



Modernizing the print infrastructure in the age of cloud



Table of Contents

◆ The appeal of the cloud	3
◆ Modernizing the print infrastructure	4
◆ The role of the print server	5
◆ The IT challenge	6
◆ The shift challenge	7
◆ Make the move without losing control	8
◆ Hybrid cloud has arrived	11
◆ Conclusion: Cloud migration driven by expectations	13

The appeal of the cloud

The cloud is revolutionizing how we do business as more and more organizations move their core IT services to the cloud. Yet, the print infrastructure often falls outside of a company's cloud-first strategy. Why? In many cases it's because they believe it's impossible to securely migrate the printing infrastructure to the cloud or, that their set-up is too complex and entering the age of cloud would negatively impact their employees' ability to print.

Despite the fact that 80% of enterprises have a multi-cloud strategyⁱ, many businesses still continue to design print infrastructures around an outdated on-premise Microsoft print server architecture. Microsoft has made incremental improvements to its server offering, but doesn't yet offer a viable solution for organizations looking for an enterprise-grade secure solution that will enable them to move their entire print infrastructure to the cloudⁱⁱ.

The fact is that the print infrastructure is both cost- and time-intensive to maintain. Therefore, for companies who have already moved basic IT applications and infrastructure to the cloud, the next natural step is to include print in their Software as a Service (SaaS) portfolio.

Common challenges cited by organizations around moving applications to the cloud include a lack of internal cloud expertise, alongside concerns regarding the cloud's ability to maintain security and provide effective governance controlsⁱⁱⁱ. We believe that every business should have the ability to control and manage enterprise-grade, highly secure print services from a cloud platform, totally eliminating dependency on a physical print infrastructure.

Understandably, organizations are nervous to make a change to their print infrastructure without a comprehensive understanding of what can and can't be achieved. The good news is that with a true cloud print infrastructure solution, companies can enjoy all of the benefits of moving to the cloud without any of the downsides. That's why we launched the EveryonePrint Hybrid Cloud Platform (HCP), an all-in-one cloud hosted print infrastructure solution designed for organizations that want to unburden themselves from running a complex IT print infrastructure while gaining all the benefits of a SaaS solution.

Top cloud challenges in 2019 are **governance, expertise and spend**^{iv}

78%

of survey respondents cite lack of resources / expertise as either somewhat of a challenge or a significant challenge^v

The top three cloud security challenges include

67% protecting against data loss and leakage

61% threats to data privacy

53% and breaches of confidentiality^{vi}

Modernizing the print infrastructure

The first step in modernizing the print infrastructure is to understand the various components of the legacy set-up - what they do, how they do it and perhaps most importantly, why they do it. Next up is to identify the challenges associated with the traditional set-up and look at what can be improved by adopting a cloud-native approach.

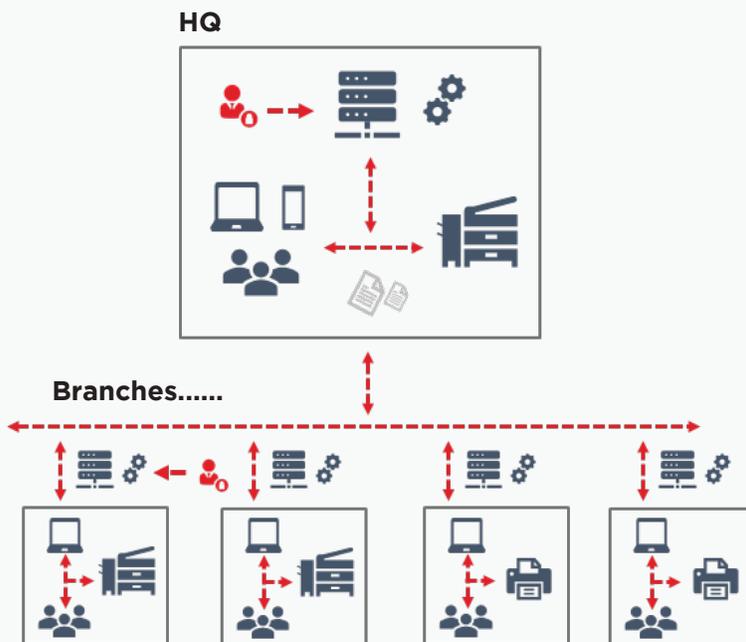
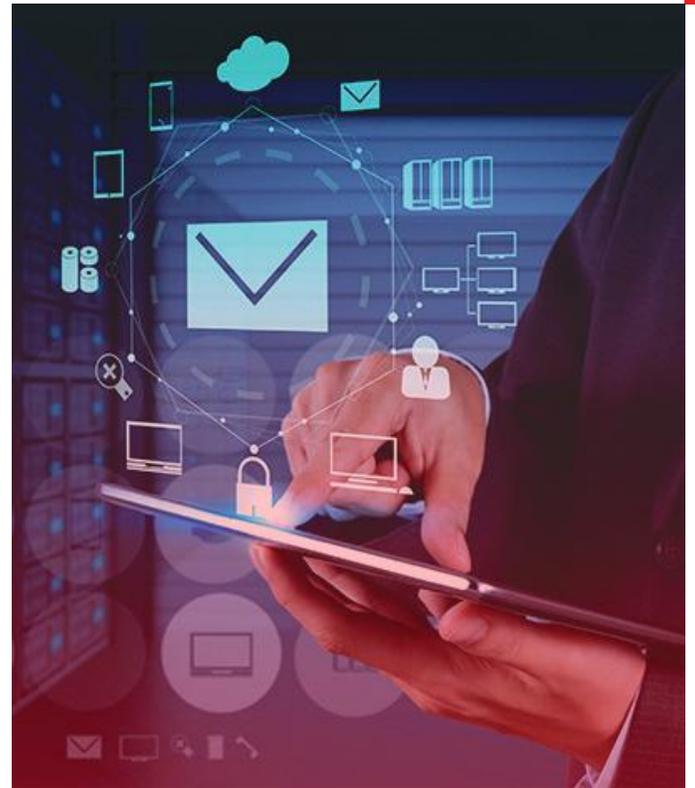


Figure 1. Typical print infrastructure of a multi-site organization

There are five elements to consider in a typical print infrastructure:

- ◆ **User devices:** Desktop, Laptop, Mobile, Citrix, VDI etc.
- ◆ **Printers:** Ranging from single function desktop devices, right through to networked multifunction devices shared by multiple users, potentially, from various departments or even organizations.
- ◆ **Print drivers:** A piece of software on a computer that converts the data to be printed to a format that a printer can understand.
- ◆ **Network:** Typical office network comprised of WAN & LAN
- ◆ **Print servers:** A device that connects printers to client devices over a network. It accepts print jobs from the devices, spools the print jobs and sends the jobs to the appropriate printers. This spooling function is often local to each site in order to reduce WAN traffic. (Figure 1.)

The role of the print server

In a typical push print environment, print servers lie at the heart of a company's critical line-of-business and office printing and perform a number of ancillary functions including:

- ◆ **Printer deployment:** Either enabling end-user self-service or deploying to users by IT centrally, through policy.
- ◆ **Printer administration:** Allows administrators to centrally manage printer ports, storage of print drivers, access control (which printers should be visible to which user group) etc.
- ◆ **Group policies:** Centralized management and configuration of users' settings such as color printing quotas, user/department authentication, or watermarking printed documents.
- ◆ **Queuing print jobs:** Holding jobs locally to accommodate the fact that work may arrive more quickly than the printer can handle.
- ◆ **Queue management:** A single interface for a site's printer queues, meaning IT can remotely view pending print jobs, and delete any problematic jobs.
- ◆ **Print driver management:** Often drivers are stored locally at the print servers, enabling end-users to download approved drivers. IT is then able to handle print driver updates centrally.



For additional control, many organizations choose to enable pull printing (delivered by an additional third-party application), where prints are sent to a print queue and prior to documents being released for printing, an end-user needs to first authenticate themselves at the printer. It's important to note that pull print queues are intended to be a one queue fits all, but in larger organizations they rarely deliver on this promise. Whether as a result of a multi-vendor fleet, or geographical constraints - organizations are seldom able to provision a single truly global pull print queue for all users.

The IT challenge

One of the biggest challenges of a traditional on-premise-based infrastructure is that each physical location requires a dedicated print server, which with a typical cost of c\$4276 per server per annum^{vii}, can drive significant incremental cost. As a business grows, adds to its fleet or opens new offices, more investment in print servers will be required.

For IT, administration can be cumbersome and time-intensive, even in a small business. It's not uncommon for print server administration to be managed site by site and server by server. Organizations operating a multi-vendor fleet, can further increase the IT burden, requiring them to manage multiple printers and even a print server per vendor where the drivers don't sit well together.

Beyond print administration, maintaining an onsite print server also creates the need to keep on top of underlying operating systems that need upgrades, patches, security, virus scanning etc. Each time a manufacturer releases a new print driver that solves a problem customers are experiencing, IT likely has to run a QA process before updating it on each print server at each site. For larger organizations, in particular, this can be extremely problematic. Scripting and group policies is another area requiring dedicated resource. Typically used to deploy printers to end-users, these can become extremely complex and require IT to implement specific configurations for users and their devices.

There is also increased pressure around failover/redundancy. Although the traditional Windows-based architecture allows for clustering to create a high-availability environment, this adds cost and complexity to an already cumbersome set-up, not to mention the requirement to maintain IT resource with the knowledge to create and maintain clustering.



In many organizations print is one of the most visible end-user IT solutions, after their computer and phone. Despite self-service offerings, end-users will often rely on the helpdesk for assistance to add or configure new printers to their computer or when they change site within the organization, consuming yet more valuable IT resource.

The shift challenge

Although the issues with a legacy print infrastructure are clear and moving to the cloud appears to be a prudent step, the cloud itself introduces several further challenges, specifically around network and security that are easy to overcome.

These include:



Networking requirements: One of the benefits of a legacy solution is that it reduces wide area network traffic, maintaining all large print jobs within the local area network, in turn keeping network costs down.



Bandwidth: One commonly cited concern is whether there is enough bandwidth, especially at smaller sites, to put a heavy application like print in the cloud.



Network latency: Another consideration is the introduction of latency through congested networks, the risk being that end-users are waiting significant lengths of time at a device for their print job. Solution resilience: Ensuring the ability to provide and maintain an acceptable level of service in the face of potential internet outage is key.



Pull print: Traditional print management solutions require connections to customer domains to communicate with multifunction devices' (MFDs) embedded clients (MFD APIs) and for authentication purposes, inbound traffic often requires a VPN, which is less secure, less flexible, more expensive and requires yet more maintenance.



Security and compliance: Migrating to a cloud solution creates an additional concern in terms of sensitive data leaving the customer network through to full scale malware attacks.



Print driver: Where the print drivers in use continue to rely on Windows spooling technology, it introduces some significant limitations for example, in order to send a print job encrypted, users would need to use an IPPS print queue. An IPPS queue can't be shared unlike a TCPIP/LPR queue. If an IT administrator shares a traditional Windows IPPS queue, all end-users will show the identity of the admin account that shares the queue. The only workaround is to give all users admin privileges (not possible in many organizations) or send print jobs via a VPN using TCPIP/LPR (which is unencrypted and the VPN requirement means it is not true cloud).

Often Windows-based print drivers do not cater for multiple domains or multiple organizations, creating a conflict where there are duplicate user names between the domains or organizations because traditional on-premise print solutions hosted in the cloud typically use SAMAccountName.



User authentication: Traditional print management solutions require LDAP for communication with identity management systems such as Active Directory and again this would require a VPN, whilst likely raising concerns in IT about suitability for cloud.



User expectations: Although modernizing the print infrastructure should generally be positively received by all within the organization, end-users' resistance to change shouldn't be underestimated. As the importance of print gradually declines in the office environment, asking end-users to 'learn' a new or more complex system for print is likely to be a significant barrier to a successful migration.

Make the move without losing control

Successfully migrating from on-premise to cloud should focus on four key areas:

Server architecture

A new print platform needs to deal with scalability in a far more modern way than simply throwing 'lumpy' resources like print servers at the problem. The platform should be massively scalable but provide the ability to pay for what you use.

Although not an explicit requirement, organizations should consider multi-tenancy within their requirements. Multi-tenancy, where multiple independent instances of one or multiple applications operate in a shared environment - logically isolated, but physically integrated - is most commonly associated with the ability to share server resources, thus driving down costs. But multi-tenancy means far more than just sharing server resources - it also means that each of the multitude of individual tenants keep the software platform constantly evolving, whilst keeping costs down. Organizations moving to a massively scalable platform, that delivers continuous innovation at cloud-speed, will also need to consider the upgrade update process. Best practice is to find a platform that offers zero downtime related to updates and upgrades. Patching a multi-tenant environment enjoys massive economies of scale, over patching multiple individual environments, allowing increased regularity, providing assurance over cloud security requirements.



A true cloud architecture should consist of a group of micro-services where specific service components (e.g. MFD embedded services and authentication services) can be placed in an organizations' environment without requiring VPN. For businesses committed to a cloud-first/web-first strategy, micro-services enable printing to be delivered with absolutely no corporate network, the provision of workstation and printer access to the internet is all that's required. This is unnecessary for the majority of organizations, but this level of flexibility enables changes to the architecture to be made as business and IT goals develop. Finally, a new print platform should have a comprehensive set of APIs, enabling simple, flexible and easily adopted connections to just about any other application or platform within the business. APIs ensure compliance and help with successful integration and inter-operability - one of the key factors in modernizing IT systems.

IT administration

Increasingly, businesses are demanding outcomes from IT departments, with little care or understanding for the work required to deliver. To that end, modernization of the print platform should, where possible, automate IT administration tasks ensuring outcomes are delivered with the minimum of fuss or human intervention.

Moving to a true cloud print platform delivers some immediate benefits to IT teams. A web-based management console provides an overview of all sites, all printers and all users from a single pane of glass. Administration of updates is simplified, when changes to the platform, for example changing the properties of a printer are made, end-users' PC client automatically retrieves the updates from the cloud – rather than needing to push updates with group policies. Moreover, IT is no longer responsible for updating/upgrading servers each time a security patch is released for example.



Beyond these basics, organizations will also realise simplification of common IT helpdesk pain points such as connecting users to a printer, installing print drivers, connecting users to a printer when visiting another site etc. A true cloud application should enable self-service for users adding devices, or even better, simplify the process of adding print devices, by only displaying those available local to them.

User experience

The most challenging part of any IT migration project is balancing the needs for modernization with improved user experience. Often the two go hand in hand, but with something as traditional as printing, there may be significant resistance to change. Essentially to minimize disruption to end-users and reduce adoption curves, a cloud print platform should enable users to continue as if nothing had changed i.e. click print or hit ctrl+P.

Various improvements can be imagined for end-users with a cloud platform. As touched on in IT administration, end-users can actually be more empowered, with a simple web interface, self-installing a new printer, mobile printing or

connecting to printers when away from their home site. With a true cloud platform, the print driver can move from being a point of frustration to a business enabler. Organizations can easily enable end-users to be able to print securely to any device (all major print manufacturers), from desktop or mobile, with full complex print driver commands (duplex, staple, punch etc.).

When coupled with pull printing, an organization could enable their entire user population a single global print queue, that caters for every device (irrespective of manufacturer), in every site (irrespective of network or even country). Not only is this printing panacea possible, it should be a standard option in a true cloud platform.

Network and security

A new print platform can't go down based on flaky internet connectivity. Even with temporary interruptions to an internet connection the print infrastructure must keep running. This means that there should be no single points of failure, with local failover potential when offline, effectively moving to the cloud should enable customers to have a high availability architecture by default (ideally with an SLA).

Beyond provision for a flaky internet connection, a new print platform must be able to effectively control its bandwidth utilization, whilst delivering print jobs at a speed acceptable to end-users. The print platform should allow either compression of print jobs, or local handling of jobs, rather than spooling large print jobs up and down the internet connection. Organizations may decide that from both a bandwidth and security perspective, it's advantageous to keep print jobs within local networks anyway.

Any true cloud solution will likely need to employ proprietary print drivers. As noted previously, traditional Windows IPPS queues have an inherent weakness when used in a true cloud environment. Further, these proprietary print drivers should enable a consistent experience across a mixed fleet of devices.

A true cloud platform should support true cloud identity management, enabling organizations to manage identity across multi-domain, multi-tenancy environments by supporting UPN (someone@company.com) or domain\username thus enabling separation of common names of users.

Every business' security requirements are unique and depending where they are in their cloud adoption journey their tolerance and understanding of security within cloud solutions will be different. An effective print platform should adhere to some defined cloud security principles e.g. ISO 27001 or the 14 NCSC principles in the UK. These standardized levels of security likely require things like end-to-end encryption of data, (meaning both data at rest and in transit).

Ultimately when considering a cloud solution for a service with heavily distributed user pool, organizations should consider Zero Trust requirements.

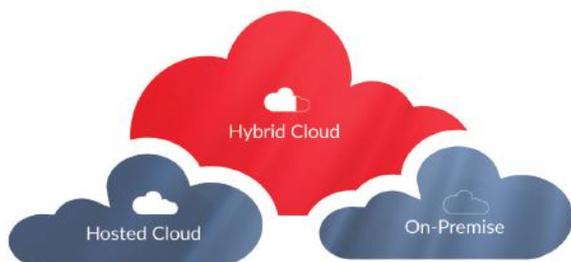
Organizations may choose to take a more active role in managing endpoint trust. In this case it becomes important that the print platform is able to not only manage its security certificates, but actually enable organizations to use their own certificates.

24% of organizations are confident that their print infrastructure is fully protected. ^{viii}

73% of organizations are concerned about print-related security breaches ^{ix}



Hybrid cloud has arrived



In the age of cloud, there is a growing need for different tools and technologies that support organizations in the achievement of their business goals. Hybrid Cloud Platform makes streamlining the print infrastructure, eliminating print servers, and incorporating cloud technologies extremely easy.

HCP lessens the burden on IT, removes reliance on print servers, enables central management and provides the strongest security between endpoints.

No VPN requirements:

Using a VPN service to enable users to connect to the print platform adds significant overheads in terms of performance of the connection, cost of the VPN, installation and management on desktops and mobiles, and creates an unnecessary security weakness as VPN provides access to the whole network.

HCP is designed to be deployed with no VPN requirements, it requires minimal (or no) investment in hardware, but still allows access to a powerful technology platform, paid for on-demand.

Single tenant vs multi-tenant:

Single tenant-hosted solutions are more expensive and can create security risks in the form of cumbersome maintenance and update processes. These are often customized, which can make upgrades time-consuming because the upgrade might not be compatible with an organizations' environment. In comparison, multi-tenant solutions like HCP are designed from the ground up to be highly configurable so that businesses can make the application perform the way they want. There is no changing the code or data structure, making the upgrade process easy.

Beyond cost and security, when hundreds or even thousands of other businesses are using the same operational infrastructure, all of them benefit from each of the different ways in which they're challenging and improving that shared infrastructure - meaning faster innovation and stronger platforms.

There is true separation of data with HCP's multi-tenant offering, tenants can be separated in the database via containers, or have physical database separation. Most other solutions share one database which means if unauthorized access is achieved, the hacker has access to all data. With HCP, in the unlikely event where a security key is broken, you only have access to that container/tenant and not all other tenants.

Single vendor:

As a third-party, independent of hardware manufacturers, HCP can connect to the devices of all major manufacturers. This multi-vendor support removes any hardware limitations for organizations implementing a new print platform.



Manufacturer print driver:

As previously stated, print drivers that continue to rely on Windows spooling technology introduce a security risk in deployment, even if this is acceptable, in most organizations there is a huge amount of time spent managing print drivers – as manufacturers make changes and release updates. Although some solutions simplify this by moving print driver storage away from Windows print servers, in a multi-vendor print environment, maintaining the repository of print drivers can still equate to a lot of needless administration.

HCP has its own print driver that includes full finishing options for all the major manufacturers precisely to take this kind of burden away. All updates are included right into the HCP driver, doing it once for all customers drives significant economies of scale.

Mobile phone release in pull printing environments:

HCP has an option to use a mobile phone app to manage secure release of print at an MFP. We have also invested to build embedded clients for all of the major manufacturers as we believe that a badge swipe provides a more natural user experience. For organizations already using a pull printing solution, HCP will be able to almost totally replicate the current release process (we support PIN or ID and password, mobile release and card reader with ID card integration) for ease of adoption amongst end-users following migration to the cloud.

Conclusion:

Cloud migration driven by expectations

The emergence of cloud print infrastructure offerings is being driven by customer demand. As organizations are adopting cloud services they're offloading their on-premise infrastructure.

In order to really unlock cloud benefits businesses need to navigate away from cloud-enabled and cloud-ready offerings, to mitigate the risk of paying monthly service charges for a supplier to host their existing print solution in someone else's datacenter, whilst suffering performance issues and security risks.

True cloud print platforms are available now that can help you on this journey, and the consequence of inaction is high. Apart from continuing to incur the higher total cost of ownership of a legacy print environment, there is in most cases, an unacceptable opportunity cost of being unable to prioritize future IT projects because of the administrative burdens of maintaining legacy systems.

With the right print infrastructure platform, organizations can enjoy a smooth transition to hassle free printing, with immediate end-user fulfillment/device provisioning, automation of traditional administrative tasks, best in class performance and security as well as the ability to auto-scale in response to demand.

Hybrid Cloud Platform is that platform

Use HCP to modernize the print infrastructure in a way that suits your business and in line with wider cloud strategies, confident that it has the flexibility to accommodate your needs now and in the future.



Want to learn more?
www.everyoneprint.com/hcp

Contact us:
sales@everyoneprint.com



- i <https://www.rightscale.com/lp/state-of-the-cloud?campaign=7010g0000016KGM>
- ii <https://docs.microsoft.com/en-us/windows-server/administration/hybrid-cloud-print/hybrid-cloud-print-overview>
- iii <https://www.rightscale.com/lp/state-of-the-cloud>
- iv <https://www.rightscale.com/lp/state-of-the-cloud>
- v <https://www.rightscale.com/lp/state-of-the-cloud>
- vi <https://crowdresearchpartners.com/portfolio/cloud-security-report/>
- vii <https://azure.microsoft.com/en-ca/pricing/tco/calculator/> [March 2019 - Server Specs - 4 core, 8 GB RAM, 1TB storage]
- viii Quocirca Print Security Landscape, 2019
- ix Quocirca Print Security Landscape, 2019