introduction	To cope with popularization of smartphones, tiered usage-based pricing has been introduced. A more reliable communication environment will be provided to users to promote use of services.	Rapid increase in the number of users has caused an increase that will soon exceed the contracted bandwidths with MNO. To hold down costs, attempts have been made to increase bandwidth usage efficiency. Degradation of service quality caused by decline in throughput and packet loss during peak periods and in specific areas has resulted in customer dissatisfaction.
Introduced service and solutions	Throughput acceleration solution	Traffic reduction solution Dynamic bandwidth optimization solution (integrated solutions)
Expected effects from introduction	The throughput acceleration solution will help provide a more reliable communication environment, thereby increasing usage of services.	The introduction of the traffic reduction solution will help reduce traffic volume, thereby reducing the fees paid to the MNO. The introduction of the dynamic bandwidth optimization solution will help reduce packet loss rates during peak periods. Throughput will also be improved.

Asia and other regions, and has proven effective in reducing costs and increasing profits. Some representative examples are shown in **Table**.

5. Conclusion

In this paper, we have introduced and summarized NEC's TMS, which, by facilitating control and monitoring of network communications traffic, helps CSPs solve various issues such as costs and performance, as well as enabling them to create a more reliable smartphone usage environment for end users, improve ARPU and reduce CAPEX/OPEX, and provide new value-added services.

Flexibly designed to adapt and respond to the latest technology and market trends, NEC's TMS will always be able to help increase both the CSPs' ROI and the end users' satisfaction. For a detailed technical description of TMS, see "NEC's Traffic Management Solutions (TMS) Component Technologies" (pp. 50–53) in this special issue.

NEC's TMS is a proven solution for the problems that face CSPs today and we encourage any company struggling to deal with these issues to seriously consider introducing NEC's TMS to their application mix.

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Traffic Management Solution

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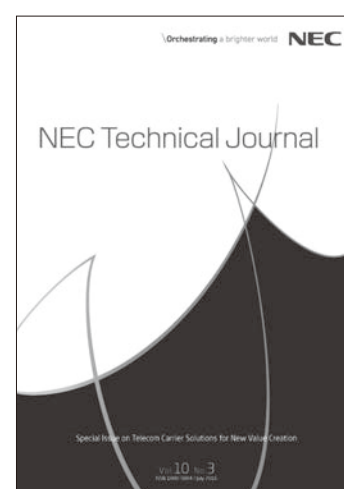
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