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2016 COOLING THE EDGE SURVEY

Conducted by Vertiv

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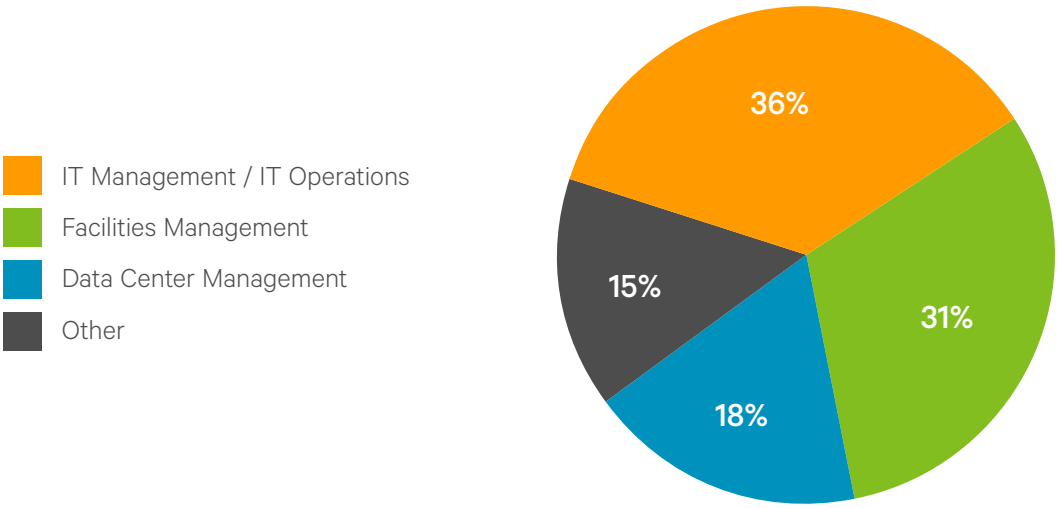
Section I: Methodology

Vertiv in July 2016 conducted an online survey of more than 30,000 IT, Data Center and Facilities professionals in North America. The intent was to better understand trends in small IT spaces where Edge Computing applications are located, as well as related cooling challenges in those spaces. Approximately 400 responses were received from individuals representing 28 industries. Over 90% stated they have some level of responsibility for purchasing cooling equipment for IT spaces.

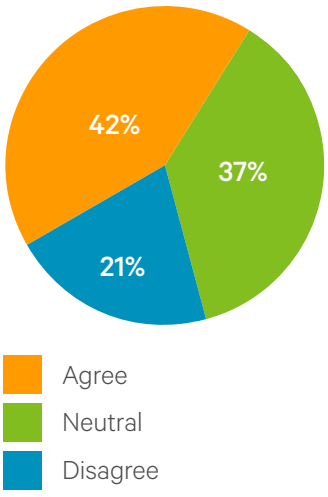
Survey Respondents by Title



Section II: Key Findings

1. Strategic Importance of the Edge. Survey respondents said the strategic importance of small IT spaces has risen in the past two years, and these spaces are contributing to driving company revenue. Investment in small space IT equipment has risen accordingly.

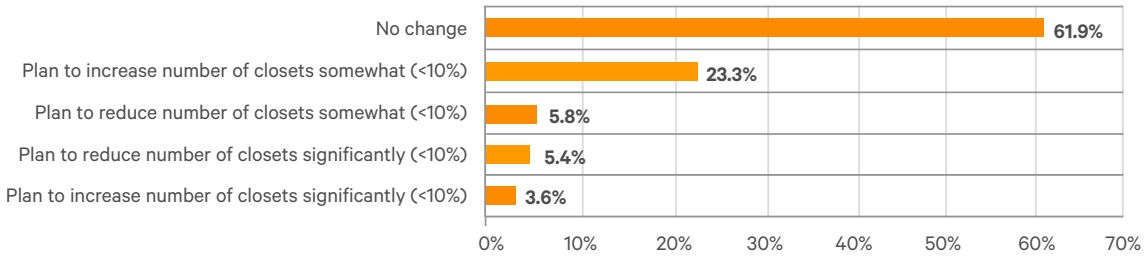
The strategic importance of small IT spaces within my company has risen over the last 2 years



My small spaces contribute to driving revenue in my company

Spending on IT equipment in my small spaces has increased over the last 2 years

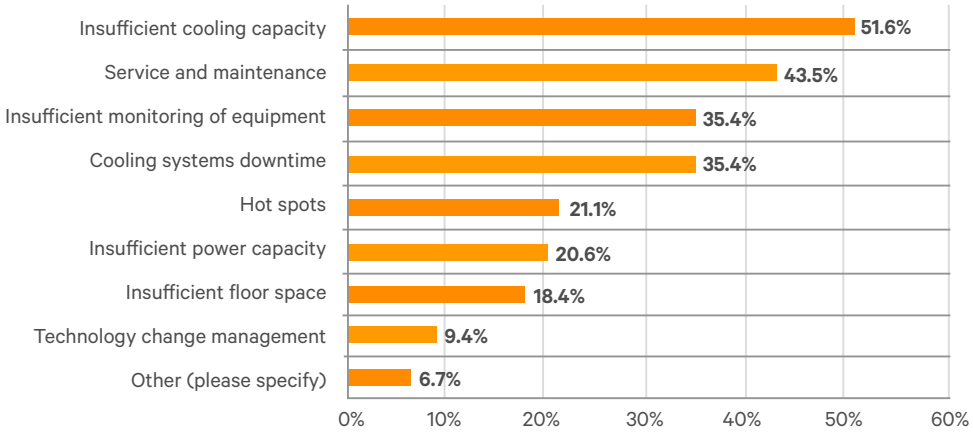
2. Growth in Edge Spaces. While important to companies, the number of network closets is expected to remain somewhat static in the next 12 months. More than a quarter of respondents said they will increase the number of network closets.



3. Changes in Edge Cooling. When asked how cooling strategies have changed in small IT spaces over the last two years, managers cited many different experiences. However, two trends emerged: higher power densities in these spaces due to new equipment and the rising criticality of these spaces. Below are some verbatim comments to that question.

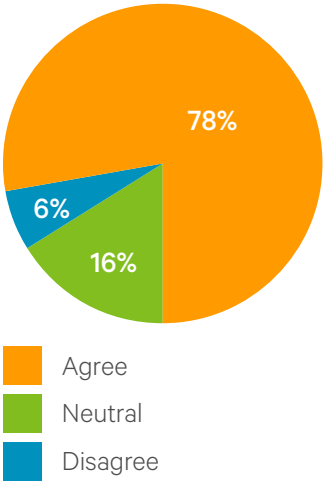
- *"Normally we have the Building Manager place an AC duct into the rooms where the IT equipment resides. We have since discovered that this is not enough."*
- *"More redundancy and remote monitoring due to extent of potential business loss."*
- *"Increased demand from moving to virtual environments, so lower number of racks but higher heat in specific virtual racks."*
- *"Greater power over Ethernet and wifi support are drawing more power from network closets, and most of them need better ventilation, if not better dedicated cooling."*
- *"New Network equipment has required additional cooling needs. and the cost of outages to the company has gone up."*
- *"Added more supplemental cooling to meet the cooling demands for networking gear and increased redundancy."*
- *"We currently use spot coolers or split units. The building's HVAC system was not adequate to manage the temperature fluctuations."*

4. Top 3 Concerns at the Edge. Cooling capacity, service and maintenance and monitoring are the top concerns when it comes to small IT spaces. These remote locations often lack dedicated IT personnel, and IT managers therefore are challenged in monitoring these spaces and responding to adverse events.

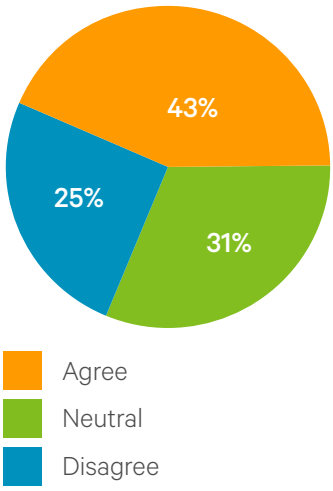


5. Reducing Risks. When it comes to operating small IT spaces, reducing risks is a top goal of managers. At the same time, they want to reduce operational costs and that includes improving energy efficiency.

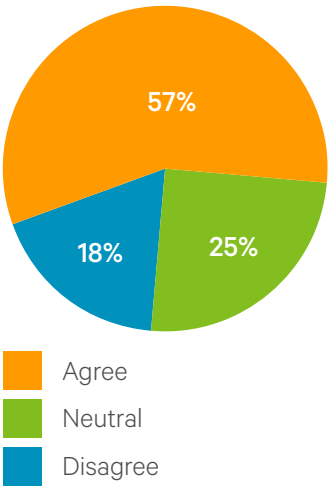
Reducing risk is important in the operation of my small IT spaces



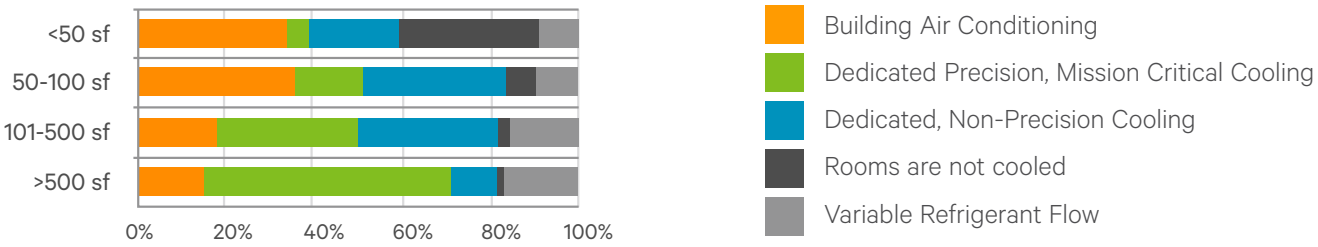
I want to be able to cut costs in the operation of my small IT spaces



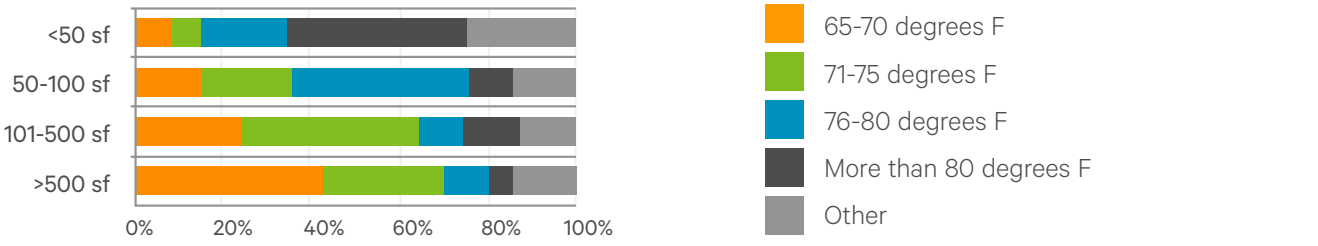
Energy efficiency is an important goal in my small IT spaces



6. Types of Cooling at the Edge. Despite their rising criticality, many small IT spaces are still being cooled by building air conditioning or not being cooled at all. The use of dedicated and precision cool- ing increases with the size of the space.

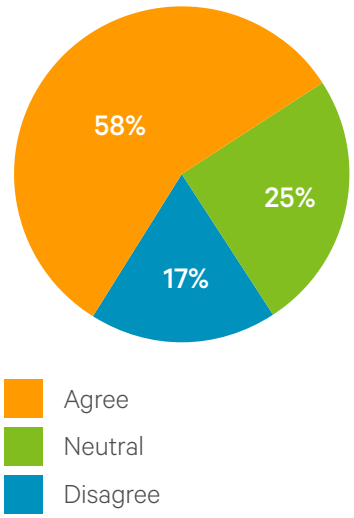


7. Temperatures at the Edge. Not surprisingly, the smaller the IT space, the hotter it gets. With more dedicated cooling in larger spaces, the temperatures in those spaces are generally lower.

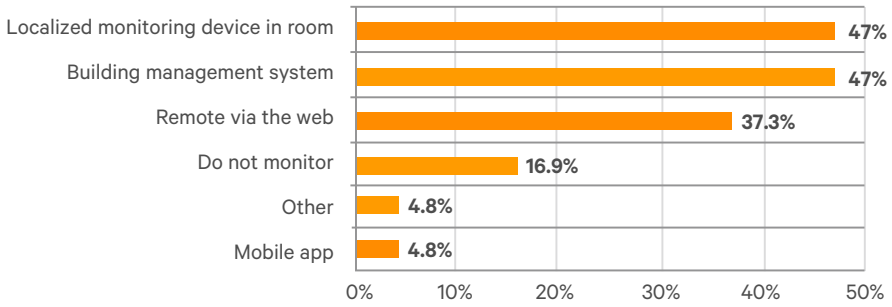


8. Monitoring the Edge. Being able to monitor small IT spaces for environmental conditions and equipment performance is important, as they have grown in business criticality. Nearly half of respondents are using in-room monitoring devices or building management systems to help manage these spaces. Use of local devices places a burden on IT managers to ensure on-site visits by personnel or service providers for adequate monitoring. About 17 percent of spaces are not monitored at all.

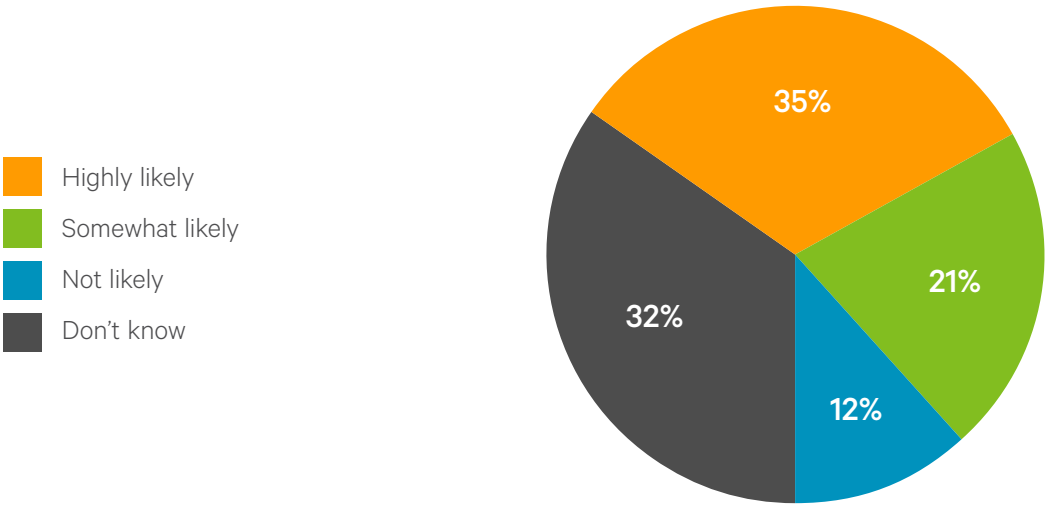
I need visibility into the status (temperature, humidity, alarm conditions) of my small IT spaces



How Managers are Monitoring Edge Spaces



9. Adding Cooling at the Edge. More than 50% of IT and Data Center Managers say they will likely deploy dedicated cooling systems to network closets and server rooms in the year ahead.



Section III: Conclusion

IT professionals are recognizing the growing importance of Edge Computing spaces to their businesses, as well as the challenges that come with remote management of these environments. As a result, they are placing a focus on new approaches to cooling and monitoring these spaces to minimize risks, improve energy efficiency and cut costs. As these spaces continue to increase in density and criticality, using building air conditioning has become impractical, because in many applications these spaces require year-round cooling. This is giving rise to changes in the way these spaces are cooled and monitored and their equipment controlled.

Vertiv™ believes it is becoming more important than ever that cooling and monitoring infrastructures in Edge Computing spaces be efficient, scalable and highly responsive. This will allow managers to cut costs without introducing additional risk in their small spaces, either through the technologies they use or how they deploy them. The opportunity to implement cooling systems that significantly cut energy consumption is a way forward for these managers to balance risk mitigation and cost control. Real-time remote monitoring technologies are being developed- and being adopted - to support web-based and app-based visibility and control via mobile devices. This should further improve risk management and the reliability of these important Edge Computing spaces.

Vertiv provides the widest scope of cooling solutions for small IT spaces. We invite you to learn more by visiting our website at www.VertivCo.com

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