

Unleashing the Smart Enterprise

A Foundational Approach to Efficiency, Agility and Security

An Executive Brief Sponsored by NEC

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Information and Communications Technology

Introduction	3
Architecture Flexibility: Establishing Your Plan	4
<i>Cloud Benefits Converge in Hybrid Environments.....</i>	5
<i>Key Takeaways for Successful and Sustainable Cloud Deployments</i>	6
Software-Defined Anything: Agility and Flexibility Unbound.....	7
<i>Software-defined Anything Breaks Legacy Obstacles.....</i>	7
<i>Software-defined Workstyles and Workflows</i>	8
<i>Key Takeaways to Establishing a Software Foundation</i>	9
Business Continuity is Not Nice to Have—It’s a Must Have	10
<i>Key Takeaways for Achieving Business Continuity</i>	12
Internet of Things: Gaining Efficiencies with Biometrics.....	13
<i>Video Monitoring = Practical Safety and Security</i>	14
<i>Optimizing Business and Driving Revenue with Video Analytics.....</i>	15
<i>Retail.....</i>	15
<i>Hospitality.....</i>	15
<i>Healthcare</i>	15
<i>Key Takeaways: Stay Ahead of the Curve</i>	16
The Last Word	16

INTRODUCTION

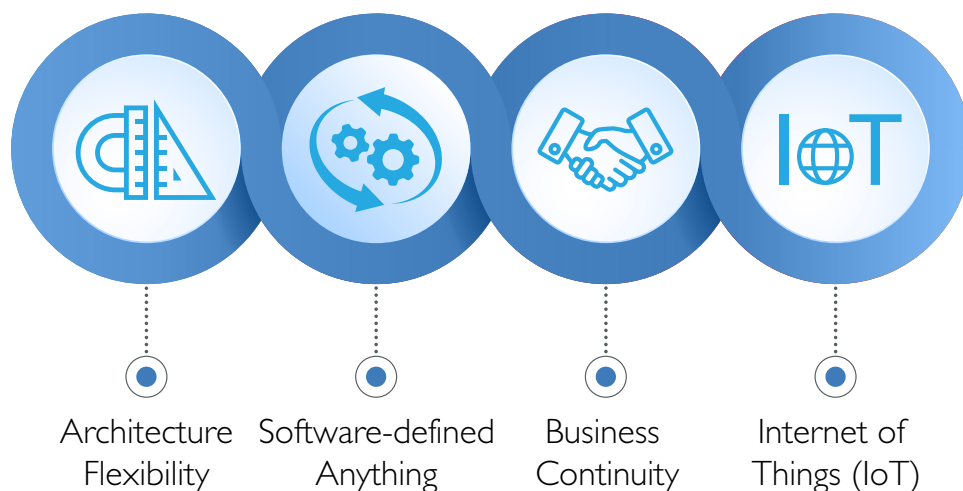
Organizations of all sizes, geographies and industries are experiencing rapid change. Workforce demographics are shifting dramatically. The number and influence of baby boomers are in sharp decline. Up and coming Generation X and Millennial workers bring a different perspective on how and where work should be done. Mobile devices and the apps running on them continue to proliferate in the workplace. Employees, business leaders and guests are accessing cloud services of all types on corporate networks, often without IT's knowledge. The need to connect a broader range of devices (machinery, cameras, vertical instruments, in-building systems, etc.) to the Internet is raising significant concerns for IT professionals. Aging, legacy technology solutions are increasingly expensive to maintain and ill-equipped to support the functionality demanded by today's businesses and users. Organizations of all sizes are flocking to cloud services but often struggle with the associated compliance, control, integration and cost implications. Security breaches and network outages endured by well-known companies are no longer a discussion topic among IT circles, but are now highly publicized and criticized on a seemingly daily basis. Overall, many organizations are struggling with intensifying reliability, security and flexibility needs.



Adapt or be left behind—that's the stark reality organizations of all types and sizes operate within today. Because the need to change is constant, organizations must become smarter in how they prepare for and respond to new challenges, influences and opportunities. They must become less reactive and more proactive. They must become a smarter enterprise.

Smart enterprises are leveraging technology to improve how people communicate, collaborate, learn and work. Those same technologies help to optimize the business, increase visibility and control, improve safety and security, and drive competitive advantages.

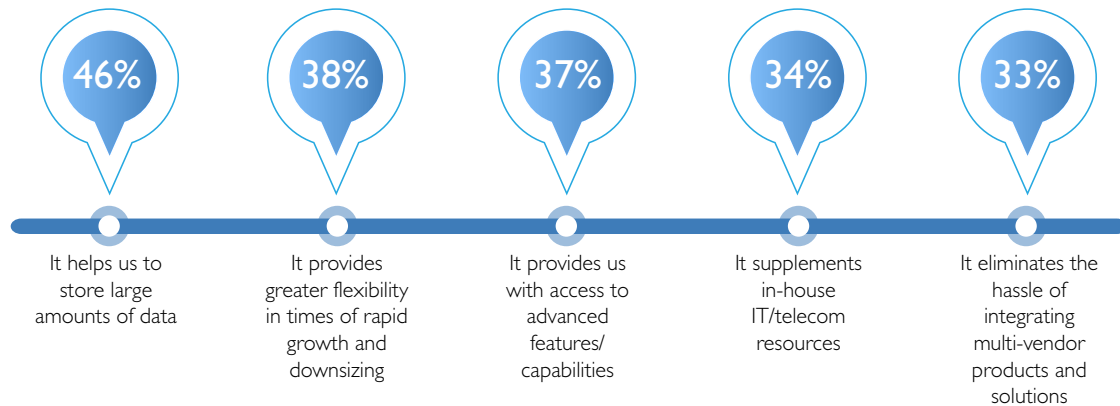
There are four key elements that organizations should embrace to become a smart enterprise:



This white paper explores solutions that address market trends faced by end-user organizations of all types. By applying these four key elements, organizations of any size can simultaneously address concerns and create new value for their business, customers and partners.

ARCHITECTURE FLEXIBILITY: ESTABLISHING YOUR PLAN

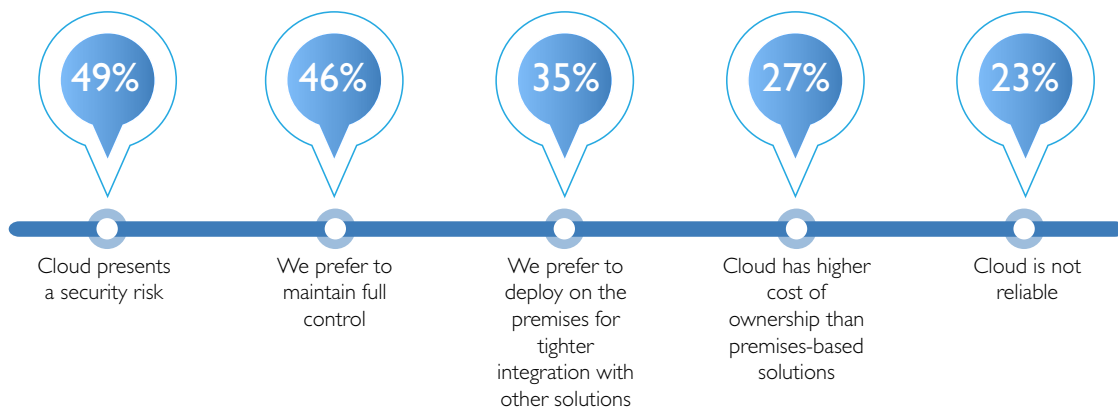
Many people in the IT industry would argue that the world is quickly moving toward cloud-based service consumption for all things, from business applications to communications functionality. Why? A recent global Frost & Sullivan survey of 1,626 enterprise IT decision makers determined the following as the top benefits of adopting cloud IT and communications solutions:



Although the feedback is positive, it must be recognized that “Cloud” means different things to different people and in different contexts. Frost & Sullivan defines public cloud as infrastructure shared by several or more end-user organizations. Private cloud is infrastructure owned and operated by a single end-user organization for self-use or infrastructure owned and operated by a service provider for the dedicated use of an organization. There are key attributes inherent to each cloud type to consider when searching for the right fit for your organization.

Attribute	Public Cloud	Private Cloud	
		(Customer Owned & Operated)	(Service Provider Owned & Operated)
CAPEX	No	Yes	No
OPEX	Yes	No	Yes
Pay as You Go	Yes	No	Yes
Cost Overruns	Yes	Yes	No
On-demand Capacity	Yes	Limited	Yes
In-house Support Staff	No	Yes	No
Enterprise Visibility	Limited	Yes	Limited
Security	Limited	Yes	Yes
SLA	Limited	No	Yes
Customization	Limited	Yes	Yes

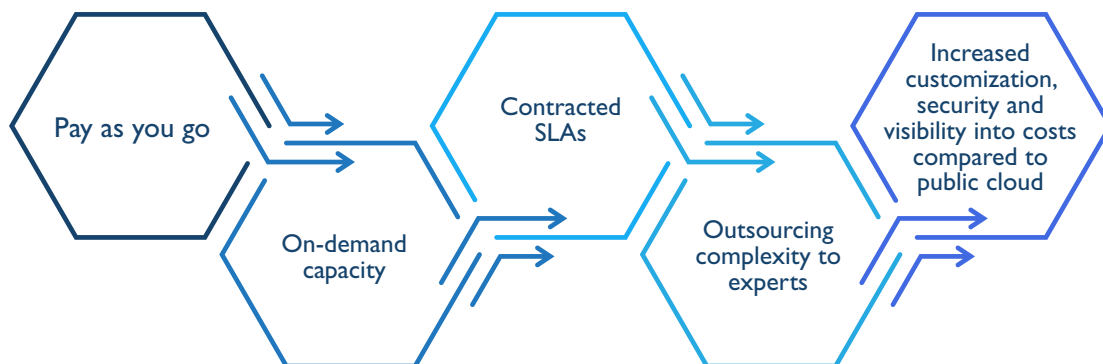
It's clear that decision makers understand the benefits of various cloud models. The concerns are also widely agreed upon. The same 2017 Global Frost & Sullivan IT Decision Maker Survey determined the top perceived risks involved with using cloud services to be:



Cloud Benefits Converge in Hybrid Environments

The reality is that most organizations will not move all of their workloads to a single cloud-based delivery and consumption model. On-premises deployments will live on for a number of reasons: greater customer control over security and data management; maximizing the value of existing assets; performance assurance; and other drivers. As such, hybrid cloud architectures need to integrate on-premises components with off-premises, cloud-based elements.

In many ways, hybrid cloud combines the best of public and private cloud. CAPEX and maintenance associated with hybrid solutions are flexible. The end-user organization decides whether to keep investing in on-premises elements or outsource that functionality from a cloud provider. Conversely, the customer may upgrade on-premises components with software-based hyperconverged architecture for improved scalability, management, physical resource optimization (power, connectivity, footprint, etc.) and integration with a service provider cloud. The OPEX/CAPEX balance is up to the customer. By integrating service provider owned-and-operated private cloud with customer premises equipment (CPE), additional benefits open up that are unevenly supported by pure public or pure private cloud:



Hybrid cloud architectures enable end-user organizations to construct the environments they need without compromise and rely on an expert provider for component sourcing, integration, ongoing support, security and compliance assurance, business continuity planning, and building a roadmap toward a flexible environment that can support more advanced capabilities today and in the future.

Key Takeaways for Successful and Sustainable Cloud Deployments

IT decision-maker feedback shows that a single approach to cloud-based solutions is not the right choice for many organizations. Before committing, or more fully committing, IT decision makers should evaluate the provider and type of cloud model that may serve them best. Frost & Sullivan's IT Decision Maker Survey asked for the top three factors when choosing a cloud provider. The top three responses were:



To effectively support the majority of an organization's cloud services needs today and tomorrow, a provider must deliver a vision that **addresses legacy, private cloud and orchestration through hybrid cloud technologies** and ensures SLAs across the entire landscape, while enabling agility and compliance required by the business owners and corporate governance.

The architecture leveraged by a cloud provider must be **standards-based**, both in platforms (i.e., Microsoft, VMware, Red Hat, etc.) and industry protocols (SIP, H.323, OpenFlow, etc.) to enable customization and integration.

Multi-vendor and vertical expertise is a must to assure solutions are integrated, customized and optimized to deliver the greatest performance and business impact.

The provider must be open and clear from the RFP process through post-deployment support to thoroughly **ensure the customer understands the services for which they're being billed**.

The provider must exhibit an **unwavering focus on security, data integrity and reliability**.

SOFTWARE-DEFINED ANYTHING: AGILITY AND FLEXIBILITY UNBOUND

There's no doubt we are living in an increasingly software-centric world of applications and services. Today, hardware-centric technology is often viewed as rigid and purpose-built. Software is viewed as inherently flexible and, more importantly, extensible. Software-defined solutions decouple the software from the IT hardware it controls, allowing for a layer of abstraction to occur. In the IT realm, the move to the virtualization of applications, servers and even the network is allowing IT organizations to deliver technologies based on logical infrastructure designs, rather than remaining bound to physical limitations. Hyperconverged architectures are enabling the integration of components based on industry standards (i.e., VMware, Red Hat Cloud Suite and Microsoft Azure Stack) and deployment onto new converged hardware form factors with improved resource distribution and management. The business network was the laggard in embracing this movement toward virtualization and software-centric control. It has benefitted from lessons learned in the virtualization and convergence of other technologies (i.e., servers, applications, databases, virtual appliances, etc.).

A significant majority of today's business networks are static, designed to support the specific application and bandwidth needs of a given location or environment. These networks are a barrier to the increasingly dynamic, on-demand needs of business users and their applications. IT organizations are, by necessity, fundamentally rethinking their core business networks to infrastructure based on an ecosystem of networks, applications and services driven by software.

Smart enterprises leverage standards-based software-defined networking (SDN) to provide safety and security over the virtual and physical environment, as well as high availability, operational efficiencies and cost savings. SDN underpins environments where applications/services and networks interact dynamically; they are synchronized for performance and efficiency.

Software-defined Anything Breaks Legacy Obstacles

Breaking away from the physical and location limitations of hardware, virtualized networks and hyperconverged architectures bring significant relief to taxed resources (monetary capital, time, real estate space, and manpower) and deliver new efficiencies to the enterprise.



In software-defined environments, the network can be highly automated to proactively identify and adjust with varying levels of utilization and demand. In the past, such events required manual processes to identify, human intervention to reconfigure and sometimes even downtime to affect those changes.

Simplicity: Easier-to-use administration tools simplify deployment and ongoing management of software-defined environments, representing a huge leap forward from the complex and arcane legacy networks bound by outdated switching and routing principals.

Security: In contrast to a manual process of elimination to pinpoint issues, SDN can dynamically isolate ports where a connection failure or an identified attack is located. Remediation intervals decrease from weeks or months to seconds.

Scale: SDN allows scale at a significantly lower cost while providing additional services with greater efficiency and time to market; resources and capacity are optimized.

Centralization: Multi-site organizations may see more advantages in smoother management and centralization with fewer skilled staff.

Safety: SDN can dynamically prioritize all forms of traffic across the entire network, including emergency calls/notifications.

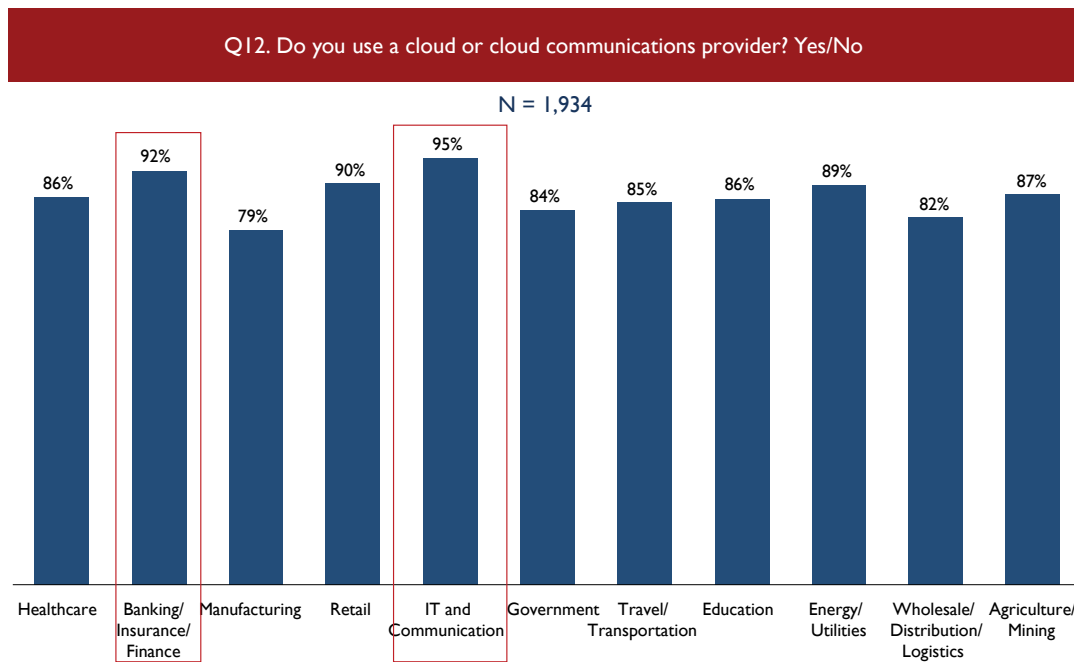
Business Continuity: Admins can assign priority routing for VIP calls as well as priority business applications (contact center, e-commerce) and bandwidth-sensitive communications apps (i.e., video). Alternate network paths are automatically selected based on network conditions and optimization of traffic, including self-healing for uninterrupted service.

Disaster Recovery: When a hard failure occurs due to an unanticipated disaster, SDN facilitates intelligent failover by load balancing services between multiple sites, ensuring recovery from the more dire circumstances.

Software-defined Workstyles and Workflows

Real-time communications applications (voice, data and video) as well as business toolsets are increasingly deployed in software-centric designs and consumed as software-based services (i.e., SaaS). The ability to deploy software anywhere on the network and dynamically scale changes the nature of work and business agility.

A majority of enterprises across verticals worldwide are already leveraging the flexibility and reach of cloud-based services for on-demand anywhere, anytime access to communications and collaboration software, which ranks among the most mission-critical application sets any business utilizes.



Secured software interfaces, including softphones and user clients provisioned to desktops, laptops and mobile devices, enable users to work from anywhere while fully connected, extending the reach of the enterprise and providing a business continuity option as well. Employees can work effectively from home or hotels without missing a beat. They can also be deployed in close proximity to customers and partners as needed. Due to this flexibility and other benefits (such as work-life balance for employees), Frost & Sullivan expects the number of mobile voice and unified communications clients sold worldwide to grow by one-third, from approximately 4 million in 2016 to over 6 million in 2023.

Key Takeaways to Establishing a Software Foundation

Software-defined anything is about building intelligent and integrated environments that can dynamically adapt to changing demands.



- IT decision makers must recognize the impact of unsecure devices and mobile solutions on their network and evaluate how those should align with compliance and privacy needs, and all-around corporate policy concerning information assurance for data handling and management.
- Technology decision makers should consider how the agility of an intelligent network can improve the ways employees and customers are served, while also driving business continuity and efficiencies.

A trusted provider can help build environments to enable flexible support for various devices and applications that will inevitably come onto the network. The provider can ensure performance, reliability and security, as well as deliver the distributed applications and mobility that most organizations need to remain competitive.

BUSINESS CONTINUITY IS NOT NICE TO HAVE—IT’S A MUST HAVE

IT departments are under constant pressure to simultaneously deliver innovative solutions for end users while also maintaining and optimizing well-established legacy platforms and services in the cloud era. As a result, it’s common for IT departments to focus the majority of their time on deployment efforts and end-user support. When IT professionals spend most of their day either “putting out fires” or working on “the next big thing,” one of the most critical post-deployment steps is often overlooked—ensuring high availability that approaches complete business continuity for processes and procedures. With long lead times for budget approval, solution purchases, deployment, turn-up and roll-out, it’s understandable that IT and other stakeholders may want or need to move on to their next projects. Business continuity solutions have also been historically hardware-centric and expensive. Furthermore, in the era of cloud, service contracts and legal agreements further complicate business continuity plans. This creates a dilemma for decision makers, with many unwilling to fight the political and budgetary battles necessary for an effective business continuity program, choosing instead to take the risks of going without.

Technology evolution, strong service-level guarantees and high-profile disruptions at well-known companies have changed the game. Achieving business continuity is much more affordable, and many more options are available compared to just several years ago. Legacy excuses for disregarding business continuity imperatives no longer hold up. Organizations of all sizes, from small businesses to the largest enterprise, expect good, reliable performance for their services today.

High availability (HA) refers to the uptime, or performance, of a system or system components (i.e., applications, databases, connections, servers, etc.). HA can allow the achievement of business continuity. Service-level agreements (SLAs) promising nearly always-up reliability throughout the year are today’s norm. However, IT decision makers must fully understand their options. SLAs will vary upon system criticality to the organization, provider capabilities, cost and type of technology covered. For example, server redundancy and failover to hot standby nodes alone do not equate to high availability and business continuity.

SLA level of 99.9 % uptime/availability gives the following periods of potential downtime/unavailability:

Daily: 1m 26.4s
Weekly: 10m 4.8s
Monthly: 43m 49.7s
Yearly: 8h 45m 57.0s



Source: Uptime.is

How much downtime can your organization afford? Business continuity solutions are no longer nice to have; they are a must have in today's highly competitive market where most consumers demand instant gratification. All organizations must prepare for both planned and unplanned disruptions.

Planned disruptions include system or component maintenance and sporting, cultural and political events that disproportionately pressure various business network and application elements, etc.

Unplanned disruptions consist of security breaches, power outages, hardware/equipment failure, software bugs, weather events, network congestion due to large spikes in traffic/access requests, etc.

Whether planned or unplanned, system downtime or disruption typically means loss of revenue and productivity and potential loss of data. It can shake employee, partner and end-customer confidence; tarnish or destroy an organization's brand; and lead to hefty penalties from regulatory agencies. It's not a question of if, but when, continuity is needed.

Today's solutions have moved well past yesterday's basic hardware redundancy. How are smart enterprises currently achieving business continuity and high availability?

Many parts combine to provide an effective business continuity/high availability (BCHA) strategy. Contemporary solutions leverage intelligent networks, applications and services. No matter if the environment is on-premises, cloud or hybrid (on-premises + cloud) solutions must provide reliable performance and data access to maintain workflows and business operations.

- **Virtualization** decouples software from hardware to leverage the principals of cloud computing wherein server software co-resides on and shares the resources of hardware (processors, power, network connections, physical footprint, etc.). The reduced hardware, footprint and complexity make it less expensive and more efficient to implement redundant or backup instances deployed anywhere on the network.
- **Active-active** server software allows multiple software instances of an application to operate on multiple servers simultaneously, providing real-time load balancing that protects against server overload and system congestion. Active-active capabilities eliminate the need for expensive, high-availability software as an add-on complication (i.e., hot standby server redundancy).
- **Fault-tolerant servers** replicate data from a shared master system and OS. Certain fault-tolerant servers are designed to provide instant service restoration to facilitate real-time continuity, rather than less-efficient buffer and write capabilities with unavoidable downtime and lost data found in some fault-tolerant servers that can run an organization afoul of regulatory and compliance requirements.
- **Software-defined networking (SDN)** eases the time and complexity of building and modifying networks that require settings to be configured in a large number of network devices. SDN decouples network control from communications processing, which previously were both performed in each network device. SDN enables network devices to operate not just individually, but through intelligent coordination with one another via centralized control. In this way, networks intelligently adjust to media traffic prioritization, route optimization, bandwidth utilization, server port availability and more.
- **Scalable, secure storage** protects data from risks and ensures business continuity as a secure data backup solution. From a compliance perspective, long-term data storage is a mandatory demand. Today's solutions support long-term growth by enabling additional storage nodes to be deployed over time anywhere on the network.

- **Unified threat management** gives enterprise administrators a single view across various network and application elements. It works with SDN in an ecosystem to address cyber threats without business disruption. Rather than manually hunting threat sources, unified threat management systems auto-detect threats. SDN solutions can then remotely close suspect ports and effectively re-route traffic as necessary.
- **Outsourced services** such as Infrastructure-as-a-Service (IaaS), cloud backup, disaster recovery, and restore ensure data availability, compliance and safety from local events through off-site storage and archiving. A range of professional, managed and investment protection (i.e., escrow, software assurance, etc.) services can further monitor, assess and address a variety of potential disruptions to business networks, components, applications and workflows. Having agreements in place that protect access to the data through providers is critical to ensuring a business continuity strategy.



Much of the discussion revolves around data integrity and access to the applications and databases that rely on that data. As such, data integrity and availability should be top of mind when evaluating individual business continuity components or entire solutions. Business continuity is a necessity—the only question is how it's achieved. Regardless of industry, there are near-universal requirements to consider with respect to how data is handled and maintained. Examples include PCI, ecommerce, inventory, CRM, human resources, company financial and other data. Adherence to regulations in specific industries (healthcare, financial services, banking, law, government, defense, etc.) raises requirements for additional capabilities (HIPPA, SOX, MiFID, etc.) to be integrated into solution sets discussed previously.

Key Takeaways for Achieving Business Continuity

Business continuity is a process and a mindset supported by technology. IT decision makers must ensure business continuity is part of the solution evaluation process from the start. Better performance and improved value are also reaped from approaching investments from a holistic view rather than discrete point products. Technology upgrades should be designed with a long-term roadmap, even when it requires organizations to address incremental upgrades over time.

Organizations should not compromise their current requirements or future plans based on the capabilities of their chosen provider. To assist with design, implementation and support of long-term roadmaps, IT decision makers should seek guidance from experts with the following credentials:

- Ability to provide both technology (servers, storage, SDN, on-premises and cloud infrastructure) and the necessary skills and service capabilities (maintenance, managed, professional and cloud-service delivery, and escrow agreements)
- Expertise in cloud, on-premises and hybrid solutions to support the best options for today and a path toward tomorrow's requirements
- Multi-vendor qualifications to integrate and support diverse components without the added complexity of bringing in third-party support
- Vertical expertise and reference designs to support efficient, compliant and integrated solution sets

INTERNET OF THINGS: GAINING EFFICIENCIES WITH BIOMETRICS

When people think of the Internet of Things (IoT), images of sensors on large machinery or medical equipment often come to mind. Others think of internet-connected thermostats, traffic signals, fitness trackers, household voice assistants or kitchen appliances.



IoT is a popular buzzword in the technology industry, but it has become a cornerstone of the intelligent network edge within flexible, dynamic network environments. In fact, potential IoT devices can be as imaginative as they are practical. Enterprises that are implementing IoT typically need devices that fall into the latter camp—they need to improve security, safety and operational efficiency.

The good news is that the potential to unlock IoT and create business value has become much more attainable. The required processing power has increased and prices have decreased. ROI can often be proven solely on the basis of safety (i.e., by mitigating liability). The combination of these benefits is compelling more organizations to take advantage of IoT.

Video Monitoring = Practical Safety and Security

The use of video monitoring technology is on the rise worldwide. Physical surveillance cameras are being installed in public and private spaces to improve safety and security. Police/security officers commonly wear body cameras. Many of these devices are IP-enabled, which adds to the network and IoT potential. Leveraging video brings in an IoT element that's not as invasive as RFID or Wi-Fi radio tracking.



IoT devices generate a significant amount of data. Add video to the mix, and the available data multiplies. Adding biometrics and analytics to the equation is an absolute game-changer in how the volumes of data can be put to work.

How is all that data put to use? How is it processed? Does it impact the underlying transport? Does it require a new network and infrastructure? Many discussions begin with improving safety and security. Video monitoring, IoT, biometrics and analytics are already delivering value in these areas.

Campus	Enterprise	Law Enforcement
<ul style="list-style-type: none">✓ Detect crowd congregation in public areas and notify security for management✓ Prevent theft and fraud on student meal plans via facial recognition verification✓ Monitor parking areas for theft prevention and safety; identify unpermitted vehicles	<ul style="list-style-type: none">✓ Multi-level authentication access control into office spaces✓ Secure area monitoring✓ Video geo-fencing to secure a property's perimeter from trespassers✓ Customization for unique customer experiences and improved engagement	<ul style="list-style-type: none">✓ Object, person, and vehicle counting✓ Crowd management monitoring✓ Identify lost people and persons of interest

Optimizing Business and Driving Revenue with Video Analytics

In addition to safety and security, organizations in many verticals are leveraging analytics to improve back-end tasks. Video biometrics and analytics are the tools that automate the process of setting business workflows into motion.

Retail



Revenue generation: Utilize video monitoring and analytics for crowd tracking and to recognize customer demographics for targeted marketing, set signage and product placement prices for vendors, and reduce point-of-sale wait times by allocating staff to speed the checkout process.

Fraud prevention: US merchants lost nearly \$3 billion to counterfeit card fraud in 2015, per The Nilson Report. Credit cards with embedded security chips are not thwarting savvy thieves. Progressive retailers are utilizing biometric authentication for point-of-sale transactions, rather than easily manipulated PIN and signature-based cardholder identification.

Reduce operational costs: Retailers that use biometrics for point-of-sale and secure-area access are reducing costs by eliminating the need to constantly issue or replace lost keys, swipe cards, passwords and PINs. Per M2SYS Technology, one end-user organization saved 18 hours per IT employee per year and re-allocated those hours to higher-value tasks after switching to biometrics from other authentication methods.

Hospitality



Contextual sales and marketing: Per Oracle research, 33% of restaurant operators and 72% of hotel operators believe that guest recognition via facial biometrics will be in use within the next five years. Facial recognition and analytics identify customer demographics, with the information used to position appropriate products and services supported by the correct marketing and sales messaging.

Customer loyalty: Employ facial recognition to identify, integrate with property management systems, and more efficiently serve guests. Per Oracle research, 31% of restaurant guests and 41% of hotel guests will be more likely to visit an establishment with greater frequency if they are recognized by an employee without having to give their name or show a loyalty card.

Guest confidence: Biometrics may be utilized to streamline and secure routine functions, such as adding fingerprint authentication to hotel guest room safe access, as well as securely billing hotel restaurant and shopping charges to the appropriate guest room. Oracle research states that 49% of restaurant guests and 62% of hotel guests believe that having this recognition would improve their experience.

Healthcare



Medical record accuracy: Per Ponemon Institute, 64% of healthcare executives said patient misidentification errors occur frequently or all the time. A patient's biometric data, including face, fingerprint or palm scans, can be associated with their electronic medical records to correctly identify them on return visits, auto-retrieve the correct medical history, and reduce latency and error associated with manual entry and record lookups.

Patient proximity: Identify patients via facial recognition as they move about facilities, using alerts to notify staff when they near or cross boundaries (i.e., exits, secure areas, etc.) that compromise their safety and facility security.

Prescription dispensing: An ECRI report found that 9% of 7,600 wrong-patient events resulted in temporary or permanent patient harm or even death. By using biometrics, in-facility and in-home patients can be quickly and accurately identified and matched to their prescriptions, with automated logging of time, dosage and administering clinician.

Key Takeaways: Stay Ahead of the Curve

As advanced as they sound, these solutions are not futuristic; they are the reality today and will be even more commonplace tomorrow. Facial recognition and biometric analytics are an attainable, non-intrusive value-add to existing video monitoring systems that produce practical and accurate insights for safety, security and streamlined business processes. IT decision makers can stay ahead of the curve by advancing their organization's capabilities today.

THE LAST WORD

The accelerating speed of business, combined with rapidly changing end-customer and employee preferences and fast-emerging security threats, are compelling all organizations to become more agile and proactive—to become a smart enterprise. There is a lot to consider when laying the necessary foundation and many places your organization can start—in the data center, in any network layer, with user apps, by locking down on security, etc.

Most IT organizations know where their priority concerns lie. However, most also lack the internal resources to simultaneously take on such strategic projects and also focus on day-to-day operations. It's smart to align with an expert provider. Forward-looking organizations are engaging with trusted providers to:

- Deliver both technology and services
- Effectively leverage big data, IoT, and network intelligence
- Help identify and prepare for emerging business needs
- Improve compliance and business continuity through intelligent infrastructure
- Allow IT and the workforce to focus on core competencies

Today's technology environments and business requirements are complex. Every component touching your organization's network is inherently interconnected, with a ripple effect emanating from nearly every change. A strategic plan is needed to address today's priorities and also lay a foundation to efficiently satisfy tomorrow's requirements. This is where a partnership with a trusted provider has the most impact in helping your organization become and remain a smart enterprise.


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