

HPE CONNECTIVITY MANAGEMENT PLATFORM

Adapt to IoT and M2M services needs for public and private network

The Internet of Things (IoT) and machine-to-machine (M2M) services sector is exploding. It presents tremendous opportunities for communications service providers (CSPs), and M2M Service Providers to create new revenue streams and expand their customer base. Always-connected devices are changing the behavioral patterns of consumers, driving growth in many sectors and providing opportunities for enterprises to be more agile.

New B2C or B2B services require IoT/M2M connectivity, automation, and remote control of devices. They might relate to washing machines, security systems, utility meters, parking meters, vehicle-tracking applications, connected cars, vending machines, and much more, depending on the vertical industry considered.

Many IoT/M2M services make use of GSM networks for the connectivity and mobility services they need and therefore require a subscriber identity module (SIM) cards to rely on mobility services, and are mainly dependent on short message service (SMS) and mobile data services—eventually voice or even video might be required for specific use cases. They have usage patterns that are vastly different from the normal human-to-human communication services and provide usually lower average revenue per device than traditional average revenue per user (ARPU) to the CSPs. However, for some specific new services, while the frequency or/and amount of data to be transmitted might be small, the transaction itself could be critical, such as the automatic sending of the location of a car after an accident.

Another important growth potential is private LTE/5G networks development. Enterprises in many sectors are keen to take advantage of 4G and even more 5G as a new connectivity method on top of LAN or WLAN for connecting their machines, equipment, or employees/visitors/suppliers at their sites—being office campus, ports, airports, warehouses, mining facilities, manufacturing sites, shopping malls, and so on. This is just the beginning, but the interest is real and brings new requirements. This market will be addressed by traditional MNOs or M2M SPs but also by System Integrators, Cloud Service Providers, or directly large enterprises potentially.

CSPs need to have innovative and low-cost IoT/M2M network solutions to cater for the demands created by these new types of devices and core applications. Hewlett Packard Enterprise experts can help CSPs approaching the introduction of IoT/M2M in a more creative way, changing elements of the current mostly focused consumer SIM lifecycle to reduce CAPEX and OPEX—as well as delivering agility and competitiveness. One change that can make a significant difference is the way SIM cards and their related subscriptions are provisioned, managed, and exposed to IoT/M2M enterprise customers.

With the introduction of embedded UICC (eUICC) technology and the growth expected, CSPs need also to enhance their capabilities to support the new eco-system and the additional use cases and growth that is expected to come with it.

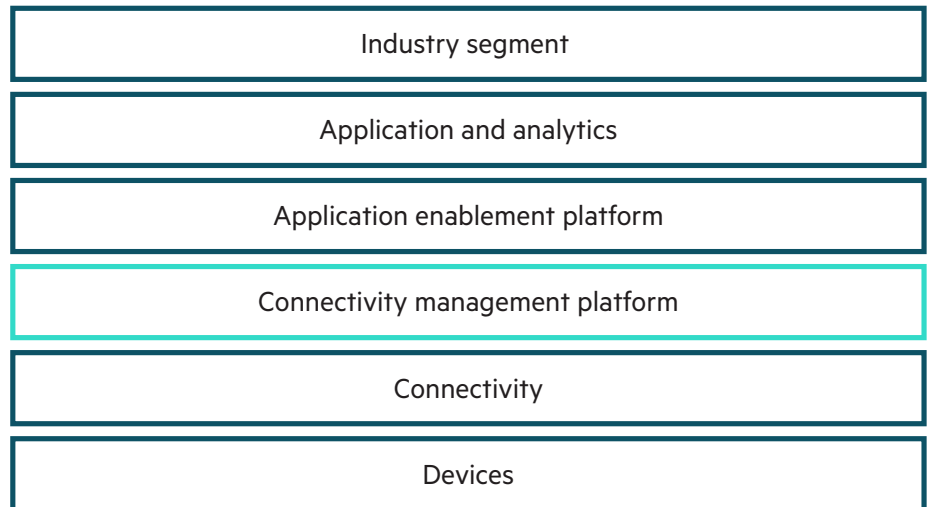


FIGURE 1. Connectivity management platform in an end-to-end solution stack

WHY A CONNECTIVITY MANAGEMENT PLATFORM?

A connectivity management platform provides an initial, low-cost answer for CSPs to cater and adapt to the growing needs of the M2M/IoT market and protect their margins—even with the potential lower associated ARPU.

It fits between the connectivity layer and the application enablement platform into the end-to-end solution stack that is required to deliver end-to-end M2M/IoT services.

This is the first step that CSPs can take to build on top of their core connectivity services some value added services for their M2M/IoT enterprise customers.

EUICC READY

eUICC subscription can be managed via HPE CMP like the de facto UICC—this is for eUICC-specific remote SIM provisioning and management operations dependent on an external eUICC subscription manager subscription manager. As per GSMA specification. The CSP admin can configure one or several external subscription manager service providers from which it is going to get services. The CSPs using HPE CMP can take advantage of competition between the several eUICC subscription manager service providers to work with one or several of them depending on its needs and commercial offerings of these new CSPs, thanks to the inter-operability supported as per the GSMA standards.

For interacting with those external subscription manager service providers, the HPE CMP enables the CSP admin to:

- Order eUICC profile and profile generation
- Trigger profile download
- Trigger profile activation, deactivation, or delete as need be
- Board new eUICC M2M devices or eUICC consumer devices
- Configure eUICC Subscription Manager Service Providers available



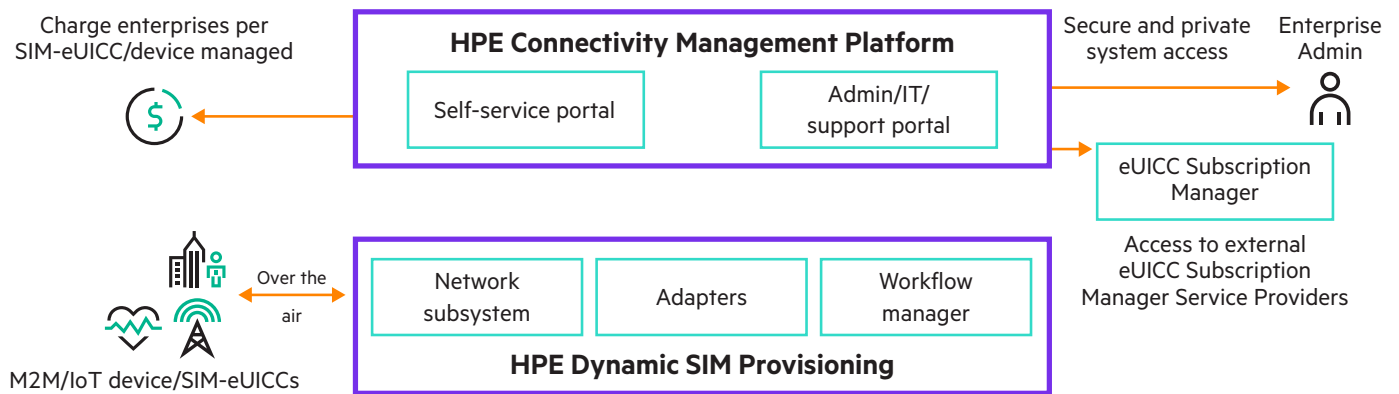


FIGURE 2. HPE Dynamic SIM Provisioning and the HPE Connectivity Management Platform

HPE CONNECTIVITY MANAGEMENT PLATFORM (CMP)

This HPE CMP implements a multi-tenant capable and self-service and automated management of the IoT/M2M SIM subscriptions. It has capabilities to create and enforce differentiated subscription packages to meet the specific needs of M2M and Enterprises. The need for self-service management for IoT/M2M enterprise customers becomes more and more critical as the IoT/M2M market grows, along with the number of small to medium-sized vendors requesting SIM cards and other services increase.

CSPs do not have the structure and the bandwidth to deal with all of these very different customers and need automated processes and self-served solutions to reduce their OPEX.

The HPE CMP includes the following:

- A graphical-based portal and a rich set of APIs for platform users or external systems to manage M2M subscriptions
- Account management module
- A SIM lifecycle management module
- A tariff management module
- An inventory management module
- A SIM ordering module
- A reporting and statistics module
- A diagnostics module
- A notifications module



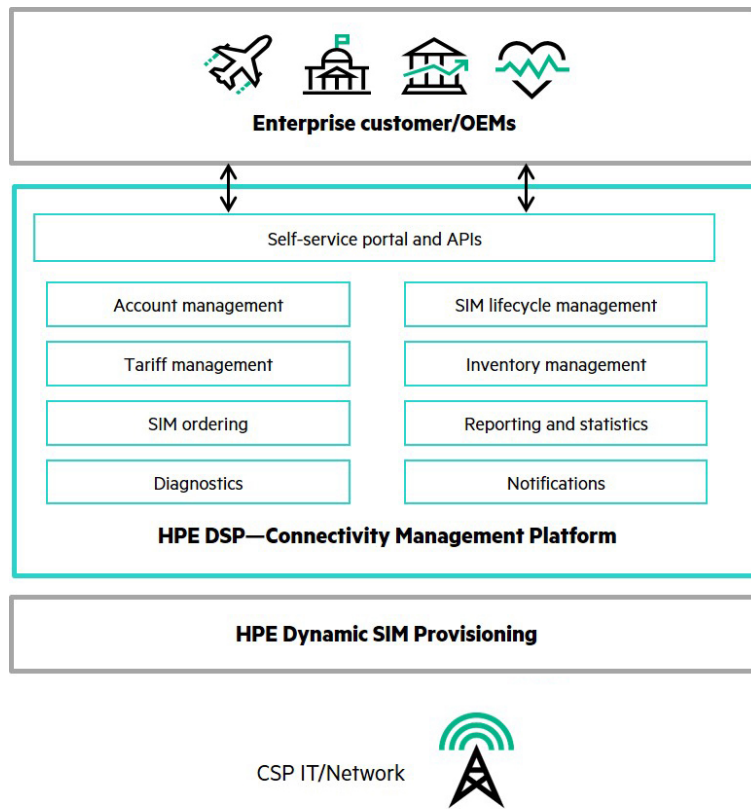


FIGURE 3. IoT/M2M subscription management

TABLE 1. Key functionalities

| | |
|---------------------------|---|
| Portal | <ul style="list-style-type: none"> • A 360-degree, integrated self-care portal for complete access to the SIM, module, and device associated with the IoT/M2M service • Dashboard view of eSIM/SIMs, associated devices, and alarms • Hierarchical modeling of customers and SIM/device groups, with role-based operational access • Device and customer usage reports • Web-service interface for managing IoT/M2M accounts, SIM lifecycle, and subscriptions profile • Role-based access control for IoT/M2M operations |
| Service APIs | <ul style="list-style-type: none"> • Rich set of web services to integrate with CSPs systems |
| Provisioning | <ul style="list-style-type: none"> • End-to-end provisioning process for the SIM subscription • Web-based, just-in-time provisioning of SIMs into CSP systems • SOA-based workflow manager for interfacing with CSP systems • Off-the-shelf, configurable provisioning flows • Workflow designer functionality for designing, customizing, and maintaining the workflows • Throttling and controlled access to service provider systems on a per M2M customer and CSP system basis |
| Account management | <ul style="list-style-type: none"> • Hierarchical modeling of OEMs/Enterprises and SIM/device groups with role based operational access • Create, modify, and delete OEM/Enterprise accounts • Create, modify, and delete EUMs and eUICC subscription manager SPs for eUICC introduction |



TABLE 1. Key functionalities (continued)

| | |
|---------------------------------|--|
| SIM lifecycle management | <ul style="list-style-type: none"> • Provides IoT OEMs and CSP admin complete control over the SIM lifecycle management • IoT OEMs have access to up-to-date information on the SIM card status, profile, and SIM card parameters for efficient troubleshooting • CSPs can update configuration parameters on the SIM card over the air |
| Tariff management | <ul style="list-style-type: none"> • Management of IoT/M2M customer tariff plan subscriptions • Support for IoT/M2M service-specific tariff plans, such as: <ul style="list-style-type: none"> – Time-controlled plans – Time-tolerant plans – Infrequent device plans • Support for individual and group-based SIM tariff plan • Manage and provision M2M customer-specific tariff plans • Assign device/SIMs to specific enterprise department or/and cost center |
| Inventory management | <ul style="list-style-type: none"> • Manage resources Inventory—IMSI, ICCID, and SIMs (Vendor, SIM profile, and so on) • Real-time detection of SIM—device and subscription association • Real-time SIM information that includes: <ul style="list-style-type: none"> – Associated device IMEI or/and device make/model or device category (sensor, camera, robots, and so on) – Associated rating plan – SIM status (SIM subscription) – Network registration status – SIM subscription change history – Associated APN details – Enables service providers to analyze SIM inventory against OEMs orders |
| SIM ordering | <ul style="list-style-type: none"> • Validate selected SIM cards and create orders towards SIM card vendor or external system • SIM input file generation covering also eSIM profile ordering if need be • SIM output file processing and provisioning |
| Diagnostics | <ul style="list-style-type: none"> • Provide diagnostic tools for efficient troubleshooting of IoT SIMs and devices by IoT OEMs; these tools include: <ul style="list-style-type: none"> – Network reset—trigger IoT device network re-registration – IP connectivity test—remotely test the ability of the device to establish IP connectivity for a given APN configuration – SMS ping—analyze the SMS delivery round trip time for the IoT device – Service failure analysis—analyze information on failures to send SMS – Access to latest IoT SIM/device activity related information |
| Notifications | <ul style="list-style-type: none"> • Enables proactive monitoring of the health of the SIM, device, and the IoT service • Data consumption control alert—usage threshold is breached for a given SIM • Data consumption control alert—usage threshold is breached at a SIM group level • SIM access blocked alert • SIM ageing alert—SIM card erase/write threshold warning, indicating SIM OTA write operation threshold limit for the SIM card has been breached • Provide value added IoT services based on SIM tool kit application on the SIM card for fraud detection and prevention • Geo-fencing service—alarm flashed for devices violating cell-id-based geo-fencing rules • Device pairing service—alarm flashed for SIM cards violating device pairing rules (IMSI/IMEI association) • Device change alert—alarm flashed for SIM cards when a device (IMEI) change has occurred • Roaming alert—alarm flashed for devices moving into foreign networks • Voice call blocking—remotely block voice calls on selected IoT SIM cards |
| eSIM management | <ul style="list-style-type: none"> • Integration with eUICC subscription manager SM-DP for example for profile download or other profile management transactions • Integration with eUICC subscription manager SM-SR for example for boarding eUICC M2M/IoT devices • Integration with eUICC subscription manager SM-DP+ for example for profile download for GSMA based Consumer eSIM device or in the future GSMA based IoT eSIM device |



PLATFORM INTEGRATION

Integration to the CSPs' network is supported using industry-standard interfaces facilitated by the HPE CMP workflow manager.

The workflow manager is an SOA-based workflow engine, based on carrier-grade HPE Service Activator providing:

- Workflow designer for designing, customizing, and maintaining the workflows
- Workflow implementation environment
- Production OSS/BSS adapter for interfacing with the operator's production IT and network systems to perform the subscriber activation process
- Plug-and-play adapters for home location register (HLR), HSS or private/public 5G core NW platforms, service transfer point (STP), short message service center, simple mail transfer protocol (SMTP), and other CSP systems
- Off-the-shelf, configurable provisioning flows. HPE CMP can be deployed on-premises or hosted in a cloud environment from one of the Cloud Service Providers—on bare metal servers, VMs, or containers.

OPTIONAL COMPONENTS

HPE DSP—SIM Updater

HPE CMP can be deployed and integrated with the HPE SIM Updater—acting as an OTA gateway—or with a legacy or third-party OTA gateway providing the right level of functionalities for covering Remote File Management or/and Remote Applet Management functionalities.

HPE TAS USSD/MAP/SMS Gateway

HPE Telecom Application Server Messaging Gateway runs on industry standard servers and operating system, can run in a virtualized environment, and supports NFV infrastructure. Messaging connectors are used to send and receive messages to and from users via protocols, such as Short Message Peer-to-Peer (SMPP), Direct SMS over MAP, and Unstructured Supplementary Service Data (USSD).

Applets

HPE CMP functionalities can be extended with some specific applets loaded onto eUICC/UICC for delivering specific use cases or scenarios.



WHY HPE?

HPE CMP is pre-integrated, reducing implementation effort, risk, and improving time-to-market. It is SIM vendor-agnostic, based on network standards and provides for a well-defined evolution toward a complete M2M service framework.

HPE CMP is designed to support integration with HPE eUICC subscription manager or third-party service provider operating GSMA SAS-certified eUICC subscription manager.

Hewlett Packard Enterprise is uniquely positioned for IoT/M2M SIM management as a trusted integrator, leveraging on its rich portfolio of leading products. Those components are widely deployed across the world with:

- Several carriers implementing their HPE Dynamic SIM Provisioning platform since 2008 including HPE SIM Updater for OTA Gateway
- Service and subscriber provisioning implementations, leveraging on HPE Service Activator
- Mobility management deployments with the HPE home location register or home subscriber server products and now 5G core network functions for public and private networks
- Additional Digital Identity products for Device Enablement with HPE DEG and eSIM Subscription Manager platforms with HPE RSPM

The HPE CMP seats on top of the proven HPE Dynamic SIM Provisioning that has been delivered to many CSPs around the world, and activates for each CSP several millions of SIM cards per year.

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