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Energy Consumption through Wired and Wireless Network Technologies

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Abstract—Trim down of needless energy expenditure is one of the most important concerns in wired networking due to the monetarily benefits and ecological impacts. These issues, usually referred to as "green networking", relates to embedding energy-awareness in the design. In this work we first formulate a more precise definition for the "green" attribute.

Keywords— Networking; Wired Networking; Reduction; Energy Consumption; Green Networking.

1. Introduction

The reduction of energy consumption has become a key issue for industries, economic, environmental and marketing resources. As energy-related study on wireless networks are very specific and would require a dedicated study, this survey focuses on wired networks, a section will exposes some wireless technologies optimizations. In the networks energy saving often requires to reduce network performance.

Determining efficient strategies to limit the network energy consumption is a real time system. Minimizing energy consumption of telecom networks can be generically addressed at four levels: they are component level, transmission level, network level, and application level. Telecom network can be subdivided into three networks domains: they are core, Metro, and Access. Energy consumption and energy conservation approaches are surveyed in all the three networks domains.

1.1 Energy Efficiency In Telecom L Networks

A. Network Domains

- Core domain
- Metro domain and
- Access domain.

The core networks domain is typically based on the inter connection pattern and carries huge amounts of traffic collected through the peripheral areas of the network. The metro networks domain is the part of a telecom network that typically covers metropolitan regions. The access networks domain is the "last mile" of a telecom network.

B. Standardization Efforts

The importance of energy efficiency networking has also been acknowledged by a number of new workgroups in international standards organizations.

C. Access and Metro Network

- Energy Consumption Estimation.
- Energy-Aware Access Networks.

1.2 Cutting the Electric Bill for Internet-Scale Systems

A. Wholesale Electricity Markets:

The outcome is based on expected load.Real-time markets are balance markets prices are calculated every five minutes.

B. Empirical Market Analysis

- Price Variation.
- Hour-to-Hour Volatility.

C. Modeling Energy Consumption

Cluster Energy Consumption: Let P cluster be the power usage of a cluster, and let us take its average CPU utilization (between 0 and 1) at time t. P cluster (ut) = F (n) + V (ut, n) + ϙ. Increase in Routing Energy

D. Actual Electricity Bills

- Available indentures: It let small corporations that do not partake openly in the extensive marketplace.
- Selling suppleness: It is the dispersed systems among energy stretchy clusters and they can be more resilient than customary customers.

1.3 Preparation for Abridged CPU Liveliness

A. Scheduling Algorithms

It simulates three kind of scheduling algorithms: which are unbounded delay perfect future, bounded delay limited future, and bounded delay limited past. Each of the algorithms adjusts their CPU clock speed at the same time that scheduling decisions are made in the decreasing time wasted in the idle loop.

B. Speed Setting Algorithm

The Excess cycles of CPU can be represents as Next_excess=run_cycles-peed*(run_cycles+soft_idle).The soft idle time during an interval approaches 0, the excess cycle approaches: run_cycles*(1-oldspeed).As the interval decreases, CPU speed is adjusted and the energy consumption will be increased.

1.4 A Study for Power Management in LAN Switches

A. Feasibility and Models for Sleeping

Models for Sleeping: Simple Sleep: In Simple Sleep, the interface sets a sleep timer2, and only wakes up when the timer expires. *HAS:* Hardware Assisted Sleep is a step up in functionality. *HABS:* Hardware Assisted Buffered Sleep is the most sophisticated sleep state.

B. Impact of Sleeping on Protocols and Design

By and large, we can claim that using HABS does not affect the higher layer protocols in any way.

C. Impact of Network Topology and Vlans on Sleeping

In order to maximize energy savings (using either or both Simple Sleep and HABS), we need to pay attention to the network topology.

1.5 Greening the Switch

A. Switch Architecture

The architecture of switch includes the power model and the buffering capabilities.

B. Time Window Prediction

A good prediction function would reduce sleeps and the consequent increase in latencies. Power save mode is a particular issue of the TWP scheme where the sleepy occurs with promptness and is not reliant on the traffic stream.

2. Existing System

In energy efficiency in telecom networks can increase in demand and their infrastructure. Network structural design: Core (vertebrae), Metro, Way in Networks**.**

3. Proposed System

Here we proposed to use a most important type of power administration technique known as Dynamic voltage and frequency scaling.

4. Methodology

The existing real time dynamic voltage scaling algorithms can be classified into two types intra-task and inter-task dvs algorithms based on their granularity at which the voltage scaling is performed. The intra-task voltage scaling algorithms adjust the supply voltage with in a task boundary. It typically works with the control flow graph of the real-time programs. Control flow graph represents the block level control flow. The inter-task voltage scaling algorithms performs voltage scaling on a task by task basis.

4.1 Intra-Task DVS

Only one task can be performed and it can compute speed of each cycle or group of consecutive cycles.

4.2 Inter-Task DVS and Hybrid

It can compute the fraction of remaining time to each task. Hybrid combine the Intra and Inter-task dvs algorithms.

4.3 System Models

A. Ideal Model

No time for energy overhead and changing speed.

$$p(f) = c_0 + c_1 f^{\alpha}$$

B. Realistic Model

It is a process of predefined set of discrete speeds.Changing speed costs time and energy overhead.No assumption on power-frequency relation.

4.4 Intra-Task DVS + Realistic System

Algorithms: PACE, GRACE. Make sure a task runs at one of the discrete speed steps.

- Hybrid (Intra + Inter-Task DVS) + Ideal System:
- Algorithm: GOPDVS Combine intra and inter-task dynamic voltage scaling.

A. PGOPDVS

Compute time allocation fraction per phase per task. At run time, it use task of fractions to allot time for each task.

Compute task speed by applying patches as in inter-task dynamic voltage scaling.

B. PIT-PPACE

It can compute time allocation fraction per task .At run time, intra-task dynamic voltage scaling can compute speed schedule for each task according to allotted time. Because the above step is time consuming, we can compute a set of solutions of intra-task dynamic voltage scaling for each task.

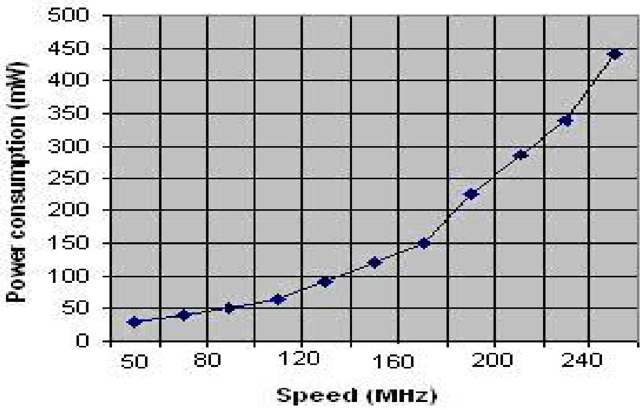

Fig .1: Power consumption in dynamic voltage scaling

5. Conclusion

Energy savings in real-time systems can be significantly improved by considering the effects of dynamic frequency scaling. The highest stable frequency available for the currently set voltage yields the maximum energy efficiency. The existing real time dvs algorithms can be classified into intra-task and inter-task dvs algorithms based on their granularity at which their voltage. The intra-task voltage scaling algorithms adjust the supply voltage with in a task boundary. It typically works with the control flow graph of the real-time programs. Control flow graph represents the block level control flow. The inter-task voltage scaling algorithms performs voltage scaling on a task by task basis. Dynamic voltage scaling algorithms are designed to ensure expectedness while saving as much energy as possible in real time systems.

6. Future Work

We have given a survey of energy consumption through Dynamic voltage and frequency scaling (DVFS). Energy can be consumed through wireless network. In upcoming work, I can implement the greatest improvement features in energy consumption.

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