



Enterprise eSIM Device Management

How new eSIM-based solutions make it straightforward for telcos and enterprises to provide cellular connectivity to the workforce.

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Executive Summary

With more people working from home, there is strong demand for cellular-connected PCs, particularly from enterprises. This fast growing market is benefitting from increasingly widespread support among mobile operators for eSIM technology, which allows end-users to store multiple operator profiles on a device simultaneously, and switch between them remotely. By making it straightforward for an employee to connect via a secure cellular network, eSIM technology can reduce the need for staff to use unsecured Wi-Fi networks.

Produced in conjunction with Hewlett Packard Enterprise (HPE), Microsoft and Ivanti, this whitepaper explains how enterprise MDM (mobile device management) solutions, eSIM devices and telcos' activation tools can work together to enable enterprises to harness the benefits of eSIM.

For mobile operators, eSIM eliminates the need to maintain a physical inventory, send anything in the mail or have anyone come to a store: enterprise MDM systems can request eSIM activation on demand.

To help operators meet those requests, HPE can supply an entitlement server that interacts with the enterprise's MDM platform via an interface defined in the GSMA TS43 specification. Once the enterprise is authenticated, the entitlement server then triggers the provisioning of the eSIM in the telco's back end systems. The MDM client on the eSIM device is directed to connect to the telco's SM-DP+ system¹ to download the operator's profile.

Many organisations are now deploying an unified endpoints management (UEM) solution, which can secure and manage sensitive corporate data and manage all endpoints, including laptops and desktops, as well as mobile devices. Ivanti's UEM solution can send an activation code via an encrypted channel, which is designed to be more straightforward and secure than using a QR code to complete this task. Moreover, its UEM can fully decommission an eSIM and its host device with one command.

By taking advantage of the flexibility of eSIMs, telcos could offer enterprises devices-as-a-service - streamlined activation and provisioning, via an UEM solution, enhanced with additional device-orientated services, such as support, insurance, security and management.

As a result, enterprise IT departments no longer need to manage their devices and connectivity separately. The advent of eSIM and related solutions are enabling enterprise admins to log into one console to manage all their connected endpoints.

HPE's standards-based solution can make real-time eSIM activation straightforward for telcos, while Ivanti offers a "one platform experience" to manage the entire device lifecycle from activation to decommissioning. Moreover, Microsoft's Windows operating system now supports device configuration straight out-of-the-box.

Together, these new solutions are designed to make it straightforward and cost-effective for organisations to deploy cellular connected PCs and other devices. That will enable businesses to take full advantage of the secure and versatile connectivity provided by 5G, while generating new revenue streams for mobile operators.

¹ The SM-DP+ is responsible for the creation, download, remote management (enable, disable, update, delete) and the protection of operator credentials (the profile).

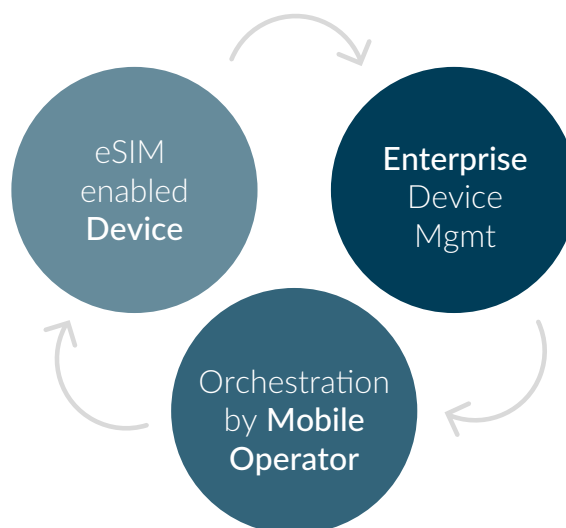


Introduction

Produced in conjunction with Hewlett Packard Enterprise (HPE), Microsoft and Ivanti, this whitepaper explores the growing adoption of enterprise eSIM devices and how existing activation processes will change to take advantage of this versatile and cost-effective technology. It considers the three critical aspects of eSIM device activation: enterprise MDM (mobile device management) tools, eSIM enterprise devices and telco eSIM activation tools. These three elements work together to enable enterprises to harness the benefits of eSIM (see Figure 1).

The paper begins by explaining the importance of eSIM and its adoption by device makers, enterprises and telecoms operators. It then explores the growing demand for cellular connected PCs and how eSIM can help meet that demand, before outlining how telcos can use standard interfaces and entitlement servers to activate eSIMs. The paper concludes by looking at how enterprise device management systems are evolving with the arrival of eSIM.

Figure 1: The three key elements in the eSIM activation ecosystem





ESIM – what it is and why it matters

Developed by the GSMA, eSIM is a global specification that enables remote SIM provisioning of any mobile device. Permanently installed in the device, eSIM is a hardware chipset on which mobile operators can store their data through radio signals. It can be used to securely authenticate a device on a mobile network in the same way as a traditional SIM card.

ESIM allows end-users to store multiple operator profiles on a device simultaneously, and switch between them remotely. Manufacturers and service providers can enable end-users to select the operator of their choice and then securely download that operator's SIM application to any device with an eSIM.

Another key benefit is simpler device setup. Devices with eSIMs generally support on-device subscription: the activation process is initiated by the user via an app. That means enterprises and their suppliers no longer have to worry about sticking the right SIMs from the right operators into the right devices and shipping them to the right countries. In practice, eSIM allows for a single product SKU (stock keeping unit), significantly simplifying supply chain management for device manufacturers.

ESIM market growth

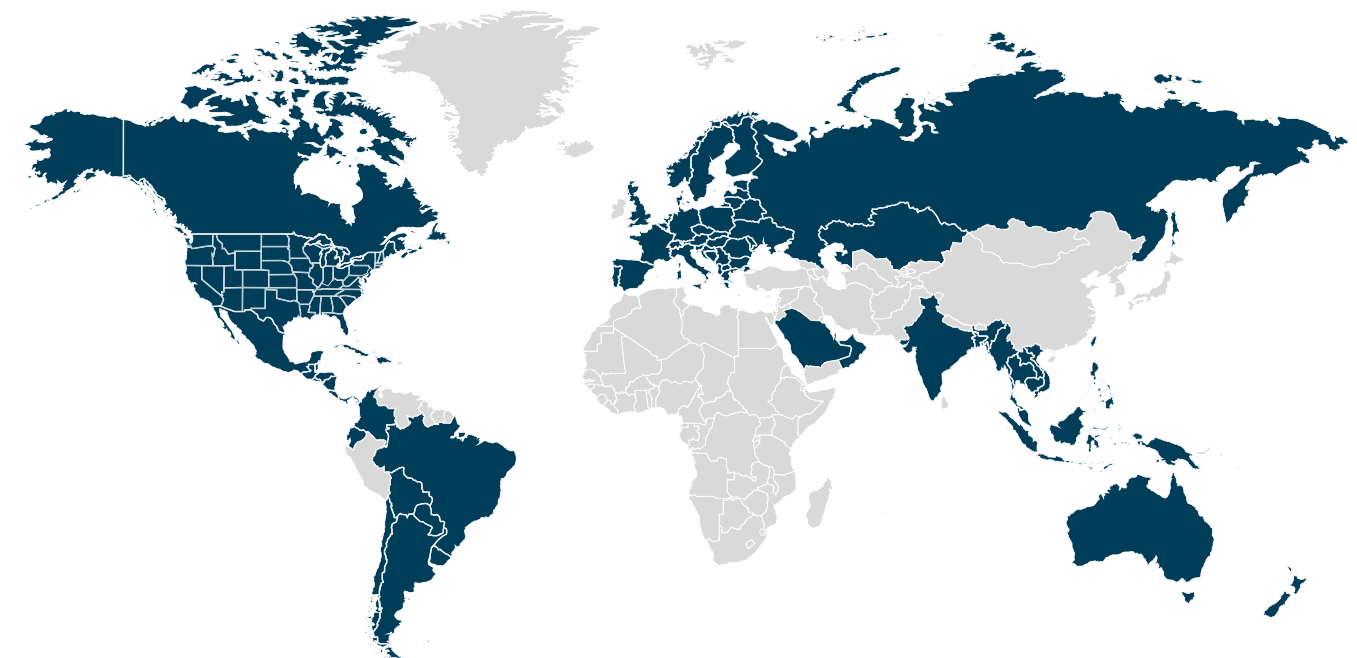
Industry analysts say the eSIM market is growing quickly in both the handset and the Internet of Things (IoT) segments. By 2025, 2.4 billion smartphone connections will use eSIM globally, according to a new GSMA Intelligence report, for example.

Market monitoring data published by the Trusted Connectivity Alliance (TCA) in March 2021 showed significant global eSIM growth in 2020: the eSIM shipments collectively reported by TCA members rose 83% year-on-year to reach 309 million units. This growth was predominantly driven by the continued launch of new eSIM-enabled handset models, IoT devices and smartwatches across the world, according to the TCA. New regulation, notably the European eCall initiative, also drove eSIM deployments in the automotive sector.

In addition to a rise in eSIM shipments, TCA data shows growing consumer and industry uptake of eSIM functionality. The Alliance reported 300% growth in eSIM profile transactions, in which a mobile operator profile is downloaded to a device. This growth was supported by an advancing eSIM infrastructure: The number of eSIM subscription manager platforms deployed globally, which enable the remote provisioning and lifecycle management of eSIMs, increased dramatically to 687 in 2020, up from 270 in 2019.

There is also widespread mobile operator support for eSIM. Industry data from June 2020 shows eSIM is supported in 64 countries (see Figure 2), while coverage is accelerating fast. GSMA Intelligence forecasts 68% of operators will support eSIM by the end of 2021 and 90% by 2023.

Figure 2: A growing number of mobile operators are supporting eSIM



Source: GSMA Intelligence



Rising demand for cellular-connected PCs

As governments seek to contain the Covid-19 pandemic, most white-collar employees are working from home from where they need secure connectivity. In the U.S., 71% of the white collar workforce is now working remotely, compared with 20% prior to the pandemic, according to the Pew Research Center².

While many employees can use their home Wi-Fi networks to get online, this approach may not be ideal – workers may have to share the available bandwidth with other members of their household, while the network may not be sufficiently secure. As a result, there is growing demand for cellular-connected PCs, according to Mohamed Samater, Senior Program Manager at Microsoft. "We're seeing some signals that imply 60% growth in the monthly active devices that support built-in cellular capability," he says. "The demand for connected PCs in the education sector is exceptional in both emerging and developed markets with school districts and education departments globally issuing requests for proposals for connected PC, as well as families buying additional devices to meet their need for home-based work education and entertainment."

At the same time, cellular connected PCs are becoming more affordable: Microsoft estimates the bill of materials for a LTE modem is now as low as US\$35, down from US\$65 to US\$80 a few years ago.

As operators roll out 5G networks in many countries around the world, Microsoft expects demand for cellular connected PCs to grow further. "We really believe 5G will play a major role in the experience of the connected PC," Mohamed Samater adds. "User expectations of constant connectivity will grow and services and apps will have ever-increasing dependency on high speed Internet access. Long-term, we see customers will use things like cloud-powered PCs, as more 5G networks with high bandwidth and low latency are deployed globally."

For many enterprises, cellular connectivity represents a more secure option than Wi-Fi. In a recent survey by asset and service management software provider Ivanti, 45% of enterprise respondents said they believe end users are connecting to enterprise resources from unsecured Wi-Fi networks. "A great alternative would be to use cellular connectivity," notes Robert Nijbroek, Technical Account Direct Carriers International, Ivanti.

²Source: <https://www.pewresearch.org/social-trends/2020/12/09/how-the-coronavirus-outbreak-has-and-hasnt-changed-the-way-americans-work/>

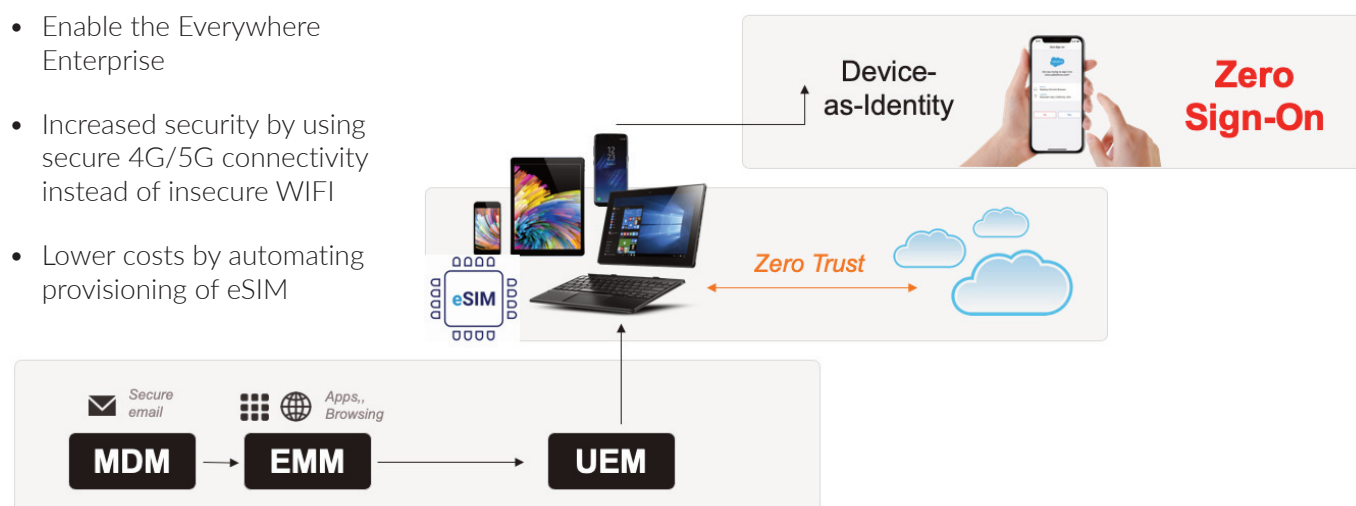
Straightforward and secure connectivity for PCs

By making it straightforward for an employee to connect via a secure cellular network, eSIM technology can reduce the need to employ unsecured Wi-Fi networks. “An enterprise would be able to configure eSIM for the corporate applications and make sure there is a secure connection to enterprise resources (see Figure 3),” says Robert Nijbroek.

If they have a dual-SIM device, the employee could use a physical SIM card for their personal applications and an eSIM for corporate applications – the latter can be easily commissioned or decommissioned as required.

Figure 3: For enterprises, eSIM supports secure and convenient cellular connectivity

- Enable the Everywhere Enterprise
- Increased security by using secure 4G/5G connectivity instead of insecure WIFI
- Lower costs by automating provisioning of eSIM



Microsoft also regards eSIM as a very important enabler of secure connectivity for enterprises. “It benefits the enterprise customer in terms of ease of deployment and management and it reduces supply chain demands for operators, who can now provide profiles to customers in seconds,” notes Mohamed Samater. “eSIM helps the ecosystem by offering a user-friendly experience and automatic deployments for enterprises using secure connections.”

Since 2017, the number of PCs with eSIM capability has grown rapidly. “We’ve heard feedback and signals

from industry customers and partners that there weren’t enough connected PCs,” explains Mohamed Samater. “We’ve taken that feedback to heart at Microsoft and have been working diligently with our mobile ecosystem partners, including silicon and OEM partners, and the PC category has grown significantly since those early 2017-2018 days.”

Almost all the top Windows OEMs partners have launched PCs with LTE or 5G, according to Microsoft, which says almost “70% of PCs in the commercial category have the option to be connected.”

Figure 4: The number of PCs with cellular connectivity is increasing over time



Device operating systems increasingly incorporate “out-of-the-box experience solutions” designed to streamline the onboarding of new devices into the enterprise. Microsoft, for example, has enhanced its Windows operating system with “bootstrap connectivity” and “zero touch activations” features. The goal is to ensure users can complete their device

setup when they don't have access to trusted Wi-Fi. “Even in the developed markets, such as the U.S., many households today don't have access to high-speed Wi-Fi,” notes Mohamed Samater. “And the bootstrap connection ensures those users can complete their out-of-box experience without any issues with security.”

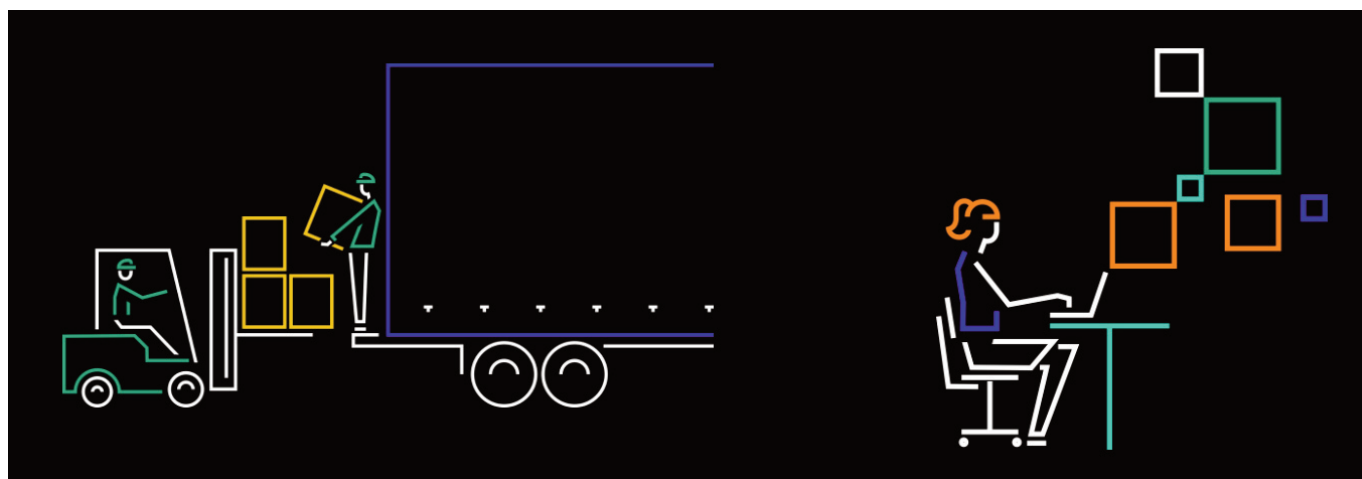


New telco activation tools

To serve the growing number of devices with eSIMs, the fundamental role of the telco is the same as with a traditional SIM: provide secure, reliable connectivity. But the advent of eSIM does change how that connectivity is enabled. In the past, an operator had to maintain an inventory of SIM cards and deliver a physical SIM to the end user (see Figure 5).

With eSIM, the entire process is digital. “There is no need to maintain a physical inventory, send anything in the mail or have anyone come to a store,” notes Julia Cutler, Senior Product Manager, Hewlett Packard Enterprise. Instead, enterprise IT departments can request eSIM activation on demand from telcos.

Figure 5: ESIM eliminates the need to physically ship SIM cards to customers



The telco's role is the same – provide connectivity. The activation technology is what's new

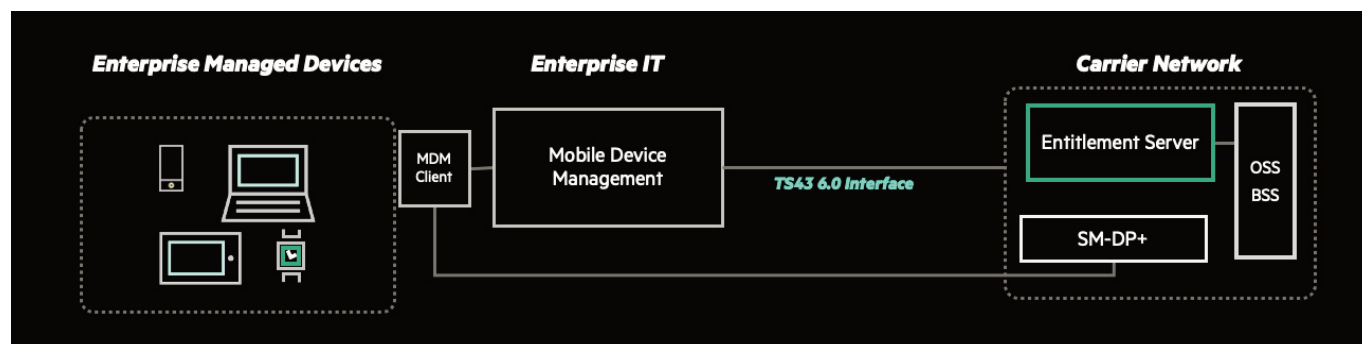
The role of the entitlement server

On-demand activation of eSIMs is enabled by an operator's entitlement server - an element that sits between the telco's network and devices or applications and which manages service and application entitlements. "In this scenario, it acts as an orchestration gateway between devices, their applications, the core network and OSS/BSS elements: it provides a single point-of-entry into the telco network that makes eSIM activation easy," says Julia Cutler.

The entitlement server interacts with an enterprise's mobile device management (MDM) platform via an interface defined in the GSMA TS43 specification, a public document available on the GSMA website.

When onboarding a new eSIM device or adding connectivity to an existing device, the MDM initiates the activation process. The MDM asks the entitlement server to validate the enterprise account and tariff plans. Once the enterprise is authenticated, the entitlement server then triggers the provisioning of the eSIM in the telco's back end systems. The MDM client on the eSIM device is directed to connect to the telco's SM-DP+ system³ to download the profile (see Figure 6).

Figure 6: The entitlement server interacts with the mobile device management system



“ Any eSIM device with an API open to the mobile device management platform can take advantage of this process,” explains Julia Cutler. “The result is that an enterprise device can be fully onboarded including eSIM activation in one process, all managed by the MDM platform. So there's no need for the enterprise IT department to order physical SIM cards or keep Excel spreadsheets of activation codes or interact with the carriers.”

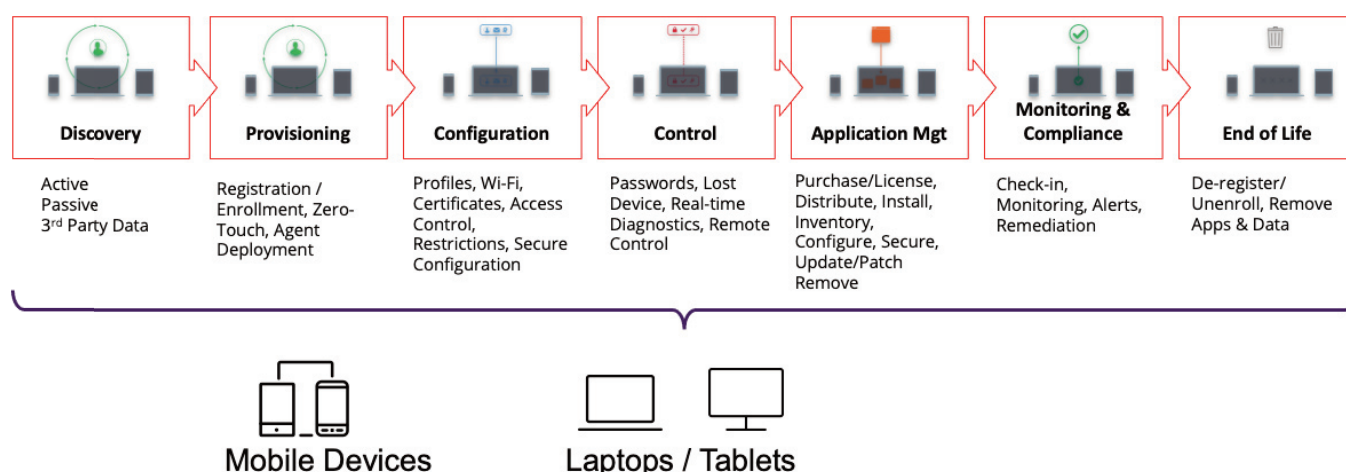
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Enabling better enterprise mobile device management

Most large and midsize organisations already have a MDM solution in place. In many cases, Ivanti says this solution has evolved into a unified endpoints management (UEM) solution, designed to enable enterprises to secure and manage sensitive corporate

data and manage all endpoints, including laptops and desktops, as well as mobile devices. Ivanti's highly-automated UEM solution can handle each step in the device lifecycle (see Figure 7).

Figure 7: The functionality of Ivanti's unified endpoint management solution



Whereas many enterprises have used QR codes to activate eSIM-capable devices, such an approach can be difficult to scale. Instead, Ivanti's solution can send an activation code via an encrypted channel. This approach is more straightforward and secure, notes Robert Nijbroek. "In the past year, we have seen a lot of hackers trying to maliciously attack end users with malicious QR codes. This new way of sending an encrypted activation code is fundamentally more secure," he adds. "We are also seeing high demand for a great employee experience, especially since the start of the pandemic with an massive increase in the number of employees working from home. It must be really easy for employees to onboard new devices and also the whole device lifecycle management needs to be automated to really lower costs."

When an end user leaves an enterprise or a device needs to be decommissioned, the data and applications need to be removed from the device.

With physical SIM cards this could be a cumbersome process. "We don't really touch the physical SIM card of a device, that's simply handled by the carrier, so there's a lot of additional steps that need to be taken to also decommission or deactivate a SIM card," explains Robert Nijbroek. "But now with this new flow, with one command, we can fully decommission a device, including the eSIM."

Ivanti aims to provide organisations with a "single plane of glass" through which they can manage all their devices (see Figure 8). Its solution brings together information that was traditionally only accessible from several different portals into a single interface. "We can then automatically assign unassigned profiles to devices and your unified end point management will communicate which your operator's activation platform to request activation codes to activate the eSIM," Robert Nijbroek says.

Figure 8: Ivanti provides enterprises with a single interface to manage all their devices



All Devices

- Manage all devices
- Anywhere Management
- Security



Single Experience

- Single Platform experience
- Device Lifecycle management



Hyper-Automation

- Real-Time Automation of eSIM
- UEM will communicate with MNO orchestration platform

Source: Ivanti

Ivanti says some enterprises will pay telcos for additional value added services, such as the immediate provisioning of eSIMs in real time and a central interface for expense management providing standardised reporting and billing data. “Another trend we are seeing is device-as-a-service,” adds Robert Nijbroek, in which a

telco provides streamlined activation and provisioning, via an UEM solution, enhanced with additional device-orientated services, such as support, insurance, security and management. These services can provide cost savings to enterprises.



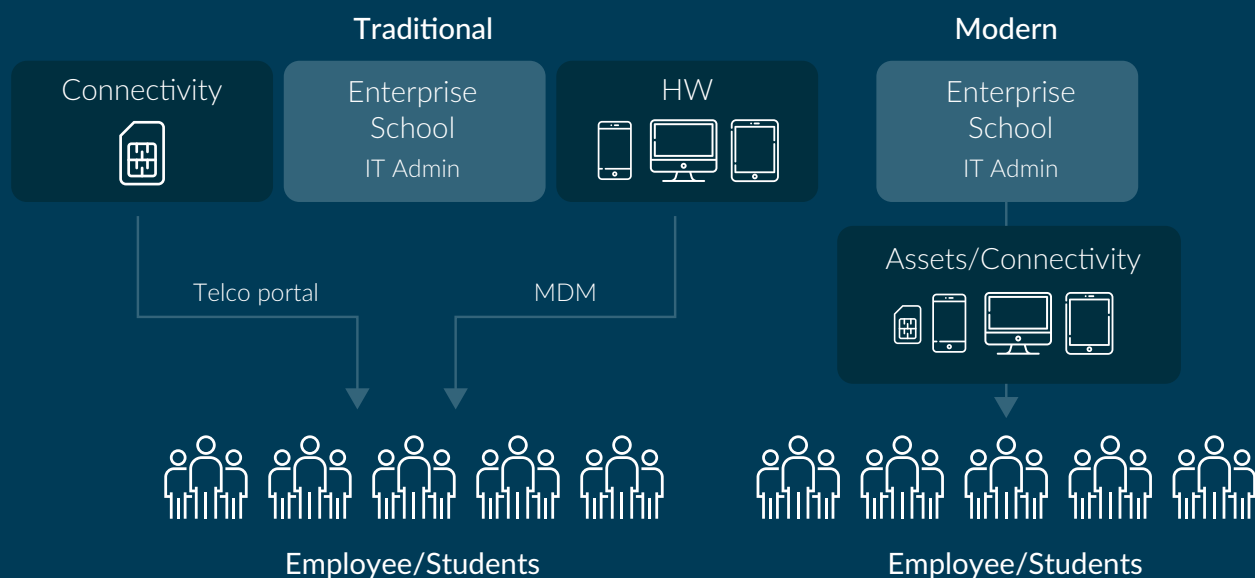
Conclusion

Until recently, enterprise IT departments were required to manage their devices and connectivity separately. But the advent of eSIM and related solutions are enabling enterprise admins to log into one console to manage all their connected endpoints (see Figure 9).

HPE's standards-based solution is designed to make real-time eSIM activation straightforward for telcos, while Ivanti offers a "one platform experience" to manage the entire device lifecycle from activation to decommissioning. Moreover, the Windows operating system can enable device configuration straight out-of-the-box.

Together, these new solutions will make it much easier and more cost-effective for enterprises and other organisations to deploy cellular connected PCs and other devices. That will enable businesses to take full advantage of the secure and versatile connectivity provided by 5G, while generating new revenue streams for mobile operators.

Figure 9: ESIM and related solutions are streamlining enterprise device management





Hewlett Packard Enterprise

HPE has over 30 years of experience in the telecoms industry, with more than 300 telco customers across 160 countries. In the core, more than 700 million subscribers across more than 80 carriers depend on HPE Mobile Core software. HPE's open telco solutions help operators evolve their networks and services to a 5G ready, cloudnative, servicebased architecture. As the edgetocloud platformasaservice company, our experience in hybrid cloud allows us to bring the cloud transformation and secure, carriergrade, standardsbased infrastructure to telecommunications networks.

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