

Network efficiency builds profits and reduces environmental impact

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Today, corporations need to be socially and environmentally conscious, but reputation is not the only reason for network service providers to pursue efficiency. Operational efficiency results in real economical and environmental savings. These savings can be used to increase network investment to address new opportunities, to respond to competition and to improve the company's bottom line. Since the potential savings are a significant percentage of cost of doing business, there is a strong business incentive to secure them and benefit.



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The telecommunications industry, like most businesses, faces pressure on both profits and margins and, increasingly, pressure to be socially conscious about environmental issues; something now called Corporate Social Responsibility (CSR). At times, CSR initiatives have been more form than substance because of a perception that its goals have to be balanced against market goals and shareholder interests.

Nevertheless, corporate needs for profitable operation and societal needs for responsibility and stewardship of the environment need not be opposing forces. Rather, the starting point for this new and meaningful solution must be in recognizing that both goals can be achieved by pursuing a single focus: efficient operations.

The transformation of materials, ideas and manpower into goods and services is the foundation for all economic activity. If any aspect of that transformation is inefficient it consumes resources that impact profitability at the macro level, depletes the global store and pollutes the land,

oceans, and air. To address business, social/ethical, and environmental needs all at the same time, companies must relentlessly pursue operational efficiency. That is true in every industry, and particularly in telecommunications.

In the telecommunications industry, this inefficiency can take many forms - from the utilization of electricity to power equipment that processes and transports the bits, to the use of manpower to manage the networks and services. Seen from this perspective, 'green networking' is an aspect of good engineering so operational efficiency encompasses the whole product life cycle, not just the out-of-the-box energy consumption rating, but the impact of factors that are less easily quantified, though just as real, such as reliability and operational simplicity.

Optimal network efficiency creates business benefits for the builders and operators of networks, which consequently have a positive impact on the environment that surrounds us all. Green networking should, therefore, improve profits rather than generate costs.

Elimination of waste is, after all, just good business practice.

A sustainable drive for green technology has to be a part of a business transformation process that generates direct, bottom line, benefits. Operational efficiency can reduce operational costs, power consumption, fuel consumption, and greenhouse gas generation. If all of these goals are accomplished, then efficiency pays for itself - and more.

The challenge for planners at service providers is figuring out just what operational issues have the greatest impact on efficiency, and how to target them while maximising the benefits, minimising costs and improving overall efficiency. This means examining operations from the top down, whilst evaluating operational cost elements in a realistic and consistent manner.

A good starting point for any discussion about improving efficiency is the power consumption of the network equipment itself. Much has been written recently about the energy the Internet consumes. According

to analysts, the Internet's infrastructure is responsible for one to two per cent of the world's carbon emissions - approximately the same as the much more environmentally maligned airline industry.

Network and computer equipment power is certainly a factor in operations efficiency. A single rack of network equipment consumes about ten kWh of power directly, and when HVAC (heating, ventilation, and air conditioning) and power conversion and storage costs are included the number jumps to 24 kWh. Server systems actually consume more - about 13 kWh/rack in direct power or about 31 kWh with HVAC and power conversion considered. The cost of this power averages about nine cents per kWh, and each kWh consumed creates about 1.3 pounds of carbon dioxide (the precise carbon footprint depends on the method of power generation - fossil, nuclear, solar, etc.).

Since it is an important operational efficiency goal, network and computer power consumption has already begun to receive much attention. Equipment vendors rarely launch products that do not make some reference to improved power consumption statistics, either in relation to competitors, or to previous generations, or to both.

In addition to the issues associated with reliably reporting energy consumption of network equipment, total network and computer power equipment power consumption is even more difficult to calculate because a significant majority of a network's total power consumption depends upon the overall network architecture. Regardless of how energy-efficient each network element is, the network as a whole cannot be efficient if resources are inefficiently utilized. Unlike other types of equipment, the power consumption of today's network equipment is not load-dependent; a lightly utilized router consumes nearly the same amount of electricity, HVAC and space as a fully-loaded router.

In short, any discussion of network power consumption should consider architectural efficiency, as well as element efficiency.

While direct network power consumption is a critical element of any campaign to improve operations efficiency, it is only one piece of the puzzle. An efficient service provider operation serves customers not only with more efficient network and IT technology, but just as importantly, with fewer truck rolls, fewer service calls, and more streamlined management systems and processes.

It will come as no surprise to many readers that service providers spend about 55 per cent of their direct network budgets on the management and support of the network, as compared to only 45 per cent on network equipment. Within this 55 per cent, there are three major groups of operational costs, which account for 30 per cent, 40 per cent and 30 per cent¹, respectively, of total operational costs:

- Service creation/provisioning;
- Fault and problem management; and
- Upgrading and integration of services and components, including with partners.

Clearly improving the efficiency of operations - with a focus on these three areas - can have a significant impact on the bottom line. Likewise, reducing support and operations cost can have an enormous impact on the carbon footprint and energy use of a service provider as well.

As an example, an average service provider truck roll - assuming 5.5 miles of driving for one call - consumes the energy equivalent of 13 kWh of electricity in fuel. The truck also produces about 14 pounds of carbon dioxide and the call centre staff about 3 pounds.

A single truck roll for each customer only every three years, requires 900 truck rolls per day per million customers. To support a customer base of five million broadband users, about 400 vehicles and technicians is required. Obviously this seemingly modest level of interaction has an enormous cost and an enormous environmental impact.

Even tasks that happen within the NOC (*network operations centre*) have an environmental impact. The average worker in a call centre or office environment consumes

about 2.3 kWh in power for HVAC, communications, and computer equipment. If every customer generates a single support call per year, that amounts to 2,740 calls per day per million customers. To support a customer base of five million broadband users, this call rate requires a call centre of 200 agents.

These two examples highlight how one aspect of operations can have a dramatic effect on the efficiency of a service provider as a whole. Simply by improving network reliability, service providers can reduce the costs - environmental and financial - of the 40 per cent of operations budget that goes to fault and problem management by reducing the need for truck rolls and call centre resources. Similarly, the other two areas of operations costs - service creation/provisioning and upgrading/integration - can bring similar gains if providers can improve the efficiency of these two tasks, reducing the number of employees and truck rolls required.

To summarize, thus far we have learned that service providers can drive efficiency by focusing on improvements two major areas: the power consumption of the network; and the efficiency of operational tasks. Taking this a step further, the following table divides the two major categories into a total of five focus areas, and what can be done from a network perspective to drive improvement.

In broad terms, operations efficiency can be improved by reducing power consumption, reducing network problems that generate service outages and customer complaints, and improving the reliability, availability, and serviceability of the infrastructure that delivers service features and content. All these measures reduce a service provider's environmental footprint and increase profitability. ●

Operational Focus		Overview	What to consider
Power consumption	Element efficiency	Power consumption of individual network elements	Efficiency of network elements, using standardized metrics where possible
	Architectural efficiency	Power consumption of network as a whole	Element utilization levels and design of the network as a whole
Operational improvements	Service creation and provisioning	The turn up and creation of new services and associated staff costs.	Service delivery speed; automation vs. manual provisioning.
	Fault and problem management	Resolving customer service issues accounts for 40 per cent of operations costs.	Reliability of network; reduce needs for service calls
	Upgrading and integration	Software upgrades and installation/compatibility testing of new hardware.	Network operating system

¹ "Market-Area Focus", *Netwatcher Volume 26.7 July 2008*, CIMI Corporation