



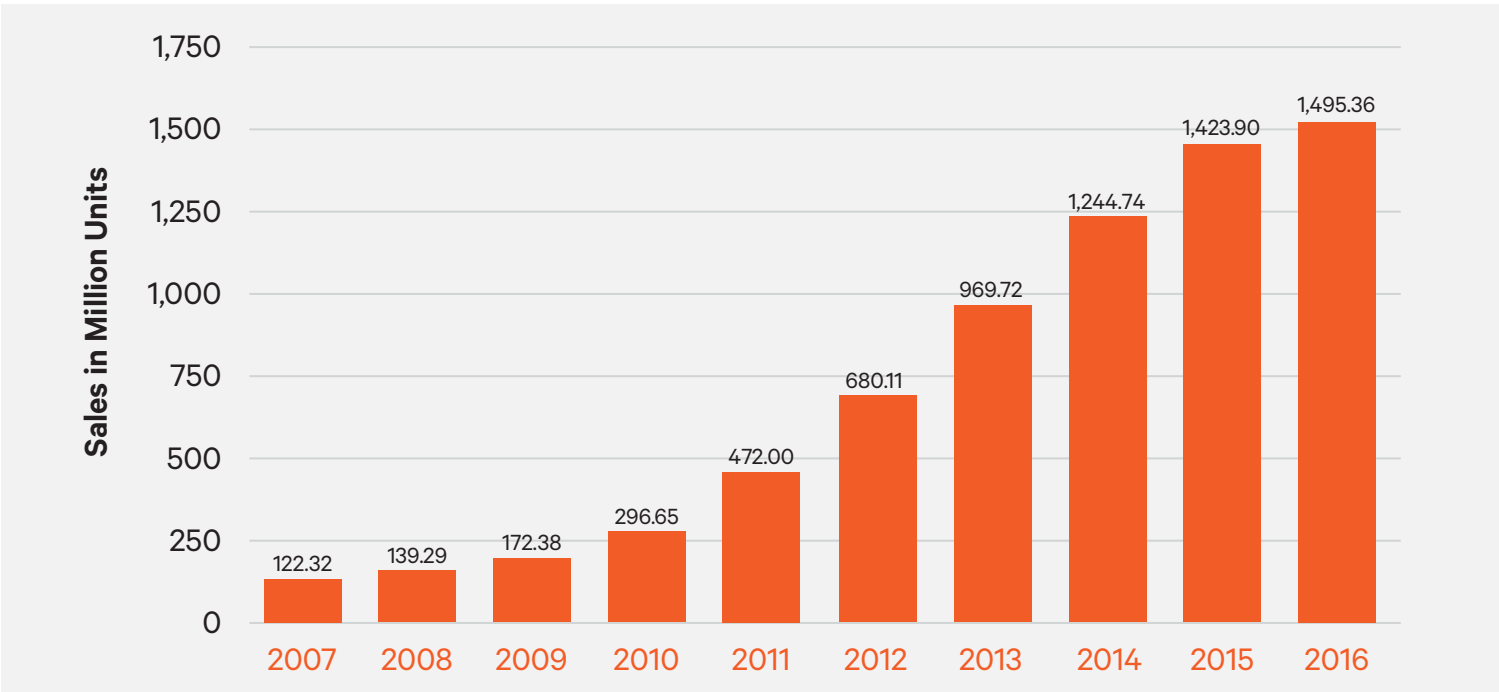
VERTIV WHITE PAPER

Leveraging Smartphones for Improved Operations in the Data Center

It could be argued that the smartphone has had the largest single impact on human society in the last 50 years. It has brought about more change in our daily lives than other technology such as the internet, personal computers, global telecommunications, the phonograph and the photograph. In part, because the smartphone is a nexus for all these individual inventions. It takes all the ‘power for change’ held within each invention and puts them into a single point of use. More powerfully, it allows them to be used simultaneously; to make them far greater than the sum of their parts. What is even more astonishing is that this ‘nexus’ is barely 10 years old.

While there were previous attempts of the smartphone concept through such devices as the PDA and mobile phone hybrids (e.g., Ericsson R380, Palm Kyocera, etc.), essential and even ‘magical’ ingredients were missing. But with the release of the iPhone in 2007, Apple made the single most landmark change to the way we are empowered to, and even expect to, interact with the world and people around us. Jump forward 10 years, smartphone consumption has changed from 122 million units per year in 2007 to almost 1.5 billion units per year in 2016. The chart below shows that over that same 10 year period over 7 billion total handsets have been sold.

This ubiquitous invention now lives alongside us. The features and abilities often have a place in both our professional and personal spaces. The inventive and innovative power is continually evolving and adding to the ways in which it can augment our lives.



¹Source: Statista, 06 July 2017.
<https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/>

What Value Can the Smartphone Add to the Data Center Industry?

The data center industry can leverage this powerful tool through a variety of means. There are many key functions and features that make using smartphones in the data center a compelling idea. One way the smartphone is especially useful is for power management at the rack level. Collecting data from rack power distribution units (rPDUs) can pose certain challenges for data centers such as time-consuming data collection, human error from manual data entry, issues with network access and decreased collaboration due to restricted permission levels.

To address the above challenges, consider these four features of the smartphone in relation to power management at the rack level:

Using applications (apps) to solve data center-specific challenges

Harnessing speed and convenience for improved cross departmental data sharing

Using optical character recognition (OCR) and image processing for fast, accurate data gathering

Implementing augmented reality for improved data collection security

Applications (Apps)

Access to Distinct Operational Programs that Solve a Problem or Enhance a Routine Experience

Mobile smartphone applications are the engine that helped propel the smartphone to the nexus that it is. The irony that you need a phone app for your phone exemplifies how much the smartphone has changed our expectations of what this technology should be able to do. When is the last time you selected your smartphone based on the ability to make a phone call? Instead of using a phone as a primary means for calls (or even texts), many users' primary purpose is for taking photographs and videos, staying connected to social media, managing email or for having consistent access to programs that make life more convenient. Maps, reminders, alarms, lists, workout programs and even sleep apps fill our smartphones.

How can data center managers leverage the use of apps in their facilities? The possibilities are endless. Power management apps via smartphones provide data center managers with the ability to more efficiently accomplish the following tasks:

- Run reports on power usage
- Collect power usage data
- Handle change management
- Designate groups of rPDUs
- Provide visibility across departments without having to provide network access

Apps allow the technical capabilities of the smartphone to work together to create new conveniences to old problems, thus bridging the gap between manual and automated processes.

Speed and Convenience

A High Specification PC that is 100% Mobile

One of the primary perks of the smartphone is that it is powerfully agile. Internet connectivity, GPS, Wi-Fi, camera, extended battery life, advanced CPU and GPU are all packaged in a convenient handheld device. These features have created new user experiences and expectations of how we accomplish individual daily tasks and how we share data as a group.

Imagine using your smartphone to collect rPDU data and automatically send reports to any number of user groups. Instead of collecting data via manual sneaker reports accompanied by entering the data into the software layer, what if you could collect and send data via your smartphone, eliminating the need for manual reporting? With no requirement to gain network access to the rPDU, pertinent rPDU information could be easily shared across Facilities and IT. Within the colocation environment, sites that require rPDU data could access details easily without compromising the network security for their customers.

Smartphones can help eliminate human error associated with manual data entry by reading directly from the rPDU.

Optical Character Recognition (OCR) and Image Processing

Use Smartphones to Scan and Record Data to Decrease Human Error

One of the top features for many people when selecting a smartphone is the quality of the camera. The ability for smartphones to visually recognize or “read” characters has created opportunities for tools like facial recognition, audio reading for the visually impaired, promotional coupons and ads via QR codes—among many others.

Using this method of data collection eliminates human error that can occur from manual data collection and re-entry into a software layer. One simple scan across an rPDU and all pertinent data is collected without manually writing down entries. Data collected from rPDUs at the rack level is critical for making informed business decisions regarding capacity planning for power, space and cooling. Too often, values are recorded inaccurately or too infrequently, decreasing the validity and value of any report that is created. Any rework that

must be subsequently completed is costly, both in time and money. In addition, decisions made using inaccurate or incomplete data can be costly to a data center.

What if that same camera technology could be used in the data center to automatically read data from rPDUs and send that data back to selected users?

Augmented Reality

Making the Invisible, Visible

Augmented Reality (AR) has been a recent addition to the smartphone platform. Though long since discussed, it has not been until more recent times that smartphones have had the necessary CPU/GPU power to process in real-time the 2D world of the phone camera and augment it with 3D generated elements. Where virtual reality (VR) is currently focused on entertainment, AR creates huge opportunities for businesses to better utilize their environments by manipulating their surroundings. Smartphones can allow for improved workflow and human interaction, as well as adding functionality to equipment that previously did not support it.

Augmentation does not have to be limited to the compositing of digital and optical imagery via the smartphones display. The technological capabilities of the phone can enhance the functionality and usability of a device by leveraging the smartphones’ power as a truly mobile power PC.

A fighter plane’s heads-up display (HUD) is an example of early augmentation through technology. The HUD provides a way to improve the pilot’s capabilities by keeping their eyes on the air space rather than down at the controls. Taking this design philosophy further, a smartphone can be used to magnify human activity in a data center by improving the capabilities of products that are not inherently available within the product. An example of deploying this augmentation into the data center space is to improve the products’ integrated displays by providing more information than they are naturally capable of displaying. This is accomplished through the encoding of data that allows more advanced information to be sent to a smartphone through optical character recognition (OCR)—making the invisible, visible.

Conclusion

As smartphones continue to grow as an extension of our daily lives, so will the expectation that they have greater inclusion within our workspace. As their capabilities grow, data centers should look to leverage their power and strength to positively influence their operations through improving human interactions and augmenting human ability. Power management is just one possibility for using smartphones to enable new levels of interaction with previously limited objects like rPDUs. Implementing smartphones means that data center personnel can expect more from their existing products—without necessarily adding expense or effort. In fact, re-imaging processes, such as power management, with the smartphone in mind, typically provides a cost-effective way to improve efficiencies, accuracy, workflows, team work and ultimately act as a bridge between systems.

