



Extreme[®]
networks



Cloud-Driven Networking

2020 BUYER'S GUIDE

How Your Network Serves You Better in the Cloud

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Everything is Moving to the Cloud; Your Network is No Exception

By now, almost every company, independent of its industry and size, uses at least one kind of IT cloud service.

And that's not surprising at all, because cloud-computing services provide huge upsides and workload shifts for companies: IT departments no longer have to purchase, deploy and maintain computing hardware and software in-house, cloud services are quick and easy to deploy, they scale as needed without involvement from IT, and are automatically updated to the latest release level. In short, they vastly simplify and reduce the complexity and cost of IT service delivery—and your wired, wireless, and data center access networks can now enjoy the very same benefits.

In this guide, we'll examine the characteristics and benefits of cloud-managed networks as a subset of cloud IT services, to help you decide whether cloud networking is right for your organization.



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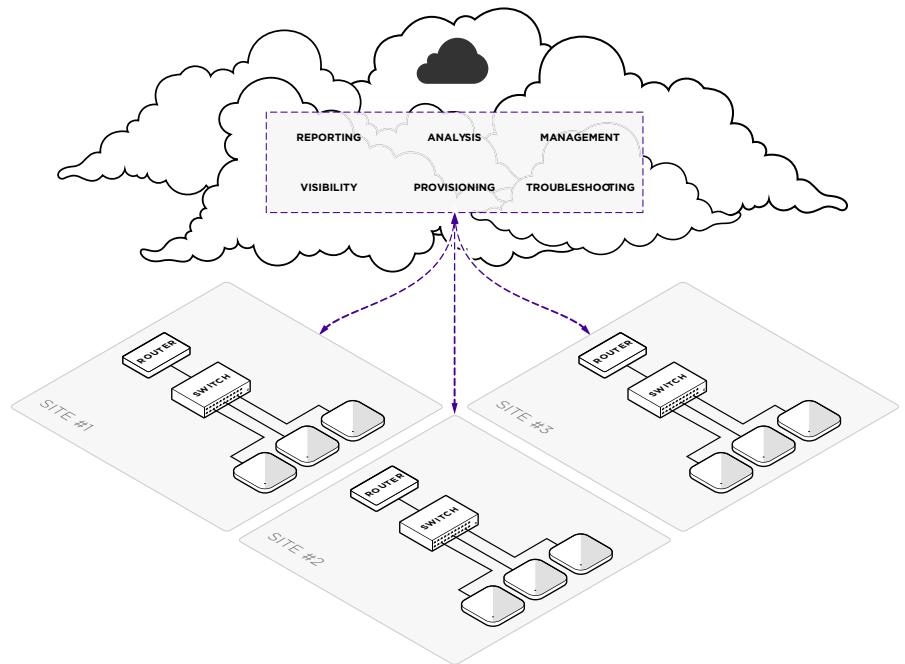
of organizations are
adopting Cloud Networking

Overview

What is Cloud Networking?

Cloud networking introduces a new way to deploy and manage networks. It delivers enterprise-class network management capabilities for Wi-Fi access points, switches, and routers, via a cloud infrastructure that requires little or no capital investment in additional hardware and software platforms or in IT resources.

Unlike traditional locally hosted on-premises solutions, cloud networking simplifies highly complex tasks, enabling organizations to deploy locations in minutes and providing unprecedented levels of centralized control and network visibility. It also allows for seamless growth without bottlenecks caused by products and supports headquarters and remote locations alike, significantly reducing the need for local intervention and truck rolls.



Above: Cloud networking allows for centralized control and network visibility of numerous physical locations at the same time.

State of the Market

The shift of enterprise IT spend—from traditional offerings to new, cloud-based offerings—is occurring rapidly. Analysts predict the growth in enterprise IT spend for cloud-based offerings will be faster than the growth in traditional (non-cloud) IT offerings through 2022 (Source: Gartner Market Insight: Cloud Shift—2018 to 2022).

To date, most cloud shift has occurred in the application software segment. For example, cloud spend on Customer Relationship Management (CRM) software, already exceeds the non-cloud spend.

Moving forward, system infrastructure—which includes networking, server, and storage equipment—is expected to experience the fastest growth in cloud shift, with a projected 27.2% CAGR (2017-2022) for cloud versus a 1.8% CAGR for non-cloud.

Benefits and Features of Cloud Networking

Cloud networking offers the same high-level benefits as all cloud services—namely simplicity, reduced cost, and faster time-to-deployment. Here we'll examine these, along with the differentiating features of true cloud networking solutions; while many vendors offer degrees of cloud networking, an understanding of the following characteristics will help you identify what to look for in different vendor solutions, and decide if they are a good fit for your organization.

Simplicity and Efficiency

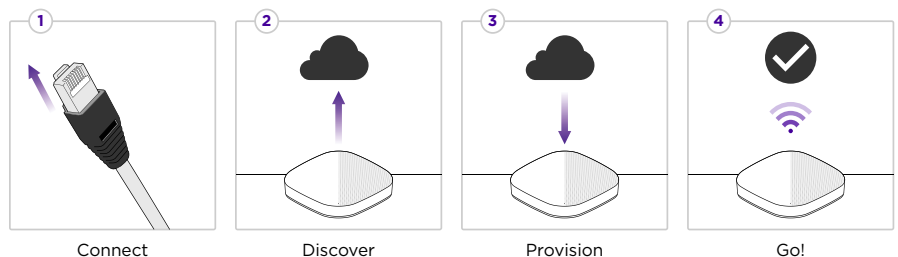
Arguably the greatest benefit of cloud networking is its simplicity, due to the ability to centrally manage unified wired and wireless networks. However, there are additional characteristics that will further enhance cloud management capabilities and increase operational efficiency.

- **Centralized Network Management**

During deployment, cloud networking enables centralized configuration and on-boarding of the policies and devices for all or part of the network. This greatly simplifies the deployment process—network devices only need to be plugged in and then each will automatically discover, download and install the configurations.

Once deployed, network administrators can easily monitor, troubleshoot, and update the network. Troubleshooting tasks are especially simplified due to the ability to diagnose and resolve issues for central and remote locations alike, with tools like historical network data to diagnose issues quickly and remote SSH to log into a network device's console from any location to perform advanced diagnostics through its CLI. Another example is cloudbased packet capture that provides cloud storage for large capture files instead of having to store them locally.

In short, centralized network management greatly reduces the need for local intervention and truck rolls. And since the management console is cloud-based, network administrators can access it even when away from their desk or office.



Above: During deployment, cloud networking enables centralized configuration and onboarding for all devices on the network.

- **Unified Management**

Networks use a combination of different device categories to enable connectivity for clients, namely wireless access points and switches in the LAN, and routers to access the WAN, offering centrally managed, secure network access with consistent access policies from HQ to remote branches and teleworkers.

Traditional Networking

1

Determine how many new Access Points and Switches are needed

- Wireless Coverage Assessment
- Site Survey

2

Procure and install new networking devices

- Access Points
- Switches
- Routers

3

Determine need for additional wireless LAN controllers & NMS computing platform

- Capacity analysis
- Hardware & Software

4

Procure and deploy new LAN controllers & NMS platform

- Installation
- Configuration
- Testing

5

Procure network management licenses

- Device licenses
- Support

6

Configure and deploy additional networking devices

- Centralized and/or local configuration and deployment
- Local deployment support and truck rolls as needed

Above: A comparison of the complexities of onboarding a traditional network versus a cloud-based network (page 6).

Cloud networks can manage both LAN and WAN access through a single-pane-of-glass, from deployment to management and troubleshooting, thereby eliminating the need to use different management systems

This is achieved with a unified management platform that offers a consistent set of tools and features, such as device templates for easy configuration at scale, the ability to push configurations and updates remotely, and troubleshooting tools that work for all categories of devices.

• Automatic Updates

Cloud networking providers can also manage the process of upgrading the management functionality and the networking device firmware, meaning customers always have the latest features available, without having to use in-house resources to perform the upgrades – just like in a SaaS model. As the market becomes more competitive and vendors look to differentiate by driving additional value and functionality with new Wi-Fi, switching, and routing features, managing the upgrade process in a legacy on-premises model can become challenging for IT departments and delay the availability of new features for your users and network team.

• Tiered Management and Multi-tenancy

Large organizations, especially enterprises, often have a need to effectively manage multiple associated subsidiaries or locations. Cloud networking presents the ability to separately deploy each of these organizations with its own network, complete with policies, devices, etc., and then manage them concurrently from one master account, accessible from anywhere.

• Comparative Network Performance Analytics

Advanced cloud networking solutions can leverage an anonymous network data pool available in the cloud to let network administrators compare the performance of their own network with the averaged performance of other deployments. Comparative analytics bring a variety of benefits, including the ability to proactively troubleshoot issues before they become noticeable to end users, and to adjust device configurations or add access points, to mitigate latent capacity and coverage limitations.

• Increased Network Intelligence

Management in the cloud with Artificial Intelligence (AI) and Machine Learning (ML) is a key component driving decision making for IT departments in the future. Utilizing AI and ML in cloud networking means networks are increasingly more intelligent and focus on defining common behaviors, which can decrease workload and increase performance. For example, admins need only to do the most basic of configurations and then machine learning and artificial intelligence capabilities can self-optimize the network. Even with the complexity of BYOD and IoT, a network powered by AI and ML will identify a device based on device fingerprinting and behavior, and assign appropriate user profiles or security restrictions. It will also self-heal, mitigating problems before they become wide spread.

Cloud Networking



1

Determine how many new Access Points and Switches are needed

- Wireless Coverage Assessment
- Site Survey

2

Procure and install new networking devices

- Access Points
- Switches
- Routers

3

Procure cloud management licenses

- Device licenses
- Support

4

Configure and deploy additional networking devices

- Centralized configuration
- Zero-touch deployment

Flexibility

One of the most attractive characteristics of cloud is elasticity – to scale up or down seamlessly, in line with changing demand. For cloud networking, a singular underlying platform is the key to enabling scalability across networks of all sizes and into different solution tier—all while supporting your initial hardware purchases to avoid expensive refreshes. That's why whether you opt for public or private cloud, the right platform is critical as you plan, grow and upgrade your cloud network.

• Scalability—Up and Out

Networks scale along two dimensions. Firstly, network size, which allows customers to grow their networks seamlessly by as few or as many devices as needed. Secondly, functionality. Scalable functionality lets customers add further features and even seamlessly upgrade to a higher solution tier with richer functionality, without impacting the current network and the existing configurations and policies.

• Seamless Network Expansion

The ability to quickly add capacity is a huge benefit with cloud networking. Instead of IT procuring more networking hardware and/or software in-house, cloud networking can quickly add more capacity, sometimes within minutes.

Organizations can add capacity in small or large increments, from only one or two network devices to bringing up one or more new corporate locations. Some cloud networking platforms can scale to millions of devices so capacity is never an issue. In comparison, traditional on-premises solutions may be limited to thousands of devices, and growth beyond this threshold requires adding additional management instances, which results in having to operate different parts of the network on different instances.

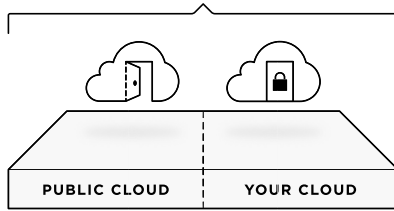
• Seamless Upgradability

Equally important as network expansion is the ability to seamlessly add new services and management features like authentication or API services, without having to worry about the impact on the underlying infrastructure, like having to purchase new hardware and software platforms, and having to train personnel on the new services and applications. In other words, the cloud infrastructure lets customers scale the network exactly as needed and greatly simplifies network expansions.

• One Portfolio of Networking Hardware

Another inherent benefit of a single underlying network platform is that, independent of network size, solution tier or deployment model, it leverages the same set of network devices—access points, switches and routers. As the network grows and evolves, customers can continue to work with the same hardware, and don't need to worry about being forced into "rip and replace" upgrades.

SINGLE, SCALABLE ARCHITECTURE



Simplify deployment and operations

Create your own centralized platform

- Centralized management
- Flexible cost model
- Automatic updates
- Private cloud / Local cloud
- Behind your firewall
- CapEx and OpEx flexibility

Above: A single platform solution for flexible deployment.

Deployment Choices

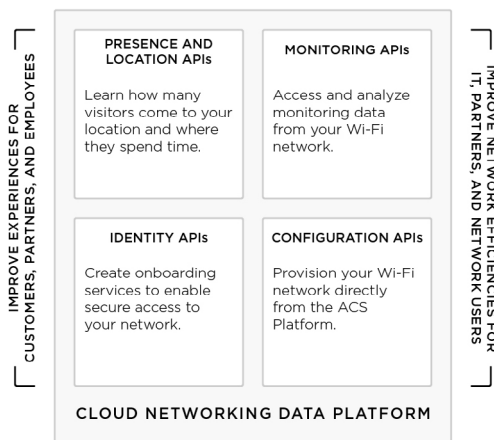
Different customers have different organizational needs. While many customers today opt for public cloud deployments with its many advantages, other customers choose on-premises deployments due to organizational or legal requirements. With one underlying cloud networking platform, the feature set is consistent across all deployment models, and customers can choose the option that works best for them without having to compromise on supported functionality.

Unfortunately, cloud networking solutions with a single underlying platform are an exception rather than the norm. While evaluating different solutions, be sure to research if they support seamless network growth and an upgrade path without requiring you to replace your management system and/or your networking hardware. Also ensure that the vendor offers the deployment option that you are looking for, that it supports the management features and the device portfolio you require, and that the vendor is committed to making new features available on either deployment option to ensure you are not missing out on functionality down the line.

Cost Efficiencies

Switching to cloud networking can significantly reduce the cost of deploying and operating an access network, compared to hosting it in-house. Organizations will be able to save cost in the following areas:

- **Capital expenditures** for redundant hardware and software infrastructure for the network management system and for centralized hardware controllers.
- **Associated personnel-related expenses** (salaries, benefits, training) for ongoing management and potential additional hires when expanding the network.
- **Ongoing operational expenses** for local intervention required for deployment and troubleshooting at remote offices and branches with truck rolls, due to the benefits of centralized cloud management.



Above: A comprehensive data platform includes APIs that improve experiences for end users and IT/Network professionals alike

Open Networking APIs and Big Data Analytics

In addition, many organizations benefit from operating in an OpEx cost environment with cloud networking, with monthly or quarterly fees from Managed Service Providers as the organization consumes the cloud service—as opposed to incurring the upfront capital expenditures required for hosting their network management in-house.

Advanced cloud networking platforms can collect a world of valuable information about the devices, clients and applications running across the network's central or remote locations. This information can be aggregated into a single data pool that can be accessed through APIs, so that customers can extend the networking platform's functionality—developing their own applications and system integrations to enable new analytics and insights, create better network-user engagement, and increase operational efficiencies.

An added benefit of some cloud management platforms is the ability to leverage the anonymized network data from collective network deployments for Big Data analytics, further enriching the use cases enabled with APIs (e.g. with comparative network analytics, machine learning and API applications).

To make customers and developers successful, comprehensive API platforms need to offer the following features:

- **A Portfolio of APIs**
Cloud networking data enables applications for a multitude of use cases. As a result, vendors need to support different categories of APIs to support a comprehensive range of use cases. These should include APIs for presence and location analytics, for identity management and for network configuration.
- **An Application Ecosystem**
APIs are an ideal starting point for application developers, customers and channel partners with software development capabilities. For those with limited development muscle, a suite of reference and 3rd party applications allows them to leverage the benefits of APIs without engaging in development themselves.
- **A Developer Program**
A developer program enables partners to successfully work with the APIs and shortens time-to-deployment of their applications and system integrations. A comprehensive developer program includes a developer portal for access to the APIs, documentation and support. Reference applications help illustrate sample use cases and shorten development time.

Not All Clouds are Equal

Today, many vendors market cloud networking solutions that look very similar at face value. But not all clouds are created equal. Over the last decade of cloud networking developments, vendors have evolved their infrastructure, methodologies, and data services to increase IT and business intelligence, delivery times, reliability and more.

Due to the differences in the cloud architectures that underpin the management application, there are often limitations or issues that can arise that network administrators may not be aware of, as on the face of it all applications look the same (i.e. you have a login portal, once signed in you see your devices, policies etc.). However, the engine underneath all of this can greatly vary between one vendor to the next, impacting capabilities, availability, feature development velocity, flexibility, and durability.

Figure 2 illustrates the evolution of cloud networking technologies. The first generation of cloud was focused on cost savings—the ability to move some hardware out of network locations and provide flexibility in management. The second generation focused on security, analytics and data gathering, and a push to increase resiliency and reliability. The third generation focuses on real-time innovation and artificial intelligence and machine learning features. Fourth generation architectures deliver increased durability, expanded data processing capabilities, and containerized microservices to increase platform flexibility and scale.

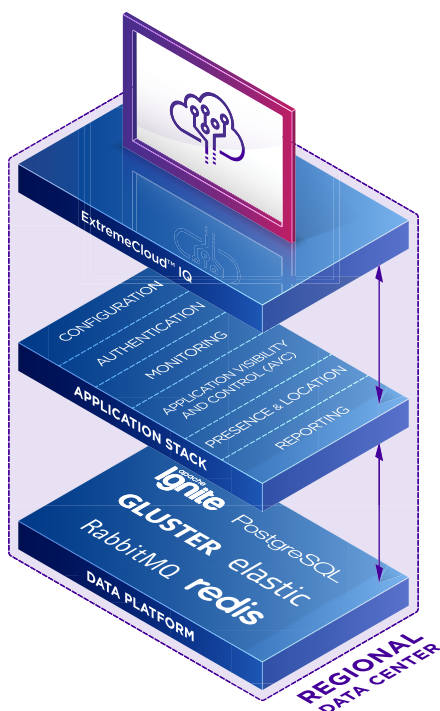


Figure 1: There's much more than meets the eye when it comes to cloud-managed networking technologies

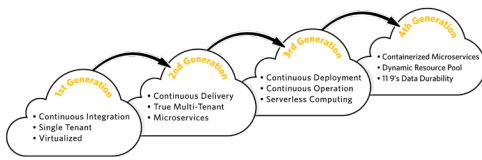


Figure 2: Every generation adds new capabilities, services, and reliability.

With containerization, a vendor's cloud networking platform becomes agnostic to the underlying data center platform, offering companies greater portability between AWS, Google, Azure etc. as their commercial and technical needs change.

The differences between vendors' solutions stem beyond the platform generations, to include licensing approach, feature dependence on the cloud, discrepancies between features available in their cloud solutions vs. on-premises. Therefore it's always important to check out a vendors full feature and service list between their different offerings to ensure you don't get short-changed, check out their underlying cloud technologies and development methodologies (hint—if they can't show you this, then it's a strong indicator they either don't implement the latest technologies, or are still relatively immature in the cloud market).

So what does all this mean when shopping for solutions? Here are some of the most common pitfalls to look out for and to research while evaluating different solutions:

Forced upgrades: as your network grows in scale, you may have to purchase a new network management system once your network reaches a certain size.

Lost connectivity or features: with some cloud solutions, if an access point loses its connection to the cloud, there is a risk of clients losing connectivity altogether, or of certain features becoming unavailable until the access point can connect with the cloud again.

- **Different Feature Sets for Cloud and On-Premises Deployment**

Options: One or more features are only available on one deployment option, not on both. Depending on your requirements, you may be forced into one deployment model. You may also risk that new functionality in future updates will only be made available on one deployment model, which in turn may make interesting new features unavailable to you.

- **Availability:** With traditional network architectures, Wi-Fi service can be interrupted if the management goes offline. With true cloud management, connectivity at customer sites will continue. The same applies if access to the cloud management is deliberately suspended by the network vendor, e.g. in case of delayed payments.
- **No Seamless Upgrade Path:** The vendor's portfolio includes optional capabilities and features (e.g. advanced authentication or APIs) that cannot be supported by all management solutions, and will necessitate an upgrade of the underlying management platform.
- **Unproven:** The rapid growth in cloud networking has resulted in the emergence of new cloud vendors. In your vendor selection process, examine not only cloud expertise, but networking experience and services and support capabilities.

Common Considerations When Moving to the Cloud

Cloud networking is rapidly being adopted by IT groups in organizations of all sizes, and the starting point for every business should be to determine their cloud strategy and priorities. However, almost all organizations have questions about their move to the cloud.

Security and Privacy

Two main considerations exist with regard to security and privacy:

- Perceived loss of control over customer network data
- Dependence on the cloud networking provider

These have a number of potential security and legal implications, related to infrastructure and identity management, physical and digital access control, risk management, regulatory and legislative compliance, auditing and logging, integrity control as well as to provider-dependent risks.

However, cloud networking providers are very conscious of the severity of these risks, and are taking highly effective measures to address them. When evaluating cloud networking providers, confirm that measures for all of the above concerns have been implemented, and that their effectiveness is reviewed regularly. Examples would be regular penetration testing of the physical access controls to data centers, and of the digital network security, for instance with simulated hacking attempts or DDoS attacks. Reputable cloud networking providers will be able to furnish ample documentation about their Security and Privacy safeguards to help you address your concerns.

Availability and Reliability

When moving to the cloud, many customers are concerned about system availability and reliability, due to a perceived loss of control. However, cloud networking providers are experts in infrastructure management. They guarantee the reliability and availability of their services with SLAs, usually of 99.99% or more. With this, customers can rest assured that their network will be available continually. Cloud networking providers are also able to minimize downtime for updating the network, and schedule updates well in advance so that the business impact to customers' networks is minimized. Providers must also clearly state their resiliency plans including redundancy and backup measures to ensure continued availability of networking services in case of outages and disasters.

When evaluating cloud networking vendors, be sure to review their SLAs, especially regarding guaranteed uptime, the expected number and duration of planned outages and upgrades. Also research the impact of cloud service outages: the most advanced cloud networking solutions will continue to provide connectivity for end users, even if the connection to the cloud-based management is interrupted.

System Performance

Customers expect their cloud services and applications to be available at all times, and with the same speed and responsiveness as if they were hosted on-premises. Again, trusted cloud networking providers will be able to provide their key performance metrics on service availability to review ahead of any decision.

While cloud networking platforms are available almost anywhere via internet access, a globalized cloud infrastructure is a must-have. A global cloud infrastructure with regional data centers is a prerequisite for ensuring the best possible system performance, and also offers redundancy.

Compliance

Many organizations have to meet regulatory compliance requirements such as HIPAA (Health Insurance Portability and Accountability Act) or the PCI DSS (Payment Card Industry Data Security Standard), and a host of other regulatory requirements in Europe and Asia. Cloud networking providers typically implement compliancy with regionally applicable regulations and will be transparent in sharing details about their compliance level, the capability to let customers generate audit reports, and the locations of their datacenters. Global data center presence therefore not only impacts system performance, but also offers organizations simplified compliance with regional data privacy requirements.

Artificial Intelligence and Machine Learning

When moving to the cloud, many customers look to advanced capabilities, such as Artificial Intelligence (AI) and Machine Learning (ML), to enhance network automation and performance. With the latest generation of cloud networking technologies, customers can benefit from an array of IT and business insights and automation tools.

Powered by big data, fourth generation cloud networking vendors apply ML and AI to vast data sets (tens of millions per second) to deliver new value to customers. Tools such as network, client, and security 360 health checks, automation of bug fixes, RMA, and device quarantining, and advanced network visibility and reporting are implemented to streamline network management operations and continually optimize user connectivity health and security.

AI and ML assistance ensures that planning, deployment, management, and support of a network is greatly simplified, allowing IT staff to focus on the places that increase value and eliminating the stages that appropriate unnecessary resources.

This ultimately simplifies the planning, deployment, management, and support of a network allowing IT staff to focus on the places that increase value and eliminating the stages that appropriate unnecessary resources.

Conclusion

Cloud networking is a powerful solution, and offers a host of advantages compared to traditional, noncloud-based network management systems. Due to its flexibility and seamless scalability, cloud networking is a fit for organizations of all sizes and industries. Even industries or regions that have traditionally relied on on-premises deployments, due to security and availability concerns, are increasingly moving to the cloud.

Hopefully you have found this guide useful in determining whether cloud networking is right for your organization, and to start reviewing potential solutions to ensure you'll benefit in the following areas:

Simplicity and Efficiency:

- Centralized network management
- Unified management
- Automated upgrades
- Tiered management of subsidiaries or locations
- Comparative network performance analytics
- More intelligence to decrease admin workload and increase performance

Flexibility:

- Expanding your network in size
- Seamless upgrade path to new features
- Full support of your deployment choice
- One set of networking hardware as you grow and upgrade your network

Cost Efficiencies:

- Reduced hardware and software investment
- Reduced resources for system deployment and maintenance
- Options to move to OpEx
- Simplified system maintenance and troubleshooting

Analytics and Insights:

- A portfolio of APIs
- An application ecosystem
- A developer program