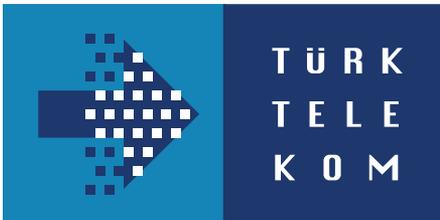


# IT and Infrastructure Efficiency Optimization for OpEx Reduction

Intel® Data Center Manager  
Energy / Utilities



Gaining insights about data center energy consumption and thermal patterns for consolidation and optimization of servers, cooling systems, and data center layout.

## TÜRK TELEKOM

Turkey's leading communications and convergence technologies company

- 7.7 million broadband (wholesale); 12.9 million fixed access lines subscribers
- 202,000 km fiber
- Over 33,000 employees

### Services

- Fixed line (voice and broadband), data and web TV/IP TV/satellite TV
- Data center services (co-location, several IaaS/SaaS cloud services, disaster recovery centers, etc.)
- Innovative convergence technologies

### Data centers

- Istanbul and Ankara (3000 square meters)

## CHALLENGES

- Energy costs skyrocketing (1/3 of Datacenter OpEx) with data center growth
- Energy inefficiencies indicated by calculated PUE of 1.77
- Green IT initiatives (Improve carbon footprint)

After the privatization in 2005, Türk Telekom Group has invested more than TL 17 billion (Turkish lira) in technology and infrastructure with the mission of adding social value for the country's residents. Türk Telekom's corporate responsibility commitments also make environmental value a priority. As a result, the company has earned a ranking as one of the top five companies for methodology and transparent reporting related to the Carbon Disclosure Project.

When a recent operational expense (OpEx) report showed that electricity costs had risen to become one-third of Türk Telekom's data center OpEx, the Group management team recognized an opportunity to improve carbon footprint and shift utility costs to high-value initiatives.

## SOLUTIONS

- Intel Data Center Manager (Intel® DCM)

### Identifying energy and thermal patterns

To gain more visibility of energy consumption in the data centers, Türk Telekom implemented a pilot deployment of the Intel Data Center Manager (DCM) solution in one of the company's system rooms. Prior to the start of the project, the calculated PUE was 1.77. To improve that number, efforts were focused on infrastructure efficiency as well as IT efficiency since IT devices directly impact the power and cooling infrastructure.

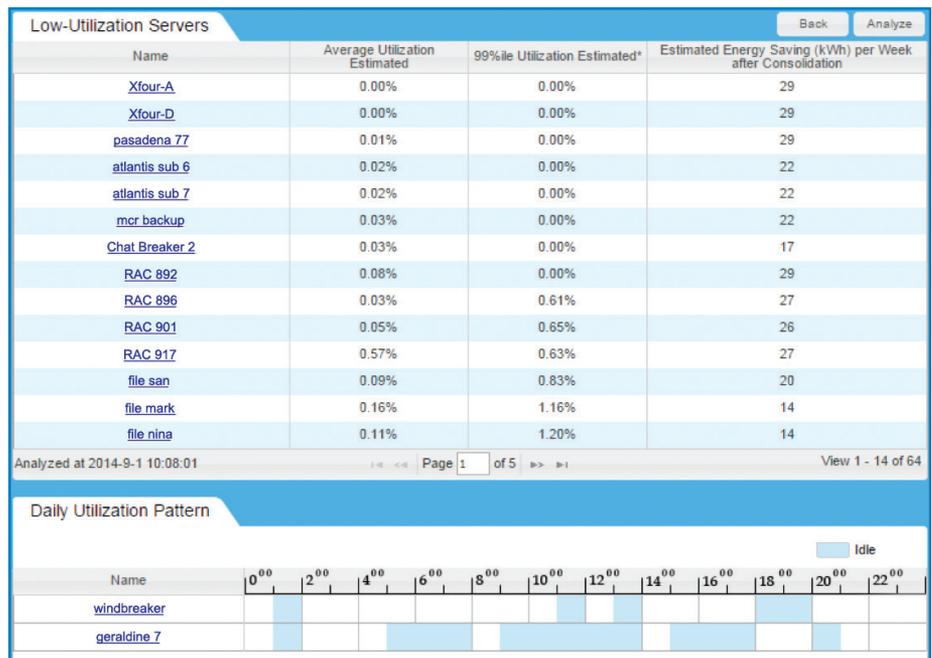
The IT and facilities teams at Türk Telekom followed the Intelligent Platform Management Interface (IPMI) standard for consistent instrumentation approaches across all of its system rooms in Istanbul and Ankara. Intel Data Center Manager (DCM) was selected to collect, aggregate, and facilitate analysis of the IPMI-based power and temperature data from the Türk Telekom data centers.

In less than one week, Intel DCM was deployed. With a short learning curve, the new dashboard allowed IT and facilities teams to immediately start quantifying and visualizing the current energy and temperature patterns related to servers, cooling solutions, and data center workloads.

The monitoring capabilities made it possible to discover:

- **Top power consumers (servers and blade enclosures).** These became candidates for renewal or removal.
- **“Ghost” servers or those systems that were idle or under-utilized but still drawing power** (see Figure 1). These servers were candidates for consolidation, removal, or virtualization.
- **Overly cooled aisles.** Temperature distribution graphs suggested an opportunity to increase return-air temperature (RAT) set points.
- **“Hot spots” based on server inlet temperatures.** This exercise led to the identification of non-operational chassis fans, which circumvented potential server failures. The temperature maps also helped the data center team confidently increase cooling units' RAT set points.

Figure 1. Dashboard views of server utilization



### Translating energy insights into boosted efficiency

One year later, Intel DCM has become one of the foundational tools for the Türk Telekom data center teams and has been introduced into additional systems rooms. IT teams are using it to see the impact of individual and groups of data center devices on infrastructure, and facilities teams now have a better understanding of the energy and cooling requirements. Intel DCM currently contributes to company efforts relating to operations optimizations.

### Increased server virtualization and consolidation

The detailed information about server power consumption supports better decision making, and helps IT more accurately target candidates for consolidation and renewal. In combination with other company initiatives aimed at efficiency, these efforts are helping increase overall virtualization of servers from 61% (compared to the Turkey telecommunications industry average of 67%) to 77% by the beginning of this year.

Detailed views of resource utilization have also contributed to larger

efforts for ongoing consolidation and adjustments in the data centers. In the first year alone, Türk Telekom has been able to reclaim (and assign to other workloads):

- **269 cores and 438 GB memory** (x86 virtualization platforms)
- **83.5 cores** (high-end UNIX systems)
- **50 virtual servers** (cloud platforms)

### Ghost server removal

By identifying idle and underutilized servers, Intel DCM makes it possible for Türk Telekom to better consolidate and virtualize servers, and to identify the idle servers that should be switched into sleep mode. In the case of one Türk Telekom disaster recovery center, consumption drops from 2700 to 300 KWh for a blade chassis put into sleep mode. This adds up to an estimated savings of US\$20,000 over three years in this particular system room containing 200 servers.

### Increased ambient temperature

By leveraging Intel DCM to aggregate server and cooling unit inlet temperature data, Türk Telekom is now making progress to comply with ASHRAE recommendations for server inlet temperatures. The data has been

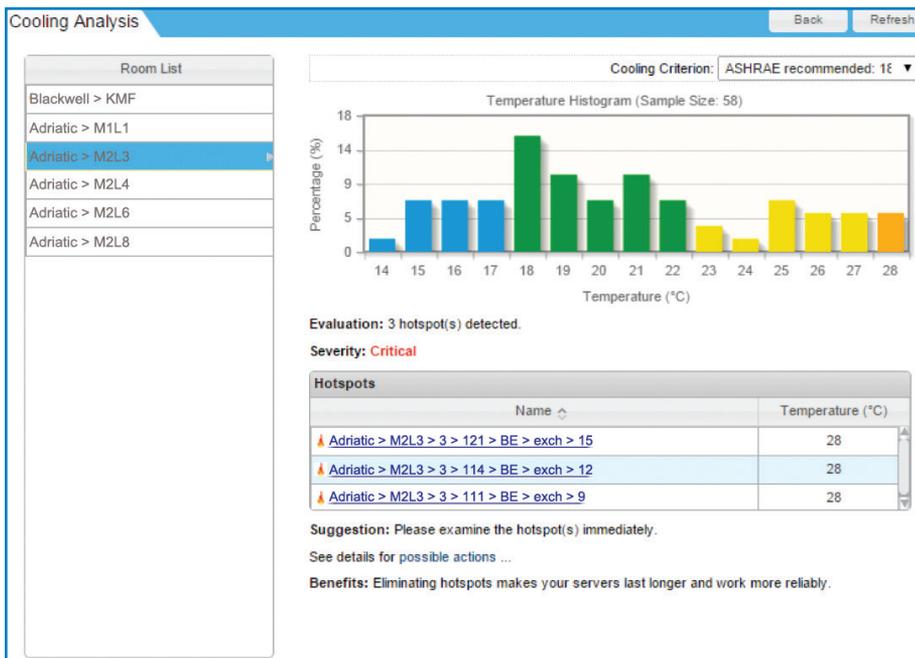
put to use by both IT and facilities teams. (See Figure 2.)

As a first step, Türk Telekom raised the set point for cooling units by 1.5 degrees Celsius and achieved:

- **US\$40,000 per year savings** (3% savings in cooling costs, with cooling load decreased from 1 MWh to 970 KWh)
- **Lower carbon footprint** (CO2 emission), equivalent to 40 fewer vehicles on the road
- **A 0.03 decrease in PUE**

During the evaluations of increased RAT set point, IT leveraged thermal insights from Intel DCM to monitor the impacts on the system room (200 servers). A 1-degree increase from 24 to 25 degrees Celsius resulted in 2% reduction in power to the cooling systems. For a 2-degree increase, the estimated savings should add up to US\$4,500 annually for the single room, or US\$50,000 for the data center.

In rooms where cold aisle containment is being introduced, the company has raised the RAT set point from 24 to 26 degrees Celsius. Intel DCM remains in use to monitor the results and help evaluate the overall viability of CAC and the temperature increases for all data center rooms.



**Figure 2.** Server room-level cooling measurements (taken prior to the start of the optimization projects), using server inlet temperatures.

## Conclusions

The ability to monitor temperature and power consumption has been proven to be a vital component of the company's OpEx reduction initiatives and gives IT, facilities, and company management teams greatly increased insights into the energy-related components of the budget.

The company's summary of the main benefits from Intel DCM include:

- Allowing IT teams to see the impact of IT assets on infrastructure, and allowing facilities teams to see the heat and power load for each IT device
- Creating better understanding and cooperation between IT and facilities teams
- Excellent ROI and affordability

To date, in targeted system rooms, PUE has been lowered from 1.77 to 1.61 by turning energy insights into data center optimizations. Note, however, that PUE reflects only infrastructure efficiency (cooling, UPS conversion, etc.). Intel DCM also enables optimizations that deliver savings in terms of IT power, for additional benefits to the OpEx budget, as well as insights about infrastructure heat and power usage.

Going forward, Türk Telekom plans to apply Intel DCM monitoring to more servers and data center rooms, and continues to introduce to systems rooms at both production and disaster recovery data center sites.

For more information on Intel® Data Center Manager, visit [www.intel.com/dcm](http://www.intel.com/dcm) or contact [dcmsales@intel.com](mailto:dcmsales@intel.com)



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