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WHITE PAPER

New Technologies Expand the Key Role of TEM

TEM and Digital Transformation Collection
Part Three

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TABLE OF Contents

We've already seen the incorporation of RPA, AI, ML, cognitive, and other automation applied to improve TEM. New technologies will create new opportunities to leverage automation to improve TEM activities and the results they create.

Say the word "telecommunications" or "telecom" or even "telco" and most people immediately think of the telephone and voice communication. Not anymore.

With all the new technologies that are constantly emerging, many have suggested that the acronym TEM should permanently change from meaning "telecom expense management" to "technology expense management." Whether it changes or not, all the new technologies depend upon telecom services to enable them.

Things Have Never Looked Better

In 2008, Cisco Systems announced that there were more "things" on the internet than people. That difference has exploded ever since. There are now billions of things, devices, sensors, switches, HVAC systems, streetlights, manufacturing equipment, cars, computer servers, refrigerators, even toothbrushes on the internet, so much so that we talk about the Internet of Things, (IoT) but it isn't a separate network. For large corporate organizations there's even an Industrial Internet of Things (IIoT) that also runs on the same internet as everything and everybody else. Billions of things all attached to the internet and all have one thing in common: They are all communicating.

The implication for TEM is that there are more endpoints to manage than ever before by an unimaginable magnitude. Each one using some telecom service to give or receive information to or from its host system. And, yes, each telecom connection must be paid for in some way to some provider. That bill must be tracked and paid just as any voice service would be. Many may only require a short haul to the nearest internet point of presence (PoP), but whoever provides that must still be paid. TEM is required to manage those billions of transactions.

Cloud-Native Software Applications

With so many endpoints using the internet, it was only a matter of time before software was developed specifically to run across it.

Traditional software applications weren't the right solution. They were written as large, self-contained sets of code, complete with all the routines, subroutines, resources, classes, libraries, literally everything needed for that program to run. Today, we refer to these as monolithic applications. Imagine a large handball court wall. Everything needed in one mammoth block of code.

Now imagine that handball court wall falling over.

> This gives cloud-native software unbelievable resiliency, flexibility, and unrivaled agility.

This is what would happen whenever anything went wrong in that mammoth block. Any error, human, machine, or otherwise, would bring the entire application down bringing all users to a halt.

Today's software is designed to run across the internet. Each operation that needs to be performed exists as a separate entity referred to as a microservice. Each microservice is packaged in its own container which contains anything and everything it needs to run. This way, wherever that microservice is assigned to run it brings all its resources with it, so it can run anywhere in the cloud. Microservices in their containers are totally and easily transportable.
But what if a microservice has a problem, an error, or some other fault?

Instead of bringing the entire system down, that container is simply discarded, and a new replacement is generated. Everything else continues running, users continue to be served. The new container travels to its intended destination and runs just as if the original faulty one had never existed. This gives cloud-native software unbelievable resiliency, flexibility, and unrivaled agility.

Since these microservices run in the cloud each must travel to and from systems connected to the internet. Once again, TEM owns responsibility for keeping all those connected systems connecting.

Mobility Everywhere

Many connections are made without the use of copper or even fiber-optic cable. Wireless systems continue to evolve and improve connecting two thirds as many mobile devices as there are people on the planet. According to Datareportal reports 5.16 billion mobile users, some using more than one device bringing the total of mobile connections to almost 8 billion not counting IoT and IIoT connections. Each connection requires more than just a gateway to the public switched telephone network (PSTN), they must also connect efficiently and reliably to the internet. Their accounts as well as the user equipment required to use them must also be closely tracked in inventory by TEM, renewed on time and terminated promptly when no longer needed.

Physical locations may aggregate connection for many of these devices through local wi-fi connections to a central access point that connects to the internet via cable. With the use of repeaters, mesh network devices, and more these access points may provide wi-fi coverage for entire buildings, campuses, even some cities. Statista estimates there were 362 million wi-fi access points connected to the internet in 2019. Assuming an average of ten users connected to each, that's 3.62 billion fewer carrier connections for TEM to worry about. That was nearly a quadrupling of that number since 2016, so where will we be three years from now?

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Coming Soon - 5G

The fifth generation of wireless digital communications is upon us, bringing the promise of significantly greater internet access speeds and virtually no latency whatsoever.

We earlier mentioned cars being connected to the internet. The self-driving automobile is clearly an application that requires zero latency. Otherwise, if the connection lapsed just as the car was deciding whether or not to make a left turn the results could be disastrous.

There will be many such applications that require zero latency, and even more that will benefit from the dramatically increased throughput speed.

With different carriers approaching 5G differently, and new technological requirements, there's no knowing how they will be billing these services. However, they do it, TEM must be prepared not only to monitor, evaluate, and pay the bills, TEM must also be ready to provide superior advice to clients as to their best way to deploy the new advantages.

The Implications of Big Data May Start Sooner Than You Think

Thanks to new and improved data management and technology tools, many organizations are taking advantage of huge quantities of data they already have in ways they hadn't formerly imagined.

The implications of Big Data begin for TEM far sooner. The element that has really given rise to the new generation of benefits derived from big data analytics begins with the collection of huge amounts of data. Capturing the data is followed by transporting the data to storage in a cloud data center.

Data collection sensors are everywhere. When you drive on the highway there are sensors underneath you and on nearby light poles. Every toll gate now has sensors scanning your pass. The digital display you watch in a retail store is watching you right back, and gauging your sizes, gender, age, weight and then following you to see how you travel through their store.

Every mobile phone is sharing immense amounts of data at all times about where you are, what you're shopping for, who you're with, your health telemetry, your transactions, your communications, and much more. Even begin to multiply the number of data points times the number of users at each minute of the day and you can feel the data become huge.

TEM takes responsibility for most of the collection, transport, even the storage and retrieval of the data for analytical purposes.

In return big data collection helps TEM by collecting direct call activity data to compare with carrier invoices to verify them.

Artificial Intelligence (AI) and Machine Learning (ML)

In the early days, TEM was a painstaking process of gathering, organizing, and examining thousands of invoices as they arrived, checking them for mathematical accuracy and doing the best possible job of confirming accuracy given the limited time between their arrival and the due date for paying them.

Robotic Process Automation (RPA) and other automation technologies do that same processing in a fraction of the time and make fewer errors. This automation has enabled a whole new level of accuracy and timeliness in TEM reporting and invoice payment.

AI and ML take this automation take TEM even further.

One of the values seemingly lost when automation took over many of the formerly manual processes, was the observations and intuitive correlations the human operator could make while examining all that data. For the early automation technology, this data was simply a stream of data points to be calculated.

ML reads the same data and begins to draw inferences, identify patterns, correlate events with related events, and find anomalies and problems that would not otherwise be detected. AI converses with your management to put these inferences into context and accessible by them.

These technologies are especially valuable when presented with multiple volumes of big data from which to infer and correlate. Accessing that data requires connectivity and so involves TEM in keeping those digital minds humming. AI and ML may interface with social media, the IoT and IIoT, and other big data sources to assemble the data needed for any particular analysis. TEM assures that these connections are always available to them.

Increasing the Need for Speed... and Agility

Software-Defined Wide Area Networking (SD-WAN) is not just another kind of long-line connection. Far from it. SD-WAN is routing technology that allows the combination of multiple kinds of connections bonded together to result in one very fast, highly resilient, fault-tolerant network. These connections include broadband, Digital Subscriber Line (DSL), Virtual Private Network (VPN), Multiprotocol Label Switching (MPLS), even wireless 4G LTE all working together and backing each other up. Since it is software-based it is highly flexible, adaptable, and agile.

The product of removing routing intelligence from router hardware, running it instead on server-class computers, making it far more accessible to operators, SD-WAN makes use of the public internet to transport data. Anytime you're on the internet you cannot guarantee much of anything. Use cases like audio or video calls require high continuity with zero latency. SD-WAN can't guarantee that, but MPLS can! MPLS is a direct connection between two points that never reaches the internet. Throughput is consistent. But MPLS is very expensive, and it limits the flexibility of a network. SD-WAN is as much as 50% less expensive than MPLS. And if you have a critical constant communication use-case that requires MPLS, the MPLS can be one of the connections bundled together by SD-WAN which adds far more manageability and improved security.

Voice and video solutions whose services are managed in the cloud are specifically designed for superior performance in an unpredictable transport environment like the internet. Like cloud communications, SD-WAN was designed for the cloud and delivers performance that is very acceptable at a cost that is highly preferable. SD-WAN can throttle low priority network traffic to prefer high-criticality applications, and it can do so on-the-fly.

Another benefit of SD-WAN created by the accessibility of the software that runs it is that it can recognize applications, bandwidth requirements, and other characteristics where MPLS is just a connection. No intelligence.

TEM benefits from the decision-making ability of SDWAN turning traffic patterns into accessible data ready for evaluation. As with every other technology advance discussed here, SD-WAN depends upon TEM to keep all its options and alternatives open.

The Growing Importance of TEM

Communication and computation have always been inextricably intertwined, but never as much as today. Very few computing devices are not connected to some form of communication service. In fact, more users use their computing equipment more for communicating via email, VoIP, texting, reporting, presenting, and more than they do to perform calculations.

This makes telecom an integral part of all computer-related operations. Where there is telecom there are expenses, and those expenses require management right along with all the technical operations. In the world of computing TEM keeps the lights on and working at their peak performance.

If you are interested in learning more - read Part One and Part Two of this TEM and Digital Transformation white paper collection.

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