FCAPS Series: Performance Management for Carrier Ethernet

It is Not What You Measure, It's How You Use the Information

Performance Management is the area of FCAPS that lets Carrier Ethernet fulfill the promise of TDM/ATM level service consistency powered cost-efficiently by Ethernet. In addition, performance management can help you differentiate your services to add value and improve customer loyalty and thereby improve average revenue per customer. Due to the explosive growth of data rates as well as connected devices and applications, the role of performance management is becoming ever more critical. It is not what you measure, it is how you use the information and this is where EchoVault comes in with SLA assurance, service classes and customer portal.

The basic ways of differentiating for a CSP are through pricing, service quality or offering. The key to accomplish any or all three is Ethernet with proper performance management, plus SLA Management and service visibility. Ideally this lets you address both business and technical challenges.

Let's start with the basics. The prerequisites for using performance management to achieve better differentiation and improved service quality is to measure appropriately. The service the CSP is providing is a connection. The basic measurements are delay, jitter and packet loss. Additionally, the 'amount' of the service needs to be measured and this is the bandwidth. Often measurements are based on 5 minute averages, which means that temporary spikes of a few seconds can go unnoticed. To avoid this, you will need more granularity, for instance 1 second, which is something most solutions cannot provide. This is going to give you a lot of data - 300 times more than with 5 minute averages - so you will need a system that can store all this data. Moreover, the setup and management of the collected metrics needs to happen without significant effort to ensure fast service setup and fast time to revenue - something that can be a challenge with standalone test and measurement equipment. In addition to the delay, jitter and loss measurements, it can in some cases be useful to measure with service monitoring and troubleshooting tools, which also measure performance. Echo Vault provides tools to measure availability through HTTP, UDP/ICMP echo, TCP connect and download speed. The results can be conveniently viewed through the same user interface.

EchoVault Performance Management

Performance data collection
Y.1731 and bandwidth per port and per VLAN unique one-second data points, Ethernet port statistics, no probes.

Analytics
Standard deviation, percentiles, Best Expected monthly service availability, user-friendly dashboards

Resource utilization
Health information including CPU and memory details

Operational intelligence
Detect E2E issues with packet loss, jitter and latency in context, actionable

Guaranteed quality
CoS per circuit to prioritise data to provide ATM/TDM level service consistency with Ethernet

Easy provisioning
Template-driven topology-aware PM provisioning, SLA associations, reporting options

Differentiate
Flexible service class configurations allow differentiation with quality. Provide visibility into service as value-add.

Automated portal reporting
Visiblity into service – differentiate with real-time customizable service views. Improve customer support and give sales detailed customer views

Advanced SLA management
Customer associations, SLA templates, circuit profiles, KPIs & SLOs, maintenance windows, EVC reporting

Scalability & Extendability
Easy scalability, OSS integration through APIs

With the basic measurements and measurement collection in place, you are ready to analyze the results. The SLA can include requirements, such as having the standard deviation of the delay within certain limits, or the 95th percentile of measurements below a certain level. These are analytics derived from the performance data, giving a more nuanced picture of the service consistency.

The benefit of analytics is improved information for decision-making. It is also possible to compute trends and compound Service Availability figures using the underlying key performance indicators to be used for decisions about maintenance efforts, sales or development efforts or network enlargements. To provide analytics, you will need a powerful system to crunch the numbers, given the amount of data.

Once you have these components, you are ready to look at how to provide more value. In many cases, the performance or quality of the connection is the most important purchase criterion. The quality required depends on what the connection is used for, so being able to provide different services provides a nice way to broaden the offering and differentiate with quality. In an environment of evolving business models due to exploding data volumes, the possibility to innovate with a flexible platform is invaluable.

When the customer buys the service, they cannot see or feel it, they only have your word and a contract (the SLA). What they are looking for is service of the appropriate quality, consistently delivered at the right price. Customer loyalty can be strengthened significantly by providing on-demand visibility into the service via portal reporting. Adding reporting to the service makes it much more tangible and is a nice way to differentiate and build trust. In the best case, good quality and visibility lead to up-sell opportunities and positive word-of-mouth and referrals leading to more efficient customer acquisition.

Creanord EchoVault supports the CSP's performance management needs with the following functionality:

* Performance data collection with an option to go down to one-second data granularity - without the need for probes
* Performance data analytics to provide analyzed data about the service consistency as well as predicting SLA breaches
* Automated portal performance reporting with end-user visibility to build customer loyalty with dynamic and interactive reports
* Service performance consistency through managing service classes (CoS)
* Utilization and error rates
* Link to SLA, meaning performance management is aligned with the service the customer has purchased

In addition to the differentiation and quality functionality, visibility into performance data linked to the SLA also gives significant benefits to internal interest groups. For instance providing information about per second bandwidth utilization per class of service can create capacity upgrade opportunities and provide a platform for premium service with advanced customer care and MTTR (mean time to repair) as more up-to-date information about service performance is at hand.

Service Class Name	Example of Generic Traffic Classes mapping into CoS			
	Mobile Backhaul		Business Ethernet	
	4G Model	3G Model	4 CoS Model	2 CoS Model
Very High (H+)	Synchronization	-	Low-latency (eg finance)	-
High (H)	Conversational, Signaling and Control	Conversational and Synchronization, Signaling and Control	VoIP, Business-critical apps	VoIP, Business-critical apps, Streaming
Medium (M)	Streaming	Streaming	Streaming	
Low (L)	Interactive and Background	Interactive and Background	Interactive and Background	Interactive and Background

Example of Carrier Ethernet with Class of Service (CoS). The highest class, H+ requires very low delay and packet loss. The lowest class, L contains data such as browsing and email, which can work even with some amount of delay, jitter and packet loss. In between, the various applications have varying requirement profiles.

Performance, Quality and Customer Satisfaction with Ethernet

Ethernet is a popular technology because it is inexpensive and ubiquitous. However, inherently it does not provide performance guarantees, meaning there may be delay, jitter and packet loss - particularly when the bandwidth consumption is approaching the limit. For this reason, pure Ethernet is best suited for some kinds of traffic, such as web downloads or email, which are not sensitive to delay or packet loss. As real-time and sensitive services are increasingly used over Ethernet, they place more strict requirements. With proper performance management, it is possible to create service classes over Ethernet, ensuring that traffic gets prioritized appropriately. As different services require different service class properties, it is vital to have flexibility and good management functionality. Service classes should be derived from the Service Level Agreement (SLA) and this means that the link from performance management to the SLA is crucial. The table below shows an example of implementing different service classes in Mobile Backhaul or Business Ethernet.

Service quality and customer experience are key drivers of customer satisfaction and impact on revenue significantly through improved customer retention rates. Further, improved visibility can reduce cost by reducing the need to contact customer care to check whether a problem is in the service provider domain. The role of performance management is much more important in Ethernet, where quality is not guaranteed by default and on the other hand opportunity for differentiation is considerable. Analytics play a vital role in improving the customer experience by giving a basis for decision-making.

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Tucana Telecom is a value added distributor of test, measurement and access solutions, for advanced protocol analysis and network management, in (mobile) telecommunications networks. Tucana Telecom offers indispensable support to operators and telecom OEMs, during the development phase of new products and services and during installation and management/ maintenance of the network. The staff is specialised in WiFi, WiMAX, LTE, UMTS, GPRS, GSM, SS7, V5.x, ISDN, VoIP, SDH/Sonet. The enhanced service program comprises consulting, all-in maintenance contracts, hands-on training sessions and helpdesk. The company has offices in Belgium, France, Germany and The Netherlands.

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