

Big Data: The future of Mediation



Management Summary

The behavioral cycle for Communications Service Providers (CSP) that was triggered by global deregulation throughout the industry in the 1990s is ending. Today, we are reaching a new inflection point. Where, fifteen to twenty years ago, productized software and in particular the role of billing systems were seen as both a measure of and an answer to addressing the changing needs of the CSP, this time the shift is more subtle. Intelligence, in the form of raw data, is the key to progress. How to unlock it is the question. This time, the pivot isn't the billing system but instead lies in the areas of BI, Analytics and most importantly Mediation. Without enhanced functionality in these solution areas, strategy amounts to little more than putting lipstick on a pig. This report addresses a simple, but critical question for CSPs today. Big Data: The Future of Mediation. We believe that future has arrived and we will explain both why we have reached that conclusion, and what we think it looks like.

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CSP – Communications Service Providers

Introduction

Approximately twenty years after global deregulation drove the telecommunications industry's first fundamental shift in direction in the mid 1990s, a second inflection point is fast approaching.

Two decades ago, with the introduction of competition, the customer supplanted the network as the focal point of CSP operations. Growing market share while reducing churn became the core drivers of business strategy. To enable these goals to be met, a generation of Business Support Systems (BSS) proliferated in areas such as billing, rating, mediation, customer care, and CRM (among others).

Where once the CSP had run its business with an almost exclusive focus on hardware (circuit switches and signaling systems) augmented by self-developed customer-facing systems, suddenly its focus broadened to include acquiring solutions in the new areas necessary to enable it to compete in an open market.

With the arrival of the second inflection point, today the goalposts are shifting again. Now, the customer is being replaced by a new focal point within the industry; information. This is information that in the past twelve months has assumed the common name "Big Data". Today, "Big Data" is the phrase that threatens to re-shape the landscape.

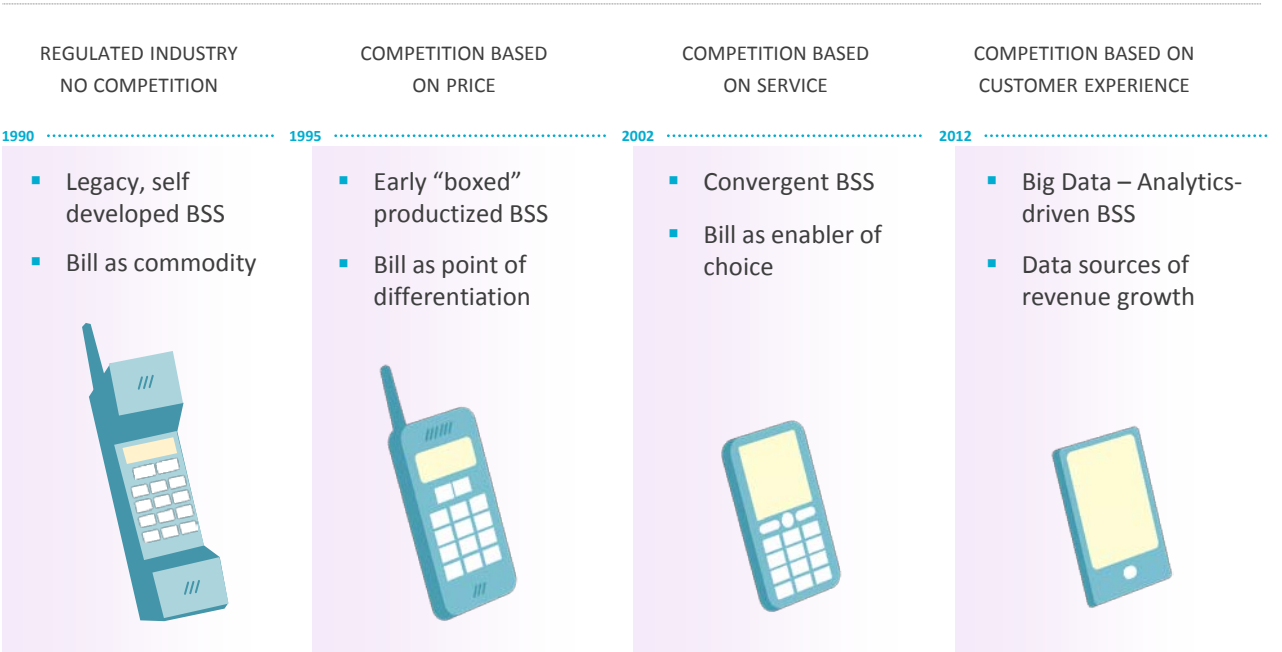
In reality, this Big Data has not displaced the customer. Rather, it simply threatens to re-define the rules of customer engagement. At the simplest level, Big Data

delivers the ability to get the customer relationship right. Today, the communications industry is highly aware of Big Data but few are in position to do much about it. This is partly because it's potential is not yet fully understood and partly because the IT infrastructure required to manage and exploit it generally isn't in place. Enter mediation.

Mediation solutions have, historically, been "beasts of burden" in the CSPs IT infrastructure. They've performed the heavy lifting, taking usage information out of the network and, in general terms pre-processing it before down-streaming it into, most commonly, billing systems. While to be sure, highly effective mediation products have outstripped their counterparts in terms of processing speed, hardware requirements, and efficiency in general mediation has been a low-profile activity confined to the back office.

In the new age of information, and Big Data, this will change. If Big Data is now the telecommunications industry's prized asset then its data processing engine suddenly becomes central to enabling the execution of its strategic intent. In so doing, the future of Mediation is redefined.

This paper will look at the forces re-shaping the communications landscape and explain not only the challenge they throw down to mediation products, but also how those products must adapt to meet them.



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CSP – Communications Service Providers

The Evolving Communications Service Provider

Over the past twenty years, traditional telecoms services have been commoditized while simultaneously, innovative mobile offerings have redefined the commercial and competitive landscapes. When the consumer thinks “CSP” today, he or she commonly thinks about Apple, applications, and data-based offerings.

Many observers have concluded that this new reality threatens to render the underlying network provider (the traditional CSP player) irrelevant. After all, who thinks about the “pipe provider” first? But to reach this conclusion is wrong.

That is because it over simplifies complex strategic questions as well as obvious realities. Furthermore, it fails to understand the nature of the new, Big Data opportunity. Offering OTT services is, for the CSP, not a mandatory choice or an inevitable evolutionary step towards ensuring future success any more than remaining solely focused on pipe provision is a guarantee of missed opportunity.

The business models and cultures required to be successful in one arena or the other are fundamentally different from each other anyway. Now, Big Data plays to the CSPs traditional strengths and, in the information age, allows it to turn away from what it’s never been good at (marketing, innovation, speed of change) while focusing on what it is (pipe provision, data crunching, exploiting utility-like software expertise in areas such as billing.)

The simple truth is that in the information age, being a bit pipe player means winning the game if you can monetize your network and leverage those key assets. It is here that mediation becomes a part of the story.

The reality of this worldview is to some extent seen in practice in the recent agreement between Orange and Google¹, whereby Orange-France Telecom has been able to impose a deal on Google to compensate it for the vast amounts of traffic sent across its networks. Does anyone believe that competing with Google and launching a competitive search engine or video service

If information is the new El Dorado for CSPs, then OTT services – regardless of the relationship between the service provider and the network owner – will be necessary components in stocking the gold mine.

Let us be clear that OTT players are not, by definition, competitive threats to the CSP. In fact, far from hastening their demise, the age of Big Data affords the opportunity for a re-birth in the importance of the pipe. If information is the new El Dorado for CSPs, then OTT services – regardless of the relationship between the service provider and the network owner – will be necessary components in stocking the gold mine.

Seen from this perspective, in the information age OTT services are simply a data creation opportunity for the CSP to milk. The money is in the data that OTT traffic generates and that resides in the network; the CSP doesn’t have to be the service provider itself to take advantage of it.

Thus, seeing the industry in the context of the service provider having a “choice” between bit pipe and value-added focuses (or extending to both roles) is misplaced.

represents a viable strategy for Orange? No. Yet Orange, without departing from its core strengths, is clearly able to monetize those services riding its network, and in more ways than one when it is able to exploit the data that follows.

Big Data renders many of the arguments raging in the communications industry over the last decade secondary. To be sure, unclear strategic initiatives around content and partnering remain problematic areas that CSPs need to resolve but those question marks do not preclude the creation of a successful Big Data story. The simple reality is that via WiFi now, and increasingly 3G and LTE in future, traffic is booming. The information that results from that activity is waiting to be tapped.

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OTT – Over-the-top services
CSP – Communications Service Providers

¹ As widely reported in the media.
LTE – Long Term Evolution (4th Generation Mobile Network)

Is Digital Content Really Changing the Paradigm? What About M2M?

As we alluded to in the preceding section, the “digital content debate” which has raged fiercely in the communications industry in recent years may be about to be rendered obsolete in the age of Big Data. To repeat, the prize for CSPs may no longer lie in owning the service (and the problems that come with it) but owning the data that results from it.

Whether through acquisition or organic build or via partners, does – for instance – becoming an IPTV player that creates and subsequently monetizes its own content really represent a sensible or viable evolutionary path for the network operator?

Even though content may constitute a significant and growing share of consumer spend, the question for CSPs is whether this fact represents a sensible reason for moving, as many have suggested doing and others have tried to do, into the content business itself. Whether through acquisition or organic build or via partners, does – for instance – becoming an IPTV player that creates and subsequently monetizes its own content really represent a sensible or viable evolutionary path for the network operator? Does the general industry experience of the past decade suggest that this is likely to be a business model for future success? Are there alternatives?

The rising costs of acquiring premium content rights and the constraints of revenue sharing agreements would seem to render self-produced content as the most viable way forward for operators determined to take this path. Yet what if they do? Content is a radically different and unfamiliar business requiring significant operational scale and subscriber bases fundamentally different in nature and behavior from those with which the CSP is familiar.

Marketing ability, rarely the natural habitat of the network operator, is a prerequisite for success. Even where money can be made, the runway to profitability is likely to be long (at least five years in the view of most experts). If CSP strategy with regard to directly owning or producing content has been either unclear or slowly evolving, perhaps that’s because the merits of such a move are questionable in the first place.

The “Netflix experience”, which may provide an opportunity and certainly affords lessons for CSPs, is instructive. With a subscription business model that threatens the accepted movie studio status quo by seemingly invalidating traditional pay-per-view services, but is nevertheless beset with service delivery and quality of service challenges that the company has failed to fully overcome, could CSP partnerships in which each party reverts to its areas of expertise be the future for Netflix and other commercial opportunities like them? The points of mutual expertise and interest are obvious and do not involve the crossing of well-established lines:

- CSPs (via IPTV) can play the role of Video-on-Demand distributors in exchange for first access to new releases and revenue shares.
- CSPs can white label online distribution abilities with quality of service connectivity guarantees.
- CSPs can augment content services with a range of value added offerings in areas such as payments, billing, interactive marketing, customer care, and supplemental content delivery.

The “Netflix experience”, provides both an opportunity and an instructive lesson. CSPs can reap the rewards of the future by doing a lot of what they’re already good at.

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M2M – Machine-to-Machine
IPTV – Internet Protocol television

CSP – Communications Service Providers



“DigitalRoute’s MediationZone enables efficient data integration between our IT and Network environment. It has played a key role differentiating our M2M offering and has reduced the complexity of introducing new features and giving our customers a unique experience.”

–Stephen Bryant, Head of Technology and Operations, Telenor Connexion

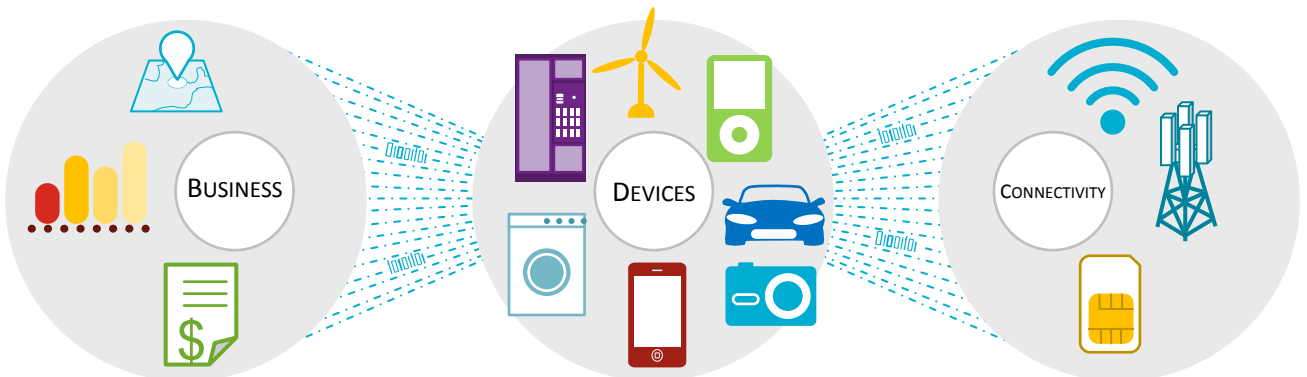
The reality is clear. Content, particularly video (in the earlier example, YouTube already represents as much as 50% of Orange’s traffic)¹ may be king but operators do not have to enter the content game to capitalize on it. By doing what they already do best, in tandem with reaping the rewards of the usage data that content generates, the way forward is clear.

While the increasing variety of service offerings, particularly in the direction of content, tugs at one end of the CSP’s spectrum of interests (and as service providers struggle to identify the right means to address that opportunity), machine-to-machine (M2M) services sit 180 degrees in the opposite direction as the second moving force redefining the CSP landscape.

Less mature than the content industry and involving merging telematics with multiple data-generating devices, M2M offerings are proliferating rapidly. Whether the services remain crude, particularly in terms of their pricing, is beside the point; from the perspective of generating usage data they are as valuable as anything else. And this will become more so as pricing models mature and complexity ensues.

So how big is the M2M opportunity and what is it likely to yield?

Analyst firm Berg Insights estimates that by 2015, M2M home installations alone will be a \$9.5bn market. Mobile app revenue is projected to hit \$38bn in the same year. Today, there are believed to be between 100 and 200 million M2M connections. This number is projected to increase to 60 billion by 2020. Gartner projects revenue generated by apps will reach \$30bn this year. And all these machines, generating a tsunami of actionable data, are utilizing communications networks.



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M2M – Machine-to-Machine
CSP – Communications Service Providers

¹ Widely reported in the media, though estimates range between 45% and 50%.

The More Things Change, the More They Stay the Same?

With all these, and other forces, re-shaping the communications services landscape, what role should the CSP play in the new world? As we noted at the outset, data should almost certainly guide the answer. While the shift to LTE and 4th generation mobile technologies will throw up network enablement challenges, particularly around the area of signaling, the data opportunity remains to the fore. And with full rollout of 4G LTE networks globally widely anticipated this year, now voice is once again threatening to become the killer app that redefines the communications landscape.

If, as predicted, Voice over LTE takes off, the service provider's traditional hand could quickly become significantly devalued in an entirely new, high-stakes poker game for market share. In the data network, minutes won't matter anymore meaning traditional billing and charging paradigms (and their supporting BSS infrastructures) could become irrelevant while, simultaneously, mediation – the means of collecting and aggregating the data – will come to the fore as that challenge takes on new dimensions.

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Voice over LTE (VoLTE) – the crown jewel of the new network – proves the point. The “Skype on Steroids” reality of voice really becoming just another application riding on a data network turns the OTT services we're now familiar with into something that delivers faster, better data-network calls with a myriad of other desirable extras (like video chat) as well, all tied to your mobile service. The paradigm we're familiar with really is about to change.

VoLTE may give Communications Service Providers an edge in competing with the likes of Skype, both due to

their services' tighter integration with a network that tracks location, device type, and billing information but also due to their ability to ensure the network quality required to carry a voice call in a manner that Skype cannot match.

As has always been the case for any kind of service provider, at heart the new CSP world remains about the customer experience. Big Data changes the equation in that the service provider's the ability to improve that experience lies in the knowledge contained by usage information rather than the service itself. This means the future lies in understanding the data goldmine the service provider is sitting, rather than trying to squeeze additional pennies out of the service itself.

The process of turning individual events into information that can be fed into an analytics system is pivotal. This – via anonymization, aggregation, data cleansing – is where the mediation solution emerges as the bedrock on which future success can be built.

The simple reality is that whether between devices and services like OTT, or between machines, CSPs have unrivalled access to usage data from which they can draw conclusions and enrich the customer experience in the process.

From demographic data to location data to information about content used, the potential for data to positively inform the customer relationship – and it has already started to be tapped by some forward-thinking operators like 3 in the UK – is little short of staggering.

But how will it work? In this new world, we believe that mediation will be a key enabler. Individual usage events have little or no intrinsic value; it is only when seen collectively that their influence can be leveraged. Thus, the process of turning those individual events into information that can be fed, downstream, into an analytics system is pivotal. This – via anonymization, aggregation, data cleansing – is where the mediation solution emerges as the bedrock on which future success can be built.

NOTES

VoLTE – Voice over LTE
OTT – Over-the-top

CSP – Communications Service Providers
LTE – Long term evolution

Mediation is the Bedrock of Managing the Customer Experience

Imagine a scenario where a customer is trying to access streamed video content from an OTT provider.

The CSP that provides the bearer also provides an ad service to the OTT provider, enabling in-stream advertisements from third parties. The advertisement to be played is tailored to the customer's location, past history of consumption and identified interests based on requirements outlined in advance by the third party. These requirements are relayed to the CSP via the OTT provider, which is in a unique position to mine this type of data. Apparently, the selection of advertisement has to be done in real-time and requires the aggregation of data from multiple sources including the access, core and IT networks and possibly external sources as well.

The content is to be streamed with a certain Quality of Service standard related to the subscription type of the customer. A policy decision thus needs to be provisioned, also in real-time, towards the CSP's core network when the streaming session is initiated.

During the streaming session, the network becomes congested and the customer's traffic is automatically offloaded to a nearby WiFi-network. Again, a real-time policy decision is required but one which also takes data from the access network into consideration.

A common denominator for the challenges in the above scenario is that creating the "information view" that is required to enact the critical decisions identified means processing millions of events per second that are being constantly streamed from hundreds or possibly thousands of sources. The processing must take place close to those sources in order to minimize the amount of data that must be stored and transferred between different operational silos.

Systems for Policy Control, Charging, Settlement, Performance Management, and Analytics all require different subsets of the same data but each with unique demands regarding format, protocol and delivery (e.g. batch or real-time). Creating an early information view of real-time data is essential as it allows business and operations support systems to scale and generate more value.

In order to overcome the challenges described here CSPs must deploy a "real-time enablement layer". This should provide a flexible integration framework with intelligent data transformation capabilities, the type of strategic role for which mediation systems are designed.

Mediation Enables Strategic Goals to be met

Embracing new opportunities is a challenge when data integration infrastructures have been allowed to multiply over many years. A unified Mediation solution helps CSPs to adapt to new business requirements.

In a new evolved role, mediation creates opportunities for CSPs to monetize Big Data using the capability to collect data that is passed between the device and the OTTs and combine this with demographic and network data. Efficiently creating valuable information from individual events that are essentially without value is one of the key benefits that a unified mediation system provides.

Examples of such information include:

- General area
- Age range
- Device Type/Model
- OS version
- App download categories and titles
- Music/film preferences
- Visited domains

Mediation makes it possible for CSPs to offer selected views of historical, real-time or predictive information about users or segments to suppliers in virtually any industry including healthcare, education, publishing, public services, manufacturing or retail services. The capability to expose real-time information means that these suppliers can take advantage of consumer actions as they happen, adding even further value to the CSPs offerings.

NOTES

OTT – Over-the-top services

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The Mediation-Centered Solution

MediationZone from DigitalRoute makes it easy to integrate systems and enterprise applications in enterprises that depend on a combination of high-volume batch and real-time processing. The wide range of formats and interfaces that are supported and multiple integration methodologies that combine in a single product makes it possible reduce the cost and complexity of introducing new services while enabling new revenue streams and enhancing the customer experience.

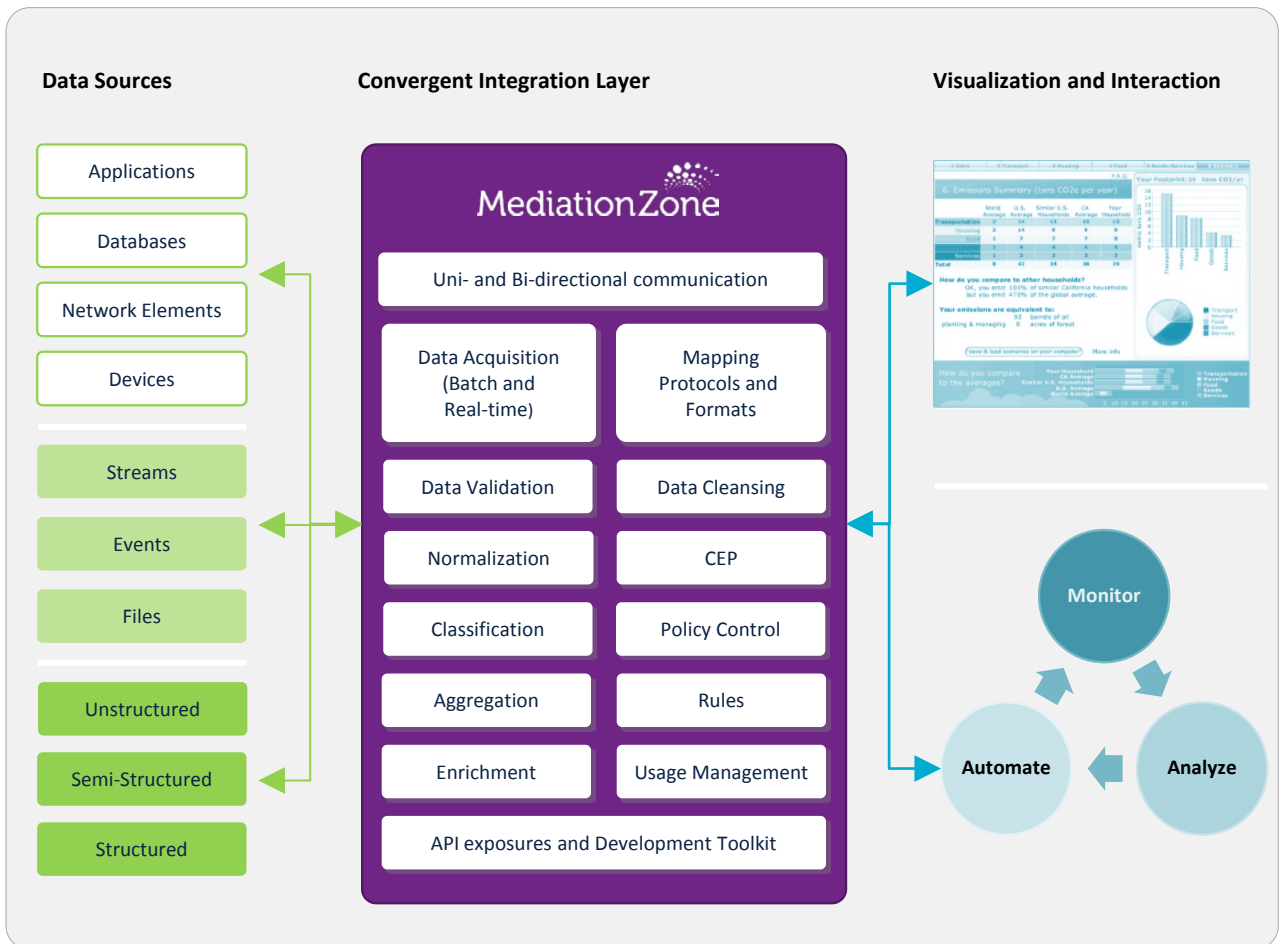


Figure 1 – MediationZone interfaces and processing capabilities

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CEP – Complex Event Processing

API – Application Programming Interface

Close to the Source

MediationZone alleviates problems related to processing the huge amount of data that is generated by devices, network elements, processing equipment, and business and operations systems. MediationZone collects data close to the source and performs multi-source aggregation to reduce data volumes while maintaining granularity and ensuring data quality and consistency. This reduces the load on the target systems and increases the possibilities to introduce new types of analytics and make use of data that was previously discarded.

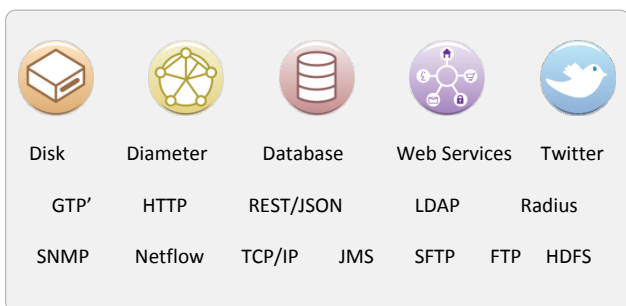


Figure 2 – Interface examples

An example of how granularity can be maintained lies in the solution’s Usage Management functionality. Unlimited counter hierarchies can be created to store KPIs, account balances, accumulated usage or any other metric based on data collected close to the source. This information can be included in batch or real-time (e.g. via bi-directional queries) to external systems or set up to trigger events for end-user communication, Policy Control, or retention programs as required. Information is consolidated to the level required by each individual system. This radically reduces the data volume that is propagated downstream .

MediationZone is a fundamental component of the transformed Billing and Revenue management processes at KT.” - Jae Lee, VP, Biz & IT Transformation at KT

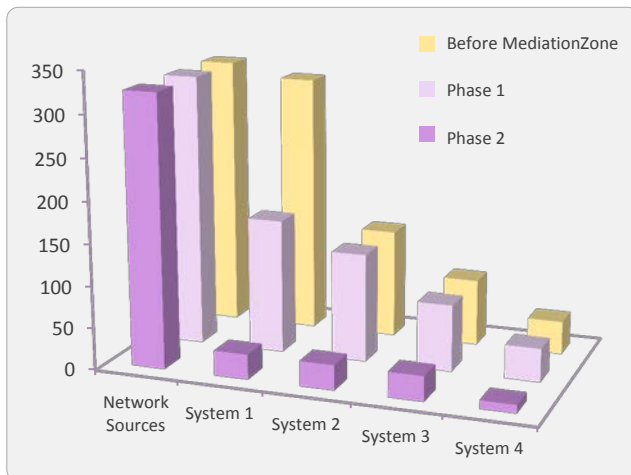


Figure 3 – Operator in Western Europe, data records reduction

One of the key aspects of MediationZone is the ability to act on events as they occur. Online charging, policy, real-time analytics, service assurance and advertisement profiling are examples of application areas common in real-life deployments. The Usage Management and integrated rule engine of MediationZone makes it possible to immediately detect and act on user or system events at any level. This includes data aggregated in external systems such as SAP HANA or IBM Netezza.

Examples of real-time processing use cases include:

- Subscriber spending control e.g. notifications
- Rules towards policy enforcement function
- KPI per cell, network, device or subscriber to performance- and customer experience management systems
- Alarm based on consumption habits, service KPI triggering retention programs
- Targeted advertisement based on typical location, demographics, history

Partners of DigitalRoute have deployed MediationZone for real-time aggregation of data from disjunctive data sources in LTE networks and with target capacities in excess of 1.2 million events per second. One example is Astellia, a leading provider of probe-based monitoring solutions for the optimization of mobile network QoS and QoE, now integrating MediationZone into its real-time Nova monitoring solution.

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QoS – Quality of Service
KPI – Key Performance Indicator

QoE – Quality of Experience

Cloud Integration

The flexibility and connectivity provided by DigitalRoute can be combined with the latest cloud technologies to further reduce costs and enable new type of analytics.

MediationZone integrates directly with HDFS and requires a very small footprint to upload the collected data for Hadoop processing (MapReduce via PIG) and forwarding to external systems on-premise or in the cloud (e.g. Amazon S3).

Regardless of the level of security provided by Cloud platforms or third parties, anonymization of data is sometimes required for privacy reasons. MediationZone makes it possible to hide sensitive data in a reversible process.

This means that processing can be performed in the cloud on information has been made much less sensitive by replacing personal information with randomly generated tokens. The possibility to rapidly create streams of anonymized user and usage data to third parties is an opportunity for service providers that are looking for new ways of capitalizing on the data in their network. Information services that are differentiated based on e.g. level of detail, frequency, volume and interfaces can be offered to clients in virtually every industry.

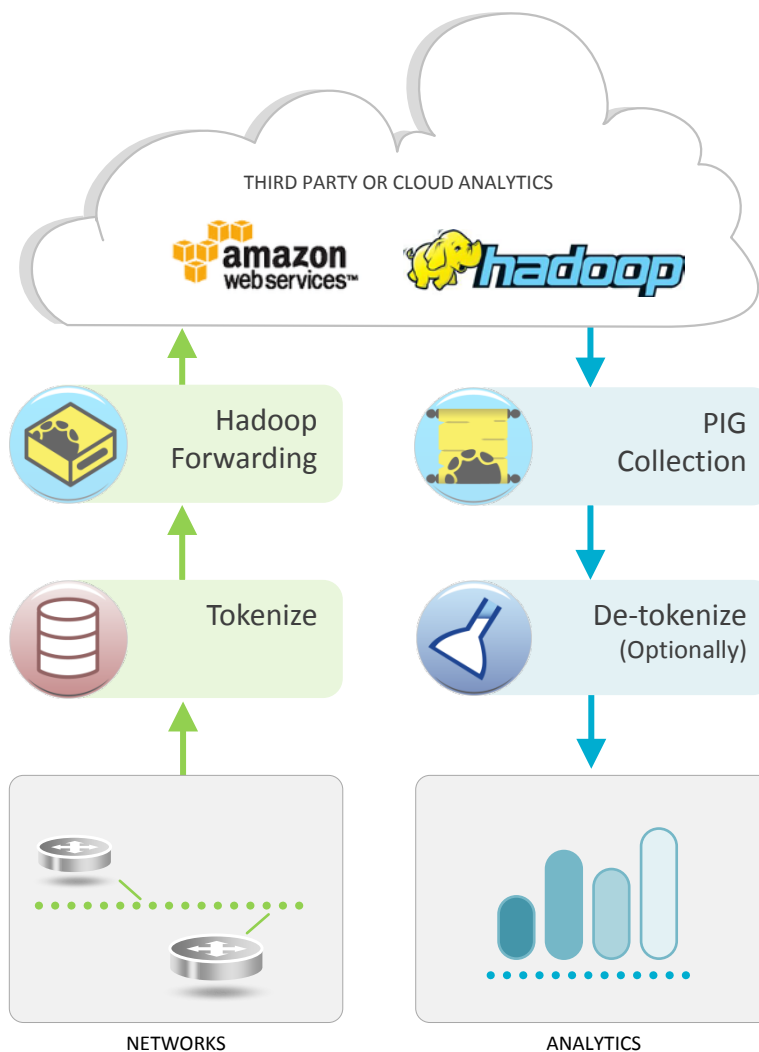


Figure 4 – Reversible anonymization with MediationZone

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HDFS – Hadoop Distributed File System

Integrated Rule Engine

The integrated rule engine of MediationZone makes it possible to trigger actions based on complex chains of events. The rules are setup to detect patterns of events occurring in a defined order within a configurable time interval. The desired business logic can be achieved without the need for using nested conditions.

One customer of DigitalRoute recognized that it was losing a large number of users in its high-end segment due to a combination of factors that typically happen in a very short time frame. At one time, the company could only observe that this was the case but could do nothing about it since the analysis was based on data captured on a daily basis. With MediationZone, it now has the capability to detect and trigger actions based on the complex series of events that occurs within sliding time windows of any size. The customer's processes are thus being tuned to apply automatic and personalized retention strategies whenever a risk pattern is identified.

CASE	POINT-POINT	POINT-INTERVAL	INTERVAL-INTERVAL
A before B			
A meet B			
A overlaps B			
A finishes B			
A includes B			
A starts B			
A coincides B			

What's Next?

The telecom industry is in the final stages of the transition to all-IP networks. From this point forward everything will become data. ARC chart is predicting that carriers will process nearly 120 million Diameter signaling messages each second on their networks by 2017. With the continued growth of data diversity and volumes and the evolution of Cloud technologies, "Mediation as a service" will emerge as a business model. Deploying advanced Cloud-based mediation enables service providers to offer partners and suppliers the possibility to extract unique insights that can only be acquired from the lowest level of detail in their network data. At the same there is an increasing need for higher levels of automation and acting on these insights in real-time. Smart segmentation and staying in control of the customer experience requires access to a variety of CEP and BRMS tools near the source of the data.

DigitalRoute is committed to leading the development in this area.

"MediationZone has reduced our total cost of ownership for mediation, and it also provides the ability to reduce the overall load on our business support systems, with its implementation, we are able to efficiently meet our expanding mediation needs, the result of continuous growth in mobile data."
 - James Ritchie, vice-president of consumer development and support at TELUS.

NOTES

CEP – Complex Event Processing

BRMS – Business Rule Management System

About DigitalRoute®

DigitalRoute® delivers a new approach to managing data. Our platform, MediationZone, empowers organizations to liberate the value hidden in their usage information via a unique approach that supports multiple mission-critical aspects of their business. DigitalRoute customers benefit from fewer integration points, reduced costs and flexible data management. Over 260 leading companies from around the globe are today actively using DigitalRoute technology to help meet their data management needs. DigitalRoute is headquartered in Stockholm, Sweden with regional offices in Gothenburg, Atlanta, and Kuala Lumpur. DigitalRoute is a venture-backed, privately held company.



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