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WHITE PAPER

Updated*—Best Practices for Mobile Data Optimization

*Because Everything You Know About Optimization is Obsolete



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The more you know about optimization, the more optimistic your future looks

Have you noticed that most discussions about the future of mobile communications start by trotting out the same Four Horsemen of the 5G Apocalypse? An unprecedented *flood of mobile traffic* is surging toward carriers, driven by rising video consumption. Meanwhile, *over-the-top (OTT) competitors* are re-directing revenue streams into their own pockets. And don't forget the *Internet of Things*, which promises to add a billion new devices to an already crowded mix. In the midst of all this, traditional *services revenue is flat or shrinking*.

You would be right to see these things as a cause for alarm. But you should also see them as a cause for optimization. By optimizing the size of Internet traffic—and video traffic in particular—mobile carriers can maximize their network resources and reduce their costs while also delivering a better experience to users.

Granted, optimization isn't the first thing you think of when someone mentions innovation. Most mobile carriers have some kind of legacy optimization solution left over from the days of 3G, and these tend to scale poorly when faced with the demands of 4G and 5G. Affirmed, however, has taken a different approach to optimization.

The Affirmed Approach to Optimization

We've seamlessly integrated it into our virtualized platform to deliver more value through

- Deep Packet Inspection
- Network congestion awareness
- Eliminating multiple packet touches associated with heterogeneous multivendor solutions

In this paper, we'll look at how Affirmed's vision of optimization helps mobile carriers improve their quality of experience and increase the quantity of services they can deliver with their existing network.

Before you supersize it, optimize it

You could say that the role of optimization is stuck between a rock and a high place. On the one hand, mobile carriers need to find cost-efficient ways to expand their network capacity, since they can no longer pass their expansion costs along to subscribers in the form of more expensive plans. That's the "rock-bottom price" perspective. On the other hand, subscribers place a premium on high-quality communications, so every carrier wants to rank highest for best network experience. Optimization supports these efforts by reducing

latency, improving the customer experience and right-sizing video streaming to free up valuable network bandwidth.

It would be possible for carriers to achieve many of these goals by adding more core and access equipment to their networks. It would also be very expensive. With optimization, carriers can achieve the same goals (e.g., accommodate more network traffic) at a fraction of the cost. Not all optimization solutions are created equal, however. The most common approach is to apply flow congestion management at the TCP connection level and throttle video traffic as needed. This has limited benefits because it supports only generalized optimization policies. Affirmed takes a different approach. We create smarter optimization policies by using deep packet inspection and real-time traffic analysis to provide session-level congestion awareness that can drive and fine-tune optimization policies. And the more you know about your network traffic, the more you can do to improve its quality and performance.

Traffic optimization with Affirmed

Heavy network traffic isn't a bad thing; after all, you want people using your network. Network congestion, however, is a bad thing. You don't want users to suffer high latency or experience stalled video streams. You can't eliminate the problem of congestion, because there will always be peak usage periods and unexpected surges. But you can anticipate it by managing congestion through intelligent traffic control. With Affirmed's virtualized optimization solution, mobile carriers can manage traffic more efficiently through congestion awareness, application awareness (e.g., knowing when traffic is coming from YouTube, Facebook, Netflix, etc.), dynamic policy-driven controls and a wide range of tools to optimize traffic.



Figure 1. Benefits of Affirmed Traffic Optimization

Real-time awareness of congestion at an individual user level is a valuable feature for traffic optimization because it allows carriers to control the Quality of Experience (QoE) for each user, despite throughput spikes in the network. To provide this awareness, Affirmed developed an algorithm that predicts congestion and applies optimization policies to specific traffic streams by looking at a mix of metrics such as round-trip time, maximum

segment size, congestion windows and the aggregate throughput for both the client and server sides of the connection. Affirmed's unique approach to traffic optimization delivers clear benefits to the network including up to 30% faster speeds and 1.4X faster downloads and page load times. These benefits, in turn, lead to a better subscriber quality of experience that results in lower customer churn for mobile carriers.

Affirmed's smart approach to video optimization

Where traffic optimization impacts quality of experience, video optimization focuses on the issue of quantity. The growing interest in mobile video has made unlimited data plans increasingly attractive to subscribers—provided that carriers can strike the right balance of price, performance and picture quality with their plans. Unfortunately, carriers don't have unlimited network capacity, so they need to carefully weigh how (and how much) data is delivered to subscribers, or risk opening the floodgates to bigger network performance problems.

Video applications by default will look to deliver service at the highest possible resolution. Most video session endpoints, however, are smartphones or other small-screen devices that don't require a high-resolution 4K Video or 1080p experience. Downshifting to a lower resolution (e.g., 780p or 480p) in these cases not only frees up valuable bandwidth, but also provides for a smoother streaming experience, especially if the user moves into a location where the network is congested.



Figure 2. Video Optimization

The ability to intelligently and selectively optimize video sessions is critical for carriers that wish to offer unlimited data plans. For example, a carrier might create video optimization policies to deliver lower resolution video during peak-usage periods (e.g., between 5:00 pm and 10:00 pm) and higher resolution video during non-peak hours, or have optimization turned on where network congestion is detected. Carriers could also choose to offer unlimited plans with tiered pricing based on different video resolutions (e.g., charging a premium for high-definition services). The advantage of Affirmed's optimization solution is

its ability to selectively assign and apply video optimization policies for individual users right at the source, rather than creating a separate environment for a subset of users.

Affirmed's video optimization solution is also designed to provide densification of radio resources—that is, to pack video transmission as densely as possible in order to free up traffic for other revenue-generating services. The goal of densification may be lower cost, better experience or, oftentimes, a balance of the two. Affirmed's video optimization solution achieves this densification through a data delivery mechanism that is designed to be radio friendly. Radio networks handle bursty traffic better than a steady stream of packets. Recognizing this, Affirmed's solution sends video packets in intermittent bursts rather than a steady stream of data. Bursting densifies the data more efficiently into the resource blocks used by radio schedulers, which frees up costly radio resources for other revenue-generating traffic.

One final point worth mentioning about video optimization is QUIC, the Quick UDP Internet Connections protocol. Google, Facebook/Instagram and Akamai have thrown their considerable weight behind QUIC, which suggests the prime-time arrival of QUIC as an alternative to TCP is imminent. In that event, video optimization will need to support QUIC, something that the Affirmed solution already does.

Right-sized resolution, the right solution

Even the best policies are meaningless if you can't enforce them effectively. Affirmed's solution makes it easy to create and enforce optimization policies through existing policy control points, such as the Policy Control Routing Function (PCRF). This gives carriers flexible policy control—for example, in case they want to turn on optimization to downshift video to 480p resolution for subscribers of mid-tier plans, but turn it off for subscribers with high-tier plans. Congestion awareness plays an important role in video optimization too, as it helps operators avoid stalling and buffering issues so that subscribers can continue to receive steady video streaming, even if it means at a lower resolution.

Benefits of Affirmed Video Optimization

The benefits of using Affirmed's video optimization solution include:

- 10-20% reduction in video bandwidth utilization
- Better spectral efficiency for radio resources
- Increased ability to offer unlimited data plans at an attractive price point
- Extra bandwidth that can be used to deliver new services or serve new markets

Updated best practices for network optimization

Best Practice #1: Best Cost/Performance

When it comes to optimization, the most important consideration for telco operators is cost. Will it require another node in their data path that needs to scale as the data path grows? How much will it cost to implement the solution? Central to cost is the solution's performance. If Vendor A's solution provides X gigabytes of throughput on a single CPU core, while Vendor B's solution provides a number greater or less than X, what does that mean in terms of additional capex and opex costs?

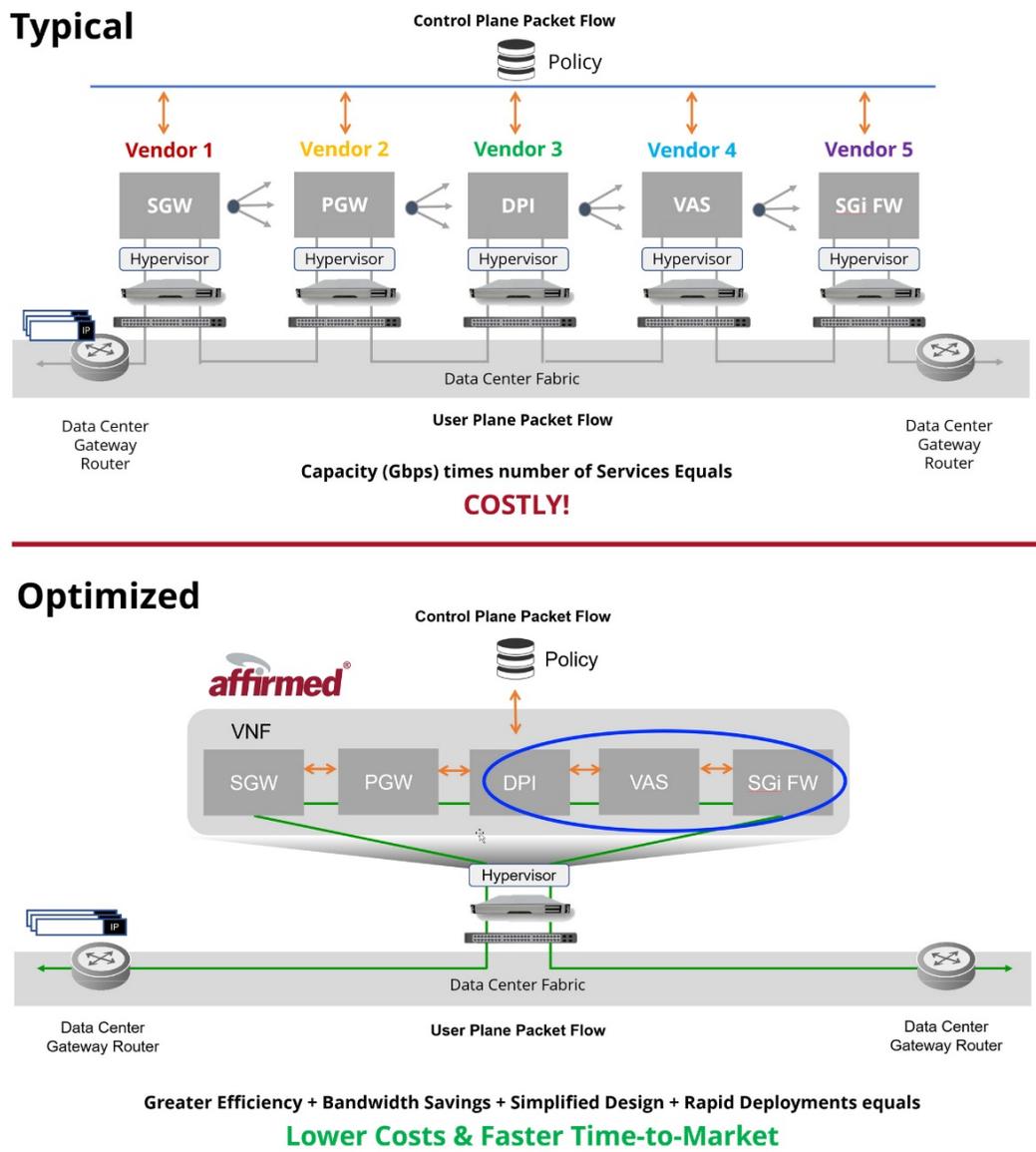


Figure 3. Affirmed VNF Software with Integrated Functions Delivers High Network Optimization

Best Practice #2: Best Features for Flexibility

When creating its optimization solution, Affirmed focused on four key features: policy control, algorithms, dynamic congestion awareness and auto-tuning.

- Affirmed’s solution offers a **single point of policy control** in the network. In addition, Affirmed supports locally configured optimization policies.
- The right algorithm matters. Some are better suited to reducing latency, for example, while others are better at increasing bandwidth. Affirmed’s solution offers a wide range of options so operators have the comfort of knowing they have the right algorithm for the job, every time.
- **Dynamic congestion awareness** allows operators to see how congestion is affecting user experiences and apply that intelligence to algorithm selection.
- Affirmed’s **auto-tuning** feature lets operators select auto-tuned, optimal buffer management, in order to avoid overloading either side of the connection.

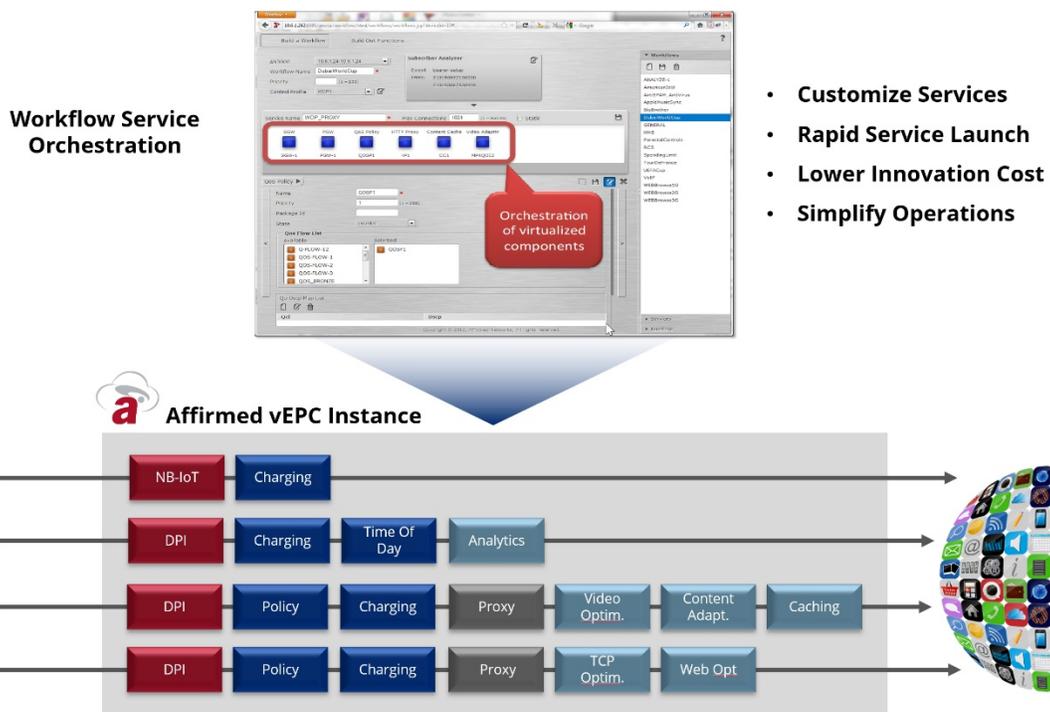


Figure 4. Affirmed Workflow Service Chaining

Best Practice #3: Best Visibility

Ironically, many operators have limited visibility into their video optimization performance. For example, they may not know how much bandwidth they're saving when optimization is turned on. Or they may not know what kind of traffic they're optimizing—whether it's Netflix, Facebook, Hulu, Amazon Prime, Vine or something else. Affirmed's solution allows operators to see what kind of traffic is in their network as well as the cost/capacity benefits of optimizing that traffic. Also important is visibility into quality of experience. Operators should be able to easily get reports on qualitative metrics from optimization such as latency, loss and bandwidth changes over time.

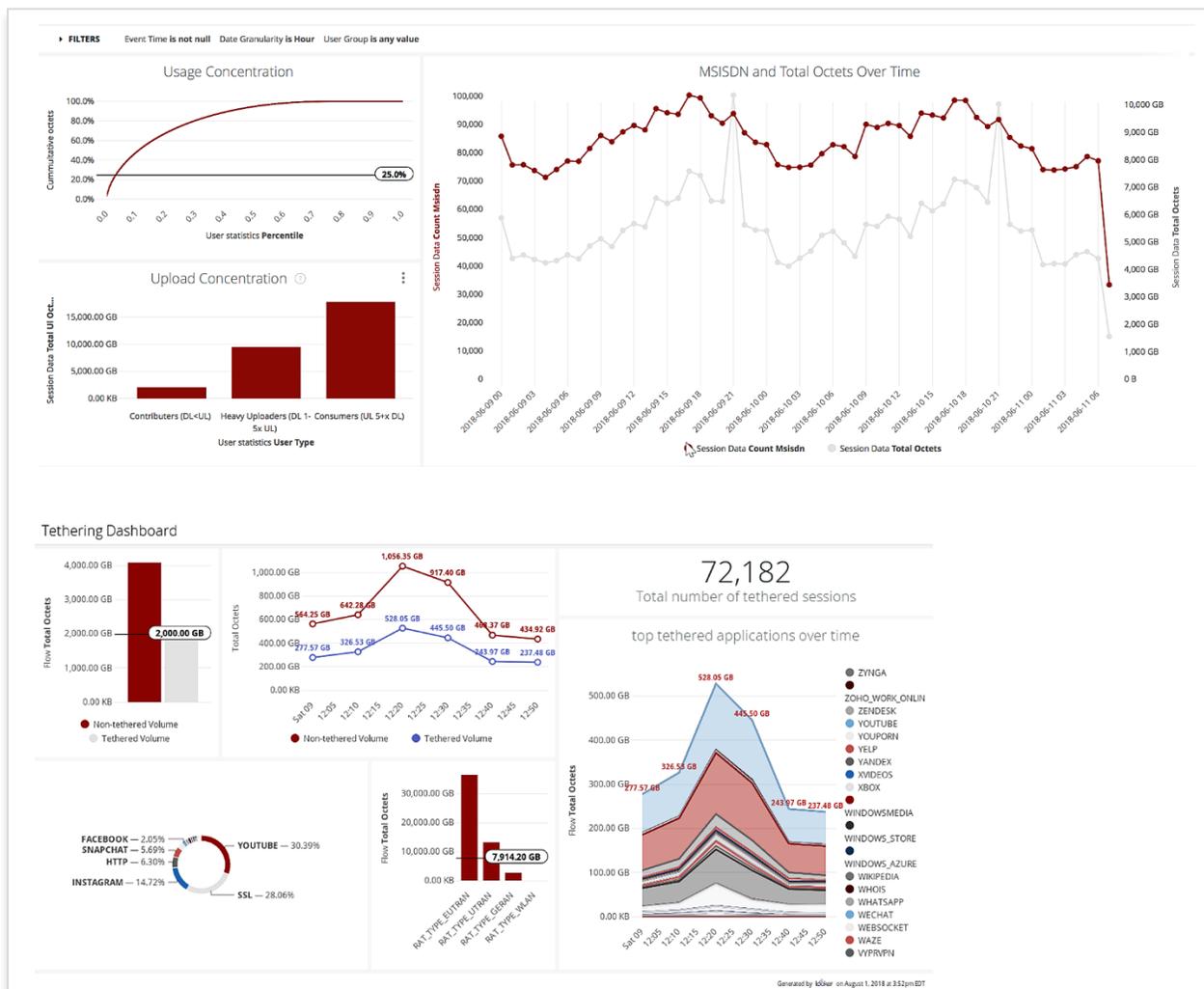


Figure 5. Example QoE Metrics

Optimization may be more important than you realize

While some may not consider optimization to be a high priority, at Affirmed, we feel it is a critical factor for delivering new services in the future. From service automation to network slicing, Affirmed is focused on delivering the industry's most advanced, fully virtualized mobile services platform featuring cloud-native, standards-based, 5G-ready technology. Our platform is optimized to deliver the highest levels of performance, scalability and economy.

To learn more about our optimization solutions and our complete portfolio of virtualized mobile core solutions, visit us at affirmednetworks.com.