RF CODE
CRITICAL ASSET TRACKING & PROTECTION

WHITE PAPER

Meeting the Demands of the Edge

What Remote Compute Requires— and What Management Solutions Must Deliver—to Maximize the Value of Edge Deployments

Introduction

The impact of edge is transformational. It changes how an enterprise's IT services are delivered; and this has changed how products are chosen, implemented and used. Edge computing is already having the same impact as cloud, requiring IT organizations to assess their organization, processes, and the relevance of existing technology. This change demands that enterprises evaluate edge management products on more than features and functions, rather they must look at the ability of any product to deliver business value.

The immediate challenge for anyone deploying edge computing is that this technology is diverse, confusing and undefined. Describing it in high-level abstract or generic terms is worthless, providing little clarity and promoting edge washing by vendors, where all products can be creatively positioned to address the needs of computing at the edge. Our edge model leverages customer, analyst and partner information to provide a foundational understanding of core edge requirements, edge objective values, product relevance and positioning and how companies can evaluate and assess their path to edge computing.

What—and Where— is The Edge?

Edge computing is about moving data processing nearer business operations. It has many variations, with some IT professionals regarding it as an evolution of the distributed lights out data center concept. No matter how intelligent a network endpoint is, all edge approaches share the same architecture: Core data center(s) with satellite locations that store and process data and interact with network endpoints.

The edge consists of network gateways, data centers and all things IoT. The purpose of the infrastructure at the network edge is to deliver distributed application services, provide intelligence to the endpoints, accelerate performance from the core data systems or collect and forward data from the edge endpoint sensors and controllers.

We recognize three different edge use cases: remote lights out data centers, container IT on the edge, and the Internet of Things (IoT), which is outside the scope of this paper because IoT devices are designed to work completely independently, delivering their data and analytics without the need for external monitoring or management.

Remote 'Lights Out' Edge Data Centers

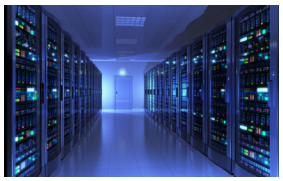
These edge deployments can be a small equipment rack in multiple remote locations or multiple large data centers. These are the most diverse, non-standard edge environments, requiring new organizational models and sophisticated software application architectures. These environments also require a high level of abstraction to visualize, provide low-touch control and enable management of a heterogeneous mix of equipment at scale.

Container IT Edge

This edge model is where converged systems live. This environment consists of a solution stack in an all-inclusive uniform physical set up, comprising of one or more of the following equipment: servers, operating systems, storage, network and optimized power and cooling. The containers are highly standardized, with customization and optional components available to suit specific edge requirements.

Internet of Things (IoT)

The Internet of Things (IoT) edge is where highly available processors enable real-time analytics for applications that can't wait to make decisions. IoT endpoints continue to get smarter with greater ability to work independently and make decisions without regular communication with a core data center.

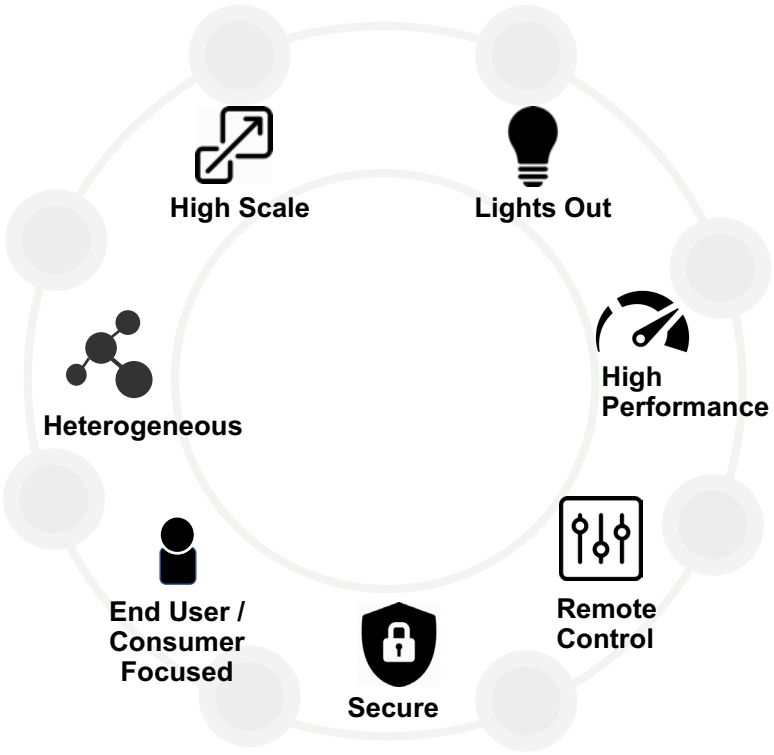
Edge Deployments	
	***Remote Edge Data Centers*** *such as a small equipment rack in multiple remote locations or multiple large data centers.*
	***Container IT Edges*** *A solution stack comprising of one or more of the following; servers, OS, storage, network and optimized power and cooling to support all the equipment in the contained environment.*
	***Internet of Things (IoT),*** *where highly available processors enable real-time analytics for applications that can't wait to make decisions.*

Remote lights out edge and container IT edge deployments each represent an evolutionary step in data center topology. They allow enterprises to distribute computing power among multiple devices and locations to allow data processing and service delivery close to the data source or computing device. This proximity to the end user, whether an employee or consumer using a cell phone or a retailer using a point of sale system, ensures rapid delivery of data and more efficient operations.

These distributed data center architectures also inherit – and in many cases exponentially increase – the traditional challenges associated with data center operations and management. In this white paper we will explore the common attributes of edge deployments, the demands that management solutions must meet, and the transformational benefits organizations can achieve by meeting these challenges head-on.

What the Edge Requires: Seven Common Edge Deployment Attributes

An edge environment exhibits attributes that differentiates it from other environments such as cloud or on-premise data centers. Products used to enable edge computing must address the following seven attributes specific to remote edge and container IT edge environments:



Lights Out

» *Holistic monitoring and control of edge equipment, using tools located physically far away and that do not require local support. Real-time monitoring ensures uninterrupted service delivery and monitors physical access and local activity to provide a picture of overall status of the edge deployment. Locations monitored and controlled remotely.*

High Performance

» *Communication to support end-to-end IT service delivery and metrics to evaluate service level agreements (SLA) and compare edge facilities. The equipment must be able to be supported without requiring customization or manual setup or maintenance. It must also be designed for high availability with no single point of failure; and continue monitoring and delivering status information even during infrastructure or environmental outages or degradation.*

Remote Control

» *Control and monitoring of infrastructure, software and environmental systems without local personnel, including integration of equipment without remote monitoring capabilities. Exception altering for environmental conditions and to provide cause and impact data and remote tracking of the physical location of all assets in real time.*

Secure

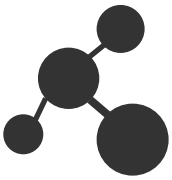
» *Connectivity to and from the equipment is secured with industry best practices and corporate policy, including logging all changes, role-based access and dashboards, and video monitoring and reporting of physical access and movement in the facility.*

End User Focused

» *Success of an edge deployment is based on constant feedback of application availability, performance and response time, and managed in line with business service levels and priorities. In addition, continual comparisons of edge locations help identify and eliminate issues and enable high and low performing equipment and locations.*

Heterogeneous

» *Edge requires consistent, out-of-the-box management, irrespective of technology type or vendor, with normalized information from multiple source forming a single source of truth in one dashboard.*



High Scale

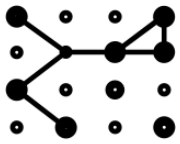
» *It must be possible to scale management of edge facilities to hundreds or thousands of different locations with consistent performance across locations, without increasing complexity, degrading service or impacting IT services or business activity.*

Managing the Edge: What Edge Management Products Must Deliver

These common attributes are table stakes – traditional data center approaches and technology will not solve the needs of edge computing. A product that does not exhibit all seven of these attributes is not a true edge product. Edge computing creates complexity, cost, efficiency, skills, organization and visibility challenges. Successfully delivering edge requires adopting edge management products and technology that both deliver edge services and address the six unique challenges: complexity, cost, inefficiency, lack of skills, inflexibility and inability to see into the system.

Reduce Complexity

» *An edge product must reduce the complexity of managing large numbers of distributed systems. Delivered at scale, edge requires the same management as a corporate data center. A smaller footprint for individual edge facilities does not necessarily mean lower complexity – each may contain networks, servers, storage, racks and power and cooling. Managed in its entirety, edge can be far more complex than the largest of data centers.*



Edge Complexity Challenges

- Multiple points of reference to understand environmental conditions and impact on edge assets
- Disparate monitoring points requiring greater cross-team collaboration
- Disparate technology supporting different parts of the edge creates high process complexity
- Asset tracking and environment monitoring require power and network access
- Infrastructure and environment require multiple monitors
- Customization required to integrate with edge assets or environmental systems
- No ability to compare infrastructure state and environmental performance across edge facilities
- No common source of truth

Edge computing is highly distributed with increasing numbers of remote locations. To be effective, it requires the same IT management capabilities as a corporate data center, accomplished at scale, and solutions that simplify how the edge is controlled, changed, monitored and viewed.

Optimize Cost

» ***Edge plays a critical role in supporting businesses focused on moving the IT data center infrastructure (or parts of the infrastructure) to the cloud. The edge cannot be moved to the cloud and even with 5G businesses will need to position compute resource near the consumer. The challenge is that edge is not just another data center and managing it using the same skills, methods and technology at each edge location creates significant cost.***

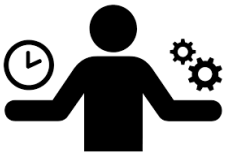
Edge Cost Challenges

- Different teams use different monitors to understand edge health, requiring more skilled personnel
- When edge location access and change is not monitored or guided, it increases management time and organizational risk
- Error reporting is a long process impacting business availability
- Asset tracking is a resource intensive manual process when not connected to the network and can result in lost or mislaid assets
- Assets tracked using adapters, custom integration and additional skills
- Monitoring edge infrastructure requires multiple skills and personnel
- Checking environment health requires multiple monitors and system consoles
- No consolidated power and energy comparisons to allow changes to optimize consumption
- Edge rack capacity not monitored to enable resource optimization

To keep costs in check requires an approach where edge is managed holistically and aligned to business impact, providing economies of scale. To be effective requires that the business is able to view the overall health of the hardware and environment across and within each edge location to optimize skills and resources, and simplify and automate processes for change, monitoring, remediation and reporting.

Manage Efficiency

» ***Edge inefficiencies are a result of traditional data center thinking and using technology that cannot adapt to and manage the highly distributed edge environment.***



Edge Efficiency Challenges

- Large teams are required to manage edge locations and heterogeneous equipment
- Physical passive asset tagging is a time-consuming manual process
- Multiple monitors are required to understand the state of the edge
- Network performance at the edge impacts infrastructure monitoring
- No information to compare the environmental efficiency across all edge locations
- No consolidated data to compare the efficiency of different power and cooling systems

To be efficient, edge deployments require edge state and performance monitoring, issue remediation, change control, organizational collaboration, skills optimization and enablement, with a management solution that provides a measurable path to improving efficiency.

Enable Skills

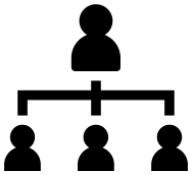
» ***Managing the disparate complexities of a data center requires expensive, highly skilled personnel. Each area within a data center has resources focused on their own management function (network, servers, storage, power and cooling, etc.), often functioning as a management silo with little understanding of adjacent areas. Managing the edge requires these same skills – requiring higher skills to understand how each edge area supports and impacts others.***

Edge Skills Challenges

- Specialists are required to interpret different edge systems
- Lack of integration with data center infrastructure management software (DCIM), environment and service management products create inefficiencies in problem management and resolution
- Edge issues are not aligned with the impact on the business

As companies move to the edge, they will need management technology that monitors each edge component, correlates state and shows holistically the overall health of the edge, providing information that is coherent, relevant and actionable. This removes management silos and domains that require their own expertise and reduces the need for expensive, highly skilled, personnel to manage the complexities of an edge data center environment.

Ensure Organizational Flexibility



» ***Edge implementations vary in size, complexity, environment and business model. Therefore, the personnel responsible for managing and supporting the edge also varies. This demands technology that provides a single source of truth, providing the right information to a broad number of people using easy to understand roles-based views.***

Edge Organization Challenges

- Management silos create organizational and process complexity, demanding high levels of collaborative maturity
- Each team chooses their own management tools, creating organizational barriers and inhibiting collaboration
- Each team uses their own tools and monitors creating a fragmented view on the health and state of the edge infrastructure, unintegrated data and conflicting information
- Problems take longer to identify and solve
- Personnel use interfaces and monitors that do not provide role-specific information

To enable organizational flexibility, edge solutions must provide holistic management capabilities that can be used by domain experts and other management teams, who can choose their own edge views and functions.

Provide Full Visibility

» *Each edge location needs physical changes and maintenance, which need to be guided to ensure the no mistakes are made. This requires remotely enabled visibility into edge locations that software, video and phone support alone cannot provide. In addition, the definition of edge must include all edge components to ensure all aspects of the edge are addressed including elements like edge security – physical, digital and compliance (e.g. change).*

Edge Visibility Challenges

- A large group of people from different teams required to monitor the edge infrastructure
- Asset life cycles tracked manually
- Lack of understanding of how the environment impacts the edge rack assets
- Edge infrastructure change and maintenance carried out without guidance
- Fragmented view of the edge infrastructure
- No integrated video
- No consolidated across edge location environmental data
- Multiple monitors and dashboards

Lights out edge locations require advanced capabilities to understand the full state of the environment, which includes the entire computing infrastructure, facility access, and activity. This is the only way to accomplish key management and support tasks like monitoring, life cycle tracking, security (physical and digital), compliance (e.g. change) and remote guided maintenance and support.

Edge Transformation: Delivering Business Value

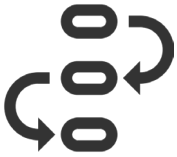
Edge deployments introduce many challenges. But they also present ample opportunities for organizations to select new technologies specifically designed to address those very challenges head on. To deliver business value, edge technology must adhere to and support a company's existing people; organizational processes; its established and planned technology tools and solutions; and provide business insights through data and intelligence. To do so requires a comprehensive edge management solution that reduces the unique challenges of the edge in each of these areas.

People

» *An edge solution must create a single point of reference to enable personnel to understand environmental conditions and the impact on the edge assets. Consolidating the monitoring of edge equipment and conditions enables IT teams to understand edge health, reduce silos and increase operational efficiency.*

Process

» *Harmonizing technology across different edge locations reduces process complexity and risk. Automatic error reporting reduces the impact of downtime on business operations. Monitoring asset movement and rack capacity enables resource optimization. And reducing the number of monitors and dashboards to view increases the IT team's ability to understand, and respond to, what is happening at edge locations.*



Technology

» *Tracking assets and monitoring environmental conditions requires power and network access. Reducing the number of adapters, monitors and consoles and integrating the with DCIM increase efficiency and effectiveness of managing edge deployments.*

Data & Intelligence

» *A single source of truth reduces complexity and enables comparison of infrastructure state and environmental performance across edge facilities. Consolidated power and energy comparisons allow changes to optimize consumption and compare environmental efficiency across all edge locations.*

RF Code for Edge: Management, Monitoring, and Visibility for Remote Computing Topologies

RF Code for Edge is a solution that monitors the edge environment (power and cooling, access and activity) and the assets (servers, networks, storage, racks and mobile devices) holistically and at scale. Built on the CenterScape platform, this combined hardware and software solution delivers capabilities other products simply cannot provide. The hardware is easy to install, providing visibility not possible using software or products provided by hardware companies.

Wireless readers enable communication between the hardware tags, sensors and the CenterScape platform, allowing monitoring to occur even when the corporate network is impacted or other products are down. CenterScape is hardware agnostic so companies can choose whatever hardware is needed (server, network, storage, racks, power and cooling) and have a solution that supports them all, without APIs or custom development.

RF Code for Edge uniquely addresses the six challenges of operating on the edge: Reduces complexity, optimizes costs, manages efficiencies, enables skills, ensures organizational flexibility and provides full visibility.

Reduces Complexity

Complexity = (number of edge locations) x (hardware in each edge location) x (hardware type at each location) x (multiple management technologies and monitors) x (types of support teams)

RF Code for Edge:

- Roles based, easy to visualize navigation using hierarchical displays that pinpoint asset movement and environmental issues at a global level
- Massively scalable solution, proven to simplify monitoring and visualization of IT infrastructure, environmental conditions and the movement of hundreds of thousands of edge assets
- Monitoring possible without the network or need to integrate with the edge hardware, simplifying communication and eliminating custom integration
- Data provides information to understand edge state, allowing performance comparisons and necessary changes across the entire edge infrastructure
- Motion triggered video ensures monitoring of access and activity, with alerts to address unauthorized activity and theft
- Energy monitoring across all edge locations
- Correlation of impact of the environment on the edge assets

Optimizing Costs

The edge is not just another data center and it's costly to manage these deployments using the same diversity of skills, methods and technology as an enterprise data center.

RF Code for Edge:

- No need for local skills and resources
- Single view of edge environment and assets eliminates displays and disparate points of reference and reduces human effort. This ensures quick identification of issues and rapid problem remediation
- Unified monitoring of asset movement, environmental conditions and physical rack access monitoring delivers understanding of cause and effect and reduces mean time to repair (MTTR)
- Assets tracked from arrival into production without requiring a network connection, eliminating delays or equipment placement issues in the asset lifecycle process
- Errors avoided by pinpointing the precise location of equipment, supported by rack access monitoring and video, to ensure changes and maintenance are carried out on the right equipment
- Integrated with common DCIM and environmental and service management products, protecting investment while augmenting and enhancing existing technology

Managing Efficiency

Edge deployments require technology to manage real-time visibility and monitoring for a highly distributed environment to be efficient.

RF Code for Edge:

- No local personnel needed to track assets, monitor the environment or monitor and track access and activities within remote edge facility
- Minimal effort and cost to add asset and environmental monitoring to new edge facilities
- Environmental sensors and asset tags added quickly and easily with minimal human effort and skills
- A single, trusted view providing the necessary detail for immediate isolation of environmental issues, saving remediation time and outage costs
- Business SLAs met by environmental conditions associated with the impact on the assets
- No custom integration and assets monitored without adapters
- No impact on the network; data sent from tags and sensors to readers do not require network access
- Integrated with common DCIM and environmental and service management products, protecting investment while augmenting and enhancing existing technology
- Information to compare to the efficiency of all edge location

Enabling Skills

Management technology that removes silos and domains that require separate expertise reduces the need for expensive, highly skilled, personnel required to effectively manage edge deployments.

RF Code for Edge:

- Roles-based views allow different teams and individuals to understand the health of the edge environment from their own perspective
- Promotes the ability to remove and/or simplify operational and support silos
- Easy to install asset tags and environment sensors, requiring no new or additional skills
- Accelerated fault remediation and decision process for change management
- Graphical interface allows ease of navigation within and across edge locations
- Easy to understand, unified, asset and environmental information
- Simplified data collection and analysis, providing actionable information to immediately solve complex issues
- Guided presence at each edge location enabling a lower skills requirement for basic housekeeping activities and eliminating risk of errors with scheduled maintenance and support

Ensuring Organizational Flexibility

Edge implementations demand technology that provides a single source of truth – the right information to the right people using easy to understand roles-based views.

RF Code for Edge:

- Eliminated edge organizational barriers with roles-based views and a single source of truth
- Roles-based views delivering information specific to meet an individual's specific need
- Understanding of environmental conditions without requiring deep domain expertise
- Collaboration helping eliminate organizational barriers allowing each team to choose their own edge views and functions
- Data shared with other edge management solutions to enrich their content
- Issues and context sent to service management solutions to support business SLAs, providing vital information to service managers and business managers
- Collection, processing and delivery of information to meet the needs of a broad range of skills and functions, or companies with edge management spanning different teams and roles

Providing Full Visibility

Visibility into each edge location for guiding physical changes and maintenance, that software, video and phone support alone cannot provide.

RF Code for Edge:

- Monitoring all edge locations using the same technology, with information delivered through a common, roles-based dashboard.
- Guided presence capability accomplishes asset change or maintenance accurately and without mistakes, leveraging LED tag flashing on the exact asset and video guidance
- Assets tracked without being connected to network or power

- Integrated asset tracking, environmental sensors, edge access monitoring and video to deliver a status and health view for all or a specific edge facility

- Mobile tracking monitors the movement of all equipment considered part of the edge but used in the offices and facilities outside the edge facility

- Dashboard showing the impacted assets when a cooling or power issue is detected

- The collection and correlation of power and cooling, asset location tracking and physical access data provides full remote visibility of each and every edge facility

Specifically designed with the unique monitoring and notification requirements of edge deployments, RF Code for Edge provides real-time insight, and control over operational risks, costs, and compliance. This easy to use solution, accurate to the rack level and operating 24/7, provides reporting and accountability for compliance with regulations and service level agreements. As an open platform, this solution is designed to easily integrate with other data center management solutions like building management (BMS), DCIM, and integrated systems management (ITSM).

Edge facilities only deliver value when they're working efficiently, effectively, and at capacity. That requires granular, real-time intelligence and alerts for each of your edge locations. As edge computing is becoming more mainstream, RF Code for Edge empowers enterprises to leverage the edge effectively, make more informed decisions and make them faster, and optimize their performance and support business growth. To learn more about how monitoring your edge facilities can transform your company, contact RF Code today.