



# PCIe Card Cooling with Dell PowerEdge Servers

PowerEdge servers ensure proper cooling for PCIe card adapters

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## Revisions

Date	Description
January 2015	Initial release

## Acknowledgements

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Dell PowerEdge servers have the cooling capacity to support a broad array of PCIe adapter cards. PowerEdge servers use customized fans, airflow shrouding, and optimized system topologies to maximize the airflow provided to PCIe slots. This design ensures the temperature of the air delivered to the PCIe cards is at or below industry requirements.

Committed to delivering best-in-class power efficiency, the industry-leading iDRAC systems management uses intelligent thermal controls to reduce fan power consumption and acoustics without compromising component reliability or performance. This intelligence uses a large array of temperature monitoring information and knowledge of the installed system hardware configuration to achieve higher efficiencies.

The PowerEdge server's thermal control starts with a baseline fan speed based on the hardware installed in a system. The baseline is set to cool components that do not have temperature monitoring. The fan speeds may never go below this level. Then the thermal control uses closed-loop control algorithms to determine if and when to increase fan speeds to cool components that do have temperature monitoring. The PCIe card responses described in this white paper can increase fan speeds above the baseline.

For PCIe cards that are designed or qualified by Dell, a server identifies the device and provides customized cooling for each card. Many customers choose to use their own cards, and for this reason, PowerEdge servers are designed to detect third-party PCIe cards and provide a default cooling response based on an estimate of the cooling requirements for the card. This white paper explains how this proprietary control system responds to support PCIe card cooling.

## Dell-qualified card optimal response

PowerEdge servers identify Dell-qualified cards through proprietary communications. All Dell-designed cards and many Dell-qualified cards have temperature monitoring capabilities. Those capabilities are used to provide optimal cooling. Cards without these capabilities are identified by the system-level thermal controls and prescribed a predetermined fan speed response based on the card's needs. Dell-qualified cards have been thoroughly validated and require no additional management.

## Third-party card default response

The automatic cooling response for third-party cards provisions airflow based on common industry PCIe requirements. For standard PCIe cards, the thermal algorithm targets the delivery of a maximum of 55°C inlet air to the PCIe card region.

The baseline fan response increases as the ambient temperature rises as shown in Figure 1. This figure also illustrates how Dell thermal controls categorize third-party cards based on how much power the system thinks the card will consume and adds additional fan speeds as appropriate. Since the PCIe card response adds to the baseline, the response for third-party cards also accounts for a change in ambient temperature.



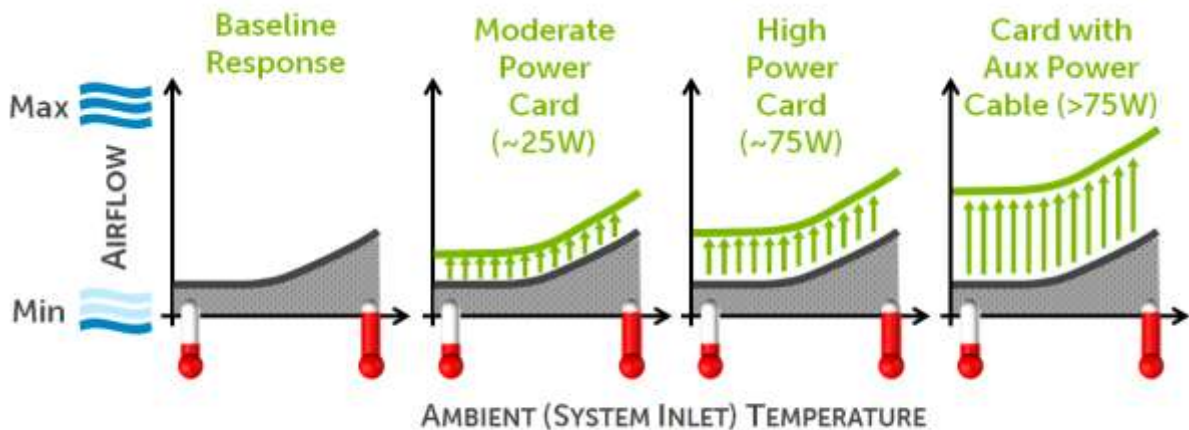


Figure 1 Third-party card response

When a system identifies a card as a third-party PCIe card, the LC log displays the message shown in Figure 2.

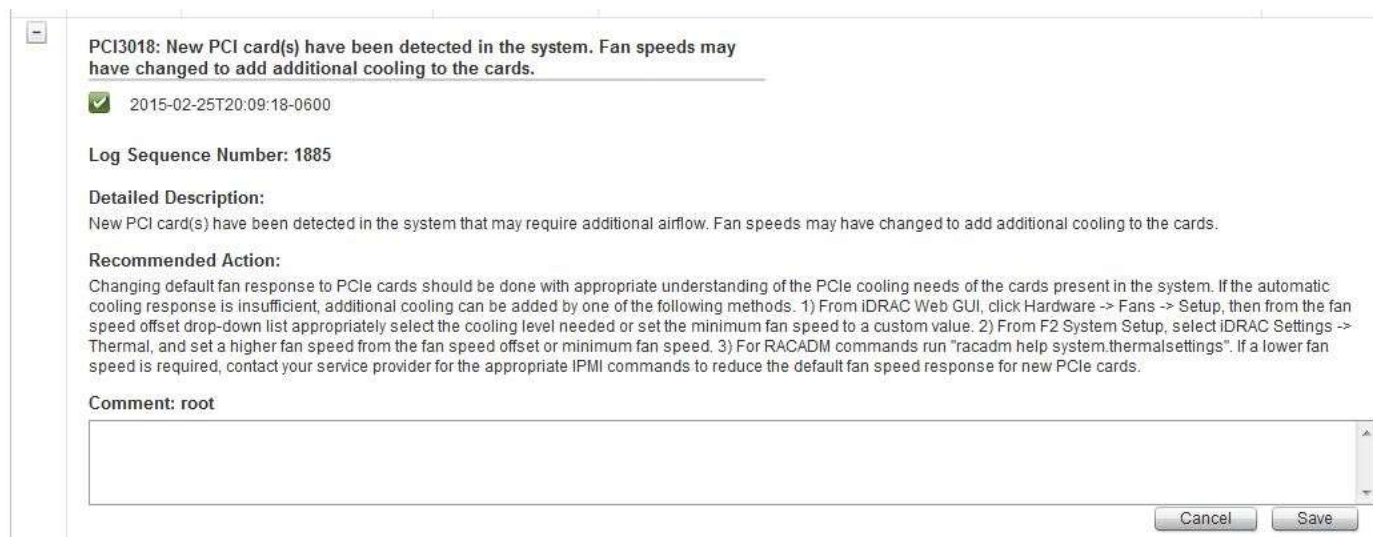


Figure 2 PCIe detection message

## Manually customizing PCIe card cooling

A card's actual cooling requirements may be different from the default response as there is no one-size-fits-all fan response. As the PCIe detection message explains, there are additional options available to customize fan speeds if the default response is considered insufficient. Please see one of the following references for more details on manual cooling options:

- User Cooling Options for Dell PowerEdge Server Fan Control Best Practices Guide
- iDRAC User Guide