

Converting Print Problems into Optimized Print Productivity While Eliminating Persistent Print Aggravation

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July 2021

Research Premises

This research is based on the following printer, multi-function printer (MFP), and copier premises:

- Under the radar print sprawl and lack of control within most organizations.
- Much greater upfront and ongoing operational costs than tracked or expected.
- Malware and data breach print attack vector.
- Pervasive user printer complaints.
- Toner or ink runs out at the worst possible time per Murphy's law.
- Extensive negative print environmental/climate impact.
- Massive increase in 'Work-from-Home' exacerbates print management and cost issues.



Executive Summary

DSC's research is designed to help CIOs comprehend their print environment, get their hands around it, and gain control, to optimize their print operations. It examines these print issues, the root causes, and why current workarounds aren't working very well.

It starts by taking a candid look at the state of print and print problems. Empirical data reveals that print tends to be a black hole in most IT organizations. There is a dearth of or incomplete organizational knowledge and control as to what's happening with their print ecosystem, fleet, and budget consumption. There's an uneasy feeling of printer sprawl. This leads to a growing angst about print becoming an out-of-control cost center. And when IT organizations discover that their printer fleet is a frequently overlooked malware attack vector, that angst grows exponentially.

As unpleasant as these issues are, they become exacerbated by the far too frequent day-to-day printer issues. Printers break or run out of toner at the most inopportune times appreciably reducing user productivity while costs proliferate.

The question then becomes how to solve these print issues. To answer this question, DSC's research explores Toshiba's answer to this question, Encompass Managed Print as a Service (MPaaS). The Toshiba Encompass MPaaS is a carefully crafted subscription service to maximize print control, minimize print costs, ease environmental and climate impact, mitigate print cyber vulnerabilities, and dramatically reduce user complaints.

The Toshiba Encompass MPaaS process begins when a Toshiba MPaaS professional team works with the customer to collect, capture, and analyze their current print ecosystem or print fleet, from soup to nuts. Every printer, MFP, copier, vendor, ink, toner, location, who has access, and much more. All current costs are thoroughly cataloged.

Toshiba then puts forth a proposal with a couple of different options that enables IT to finally get their hands around and get control of their print ecosystem. For more depth, read on.



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Persistent Fundamental Print Issues

Print has been the bane of IT organizations since the very beginning of the computer age. The common wisdom for decades has been printed materials are going to go away. They will disappear as all output moves to digital. And yet, paraphrasing Mark Twain, rumors of print's death have been greatly exaggerated. Printed materials may have declined somewhat with the ubiquitousness of smart phones, tablets, wearable devices, pdfs, electronic signatures, etc. However, the number and variety of printers, especially multi-function printer (MFP), keeps growing.

Print is thriving in most IT organizations both now and in the foreseeable future. That means print problems not only are persisting, they're growing.

Under The Radar Printer Sprawl and Lack of Control

Printers counterintuitively proliferate even as the amount of printing declines. There are several reasons for that phenomenon. A key reason is for productivity and convenience purposes. The less an employee or manager has to walk to get their print, the higher their productivity. And of course, there are always a few that simply don't want to share their printers.



Another fundamental reason comes from discreet departmental budgets. These printers fly below the radar because the purchase, maintenance, and toner are frequently miscategorized as miscellaneous or general expenses and not print. And of course, there are the broken and forgotten printers still under maintenance and requiring supplies.

DSC research has discovered approximately 40 to 64% of businesses are unable to track their print usage, print management, or printing costs. What can't be seen can't be controlled. Uncontrolled printing leads to printer sprawl and uncontrolled print costs.

Much Greater Upfront and Ongoing Operational Costs

Anyone who has ever purchased a printer knows that the purchase price of that printer is a mere fraction of its total cost. There are many more operational expenses or OpEx that dwarf the initial purchase price. These OpEx include maintenance, spares (including spare printers) management, consumable supplies (paper and toner or ink), management, power, and real estate.

But many of those expenses are misattributed from an accounting standpoint. It's quite common for an employee to rush out to the local office supply store that when a printer runs out of toner, ink, or paper. Procurement way too often takes days or even weeks to get them the supplies they need. They simply cannot wait for procurement to get them what they need. The charge goes on the books as a reimbursable employee expense. It is not attributed to the print budget and is not visible as a print expense. Alternatively, the department or group over-procures the supplies they think they need, thus continuously spending more than required.

There is too much cost uncertainty and manual policy management. Take the example of the cost of monochrome versus color printing. Color printing tends to cost 6 - 10x that of monochrome. Policies are implemented in an attempt to limit cost. Lack of visibility makes it implausible to enforce those policies leading to continuous print cost uncertainty. IT organizations might not realize the scope of solutions available to help in these areas.

What the IT department doesn't know about their print ecosystem can and does hurt. When they don't have full knowledge of their print ecosystem, they cannot prevent costs from spiraling out of control.



Malware and Data Breach Print Attack Vector

It is hard to miss the increasing malicious malware attacks on organizations of all sizes. Data breaches and ransomware have reached epidemic proportions. Headlines are filled with attacks on supply chains, healthcare, infrastructure, governments, and more. Costs escalating faster than the attacks. These attacks are no longer random. They are organized crime. A significant portion is even state sponsored. Ransomware, malware, and data breaches are big business.



Why? Because data has become the crown jewels of all organizations. Data is more valuable than gold. Personally identifiable information (PII) has become increasingly regulated across the globe. Failure to protect PII from being stolen can result in huge fines in addition to the cost of the breach itself and cost of remediation to ensure it doesn't

happen again. Remediation is often multiple times the cost of the data breach itself.

How does print become an attack vector? Printers, MFPs, etc. are electromechanical devices. They have CPUs, memory, firmware, operating systems, applications, storage, and networking. Firmware, OS, networking, internet access, and applications all must be kept up-to-date to make sure all known security vulnerabilities are closed. Vendors generally provide patches to close security vulnerabilities soon after they are discovered. There is a time lag from when the patch is released and when it is implemented by the users if it's implemented at all. It is quite common for many printers not to be kept up-to-date.

The malicious actors know this. They exploit these vulnerabilities to get into the printers and from there, through the connected systems. From the connected systems they spread to other systems leveraging infected system permissions. Work-from-home has exacerbated security vulnerabilities. They've increased potential attack vectors and generally lack the extensive security measures found

Keep in mind that data theft is big business. It's a huge multi-billion-dollar profitable business. Those massive profits are being re-invested into R&D to build better malware. The malicious actors quickly modify their malware to take advantage of known vulnerabilities making printers an inviting target.

User Pervasive Print Complaints

Users are always complaining about problems affecting their ability to print. A deeper look by DSC research found that as high as 40% of IT help desk calls and tickets are print-related. Some examples of these common complaints include:

- They can't find or see the printer or device on their system.
- They can see the printer or device but cannot connect to it.
- Their system says their job printed, but it didn't.
- The printer or device can't connect to the network.
- How do they replace the toner?
- They replaced the toner, but it still won't print.
- Their print job went to the wrong printer especially problematic when it's the wrong type of printer.
 - Such as a pharmacy printing to a regular printer instead of their special thermal printer.



These are accepted as the price of printing. They don't have to be.

Toner or Ink Runs out at the Worst Possible Time per Murphy's Law

Murphy's law states that whatever can go wrong will go wrong and usually at the worst possible time.



Printers generally run out of toner or ink just when an important document needs to be printed. Like a RFP that must be delivered physically by a specific deadline. Or a contract that needs to be signed physically in front of a Notary Public right now.

This is another example of how lack of print ecosystem knowledge leads to unnecessary emergencies.



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Extensive Negative Print Environmental/Climate Impact

Most IT professionals have no idea of the environment and climate print impact. The impact is huge. And out of control print ecosystems make it worse. A look at the statistics¹ shows how:

- One standard harvested tree is ~ 40' (12.2 meters) tall at ~ 6-8" (15-21 cm) diameter.
- Each standard tree supplies approximately 8,333.3 office copier or printer paper sheets (16.67 reams).
- A "pallet" of copier paper (20-lb. sheet weight, or 20#) contains 40 cartons weighs ~ 1 ton (907 kg).
- One carton (10 reams) of non-recycled copier/print paper consumes 60% of one tree.
- Just a single ream of copier/print paper consumes 6% of a single harvested tree.
- It's estimated that 42% of industrial wood harvest is used for paper.
- US office paper use equates into 16 million tons of greenhouse gases into the atmosphere each year.
- A 10% office paper reduction would be the equivalent of taking 280,000 gas cars off the road.



These statistics make it clearly evident the impact of print on environment/climate. Not managing the print ecosystem makes just makes that impact worse.

Massive increase in Work-from-Home (WFH)



WFH has been trending at a relatively small but consistent rate for years. The COVID-19 pandemic changed everything moving massive numbers of employees to WFH. It was initially believed these WFH employees would be back in the office within a few weeks. But those weeks extended into months and is likely to go on for years. WFH is trending towards being permanent. It has been reported in the media that WFH employees have come to prefer WFH and don't want to go back to a corporate office setting. IT organizations are being forced to adjust.

Print is a major adjustment area. WFH print was not considered an issue when it was only supposed to last a few weeks. WFH has exacerbated every single one of the previously discussed print problems and introduced more problems for IT to solve. It is extremely difficult for IT organizations to ascertain and troubleshoot print problems, provide toner in a timely fashion, secure those printers from internal or external malicious actors, replace printers, etc. for dozens, hundreds, or thousands of employees. Few IT organizations have anywhere near the personnel to handle it. And as the COVID-19 pandemic has progressed, IT organizations are wary of putting their personnel, WFH employees, or their families at increased infection risk. WFH by design is supposed to minimize that risk.

WFH creates an IT conundrum. IT is responsible for managing the organization's print. Figuring out how to do that when then number of managed printers have increased exponentially, are located all over the geographic map, are Rube Goldberg complicated, and devastating the IT print budget, is a nightmare of epic proportions.

¹Source: <http://www.conservatree.org/learn/EnviroIssues/TreeStats.shtml>



How Toshiba “Encompass” Managed Print as a Service (MPaaS) Solves These Print Problems

Encompass is a unique MPaaS program architected to deliver comprehensive management and control of

encompass®

MANAGED PRINT AS A SERVICE

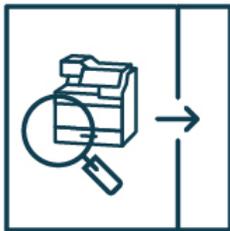
the organization’s entire print fleet and ecosystem. It utilizes a proven assessment process and methodology to evaluate the customer’s complete current state of their print ecosystem including all printers of all types, MFPs, copiers, etc. From this assessment the Encompass MPaaS establishes the true cost of that ecosystem. A plan is then put together that optimizes and right sizes the print fleet and ecosystem without requiring the print fleet to be replaced. Print management software including mobile apps, are instituted to reduce waste and control costs.

Encompass MPaaS is a highly automated service with several unique and innovative components. Each of these components are designed to solve the common print problems previously highlighted, both by themselves individually, and in combination. These components include:

- Encompass X
- Global Service Portal (GSP)
- PageSmart
- National Service Programs
- Green Edge
- Encompass MPaaS for Remote Workers

Toshiba Encompass X

Encompass X is Toshiba’s onsite assessment and quoting software tool used by Toshiba’s business development teams to provide a customized report and plan to each prospective customer. The tool incorporates printer data collected from the various customer locations, a database of over 10,000 models of print equipment, a Six Sigma document output calculation, and Toshiba’s worldwide print experts print expertise. Print environment vulnerabilities are also uncovered via an extensive security assessment.



Encompass X then provides a current state of the print fleet and ecosystem while comparing it to an optimized state. The optimized state is right sized by eliminating print that no longer serves the organization. Optimization is modified by customer requirements that may not be optimal but are necessary. After all this is completed, a compelling cost effective MPaaS proposal is generated.

Toshiba then provides a complete project plan and implementation schedule based upon the agreement.

It’s important to note that Toshiba does not stipulate printers, MFPs, and copiers be replaced with Toshiba products to become a MPaaS customer. Toshiba has powerful alliances with both printer hardware manufacturers and third-party software providers. Hardware suppliers such as Brother, HP, and Lexmark



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and more. Third-party software providers for areas like output management and advanced scan/capture as well as those for document management and workflows.

Encompass View

Encompass View is an Online Cloud Portal that gives customers real-time access to information about their print ecosystem. That real-time information includes enormous tracking capabilities as seen in the chart below.

Global Service Portal (GSP)		
Fleet data	Supply requests	Active/open service calls
Fleet change request	Supply shipping data	<i>Verify data about each call</i>
<i>Remove decommissioned devices</i>	<i>View shipments by date range</i>	<i>View call details</i>
<i>Add new devices</i>	<i>Sort orders by device & month</i>	Place a service call by device online
<i>Change existing devices</i>	<i>View details & track shipments</i>	<i>Fill out & submit online form</i>
<i>Relocate existing devices</i>	Historical supply shipments	Service call history and details
Monthly page volume	<i>View supply shipments over a specific timeline</i>	<i>View all calls within a specific timeframe</i>
<i>By fleet</i>	<i>Export data to an Excel spreadsheet</i>	<i>Breakdown calls by device</i>
<i>By individual printers</i>	Online service call requests	<i>View call details</i>
<i>Color prints to black and white</i>	Submit fleet change (IMAC) requests	<i>Export data to an Excel spreadsheet</i>

GSP enables customers to have timely information about the entire print ecosystem and individual printers. Because when customers do not have that information, or it is inaccessible, serious problems can and do occur.

Toshiba PageSmart

The public cloud has changed how IT organizations pay for service expectations. The cloud model charges for what is actually used or consumed instead of paying for what could be used or consumed. This is also known as the “utility” model. Toshiba’s MPaaS Page Smart is based on that utility model. The Toshiba MPaaS customer only pays for what’s used. Toshiba offers a full range of options here for copy, print, and scan systems.



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It starts with a blended cost per page (CPP) model. This payment model delivers cost certainty. The cost of monochrome print is significantly less than color. This leads many IT organizations to try to limit color print through organizational policies even though there is an increase in print projects calling for color. It's very difficult to enforce these policies. That leads to a lot of cost uncertainty each year. The PageSmart CPP blended cost model provides cost certainty for the defined contract time period. Toshiba also works with and offers other third-party software output management partners for tracking and enforcement of print policies. This all part of Toshiba's comprehensive Encompass MPaaS portfolio.

PageSmart cures several other uncertainties. Take the print consumable issues. Instead of pre-buying supplies or racing to buy them when they run out, PageSmart is aware of when toner is running low. It also knows the consumption rate and delivery timeframes. Based on those factors, PageSmart provides that toner before it runs out. But not too far in advance. In other words, Toshiba Encompass MPaaS PageSmart provides just-in-time supplies to 99% of the population via ground shipping.

PageSmart is a flexible program. It has a full range of options customizable based on the needs and requirements of the customer. There are generally three primary PageSmart options. They're compared in the matrix below.

	PageSmart		
	Express	ABC	Direct
Simplified Flat Rate CPP	√	√	√
Toner (OEM or Compatible Options)	√	√	√
Mono & Color Pricing Options	√	√	√
Automated Meter Reading	√	√	√
Customer E-commerce Site	√	√	√
Automated Toner Monitoring	√	√	√
Automated Toner Replenishment	√	√	√
Toshiba Gold Desk Support		√	√
National On-Site Service		√	√
Repair Parts		√	√
Consumable Parts (Maint Kits)		√	√

Toshiba National Service Programs

Encompass is supported by Toshiba's nationwide support network with over 100 direct and more than 500 partner service locations throughout the USA. It's supplemented by third-party service partnerships for those areas not covered directly by Toshiba and its partners.



Another part of Toshiba's Encompass National Service Programs is the national service dispatch with InTouch network support.

Toshiba MPaaS service billing is quite flexible. There are national CPP rates, time and material per incident rates for printers, and can include thermal as well as barcode printers.

Toshiba's Green Edge

Toshiba's Encompass MPaaS has a major green edge over any other MPaaS or Managed Print Service (MPS). From printer device performance optimization that reduces power and toner consumption, toner recycling, and green manufacturing to a Toshiba tree planting service called "PrintReleaf".

PrintReleaf is a certification system and software platform for automated global reforestation. The number of trees consumed are calculated based on each Toshiba Encompass MPaaS customer's paper consumption over time. That paper footprint consumption is automatically replanted. The customer gets to choose where those trees are replanted at any or all of eight locations including Brazil, Canada, India, Ireland, Madagascar, Mexico, and the USA. And



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they can download a pdf impact report anytime. PrintReleaf essentially provides a paper neutral impact. But with recycled paper that outcome becomes net positive.

The Toshiba Encompass MPaaS Green Edge completely changes the game when it comes to environmental/climate print impact. Instead of being massively negative, Encompass MPaaS neutralizes or even reverses that impact.

Toshiba Encompass MPaaS for Remote Workers

WFH has generally not been part of managed print services or MPaaS. The numbers were too small or not relevant. COVID-19 changed that market, and Toshiba Encompass MPaaS adapted to it. Toshiba studied the market, customer requirements, and the most cost-effective way to meet those needs. The result is the Toshiba's incredibly easy comprehensive Encompass WFH MPaaS.

Encompass MPaaS for Remote Workers is designed to completely address all of the WFH print problems. To provide remote worker printer support demands printers that can be reliably remotely monitored, updated/patched, troubleshot, exchanged without sending a technician, and most importantly, secured. The key word in that sentence is "reliably." Most networked MFPs and printers have cheap networking chips. It's why many home printers are constantly disconnecting from the WiFi or Ethernet networks. Some are well-known for corrupting networks or easily letting the unauthorized access.

Toshiba initially selected five supported MFPs for the Encompass MPaaS for Remote Workers program that meet these requirements. There will be others over time.

Each of these MFPs can be reliably remotely monitored, updated/patched, troubleshot, exchanged, and secured. All units come with a starter cartridge and a 36-month supply of toner, based on 250 pages per month monochrome and 100 color. The Encompass MPaaS for Remote Workers program requires the use of genuine OEM toner cartridges or service warranties will be void. HP models FM Audit fleet monitoring tool also has to be installed at the customer's corporate office before implemented at the remote/home office.

All MFPs in the Remote Workers Program include a 3-year Advanced Exchange that requires no onsite personnel. When service-related issues arise, a call is placed to a provided 800 number of the MFP manufacturer. The issue is then remotely diagnosed. If the call is unable to resolve the service-related issue a replacement MFP is shipped the next business day. The remote worker installs the replacement MFP. Then returns the defective MFP in the box the replacement arrived in. A pre-printed shipping label is provided to return the defective unit. All shipping costs are included in the Encompass MPaaS for Remote Workers pricing. Toshiba notes that only the MFP itself is replaced. The remote worker retains all paper trays, toner cartridges and other options before sending back the faulty MFP.

Encompass MPaaS for Remote Workers also provides an optional user-based security and print tracking with the use of "PaperCut Pocket" software. PaperCut Pocket empowers print from any printer without user expertise or fuss. The PaperCut Pocket apps runs on the remote laptop, workstation, or a mobile device. These apps release the print job. Alternatively, PaperCut Pocket has an app installable on the MFP itself. This app tracks both copying and scanning and the release of the print jobs from the MFP. PaperCut Pocket requires a minimum of 25 users divided between remote users and the primary office. The software is very easy to administer because of its cloud native and intuitive architecture.

What about the security? That's a key reason for specifying specific MFPs for the remote workers program. These MFPs make it much more difficult for external or internal malicious actors from compromising MFP security as seen in the table below.





Device Security	HDD data encryption configurable	Encrypted HDD optional	HDD data encryption configurable
	Firmware digitally signed	Firmware digitally signed & white listed	Firmware digitally signed
Network Access Security	Latest network protocols support: HTTPS, TLS for wired, & WiFi	Latest network protocols support: HTTPS, TLS for wired, & WiFi	Latest network protocols support: HTTPS, TLS for wired, & WiFi
	MACID/Port filtering	MACID/Port filtering	MACID/Port filtering
	Security certificate management	Security certificate management	Security certificate management
Data & Document Security	PDF Encryption	PDF Encryption	PDF Encryption
	Password management	Email Audit log	Password management
	Audit log	Audit log	Audit log
Policy-based Monitoring	Automatic firmware update	Automatic firmware update	Automatic firmware update
		Policy-based security settings mgmt via HP security mgr.	

Summary and Conclusion

Print is a problem for the vast majority of IT organizations. There are six very persistent common print problems. Those problems are non-trivial. Ranging from

- Under the radar print sprawl and lack of control within most organizations.
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- Massive increase in ‘Work-from-Home’ that exacerbates print management and cost issues.

Toshiba Encompass MPaaS is the first managed service architected to make them non-events by mitigating or eliminating each and every one of them. IT organizations that need or want control of their print ecosystem, printer fleet, printer security, and print costs should take an in-depth long look at Toshiba Encompass MPaaS.

For More Information on the Toshiba Managed Print as a Service

Go to: [Toshiba MPaaS](#)

Paper sponsored by Toshiba America Business Solutions. **About DSC:** Marc Staimer, as President and CDS of the 23-year-old Dragon Slayer Consulting in Beaverton, OR, is well known for his in-depth and keen understanding of user problems, especially with storage, networking, applications, cloud services, data protection, and virtualization. Marc has published thousands of technology articles and tips from the user perspective for internationally renowned online trades including many of TechTarget’s Searchxxx.com websites and Network Computing and GigaOM. Marc has additionally delivered hundreds of white papers, webinars, and seminars to many well-known industry giants such as: Brocade, Cisco, DELL, EMC, Emulex (Avago), HDS, HPE, LSI (Avago), Mellanox, NEC, NetApp, Oracle, QLogic, SanDisk, and Western Digital. He has additionally provided similar services to smaller, less well-known vendors/startups including: Asigra, BrainChip, Cloudtenna, Clustrix, ConduSiv, DH2i, Diablo, FalconStor, Gridstore, ioFABRIC, Nexenta, Neuxpower, NetEx, NoviFlow, Pavilion Data, Permabit, Qumulo, SBDS, StorONE, Tegile, and many more. His speaking engagements are always well attended, often standing room only, because of the pragmatic, immediately useful information provided. Marc can be reached at marcstaimer@me.com, (503)-312-2167, in Beaverton OR, 97007.

