Hewlett Packard Enterprise

Business white paper

The ubiquitous advance of Subscriber Data Management

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Introduction

Latest evolutionary trend around subscriber and data management (SDM) presents new opportunities for CSPs. The very nature of SDM is conceptually expanding beyond the telecom domain to managing any subscriber served in a cross-industry distributed cloud. Accordingly, the focus of this white paper is to address the advancement and personalized services future of SDM to enable new applications and address new market opportunities, including the Internet of Things (IoT). In addition, the white paper documents the logical steps and business opportunities that await service providers in their quest to transform SDM into a truly ubiquitous data management platform.

The ubiquitous advance of SDM

In some form, as network operators looked to a more distributed architecture to support a lower-cost scalable model, SDM has been a foundational core network element for more than seven years. The result shown in Figure 1 illustrates vendors bringing to market next-generation HLRS (ngHLRs) designed to support a massive common, mirrored back-end (BE) commercial database, interfaced by a number of functions, such as HLR, HSS, EIR, and AAA deployed as front-end (FE), software-based applications.

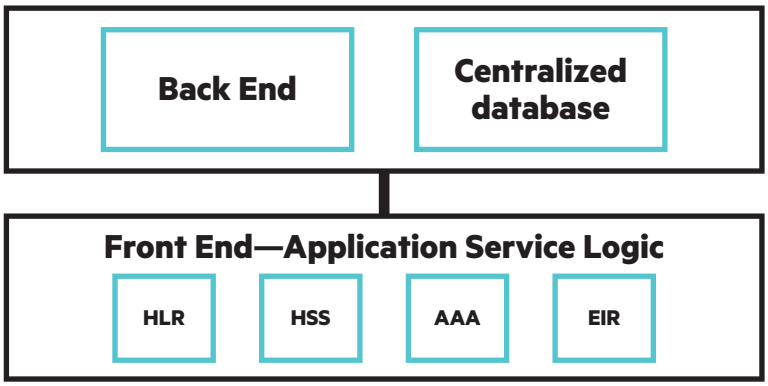

Figure 1: ngHLR architecture

This successful approach delivered a low-cost, highly scalable platform to manage data. But it soon became clear that a common data source, interfaced by several vital network functions, could be utilized to also enhance service innovation, given the network was both subscriber- and application-aware. Leveraging FE and BE databases and software logic in this subscriber context became known as SDM.

However, the scope of subscriber context is once again evolving, advancing from strictly a telecom context to a ubiquitous communication context, which has the potential to address multiple market segments, including IoT and connected services. This is in large part because in both service provider networks and in the IoT connected world, data is exploding and requires new approaches to manage and secure personal data.

Therefore, in this new model where data is ubiquitous—in the cloud, in service provider networks, in enterprise segments—there is a compelling demand to re-architect the data plane. The outcome of this process requires SDM to evolve into to an elastic, multitenant model, possessing the ability to most efficiently scale data across these business-driven boundaries to maximize customer experience, while maintaining privacy metrics.

Ubiquitous SDM: technical drivers

The very nature of IP services is converging. Regardless of service, SDM can play a strong role in enhancing/facilitating customer experience management (CEM). This was the case in the past as well, but this time SDM will adopt a wider scope. Stated another way, SDM is now poised to become a ubiquitous service enabler to extend the concept of CEM into other related markets, such as IoT.

There are several reasons for this. First, the movement of telecom services to the cloud, via the adoption of network functions virtualization (NFV), provides a new cloud-based fabric germane to several market segments, from telecom to enterprise and utility clouds. In this context, virtualizing SDM moves it from a service provider-only cloud, to ubiquitously support any cloud.

Secondly, SDM is very well suited to managing pure software functions, given the FEs are, by design, software-centric functions. Figure 2 shows running virtualized network functions (VNFs) on common NFV infrastructure (NFVI), making it possible to achieve an even greater scale model than the ngHLR architecture.

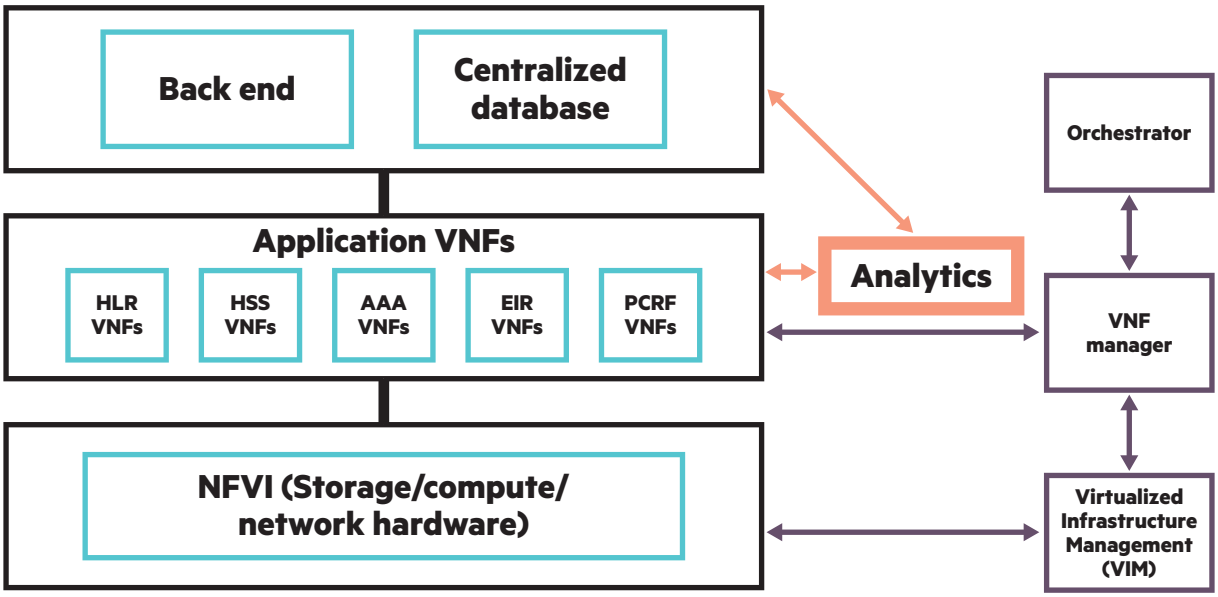

Figure 2: NFV applied to SDM FEs

In addition, since VNFs are running in a cloud and potentially distributed environment, and spun up based on real-time demand, pairing real-time VNFs with real-time analytics enables more powerful capabilities to enhance CEM in real time.

As a result, we have already seen several leading SDM vendors, such as Hewlett Packard Enterprise, aggressively move to develop fully virtualized SDM functions (vHLR, vHSS, vAAA, vEIR), augmented with powerful analytics functions.

Ubiquitous SDM: market and business drivers

Beyond question, cloud and NFV are megatrends indelibly shaping the communications landscape. And with megatrends of this influence, there is major impact on business models and even business boundaries.

Figure 3, for example, clearly shows the endgame of leveraging cloud, NFV, massive data store and analytics functional capabilities to reflect a common foundation for all IP-based market segments. The result is a continued blurring of the boundaries between communication and other service providers (for example, IoT providers), evolving into converging business models and making competition even fiercer.

While it will take several years to fully play out, the reality is technology convergence further drives market convergence. Therefore, service providers must leverage and be proactive in further defining their ubiquitous SDM capabilities, ensuring they flourish as new market opportunities present themselves in the cloud.

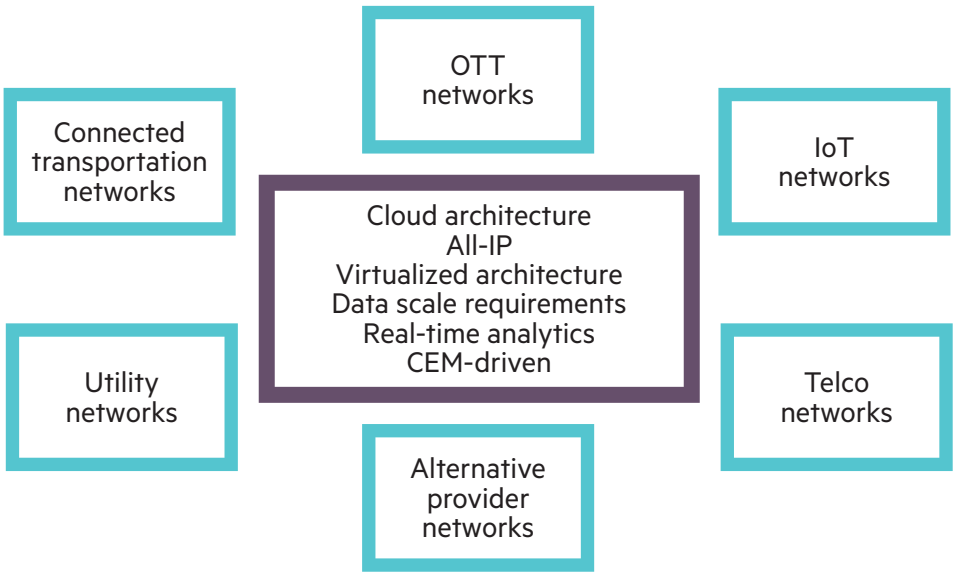

Figure 3: Market convergence via technology convergence

For example, we believe service providers are well positioned to manage and scale IoT, utility (smart grids), and connected transport (smart car) networks, since they bring to the table a strong suite of technical skills related to scaling data networks, safeguarding user data, managing customer care, designing mobility networks, as well as meeting rigid high-availability (HA) requirements.

As a result, it's readily apparent that service providers have all the requisite skill sets to partner or even host these additional functions for third parties. Of course, over-the-top (OTT) providers are also very active in this market push, and will continue to be a threat. Moreover, it's important to note that a new, emerging breed of alternative providers plays outside of the service provider domain.

Referred to as private virtual network operators (PVNOs), they are based on the premise of cloud and virtualization driving the shift of the network from simply communications networks to IP service enablement, which support connected devices and IoT. To accomplish this, PVNOs need to manage the subscribers and, hence, deploy SDM in their own cloud to maintain control of their own customer data. This means a PVNO can start small and scale up, based on service and subscriber demand.

A recent example of a PVNO playing in this space is the Netherlands-based electric utility Enexis B.V., which has deployed a virtual network to manage smart meter-reading and provide other innovative utility services.

With this model, SIM data can be accessed from the mobile network operator, assuming regulatory approval, as is the case in the Netherlands. This opens up the door for PVNOs to share SIM data with the mobile network operator, using an arrangement known as mobile network code sharing. The value of this approach is that it enables the end user to move from one network to another network provider, in this case a PVNO, without swapping out SIM cards.

To be clear, given decisions on mobile network code sharing will be made by regulators on a country-by-country basis; global adoption of this model is certainly not a given, but it does provide an early view into how technical convergence can drive market convergence in the cloud with SDM implications.

Implementing ubiquitous SDM: steps and strategies

Given the rapid pace of change in both technical and business domains, we believe service providers must develop a ubiquitous SDM strategy. Overall, we see executing this strategy can be accomplished gradually, utilizing four straightforward steps. These steps are:

- FE Virtualization
- FE Ecosystem Integration
- Policy & Analytics Integration
- BE Virtualization

Step 1: FE Virtualization
The value proposition of virtualizing FE applications has already been described, and it's clearly the logical network starting point to ensure scale and deployment flexibility. Still, it's important to note that, increasingly, scalability must be considered in a wider context to support the other applications and segment clouds captured in Figure 3.

Due to the conversion of network functions to virtualized network functions, the challenge is potential, exponential increase in the number and sources of software instances having to be managed. This represents not only a pure administration challenge, there is also a sharp increase in the related data that must be managed and stored.

Complicating the process is the fact that many existing data repositories are siloed, and therefore, not capable of providing a complete data view. There are two options to overcome this limitation. This first is consolidating data into a single repository to provide a single view of the subscriber profile; the second is federating data via software, where multiple data repositories continue to coexist, but can be viewed/queried as one. Whichever approach is adopted, open interfaces and a strong understanding of managing data convergence are vital to successfully realizing all the benefits of FE virtualization.

Step 2: FE Ecosystem Integration
The next step in the process is integration of third-party FE functions to expand the scope and reach of SDM functions. In this scenario, third-party functions include the other market segments we have defined, such as IoT and connected cars. This not only opens the door to new revenue streams, it also accomplishes the goal of creating a ubiquitous SDM data platform.

Step 3: Policy & Analytics Integration
As we have already noted, policy control and real-time analytics will play greater roles in the virtualized world of the future. This is in large part because the data plane is more complex, and requires greater real-time insight into which applications should be allowed to access the BE data store, as well as which privileges these applications should be assigned once connected to maximize the customer experience.

The other consideration is how to most effectively leverage this data to take CEM to the next level. The upside of increased CEM, via analytics when applied to SDM, is it creates new opportunities to develop targeted offerings on a per-subscriber level. Regardless of serving access radio technology, or even mobile device type, data is captured and accessible in an SDM data system enhanced with policy control and analytics.

It also enables a more agile and insightful service delivery model since new services can be spun up, utilizing third-party software, thereby exploiting the inherent strength of a rich software ecosystem that possesses expertise in analytics and policy control (see Step 2).

Step 4: BE Virtualization
The final step in creating a ubiquitous SDM data platform is BE virtualization. Figure 4 shows how applying virtualization techniques to BE databases is very similar to FE virtualization, and provides many of the benefits, including scale and deployment flexibility necessary to support both telecom and other services, such as IoT in the cloud.

Also similar to FE virtualization, BE virtualization represents a strong value proposition. This is because it applies an additional level of software intelligence to the existing BE data repository, known as the User Data Repository (UDR), to create a virtualized UDR (vUDR). In so doing, it not only delivers additional scale potential, since VNFs can be instantiated based on demand, but also helps fulfill policy and analytics service-specific requirements.

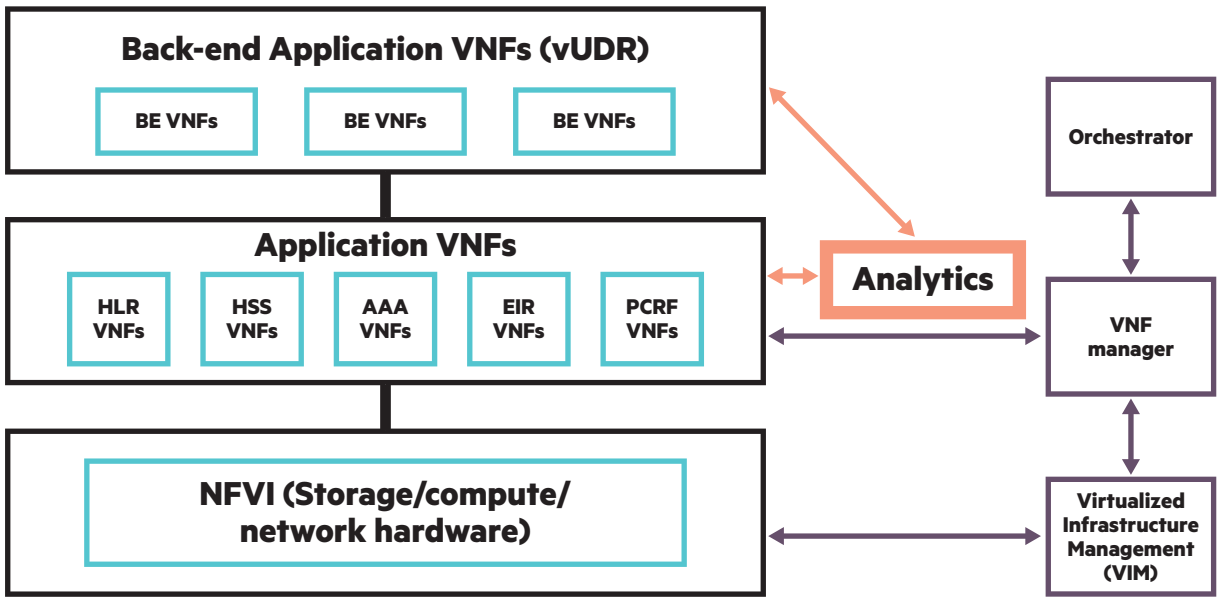

Figure 4: BE virtualization

This, in turn, introduces the opportunity to more intelligently segment data in the UDR to support multitenant services (via unique VNFs), as well as supporting VNFs for other clouds if it hosts data for those third parties, such as utilities (see Figure 3).

Moreover, this approach has the potential to drive an open source and eco-system-centric strategy for UDR vendor selection, which has never been possible before, since past BE systems have been tied to the same vendor FE products.

While BE UDR virtualization represents the final step in creating a ubiquitous SDM system, and will not happen overnight, it's clear that market convergence will be a driving factor to adopt this approach. HPE and other vendors have already developed virtualized BE capabilities to assist service providers with expanding into new service markets, such as IoT. Over time, it is anticipated BE virtualization will become more common as these IoT footprints grow.

Ubiquitous SDM use case

As we have documented, SDM now advances to the next stage in its evolution, having grown from ngHLR to service provider-personalized service delivery, to enabling ubiquitous personalized services.

As shown in Figure 5, applying SDM outside of the service provider domain is conceptually straightforward, based on the extension of cloud and virtualization techniques to other IP-based market segments. In this use case, a service provider offers hosted SDM network functions for an IoT provider.

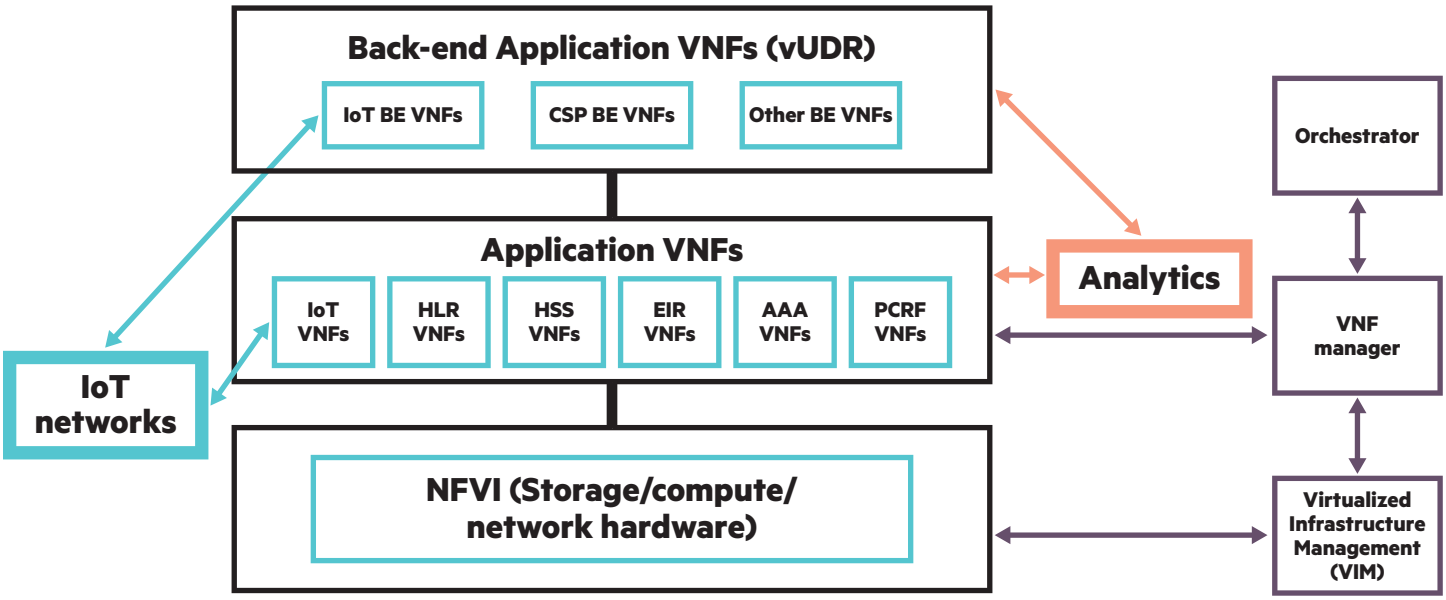

Figure 5: Ubiquitous SDM application virtualization

There are several advantages to this approach. First, it enables IoT providers to scale their business based on IoT growth without having to deploy their own SDM systems. In addition, leveraging BE virtualization means IoT protocols, as well as unique data management requirements specific to IoT, can be most effectively managed via multitenant segregated IoT VNFs in the vUDR.

The other strong value proposition this approach delivers is the ability to apply a unique set of analytics and policy enforcement techniques for IoT subscribers.

Conclusion

The endgame for SDM is now clear. Fueled by market and technical convergence, SDM is well positioned to leverage virtualization, elastic scale, and analytics to extend the concept of services personalization to other market segments, and ultimately deliver a holistic view of customer experience. By so doing, SDM will execute a logical next step in the evolution process, advancing to elegantly support a ubiquitous service delivery model not considered possible only a few years ago.

Learn more at
hpe.com/CSP/SDM

About the author

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