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# NETWORK OPTIMIZATION THROUGH ANALYTICS

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# NETWORK OPTIMIZATION THROUGH ANALYTICS

**Mobile broadband operators are faced with commercial and technical pressures to continually enhance their services. As the need for performance increases, so must the rate of network application software upgrades and network optimization. Operator dtac in Thailand has met these challenges by applying analytics to both improve and accelerate network optimization**

Mobile networks were initially built for services such as voice and text messaging, which have relatively stable performance requirements. These were managed by tracking and optimizing a number of key performance indicators (KPIs) focusing on availability, retention and quality. With additional services such as web browsing, social media and video streaming, the focus has shifted to user experience-based service KPIs, designed to reflect the rapidly evolving requirements of popular apps such as Facebook, YouTube, Instagram, and Line, which dominate network traffic today.


This article was made in cooperation with dtac, one of the leading mobile operators in Thailand. It provides mobile services to approximately 25 million subscribers. dtac emphasizes using the internet and digital services to empower society.

### The evolution of user experience in mobile networks

Time-to-content (TTC) and consistency for web browsing and video streaming have a significant effect on how users perceive their network. Operators are extending network performance monitoring beyond traditional KPIs, to incorporate new service KPIs that reflect users' changing needs and app developments.

Providing high peak data throughput for users has long been a fundamental target for operators. While it remains a focal point, service KPIs such as TTC are becoming more important. TTC is dependent on throughput ramp-up time and hence fast resource allocation. LTE networks optimized to reach very high peak throughput several seconds after a session is set up do not necessarily provide the best app user experience. Ultimately, the goal of user experience optimization is to ramp up throughput as high as possible, as fast as possible.

**Given the above, mobile network operators are faced with two distinct but interrelated challenges:**

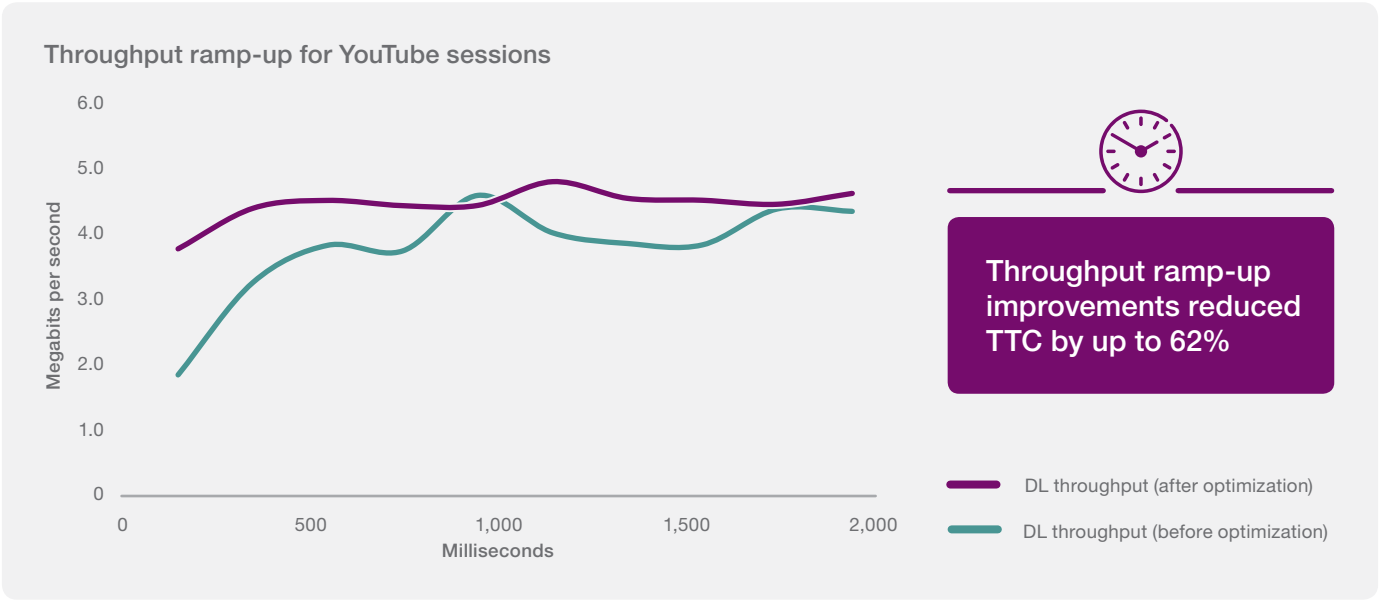
- Rapid changes in mobile broadband and the increasing frequency of network application software updates leave less time to complete network improvement and optimization projects between software updates
- As the focus of network performance shifts to user experience, ways to translate service KPIs into network KPIs must be developed to meet subscribers' expectations

### Advanced analytics to speed up improvements of network quality and user experience

The answer to these challenges lies in big data, analytics and machine learning. New tools and processes for network optimization are being developed and tested. Part of the solution is to adapt some of the same tools that enable a faster pace of software development to network improvement projects in live networks.

System application software development increasingly employs advanced analytical tools that enable process automation. The same methods are now also starting to be utilized in network improvement and optimization processes, vastly speeding up statistical analysis of all aspects of a network's performance. This allows the rapid addition, change or tuning of many network functions over a short time.

Relating service KPIs, such as TTC or video re-buffering, to network KPIs, such as channel quality or cell load, is usually accomplished by correlating data from drive tests or on-device measurements with network KPIs. In order to speed up the process, the solution is to increase the use of data analytics to develop predictive models. This will allow an operator to directly address the user experience, such as TTC for typical webpage loading or streaming video.



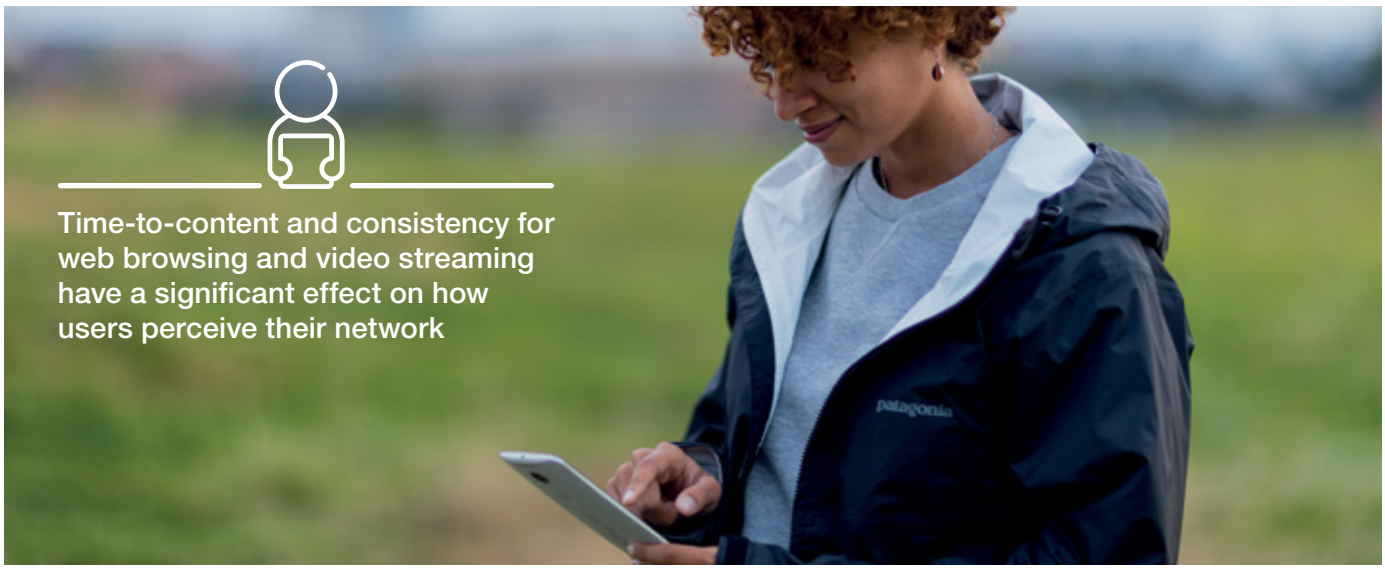

Mobile broadband operator dtac in Thailand has been using these methods to accelerate their network improvement and optimization projects for both WCDMA and LTE. Faced with a highly competitive market environment, the mobile broadband operator is enhancing network performance to support a push to unlimited data plans for postpaid subscriptions. This is reflected in the doubling of 4G subscriptions between Q1 2016 and Q1 2017, along with an increase in data traffic per subscriber from 2.5 GB to 4.4 GB per month. Postpaid subscriptions also increased 18 percent year-on-year.

A typical optimization project, which historically took several months to complete, now takes less than a quarter of the time. Using analytics-driven user experience optimization has enabled dtac to dramatically reduce both time and resources devoted to network optimization. It can manage more frequent software and application updates, and focus on network enhancements that support strategic commercial goals. In addition, advanced analytics were used by dtac to mitigate risk and facilitate an aggressive network improvement project, whereby a large number of changes could be deployed in a condensed time frame without jeopardizing network integrity or user perception.

### Improving time-to-content with enhanced throughput ramp-up

Downlink throughput is a major contributor to TTC. However, a clear example of applying analytics to optimization is the identification of throughput ramp-up as another key factor to improve, as well as the steps needed to address it. By optimizing characteristics such as resource allocation, latency and control channel efficiencies, ramp-up was significantly enhanced. This allowed dtac to deliver performance improvements that were directly visible to consumers, even though peak throughput was similar once the download process had ramped up. The throughput ramp-up improvements directly reduced YouTube TTC for both WCDMA (which saw a 43 percent reduction) and LTE (which saw a 62 percent reduction). The figure above illustrates the download progression, measured in megabits per second, before and after the LTE optimization project.

Powerful analytics models provide operators with effective tools to not only react adequately to ever increasing consumer expectations of network quality, but also to augment networks in anticipation of rising data demands.



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Ericsson
SE-164 80 Stockholm, Sweden
Telephone +46 10 719 0000
www.ericsson.com

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