

Chapter 2

A Demand Model for Mobile Data Traffic in the 5G Era: Case of Finland

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ABSTRACT

This chapter examines how to estimate and forecast the market demand of mobile data traffic in the 5G era. The research objective is to develop a demand model for forecasting the market price and quantity of traffic in the Finnish mobile data communications market for the period between 2016 and 2020. The market price of traffic unit (GB/month), quantity, revenue, and profits are empirically estimated and forecast. The results show that the improvements of network performance, reflected by the user experienced data rate, cause a drop in the price from 0.8 to 0.27 € per GB/month between 2016 and 2020 (tenfold traffic growth). Also, a more than threefold increase is shown in mobile data revenues, whereas the profitability remains at a high level for the minimum marginal cost of 0.08 €.

INTRODUCTION

Facing the challenges of mobile data traffic growth, mobile network operators (MNOs) need to continuously develop their networks. A large variety of network technologies are being developed to handle traffic growth and support new services towards the 5G era (3rd Generation Partnership Project [3GPP]). However, the network evolution requires high investments which can be undertaken if MNOs

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have a justified expectation of profits. In this decision-making process, the expected revenues are difficult to predict and the costs are difficult to manage.

This chapter focuses on the revenue side. The revenues are associated with the demand and an accurate knowledge about the demand creates competitive advantage in any company. Due to the rapid changes in the mobile communications market, a MNO would like to know the future market demand to modify its investment plans, operational expenditures and pricing policies in order to gain an advantage over its competitors.

The most rapid changes, in terms of mobile data traffic growth, occur in Finland. Finland is a pioneering market in which mobile networks are among the busiest in the world. In 2016, the mobile data traffic volume per capita was 16.4 gigabytes per month (Tefficient, 2017; Finnish Communications Regulatory Authority [FICORA], 2017a).

The chapter gives insight into how to make empirical estimation of market demand for mobile data traffic, aiming for improvements in quantifying the expected mobile data revenues. The research objective is to develop a model for forecasting the revenues in the Finnish mobile data communications market for the period 2016-2020.

The model includes the estimation and forecast of the market demand for mobile data traffic. The price of traffic unit (e.g., GB/month) and the quantity of mobile data traffic are forecast for the early 5G era in 2020. Further analysis provides also essential information about the target marginal cost and profitability. The model follows a top-down approach, using the knowledge about the past market conditions to improve the perception of what is happening empirically in the reality.

This research assists MNOs in quantifying the value and amount of mobile data traffic transmitted over their future radio access networks. A good understanding of the mobile data traffic demand supports the investment decision-making process and improves the pricing policy, leading to digital business transformation.

The chapter is outlined as follows: Section 2 presents a literature review about demand modeling, and introduce the Finnish mobile data communications market. Section 3 describes and develops the demand model. Section 4 covers the result from the demand forecast. Finally, Section 5 discusses and draws conclusions.

BACKGROUND

Literature Review

The first-phase of 5G commercial network deployments (based on standards and products of the 3rd Generation Partnership Project, as defined in the upcoming Release 15) is expected in 2020 (5GAmericas, 2017). A thorough analysis of costs

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