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OUTSIDE PLANT

ITU-T L.1310 – Supplement on energy efficiency for telecommunication equipment

ITU-T L-series Recommendations – Supplement 1



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Supplement 1 to ITU-T L-series Recommendations

ITU-T L.1310 – Supplement on energy efficiency for telecommunication equipment

Summary

Telecommunication technologies play a large and increasing role in modern society; we depend increasingly on constant streams of information in our work and free time for data access and entertainment. Every day, more people access high speed networks via wired and wireless channels, and the amount of energy to deliver all those new services is also growing rapidly.

Without an increase of energy efficiency, this would lead to a dramatic increase in energy use for all new services and customers. Scaling existing technological solutions is not enough. Not only do we need to implement changes in energy efficiency but we also have to implement them rapidly.

This Supplement on energy efficiency for telecommunication equipment reviews the concepts for energy efficiency in application to networking devices; it presents a concept of place in a network as a base for classification, describes a process for creating a single metric for energy efficiency which reflects the qualities of equipment scalability with traffic levels and provides testing topologies and traffic pattern descriptions.

History

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Introduction

Telecommunication technologies play a large and increasing role in modern society; we depend increasingly on constant streams of information in our work and free time for data access and entertainment. Every day, more people access high speed networks via wired and wireless channels, and the amount of energy to deliver all those new services is also growing rapidly. This would lead to a dramatic increase in energy use for all new services and customers. Scaling existing technological solutions is not enough. Not only do we need to implement changes in energy efficiency, but we also have to implement them rapidly. In order to understand if the speed of change is sufficient, we need to evaluate the energy efficiency of the products that are used to build new telecommunication equipment and then compare it to existing solutions. This process highlights the necessity to have reliable and consistent methods and metrics for energy efficiency evaluation.

In recent years, interest in improving energy efficiency of all energy consuming products has become a hot topic for all society and for the business community in particular.

This interest can be attributed to two major factors: concern regarding global warming contributions, and the high price of energy. Both are fair concerns and both require fast action.

Networks have increased significantly in utility and capacity and are now a critical feature of most businesses. However, the energy consumed by networks has also increased, and it is estimated now to represent as much as 10% of all ICT energy usage. Network users, service providers and regulators are looking for ways to reduce or limit the growth of network energy usage without losing critical network functionality. This will require a focus on the energy efficiency of the network installation, with a particular attention to the energy used and the service delivered by the networking products and supporting infrastructure.

The first instinctive action for energy efficiency improvement is to reduce the nameplate power rating for any product. However, while the actual power rating of a product is an important characterization, its use is limited to facility wire provisioning and does not consider what the product actually does. How many useful features does the product have? How does it compare with the previous generation of products? What are the new functions, features, services it brings? What is its power in the real network?

Generally, the first step in improving energy efficiency should always be to define the meaning of energy efficiency and measure current energy usage in order to see where efficiency gains will have most of the impact and to quantify the effects of those efficiency gains. It should be expected that these efficiency gains will be in the production network equipment as well as in the supporting infrastructure and the interactions between the two.

Continuing energy efficiency improvements will require an examination of the procurement and provisioning process to ensure that new equipment that is added to the network or the infrastructure works to maximize the efficiency of the system as a whole. There may be times when particular sets of products must be compared with each other for energy efficiency. It is important that this comparison is made in a manner that demonstrates the best energy efficiency without compromising the critical functions or performance of the network.

Often there is a strong desire to have a single metric that would give a representation for energy efficiency, similar to the miles per gallon for cars. This may be bits per second per watt or an equivalent for networking. The problem with this approach is that a car has only one major function: to take you from one point to another. Networking equipment, on the other hand, not only controls the flow of information, but also performs additional tasks including encryption, packet inspection and quality of service support. Sometimes a metric expressed in watts per port (or similar) is proposed; but again, it does not reflect the nature of the port, its function, its throughput or how it relates to the rest of the network. Does this mean that a single metric is unusable? No, it