

SELECTING TELECOMMUNICATION CARRIERS FOR V-MOBILE

The telecommunications industry has changed dramatically after the privatization of the market, due to the surge of competition. In the Netherlands, for instance, the number of mobile operators increased from one, the previously state-owned KPN, to six in 2001.

Initially, many mobile operators' first priority was to gain market share. Since roughly 2001, however, they focused on cutting costs. One way to achieve this is to reduce spending on international calls. These calls are routed through network operating companies called *carriers*. The carriers charge per call-minute for each destination, and they often use a discount on total business volume to price their services. A mobile phone operator must decide how to allocate destinations to carriers.

V-Mobile, a mobile phone operator in the Netherlands, must make such a decision for a T -month planning horizon when it has C carriers to choose from, D destinations for its customers' calls, and there are I price intervals for a typical carrier. These intervals define a carrier's discount structure. The inputs include the following:

- The price per call-minute for destination d from carrier c in price interval i in month t
- The (forecasted) number of call-minutes for destination d in month t
- The lower and upper limits for carrier c in price interval i
- The lower and upper limits on capacity (number of call-minutes) for carrier c in month t
- The penalty per call-minute (to discourage poor quality options) for carrier c to destination d in month t

V-Mobile wants to find a least-cost way of routing its call-minutes through the various carriers. Of course, it hopes to take advantage of price discounts offered by the carriers.

The file 17.V-Mobile.xlsx provides inputs for one version of V-Mobile's problem. This version has $T = 2$, $C = 3$, $D = 5$, and $I = 3$. The decision variables should include the following:

- The number of call-minutes routed through carrier c to destination d in price interval i in month t
- a binary variable for each carrier c and price interval i combination that equals 1 if the total call-minutes for this carrier (over all destinations and months) falls in price interval i , and equals 0 otherwise.

Develop an optimization model that helps V-Mobile allocate its international calls in a cost-efficient manner.