Supply as an enabler in the new telecoms world

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Building the third-generation network infrastructures needed for mobile Internet services will require the production and delivery of base stations and network nodes in very large volumes.

At the same time, the demand for infrastructure equipment for GSM and other second-generation networks will continue to grow as existing networks expand to cope with the twin pressures of subscriber growth and traffic growth.

The supply processes that have brought the mobile communications industry this far will not be adequate to cope with the extreme market demand for equipment for second- and third-generation infrastructure. This is why Ericsson is developing supply concepts that have a lot in common with the techniques used in large-volume businesses, such as the automotive and consumer-electronic-goods sectors.

In this article, the authors focus on the likely impact of market growth on the supply flow, and profile the supply management initiatives being taken by Ericsson to meet the expected demand from mobile network operators.

Introduction

With more than 650 million mobile phone users in the world today—a number that is expected to reach one billion in the next two years—the mobile phone has clearly become a mass-market commodity (Figure 1). It has become as much a part of people's lives as televisions, cars, radios and washing machines. In fact, if you compare the mobile phone with any other consumer electronic product, the fact that its customer base grew from zero to 600 million in 15 years puts it in a league of its own.

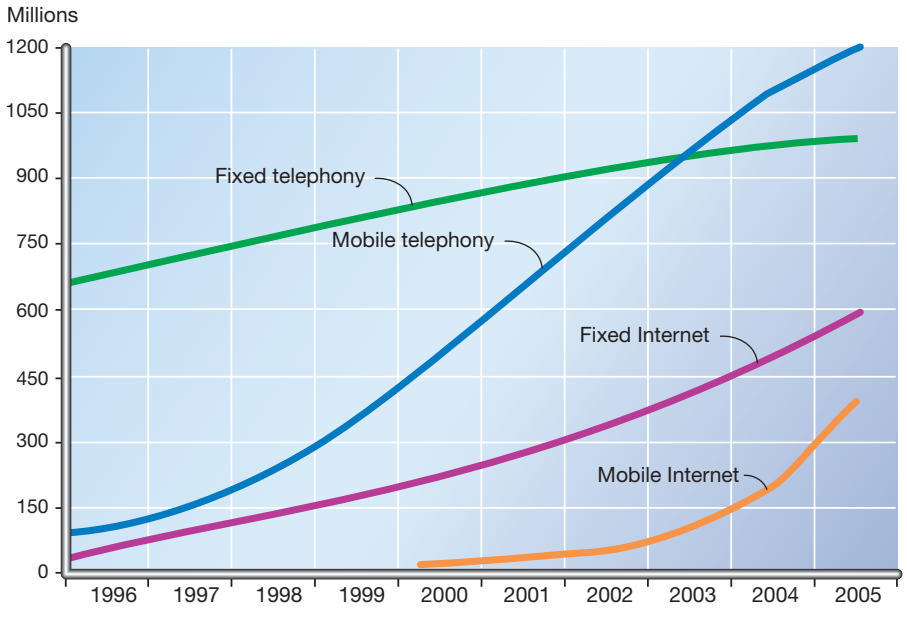
Yet it is interesting to look back to the late 1980s and remind ourselves that the mobile phone was then regarded as an accessory that could only be afforded and justified by business people. In 1988, the industry was forecasting that by the year 2000, the number of mobile phone users might reach 20 million in western Europe.

Every couple of years since then, the industry raised the forecasts in light of growing market demand. Each time this happened, the manufacturers of infrastructure equipment (radio base stations, mobile switching centers, and so on) had to gear up for greater volumes.

As the main supplier of mobile infrastructures, with a global market share of around 40%, Ericsson had a bigger challenge than most companies each time the market growth exceeded expectations, since it also had to increase the production of necessary infrastructure equipment.

The fact that the company managed to maintain its global market share at a fairly constant level throughout this decade of rapid growth says much about the effectiveness of the supply strategies that have been developed. But as the world prepares for the build-out of third-generation mobile network infrastructures, it is clear that even more aggressive supply strategies will be re-

Figure 1
Subscriber growth.



quired (Figure 2). Mobile network operators are planning for

- rapid migration to third-generation resources; and
- rapid increases in traffic in the networks.

One scenario portrays an explosive growth of traffic in mobile networks, due to swift migration from fixed to mobile telephony and rapid growth in data traffic. This scenario represents the consequences of an operator's change in focus from subscriber growth to increased use of services by the subscriber base.

The industry is poised on the brink of another massive expansion phase, but this time there is greater pressure on shorter time to revenue than ever before. And when time and cost are essential, supply flow is critical.

BOX A, TERMS AND ABBREVIATIONS

BSC	Base station controller
FC	Flow control center
GPRS	General packet radio service
GSM	Global system for mobile communication
MSC	Mobile services switching center
OSS	Operations support system
TTC	Time to customer
TTS	Time to service
UMTS	Universal mobile telecommunications system
WCDMA	Wideband code-division multiple access

The pressure for change

Although mobile phones have become standardized mass-market products, the network infrastructures that support mobile phone users are generally still built up on the traditional telecommunications infrastructure supply model. According to this model, network operators specify in detail at the node level what they require, and a supplier, such as Ericsson, makes custom adaptations. This process has delivered what the industry wanted. At least, so far. But special orders mean special handling and special manufacturing and testing. Special orders also promote multiple variants. This is a costly and time-consuming approach that also creates capacity problems right through to the supply chain.

For the future, the emphasis is on achieving large volumes and rapid roll-out, with high quality and at low cost. The stakes are high for network operators, with the costs of licenses and of building out new and en-

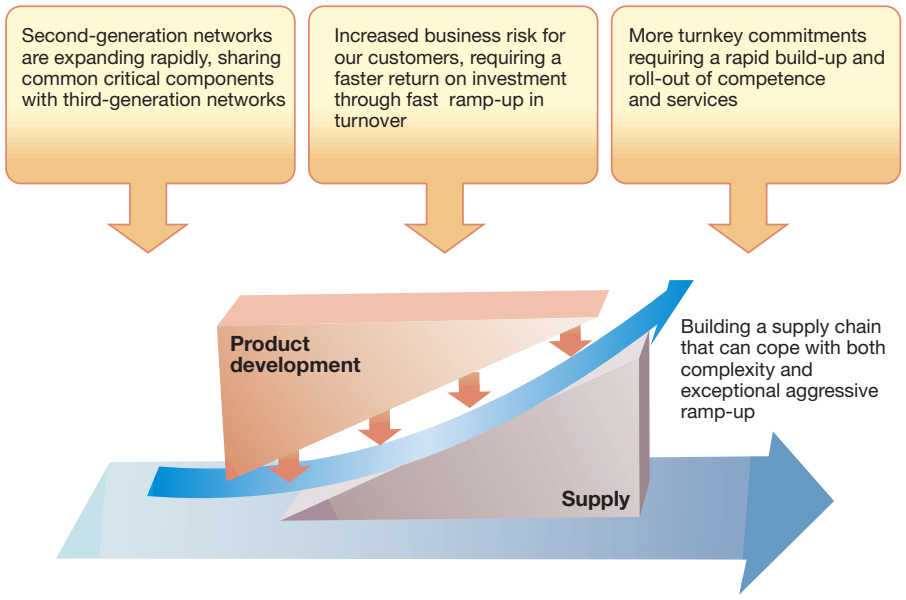


Figure 2
The supply challenge.

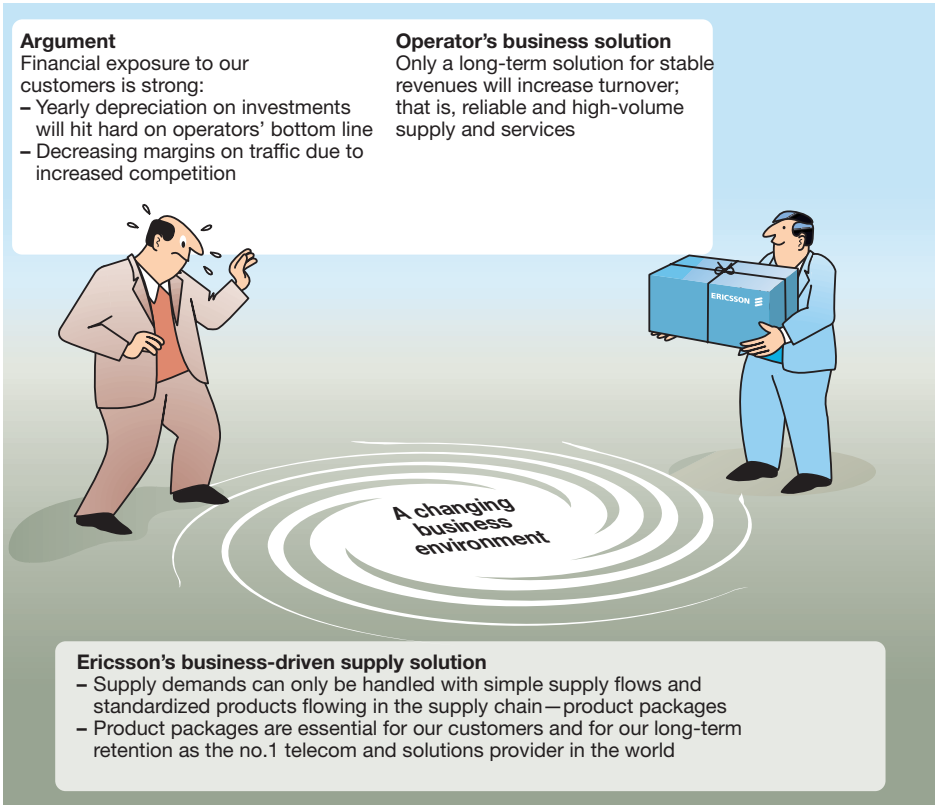


Figure 3
Changing business environments.

hanced network capabilities (Figure 3). Anything that adds unnecessary costs is unacceptable. This focuses attention on certain key areas of the supply chain. Special designs, multiple variants, and inventory all have heavy cost penalties.

Technology, of course, continues to be a vital ingredient. In fact, as we move to third-generation networks, the technologies are becoming even more complex—at a time when greater volumes will be needed, to meet network operator plans for rapid network roll-out.

A further challenge is that third-generation infrastructures will involve the integration of a greater proportion of products from multiple vendors than was the case with second-generation networks.

The process of consolidation among mobile operators has created a number of global operators—another factor that is shaping the supply strategies. Global operators expect standardized and consistent supply and support deals in every market in which they operate.

The challenge for manufacturers is to fit increasingly complex technologies into simpler, faster and less costly supply processes that deliver better quality. The only way to do this is through new supply chain strategies based on greater standardization that enables flexibility.

Large volumes of standard configurations allow a manufacturer to maintain good quality consistently. Standard products also make testing, delivery, installation and integration easier and more dependable. Delivery precision is particularly important. An operator might have to close streets, hold up traffic and arrange a helicopter to position new equipment on site. It is therefore vital that planned delivery commitments can be honored, not just to the day, but often to the precise hour and minute.

Testing supply and logistics processes

Several initiatives taken by Ericsson in the late 1990s, to transform supply chain and logistics processes for second-generation systems, had already highlighted the potential benefits. One initiative, for example, focused on cutting the time needed to fulfill customer orders for GSM mobile infrastructure equipment. This initiative has

evolved into the wider TTC Global (time-to-customer) program initiative that operates across the entire Ericsson organization. The focus is on time to service (TTS), since the truly important requirement among network operators is to get equipment quickly installed, integrated and into service, in order to earn revenues.

The primary focus was on taking time and cost out of every stage of the supply chain—from the customer ordering stage through to delivery to the customer site and customer acceptance. This was tackled by introducing significant changes in the ordering process and the supply processes.

One result was that the time needed to build GSM base stations and ship them to the customer site was cut from around 60 to less than 14 days. Cutting the time needed to deliver built-to-order products is only one benefit. Quality and delivery accuracy also improved significantly. Likewise, the whole ordering process has become much easier for customers, thanks to simplified product packages and new e-business processes. This had the important spin-off benefit that customer personnel and Ericsson sales and support personnel spent less time engaged in completing and checking orders.

Greater standardization in the configuration of equipment, such as base stations, meant that there was less scope for errors in ordering, and reduced the number of variants that had to be manufactured. This led directly to better quality and greater production efficiencies.

Ericsson has introduced a logistics concept based on regional flow control centers (FC). Orders flow to the center directly from the customer via Web tools. Completed equipment is then shipped directly from the flow control center to the customer site. This allows traditional warehousing requirements to be reduced or even eliminated, and greatly improves delivery precision (Figure 4).

These supply processes offer clear commercial benefits to network operators. They also represent some big changes in established practices and ways of thinking. One of the main challenges is the acceptance of standard product packages, rather than fully customized products. As Ericsson introduces these supply processes, network operators recognize that a reduction in the "uniqueness" of the equipment they order is a small price to pay for significant improvements in time scales, cost, quality and simplicity.

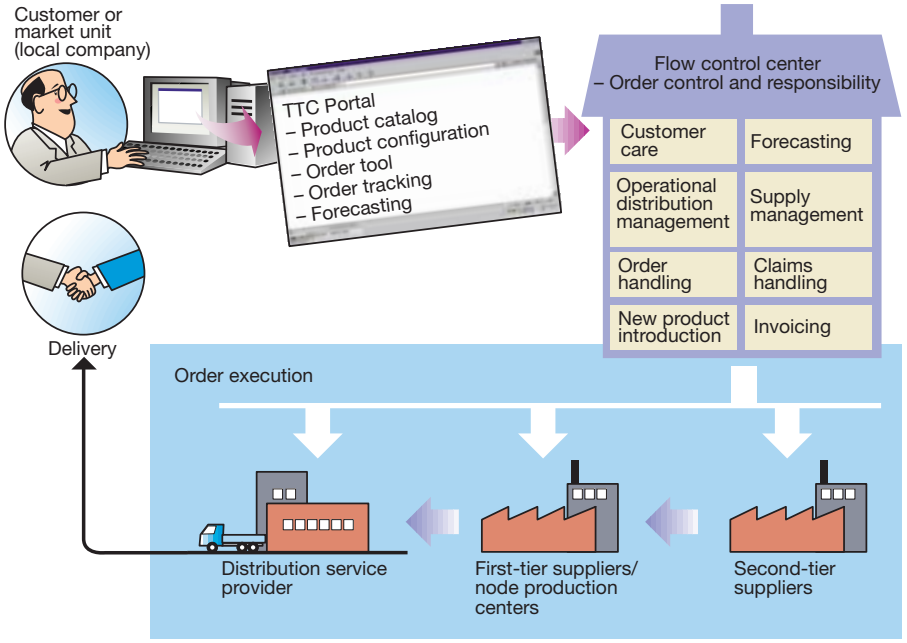


Figure 4
The flow control center concept.

Guiding principles for the supply of equipment

Drawing on experiences of the initial phase of the TTC Global program and other related initiatives, Ericsson has developed a supply and logistics framework that will cope with the combined need to deliver even greater volumes of second- and third-generation products.

Product packages

Product management is about considering the infinite variety of possibilities, and turning them into the actual products that can enter the supply flow. The enabler of this in Ericsson's supply strategies is strict adherence to standard product packages. Ericsson has looked to other industries to see what lessons could be learned, drawing ideas from strategies used in the automotive, personal computing, and consumer goods sectors.

In essence, the idea of product packages is that a customer should only be required to specify a few properties and options in order to get the node that will meet the network and service needs (Figure 5). This represents a major shift away from traditional ordering

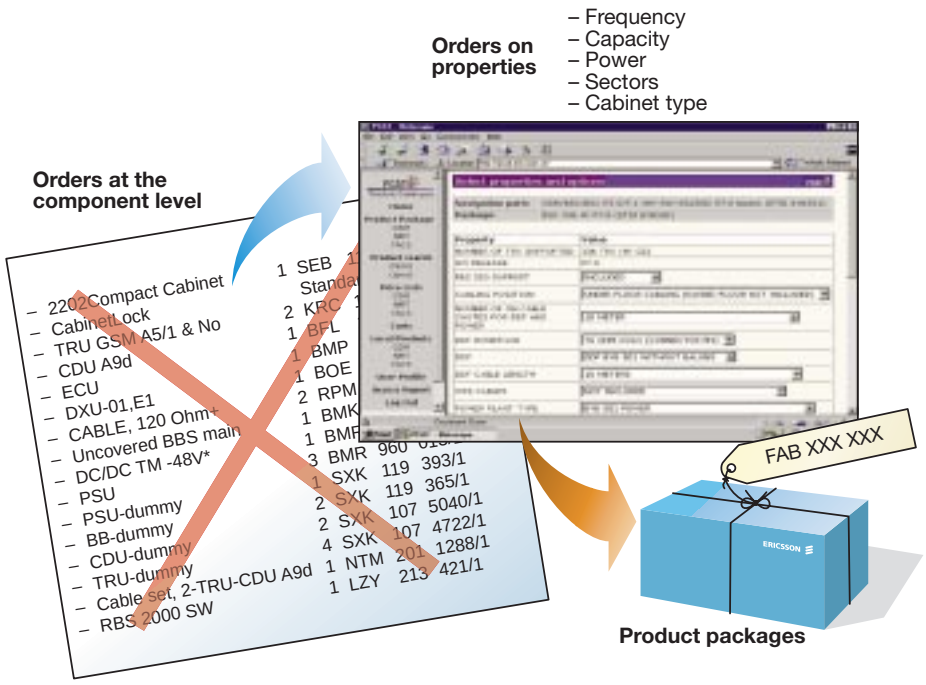


Figure 5
The product packaging enables cost-effective order handling and execution.

practices in the telecommunications infrastructure business, and reduces the operator's scope to specify unique market adaptations. The benefits, however, are considerable:

- because software is the main bearer of functionality, hardware platforms can now be standardized for a mobile network;
- the attraction of standardized product packages is that they promote or facilitate repetitive production, short and fixed lead times, and reduce problems during on-site installation and network integration;
- product packages enable better cost control throughout the chain of value-added activities, which yields configuration flexibility;
- standardized products or modules also enable the supply chain to provide the customer with better and more consistent product quality at lower cost; and
- the ordering procedures are simplified and more resistant to errors.

All new Ericsson product development for mobile network infrastructures is currently managed within this product package concept. Proposed designs are evaluated as much for their impact on supply processes as for price and functions.

The product-package approach has moved the ordering process to a higher level. The emphasis is on the functionality and value of the node in meeting the operator's business plan, rather than on a detailed technical appraisal of what is inside the equipment cabinets.

The product-package approach has strong parallels with, say, ordering an automobile: the product package is the model. Customer choices are simplified (color, engine size, seating, and so on). Additional items that can be specified might include aluminum rims or a stereo.

The product packaging model consists of core product packages—these represent the range of packages that suits all market requirements. On top of the core product packages are the options. There might also be additional materials (special needs to meet, for example, mandatory requirements for a certain market), and finally the installation materials.

Ericsson's goal is that standard product packages should cover over 90% of the market needs. Market adaptations can still be considered, but these will always incur higher cost and longer lead times.

In the case of an Ericsson base station controller, for example, there are now only a few

core sizes from which to choose—each size supports a different number of speech channels. There are also a few options, such as interfaces to different generations of base station, choice of overhead or underfloor cabling, choice of 75-ohm or twisted pair connections, and inverter voltage level. Similarly, there are standardized expansion steps and upgrade packages from previous releases.

Site solution

The scope of the product-packaging idea is being broadened. The next step takes the ordering process even higher up in the value chain, to encompass complete site solutions. A site solution contains several node products together with all necessary cables, fixings, power, cooling, services and other items.

The completeness of a site solution can be extremely important in the timely completion of a network project. A missing two-dollar cable, for example, might not be a problem for a base station installation in a city—the installation staff can probably obtain a suitable replacement from a local computer shop. But if the installation is in a very remote location, it could result in several days' delay in getting the network into service. The missing cable could thus result in lost operator revenues running to thousands of dollars.

Forecasting

Forecasting is always a mission-critical activity in planning supply processes. As supply chains get leaner and faster, the role of forecasting will become even more important. Disturbances are more critical when lead times are shorter.

Good forecasting input results in good supply performance. Ericsson is thus developing ways of ensuring the accuracy of the forecasting process. In part, it is a question of education, so that everyone involved in the forecasting process, on the customer side and on Ericsson's side, understands the new context for forecasting. In part, it is an issue of trust on both sides: trust that the figures being presented are accurate, and that the requirements will be met.

Traditionally, forecasting has been more of an art than a science, subject to "adjustments" by people at various stages in the information flow. Part of the supply flow is a Web-based forecasting tool that authorized persons in the local markets use to update forecasts directly. In addition, some customers can currently update their own forecasts in the system. By means of the planning part in the tool, suppliers can immediately get access to updated plans for the products they supply.

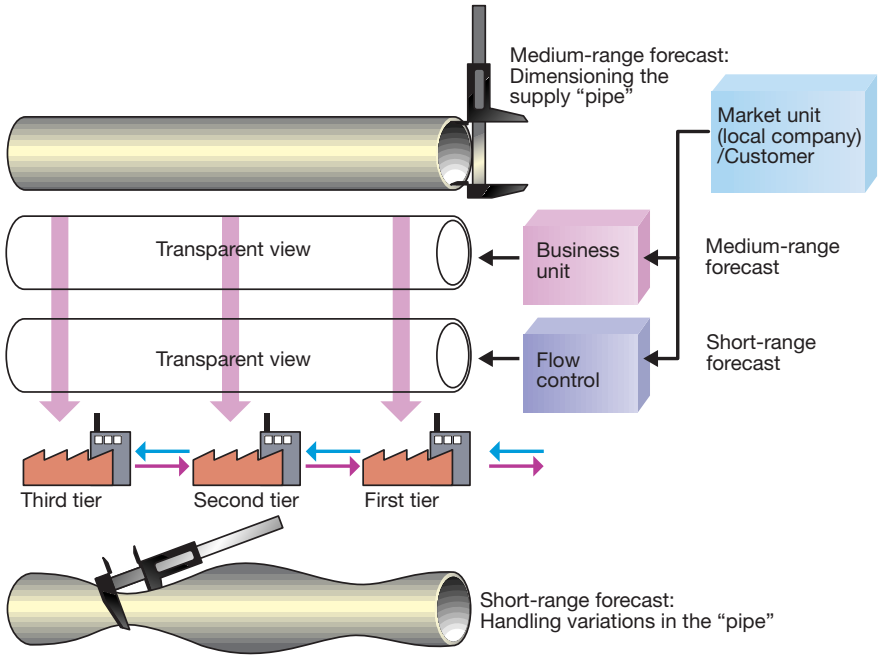


Figure 6
Forecasting information is critical to manage the supply chain.

The aim is to give everyone in the supply chain the required information at the same time, so that the necessary capacity can be accurately planned. The Internet is a good enabler of this objective (Figure 6).

Ericsson is also investigating a way of bringing greater precision to the process by means of a new software tool which, based on the figures of actual and desired network performance, will automatically calculate a forecast.

Direct distribution

Inventory costs money, and as the value of the inventory rises, so do the cost implications. At the same time, product lifecycles are becoming shorter, so there is a need to keep inventory as low as possible to avoid losses through obsolescence.

An important change to supply management is direct distribution. Beginning in 1999, Ericsson started to introduce a technique called *merge in transit*, which can be defined as the coordinated distribution of material from multiple suppliers in order to

provide a single, complete, on-time delivery without using any inventory.

Software perspectives

Software delivers the functionality of a mobile communications network. Consequently, because traffic in mobile networks is growing, new types of node element for GPRS and WCDMA/UMTS services are being deployed. Similarly, as the number of services and applications expands, the need to install new software in the network is also growing.

A complication is that many software adaptations have been made to suit the needs of different operators in different countries. This legacy situation is being redressed as the market recognizes that, just as with the product-package concept in hardware, there are enormous benefits in accepting a more standardized, less customized, software strategy.

The traditional approach to a software upgrade is for the network operator to implement the upgrade node by node, with engineers spending time at each site. For an operator with many nodes in the network, this is a heavy, ongoing workload as well as a financial burden. It takes skilled people who might quickly tire of living out of a suitcase and working through the night in order to execute the upgrades.

In 1994, Ericsson began remotely loading software in GSM networks. Today, operators can manage upgrades automatically from a central maintenance center by means of electronic links (as well as satellite links) to the switches in the network. Increasingly, operators are allowing Ericsson to handle these upgrades.

In one case that has been studied, remote upgrading cut the number of man-hours needed by 90% compared to traditional methods. Remote upgrading also lays the foundation for new upgrade strategies. For example, in the past, the emphasis was put on big annual releases of new software, with monthly packages and corrections. With remote software loading, it is possible to install smaller packages at shorter intervals and with less disturbance to the network. Additional benefits are

- fewer human errors;
- operators can more easily retain the expertise of software specialists who no longer have to travel extensively to install software in individual nodes; and
- operators can tap into Ericsson's resources, if necessary, by giving Ericsson online access to individual nodes in the network.

A similar approach has also been adopted to the flow of software updates to customer networks. The automated update-deployment concept—which is based on the operations support system (OSS), Ericsson's network management system in use by the majority of Ericsson's mobile operator customers—facilitates a very aggressive roll-out of updates. The first mobile operator to apply this approach has reported that it could reduce its manpower resources for update handling by more than 80%.

As part of these new software supply processes, Ericsson is moving toward the licensing of software on a right-to-use basis. This business logic for mobile infrastructures fits well in an environment in which operators need to remain flexible and move quickly with their services. It also plays to the strengths of an industry that is moving toward high-functionality software running on non-proprietary hardware platforms.

E-business

Web-enabled ways of working are another integral part of the supply chain management program. The Internet is the main carrier of information along the supply chain, giving everyone the same information at the same time. It is also used as the central communication channel between Ericsson and customers, not only for product ordering, but also as a shared platform for information that can be used by Ericsson and customer personnel.

When customers use the "fast-track" supply processes based on standard product packages, they can place orders via a Web

portal directly to the flow control center. Customers can check the status of the order, tracking it all the way to site via a global tracking system that is used by all main global distribution service providers.

Ericsson's first customer to switch to direct ordering of standard product packages over a Web portal did so in 1999.

The prime advantage of putting the product catalog on the Web is that it eliminates any handovers of paperwork or information between the customer and the flow control center. It also prevents customers from ordering non-standard product packages, since only standard packages are included on the Web portal.

For operators with a global business, Web ordering is useful for reinforcing a consistent ordering strategy across the entire organization.

Once the standard product information is on the Web, customers can easily look up relevant technical information on products and related subjects, such as training.

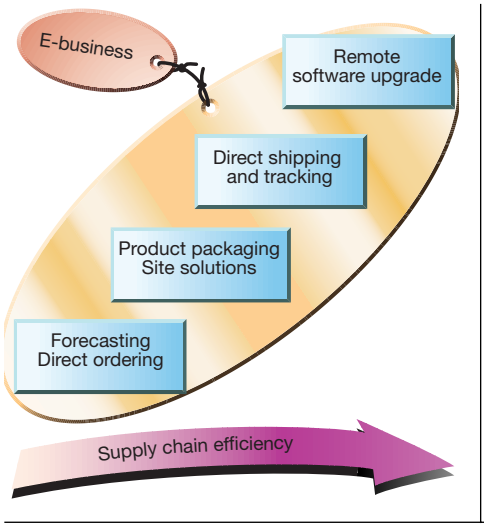


Figure 7
Enhancing business competitiveness by increasing efficiency in the supply chain.

Conclusion

The supply and logistics concepts presented in this article are part of a larger trend toward new ways of working between suppliers—in this case, Ericsson—and their customers.

Many operators are struggling to cope with shortages of skilled and experienced people. Consequently, many of them are reevaluating the role of their procurement functions. As a result, the language of procurement is changing. Instead of discussing bits and pieces, the participants

- want to discuss more strategic business issues, such as coverage, capacity and consultancy; and
- are seeking solutions that support their business objectives.

Operators are increasingly willing to give the technology supplier access to the network. That way, for key activities, such as software upgrades, updates, and planning for the expansion of infrastructure, the operator can benefit from the supplier's know-how and resources.

Obviously, these changes in the supply flow must be planned and implemented jointly by the operator and the supplier, because there are many related implications to be considered. In some cases, the supply processes will also require operators to change their own internal processes—for example, how should an e-procurement process be integrated into the operator's procurement and computer-support systems? However, the overall trend is clear: with the advent of third-generation products, the supplier-customer relationship is moving into new territory, putting new demands on the supply chain as a business-critical function.