

We have entered a phase in the development of the communications industry when **producing is not the big issue.**

While the supply-side is reaching ever-higher levels of efficiency, volumes and lower production costs, demand-side market strategies are still something of a novelty in the telecom business. **It's time to be creative.**

Yield management

ILLUSTRATIONS Cecilia Carlstedt

– getting more out of what you already have

The numbers are shocking: Operators are utilizing on average only 35 to 40 percent of their network capacity. It **takes some creativity** to turn this huge dormant asset into profits. Following the principles of yield management and real cases presented below might **kick start** the thought process.

ONE EXAMPLE OF the successful adoption of yield management techniques is the airline industry, which has developed sophisticated price-discrimination strategies to manage its two main customer groups. Business travelers are relatively price-insensitive, especially if the company is paying; but they have less choice over travel arrangements. So airlines reserve full-price seats for these passengers and limit the number of discount seats. Leisure travelers are more concerned about price but tend to be more flexible, so the cheap seats have conditions that make them unappealing to business travelers; for instance compulsory advanced booking, non-refundability and stop-over restrictions.

Yield management works well with industries that require a high initial investment and have perishable products such as airlines seats, time

shares, and hotel rooms, which produce no value if not used.

The telecom industry faces similar challenges. Transmission costs per byte are low but network construction involves high fixed costs and capacity is perishable - unused bandwidth is lost.

Yield management principles would indicate that, as the costs of using network capacity are minimal, it makes sense to use as much of it as possible when it is available and maximize revenue from it when it is in shorter supply.

Increasing revenue, however, is not the only benefit. Yield management can also reduce the need to increase capacity, resulting in savings in investment for providers, which can be passed on to consumers as lower costs. Reductions in costs will also enable users with lower disposable incomes to access services they could

► not previously. Other consumers would benefit from a greater degree of choice as new services created to utilize spare network capacity become available.

ASSAULT ON MULTIPLE FRONTS

If management services are to be implemented successfully modeling and analysis are not enough. The airline industry, for example, has invested in improving infrastructure so as to collect more information, integrate yield management models with the reservations systems and develop software interfaces, back-end systems and decision models. In the telecom industry, basic information and capacity-management infrastructure will be needed to control usage of “yield managed” traffic; and service-operating software will be required to the network information needed to make intelligent decisions.

When the benefits from yield management services are demonstrated, they might lead to investments in better management infrastructure. The nature of the decisions that can be made and the implementation constraints are so tightly coupled that one cannot be considered without the other.

This article concludes with a few concrete examples that have been commercially implemented and have proven to improve revenues and reduce tariffs significantly. For each service, several decision variables can be considered to maximize revenue from available capacity, like for instance pricing, capacity limits and admission control. Incorporating all such decisions in a single model usually leads to complicated formulations. A framework that decouples the decisions from each other to obtain simpler, more insightful models is therefore immensely helpful.

If a service requires transporting bulk content between locations, its operating software may consist of distributed agents at select ingress points to the network, making decisions about if to accept content or off-load it to an alternate provider. In this case, each agent will need some notion of available capacity between locations that need transport. This information may either be obtained directly from other agents, or from a central database tracking summary information for all agents. In either case, one will need protocols for information exchange between the agents and/or the controller.

Clearly, if decision-making is embedded in the agents, the models will be restricted by the amount of information that can be reasonably exchanged by the agents. On the other hand, if the agents are “dumb,” simply querying the decisions from a central model, the nature of the decision models will be completely different.

Several issues arise in implementing a service idea once its market viability has been established:

► **NETWORK INFORMATION COLLECTION.** If yield management initiatives are to succeed in the

telecom industry, the problem that internet-type networks have in obtaining network information needs to be solved, as accurate collection of information on available capacity is crucial.

► **CAPACITY ALLOCATION.** The discount traffic resulting from yield management strategies must not impede premium or existing network traffic. Ways to achieve this include setting a maximum capacity limit for discount traffic or restricting it to certain times of the day. As these will change, the system will have to allow for regular network reconfiguration. This must be based on accurate data and traffic patterns will need to be tracked and recorded, bringing us back to the data collection issue.

► **SERVICE-MANAGEMENT SOFTWARE.** Controllers or decision makers to operate the services need to be installed, presenting wide-ranging challenges that cover software, modeling and communication protocols. Centrally or distributed control architecture decisions will dictate how much information can be exchanged between distributed agents. It will also govern the software implementation of the agents and that of the central databases. In any architectural choice, protocols will need to be developed for agents, controllers and databases to interact with each other.

► **NEW MARKETING CHANNELS.** Services developed through yield management may require new marketing channels to target likely consumers. Deals may also have to be made with other network providers; for instance off-loading overload traffic to their networks using bandwidth exchanges. As bandwidth trades become more prevalent, “liquid bandwidth” markets will expand, offering a range of possibilities such as trades with widely differing time scales. These developments will in turn promote yield management techniques.

Telcos can learn a lot from other capital intensive industries that have developed extremely sophisticated yield management systems: Commodity industries such as petroleum refining or time-based industries such as transport understand the principles, the link with transaction and product pricing, and how to use these factors to increase revenue.

Telcos increasingly need to focus on the individual customer, working out how to segment the market, to differentiate the product and to maximize capacity usage. It is far from clear, however, what that entails. Companies such as Vodafone, Telefónica, France Telecom, MCI, Sprint, AT&T and GTE have all invested in large data warehouses to allow them to make better managerial decisions by analyzing vast amounts of customer data.

Telcos clearly need to embrace new business models and create new types of partnerships to ensure spare capacity is used. But the reality is

Seven steps towards yield management

- ① Identify unused capacity and reasons for underutilization
- ② Identify and derive use cases for unused capacity
- ③ Calculate the impact on profitability and cost of ownership
- ④ Perform value-creation analyses for different stakeholders
- ⑤ Base solutions on innovative services explicitly designed to use only spare capacity (e.g., “MTNZone”)
- ⑥ Get ideas from other industries for a framework that will simplify decision modeling
- ⑦ Articulate several innovative cases to test both the strength of arguments and the decision framework.

that there is still no book entitled: "Business Practices for Yield Management Tools."

The global mobile network utilization figures are shocking. Operators utilize an average of 35 to 40 percent. This means that the enormous amounts that have been invested in radio, core, transport and frequency are severely under-utilized. Inefficiency in network asset utilization means higher cost of production and higher tariffs. Yield management holds some important answers to this challenge.

There is no doubt that the future of telecom sector profitability depends on how efficiently different stakeholders adopt new business models and ensure lower total cost of ownership.

Yield management strategies and tools will help to improve capital-asset utilization, ensuring quicker return on investment and much lower cost of production. The reality is, however, the necessary yield management strategies and tools have yet to surface. ●

CASE: Cruise control

► **CRUISE CONTROL** uses innovative algorithms based on cell handover and cell-based way-pointing in order to derive real-world information from device and network activity. Data is supplied to a server from mobile devices with the Cruise Control sensor client installed (independent of the network or operator) and by raw data imported from the network operator.

As well as an initial live-traffic map, further traffic and navigation applications are possible, such as location-based services, air-pollution prediction.

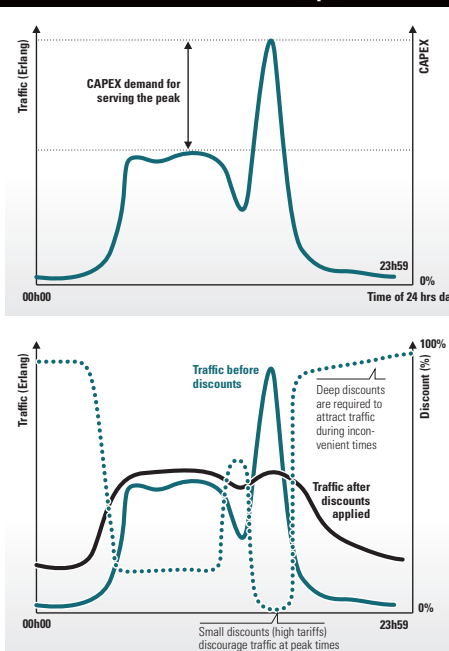
So by using the Cruise Control smart software solution, mobile users can use the network data for following useful applications

- **LIVE TRAFFIC INFO:** The system provides real-time and high accuracy traffic information on all the main roads in a city.
- **COMMON MOBILE NAVIGATION:** Mobile phones can now be used as a road navigation system.
- **TRAFFIC NOTIFICATION:** Smart software algorithms can be used to provide traffic notifications. ●

CASE: Base stations as charging units

► **A RANGE OF** energy sources are used to power network radio base stations, including diesel power, solar energy, wind farms, biofuels, and battery back-ups. The combination of solar, wind and bio-fuels has been a huge success. So much so that too much energy is being generated. Applying yield management principles, this excess power can be used in rural areas; for instance to run fridges to store medicines and antitoxins closer to villages; mobile phone

CASE : Impact of a yield management solution on network utilization and tariff patterns



CASE MTN Zone is a service that employs dynamic discounting. MTN's problem was traffic peaking at certain hours of the day. Dynamic discounting enables the operator to offer discounts on the tariff. As the utilization of the network goes down, discount on the tariff goes up, giving users a motive to make calls during off-peak periods.

charging units and electric lanterns to power PCs in schools.

Furthermore, by charging for this excess power, network operators could expand on their existing investment in order to create more energy and, more importantly, maintain the energy systems. This will have a knock-on effect of creating numerous small businesses that would further boost local village economies, allowing them to buy even more energy and thus promoting the expansion of already existing energy systems. ●

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Airlines and telcos have this in common

► There are several analogies between the airline and telecom industries that can inspire creative business thinking.

PERISHABLE INVENTORY. Seeing bandwidth/sec as "perishable inventory," just like hotel rooms or airline seats, opens possibilities for gaining revenue from unused capacity. And this is just one measure of inventory in telecom networks; others include the streaming capacity of video servers and switching capacity.

LARGE SUNK COST AND LOW MARGINAL COST. Yield management techniques are particularly applicable when increasing capacity costs considerably more than providing a service. In the airline industry, for example, short-term capacity such as aircraft seats is fixed but buying another aircraft involves a huge investment compared to the cost of providing service when capacity is available.

VARYING BUT PREDICTABLE DEMAND VOLUME. Demand for services is time-based, with predictable daily and weekly trends.

