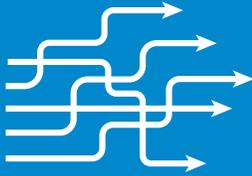


ANALYTICS DRIVEN TRANSFORMATION

Dell EMC and Cardinality

Solution benefits:

- 1.2% churn reduction contribution



- Driven 4G adoption (1.5M customers in the case of one service provider)



- 2X faster deployment time compared with build-it-yourself



- Ingest speeds in excess of 60 billion complex rows per day



Providing a big data analytics platform to enable service provider transformation through new business insights

Data analytics offers service providers and large enterprises the opportunity to apply data insights toward their digital transformation. Dell EMC and Cardinality have joined together to combine their understanding of the specific challenges facing Telcos in their journey to 5G readiness and develop unique solutions to help address specific use cases that need real time insights into their big data with the latest version of the ready architecture.

The Dell EMC Service Provider Analytics Ready Architecture with Hadoop enables service providers become more data-driven by applying actionable insights from network and customer data to improve the customer experience, increase operational efficiency, and introduce new revenue-generating services.

The Dell EMC Service Provider Analytics (SPA) Ready Architecture with Hadoop is designed to deliver quick ROI and sustainably low TCO via:

- Pre-built use cases which address service provider pain points
- Proven scalability that can grow with a service provider's business needs while address mission critical issues

Dell EMC SPA ready architecture v1.1 has been purpose built to meet service provider needs and is underpinned by the industry's #1 compute, storage and networking infrastructure. The design is based on Isilon HDFS datastore utilizing Dell EMC PowerEdge rack servers and Isilon hybrid scale-out NAS for deploying Hortonworks Hadoop and the Cardinality Perception 4.0 platform.

Why is data so important to today's service provider?

Modern service providers face an imperative to utilize the petabytes of data collected from their operations to accelerate business growth and improve operational efficiency. Service providers have learned that they can achieve business advantage by building on the known benefits of business intelligence and rules-based automation to derive new benefits from advanced machine learning-enabled automation and eventually achieve fully autonomous operations. The challenge they face is how to accomplish this. This is where the Dell EMC SP Analytics Ready Architecture with Cardinality can help.

Out of the box Use Cases

Cell Experience

- Cell-level performance per subscriber, Technology, Service, Frequency Band
- End user, experience driven proactive Network Management
- Hotspot identification, and effective RAN optimization

Marketing Insights

- Achieve “Segment of One”
- Understand customer interests by usage
- Actionable marketing strategies, driven by validated data

Operational Intelligence

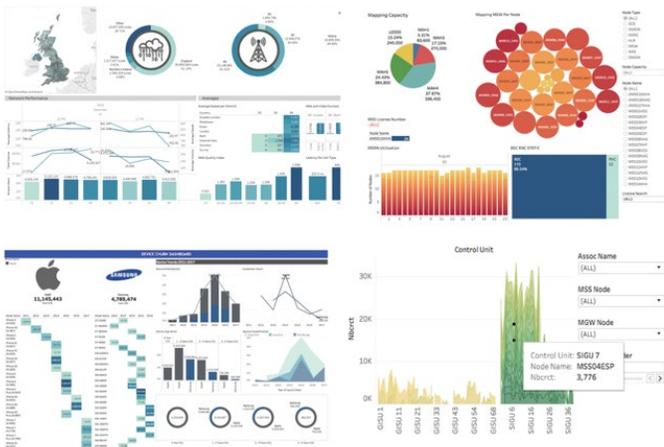
- Increase service efficiency in real-time
- Predict service desegregation
- Faster root cause analysis
- Heightened monitoring

Customer Experience Management

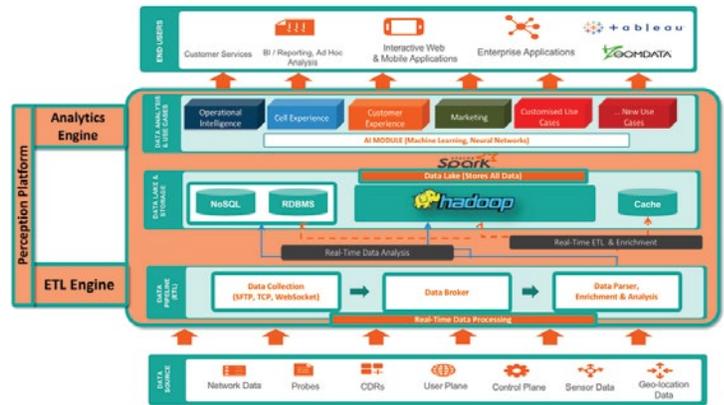
- Understand your customers to better meet their needs
- Closed-loop experience management
- Improve satisfaction through proactive engagement
- Enhanced self-care opportunities

Device Analytics

- Device distribution by OS, manufacturer, model, age, band, etc
- Locate and eliminate rogue devices
- Identify device or device software issues quickly
- Target aged, low quality devices for customer upgrades



Multiple Use Case Insights



Cardinality Perception Platform

Cardinality Perception Platform

The Cardinality Perception platform incorporates an Extract Transform and Load Engine (ETL) and Analytics Engine (AE) in a single coordinated platform. In addition, Cardinality offers a number of out of the box use case modules to address specific business needs.

ETL Engine

- Allows the ingest of massive amounts of data from multiple sources and load into Hadoop
- A high performance ETL engine capable of processing above 60 billion complex rows of data per day
- Enriches data in real time using massive cache lookups leading to faster and easier data mining and reporting

Analytics Engine

- Allows reports to be easily built from billions of rows of data
- Enables a project-driven approach by supporting multiple teams sharing queries and grouping queries into projects
- Connects to Hadoop clusters to run out-of-box SPARK queries, outputting to MongoDB, MySQL and Hadoop

The Cardinality Perception platform uses the latest technologies such as Kafka, Spark, Kubernetes, Redis and Grafana to provide massive scale. We leverage Machine Learning models such as K-Means, Markovian & Bayesian and also Deep Learning. To ensure deployments can be repeatable and scaled up, Cardinality leverages virtualization via containers:

- Every component is deployed as a container
- Deployment is done on standard X86 servers
- Zero reliance on proprietary “engineered” systems
- Leveraging Open Source Engines which significantly reduces the cost of licences
- Fully Horizontally and Vertically Scalable

Dell EMC Ready Architecture Advantage

Based on customer feedback on design principals, in SPDA v1.1 there is a clear delineation of compute and storage functionalities. This separation has formed the baseline of the ready architecture design. This design principal has brought a lot of benefits to it's functionality including

- **Introduction of Isilon capabilities in the ready architecture:** The Dell EMC Isilon H600, with 144 TB storage density and 12 Gbps read performance enables one to decouple storage from compute for asymmetric scaling. It is focused on high level of data ingest, allowing to haul in a lot of data, parking it and structuring it and conduct ETL on it.
- **Access to rich data services:** When you store data using Dell EMC Isilon, apart from getting access to persistent storage resources, you also get access to essential data services like data protection, support for multi-tenancy, advanced authentication, and support for distributed environments like blockchain storage. Isilon supports multiple protocols (not just HDFS) using protocol translation to its native OneFS file-system. Smartconnect capability in Isilon allows auto-scaling of storage resources.
- **Better alignment to Cardinality's Perception 4.0 platform:** Cardinality stack provides ETL and Analytics services. ETL converts unstructured or semi-structured data to structured data, and Analytics enables unlocking of insights in structured persistent data. Being able to spatially and temporally decouple Analytics from Storage opens up many new use-cases.
- **Better flexibility for connectivity of containers:** Cardinality Perception 4.0 uses calico as opposed to flannel which brings richer networking capabilities to container networking, enabling wider interplay between micro-services in the analytics space.

The Dell EMC Service Provider Analytics Ready Architecture with Hadoop offers a simple and reliable path to identify and acquire tested, validated architectures aligned to CSP workloads so that service providers can accelerate innovation, reduce risk and lower the total cost of ownership. The Dell EMC Service Provider Analytics Ready Architecture with Hadoop delivers a hassle-free package of best-of-breed, disaggregated components to help CSPs get up and running quickly.

- Dell EMC is able to offer full systems delivered with complete lifecycle support, with pre-constructed templates, tools and documentation that serve as starting points for your own custom built solutions and help you deliver better outcomes. Services and support from Dell EMC and channel partners complement your resources, while agile options from Dell Financial Services remove traditional capital budget bottlenecks.

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