# Innovating to Increase Revenue

Uniquely Driving Differentiation & Competitive Advantage

affirmed

INTRODUCTION

The business drivers for mobile operators looking to transform their networks are: 1) Declining revenues due to competition from the OTT service providers; 2) increasing network costs due to the exponential growth of mobile data traffic. Operators began their network transformation initiatives primarily focused on cost reduction through virtualization of their network functions:
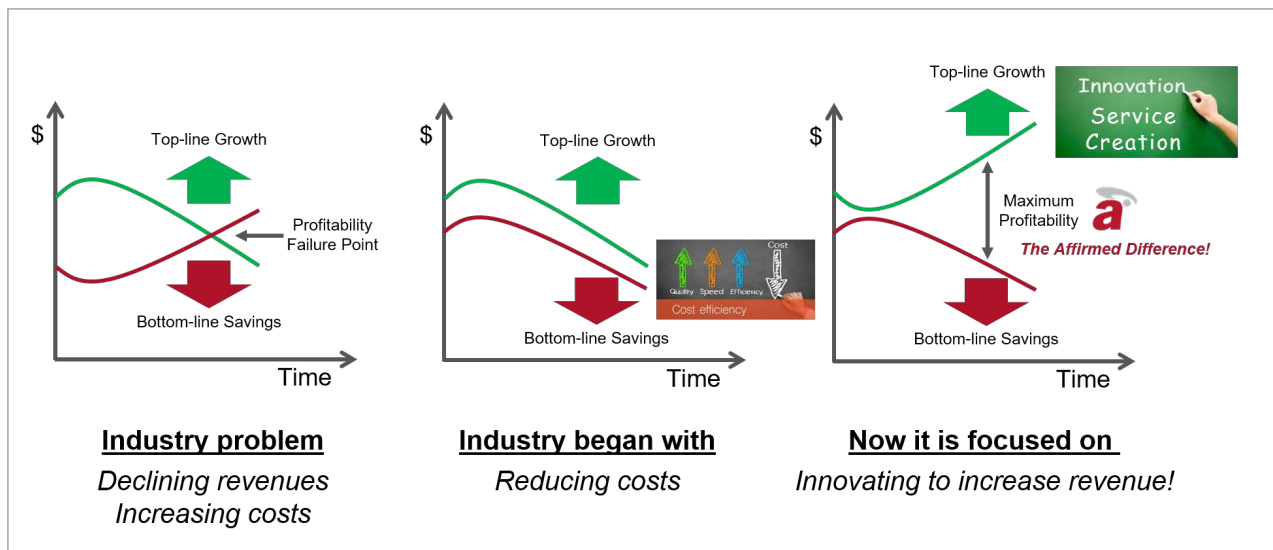
Figure 1: Rapid Feature Developmnet with Cloud Native Architecture

During this phase, Affirmed Networks clearly established itself as the industry first mover in the virtualized mobile core market. This has enabled Affirmed to become the market leader with 79 global customers, in 71 countries with numerous Tier 1 customers in every geography. Affirmed's innovation produced a virtualized architecture that has driven distinct marketplace disruptor advantages.

By not relying upon a legacy solution and having a multi-year head start, Affirmed has been able to bring to market a unique decomposed Virtual Network Function (VNF) architecture that has driven market leadership in the following ways:

1. Lowest total cost of ownership (TCO) in the industry via software efficiency and minimal deployment footprint

2. Highest throughput and performance

3. Greatest solution simplicity via a single operating system and sharing of packet metadata across all VNFs

4. Fastest new service launch through use of integrated service chaining (Workflow); rapid provisioning of gateway and internet services functions as part of an end-to-end combined solution
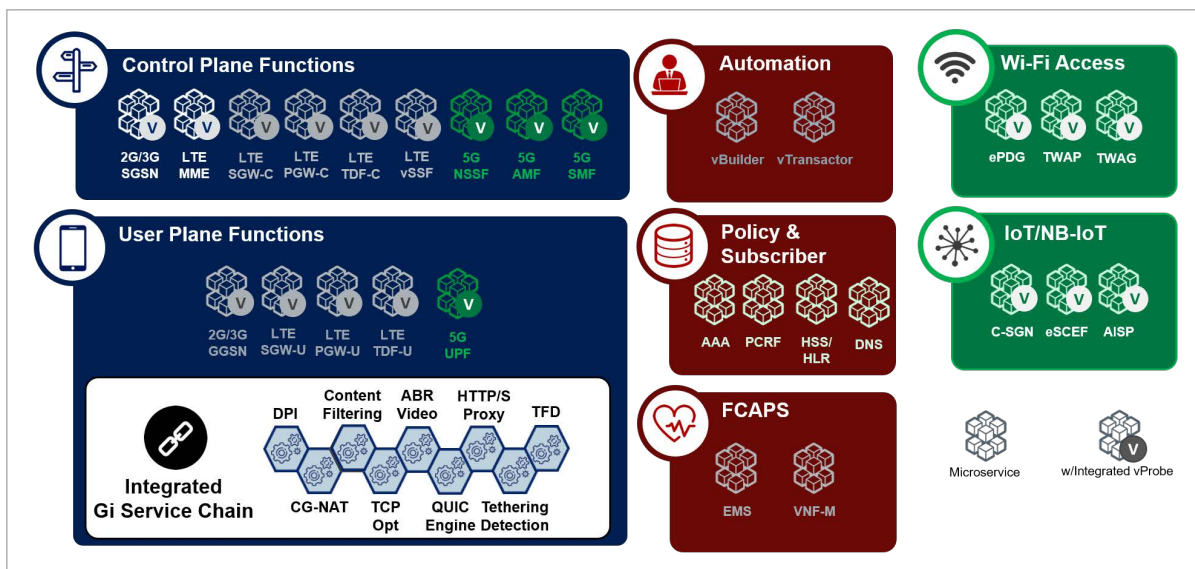

Figure 2: Rapid Feature Developmnet with Cloud Native Architecture

Innovating to Increase Revenue

Through continued innovation and market disruption, Affirmed is now uniquely positioned as the first mover to help operators increase their top line revenue growth and gain a significant competitive advantage through unsurpassed service agility, customized vertical solutions, and differentiated services.

Affirmed's market disruption utilizes key solution components working in conjunction:

1. Decomposed container-based micro-services architecture

2. Virtualized probe, analytics and report mediation

3. Virtualized network slicing

4. Service automation and service chaining

5. Virtualized and hosted applications

6. Mobile edge computing
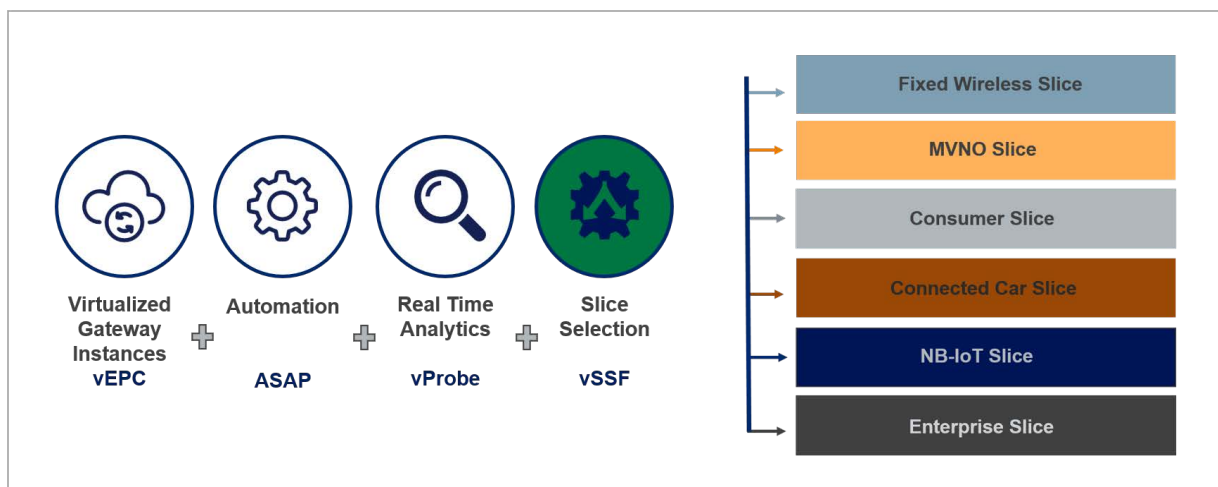
Figure 3: Combining Affirmed Innovations

MICRO-SERVICES ARCHITECTURE

Affirmed Networks is continuing to innovate an industry-unique VNF architecture with further decomposition, leveraging a separate stateless database that is working in conjunction with container-based applications. The resulting value is a mass customization, micro-services-based approach that is more processor efficient, occupies a smaller footprint, and enables the ability to upgrade and incrementally launch services in a more agile, parallel fashion without impacting neighboring applications. New services creation is now significantly less impactful on operations.

This rapid innovation architecture enables the mobile operator with speed- to-market to launch low-risk, low-cost Internet of Things (IoT) services that either enable revenue velocity of new services or fast fail services that carry minimal cost and risk.
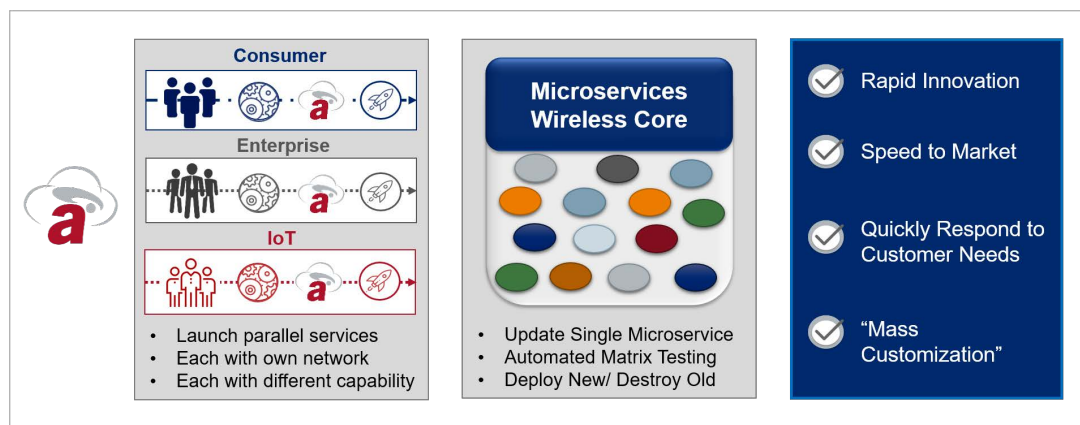

Figure 4: Rapid Feature Development with Cloud Native Architecture

Virtual Probe

Affirmed has the industry's only fully virtualized probe that is integrated with the mobile core and derives robust analytic feeds natively from the VNF. This implementation is much more cost effective than external probes. External probes cut the performance of the mobile core in half due to the duplication of session mirroring. They also require double capacity of the IP infrastructure and require separate hardware compute platforms to run the probe and analytic reporting platforms. Affirmed's vProbe is dynamic and captures real-time granular analytics of user behavior that can be utilized to invoke and create new policies and monetize new services offerings.

These new services and policies can be introduced and automated through the use of our Affirmed Service Automation Platform (ASAP). Affirmed's vProbe also captures the analytic data once, which can be streamed via a single instance to the Affirmed mediation service function (MSF) platform which produces customized report views for billing, operations, marketing, and end customers.
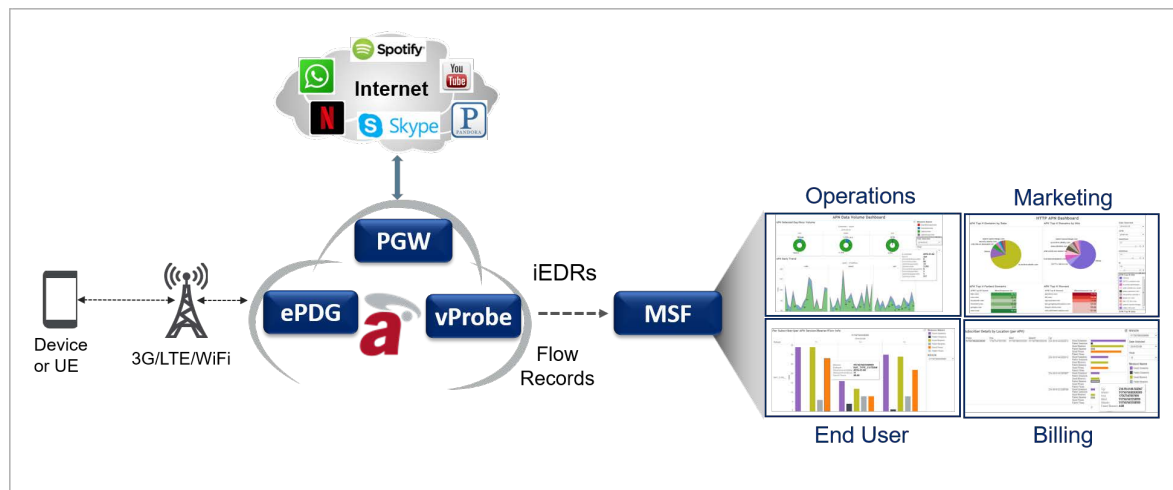

Figure 5: Capture Real-time Granular Analytics Using Integrated Virtual Probe

## SERVICE AUTOMATION & SERVICE CHAINING

Service automation and service chaining are key operational capabilities of virtualization. Service providers can leverage Affirmed's ASAP and integrated service function chaining (Workflow) solutions to establish a competitive advantage for revenue velocity, customized vertical applications, and agile new service introduction. These capabilities greatly simplify service creation as well as significantly lower the operational cost and timeframe to launch new services.

ASAP provides end-to-end, multi-vendor service automation that spans legacy and virtualized network functions.
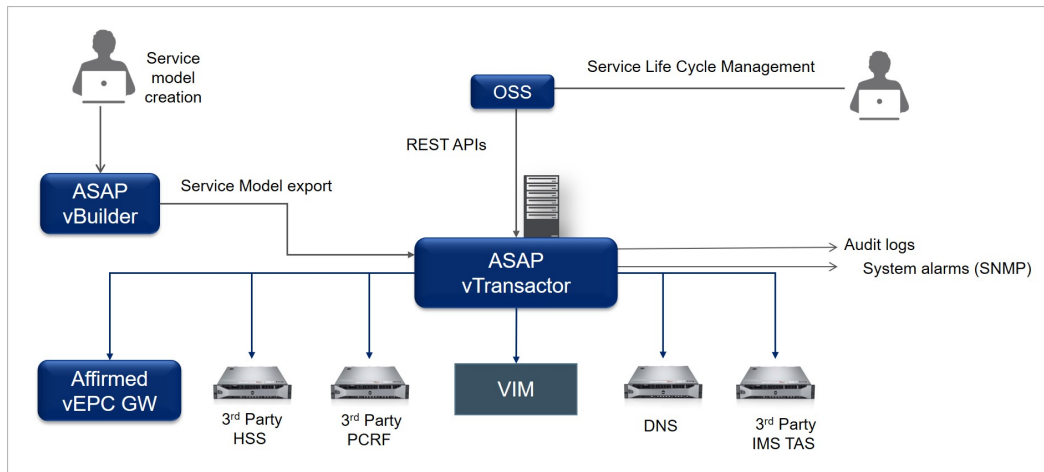
Figure 6: Enable Rapid Service Development With Affirmed's Service Automation Platform

Workflow is utilized to dynamically create and apply service chains that provide customized service flow treatments per IoT vertical service via a simple GUI. This integrated solution enables an environment for low cost, rapid service innovation.
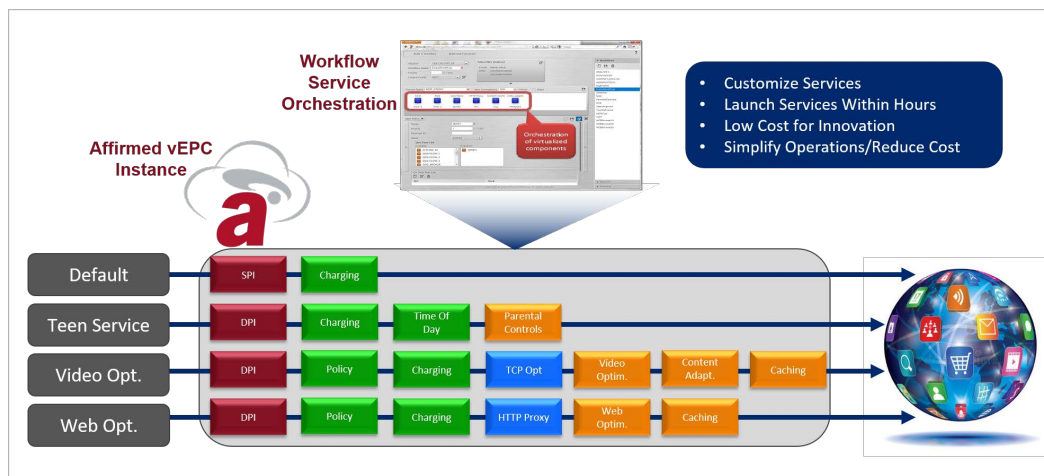
Figure 7: Simplify Service Creation with Reduction in Operational Cost with Affirmed's Workflow and Integrated Service Function Chaining Solutions

NETWORK SLICING

Affirmed is the first company to deliver network slicing (vSSF) for 3G, 4G, and 5G networks. Affirmed's vSSF solution enables the service provider to gracefully micro-segment real-time service flows based upon very granular GPRS Tunneling Protocol (GTP) attributes and offer differentiated services. Affirmed's network slicing ensures each vertical service flow is directed to specialized virtual compute resources to meet the unique attributes and performance needs of different IoT verticals. This also has the added benefit of best-optimizing infrastructure cost.
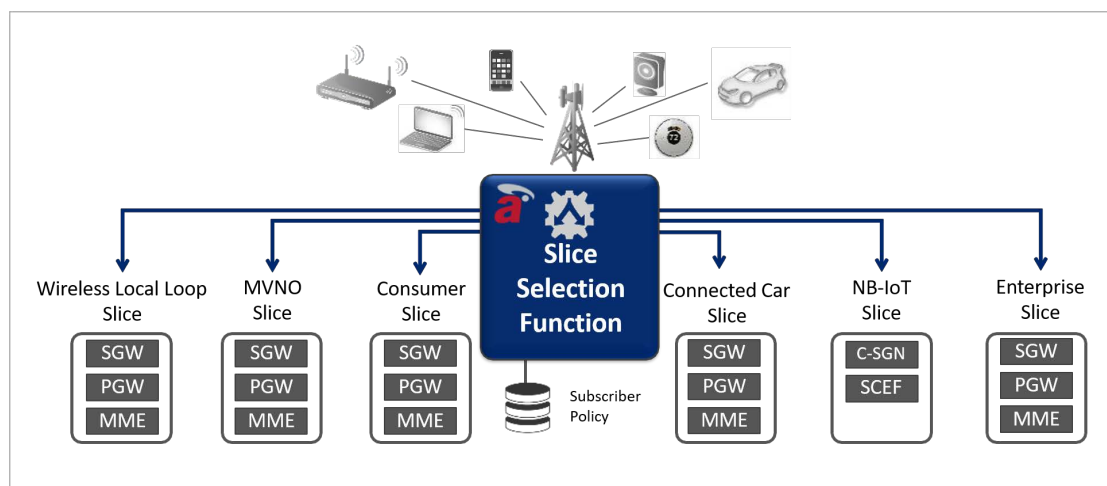

Figure 8: Deliver Customized and Differentiated Services with Affirmed's Virtual Slice Selection Function

Network slicing also enables the mobile operator to meet the high diversity of IoT vertical service requirements by directing each slice to a virtualized zone configured to handle the unique latency, throughput, capacity, security, availability, and service treatment of the specific vertical service.

This micro-segmentation capability further enables the service provider to create slices for a variety of use cases, such as

1. Slicing off a specific service use case like sending traffic to a third-party hosted application provider;

2. Migrating control plane or user plane traffic off existing infrastructure to gracefully migrate to a 5G infrastructure;

3. Utilizing slicing to perform a software upgrade of a virtualized zone then redirect the slice of traffic back onto the virtualized zone once the software upgrade is completed;

4. Slicing problematic traffic off the production network into a troubleshooting sandbox to isolate users or sessions in a granular fashion.
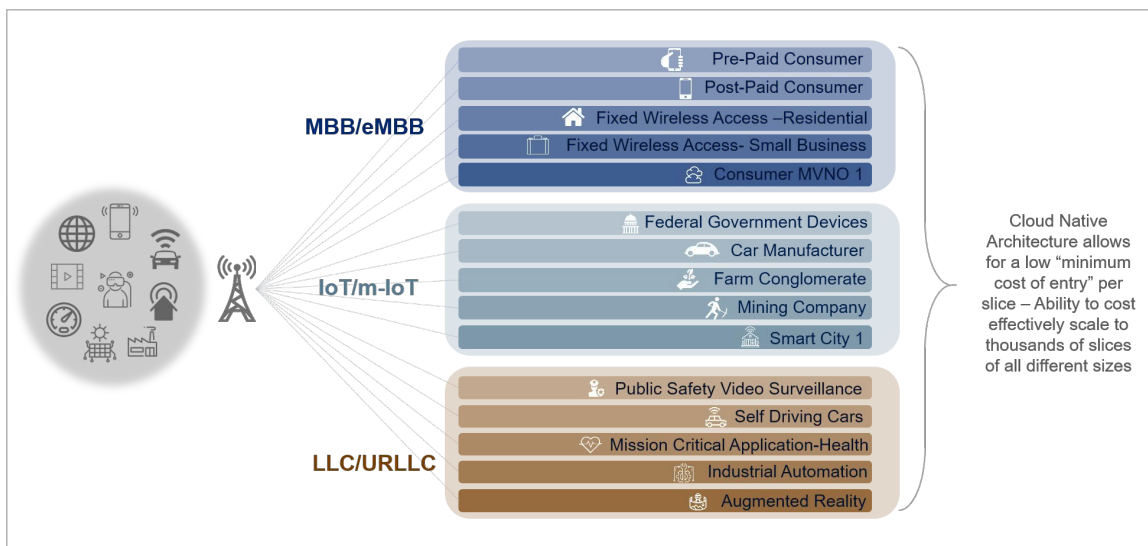

Figure 9: Deliver Differentiated Services and Maximize Profitability with Affirmed's Virtual Slice Selection Function

VALUE-ADDED SERVICES

Affirmed has the industry's broadest set of mobile VNFs, offering ubiquitous network access across multiple mobile and WiFi environments. These VNFs are combined with robust GiLAN features needed to identify, manage, and monetize internet anchored services. This is especially important for service differentiation, policy management, and partnerships in a post net-neutrality world. Affirmed's solution anchors the Gn mobile session, as well as the Gi Internet session simultaneously. As such, Affirmed's mobile core possesses full knowledge and control of the end-to-end service flow.

Through the use of deep packet inspection(DPI) and application signature heuristics, the mobile core solution opens the mobile flow only once, sharing meta-data with all consolidated VNFs, dynamically applying a pre-configured services chain to treat the identified flow, then re-packetizing the flow and place it in the fast path. This efficient software architecture requires very little processing for opening and closing packets. DPI and heuristics work in conjunction with Workflow, Affirmed's industry unique, rapid service chaining, and graphical user interface (GUI) platform. Services that previously took months to launch can now be launched in a matter of minutes to quickly and economically monetize new service concepts.
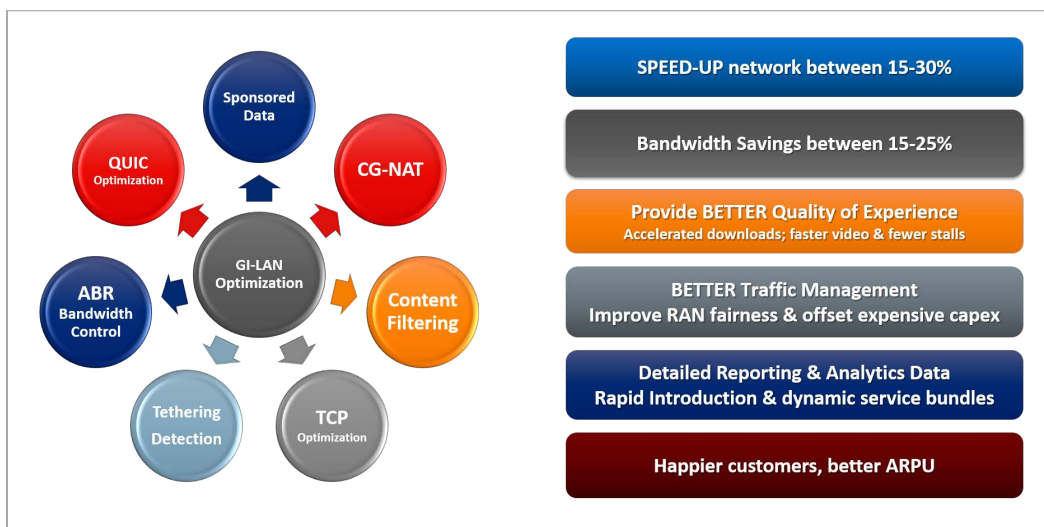
Figure 10: Monetize Growing Mobile Data Traffic with Affirmed's Virtualized DPI and Integrated GiLAN Services

AFFIRMED IoT SERVICES PLATFORM (AISP)

The Affirmed IoT services platform (AISP) is a pre-integrated hosted platform that enables a simplified, low-cost, rapid time-to-revenue opportunity for the service provider to launch new services. The AISP solution is an application platform that integrates with the IoT mobile infrastructure and the mobile operator's back office to provide a single common northbound interface for integration of IoT applications. The AISP allows for uniformity of operations and billing as well as the integration of applications that scale most readily with the breadth of multiple IoT applications. This is achieved without the need for extensive systems integration for each new application introduced to the provider's services portfolio, enabling the rapid launch of new services in the most economical method possible. As a micro-services-based hosted platform, the AISP supports device management and protocols, analytics and rule engines, security, certificate and profile management, per customer portal access, billing mediation, and management of the data lake.
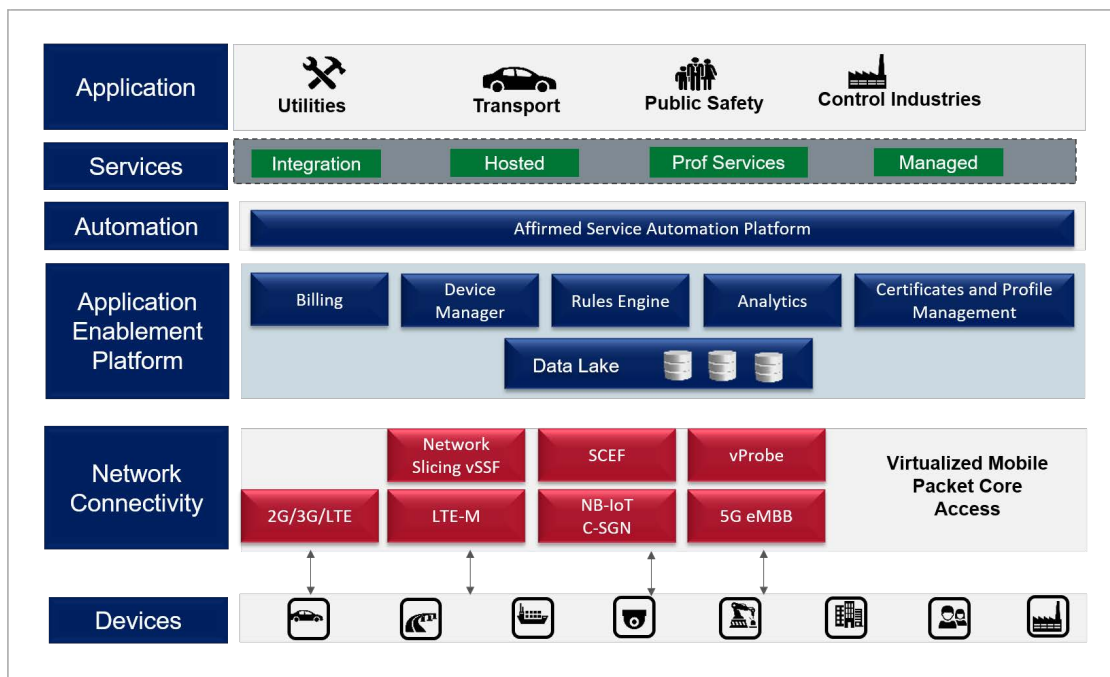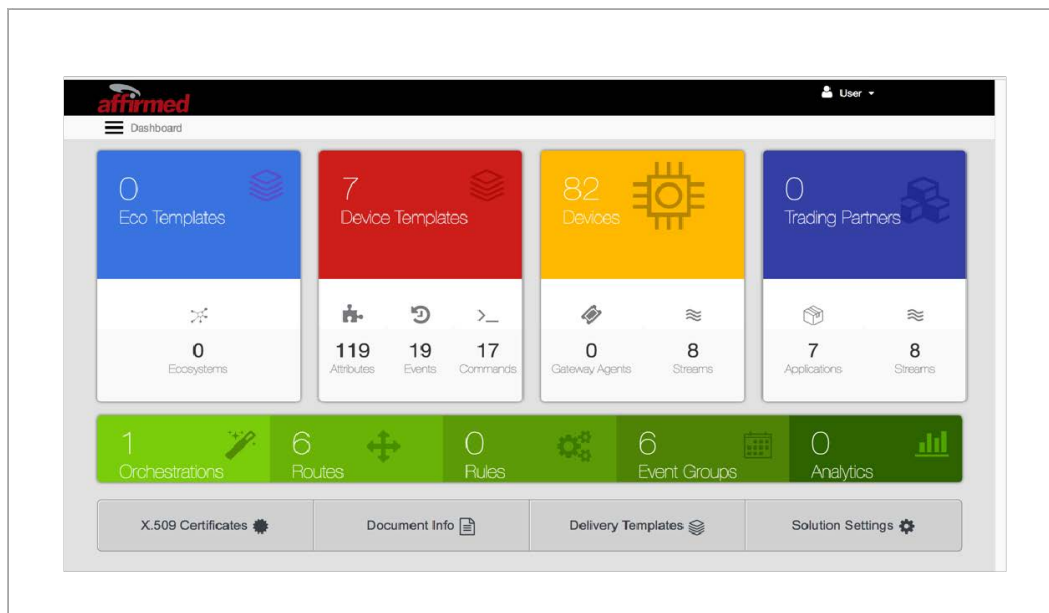

Figure 11: Profitably Deliver IoT Services With Affirmed's End-to-End IoT Solution

With this application platform framework, AISP offers pre-integrated vertical solutions for connected car, healthcare, industrial, smart-city, public safety, wearables, and NB-IoT applications.


Figure 12: Affirmed AISP for IoT Service Enablement

MOBILE EDGE COMPUTING (MEC)

Affirmed is first in the industry to launch a control and user plane separation (CUPS) based mobile core architecture. With a fully decomposed, independently scalable VNF architecture of management, signaling, application, and user plane functions; execution of the next evolutionary step to geographic CUPS was a natural extension of our existing vEPC solution. Affirmed's CUPS- based solution is ushering in a new class of high throughput, low latency mobile services by distributing the mobile core infrastructure out to the edge of the network. This enables the highest Quality of Experience (QoE) for subscribers, especially for support of new, latency-sensitive services, and high bandwidth applications. Mobile edge computing and CUPS architecture are enablers for new ultra-low latency use cases like critical IoT(C-IoT), virtual reality (VR) and augmented reality (AR).

A new use case example that requires these network attributes is autonomous cars, where real-time analytics, geo-relevant network data, and significant data throughput are essential to delivering this innovative service. These new network edge capabilities require significant packet processing compute, software efficiency, and application treatment of local content flows to lower backhaul costs in this emerging environment of explosive data growth. Affirmed's virtualized CUPS-based vEPC software, coupled with Intel Skylake servers, can run up to 150G of throughput per server and instantiate a distributed composite VNF solution that anchors the mobility session, as well as treats content flows at the edge with caching and local breakout services.
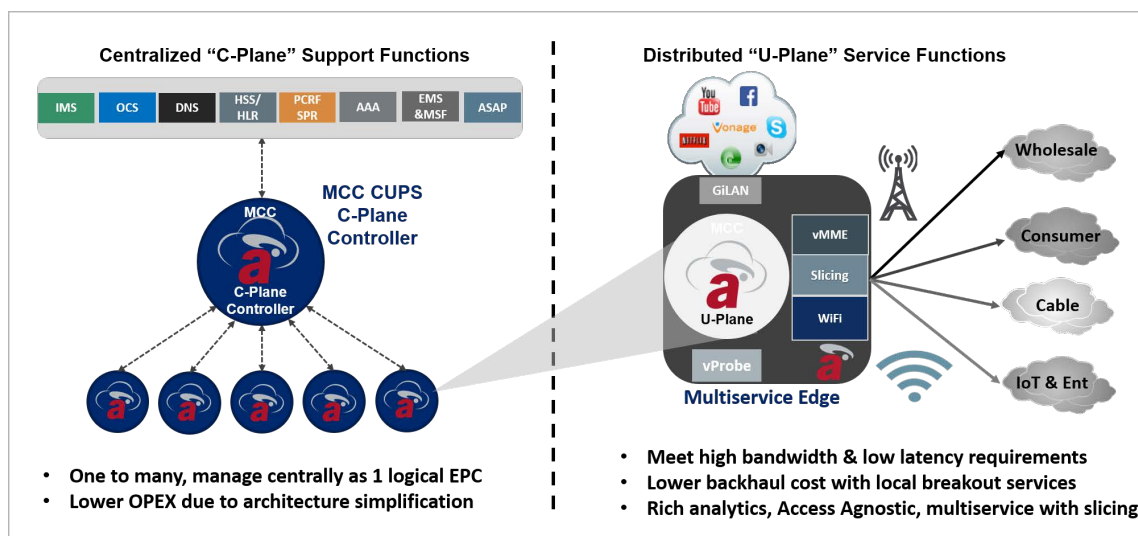
**Figure 13: Seamlessly Transform to 5G Services with Affirmed CUPS**

In addition to the edge services paradigm shift, centrally consolidating control plane and signaling functions allows the service provider to manage the geographically-extended mobile core as one, logical mobile platform. Centralized management and pooling of subscriber policy, authentication, management, and billing functions offers considerable operational cost reduction and network simplification. Furthermore, the mobile operator can independently scale user, control, and signaling planes for greatest efficiency and cost control. With CUPS and mobile edge computing (MEC), the mobile operator will have the ability to seamlessly transform to 5G services and accelerate a competitive marketplace position.

SUMMARY

Through continued innovation and market disruption, Affirmed Networks is leading the industry into a new market transformation focused on network agility, intelligence, automation as well as differentiated, high-bandwidth, edge-based services. This solution involves:

1. A combination of a geographically decomposed, micro-services architecture
2. Hosted mobility and application services
3. A micro-segmentation enabled virtual network slicing solution
4. Virtual probe with real-time user/usage-based analytics that feeds into Affirmed's ASAP service automation platform

This solution rapidly instantiates new service chains via integrated service function chaining on our mobile core software platform that truly maximizes competitive service differentiation. The Affirmed Networks' virtualized solution creates new lifecycle management capabilities and new mobility services that are truly empowering unique service differentiation and competitive advantage for the service provider.
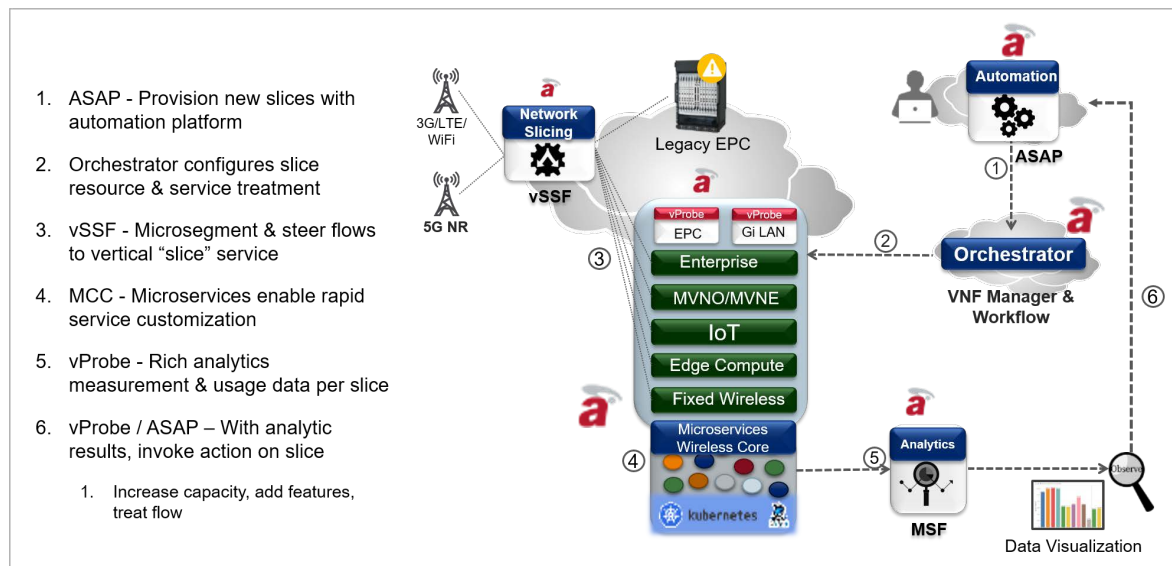
Figure 14: Attack New Markets with Affirmed's Solution

ABOUT AFFIRMED NETWORKS

Affirmed Networks' NFV solution has become the standard for the world's top mobile operators, who are embracing new business models and building new revenue streams by making the transition to virtualized architectures. The company's technology portfolio includes the Affirmed Mobile Content Cloud (vEPC), the Affirmed Wi-Fi Gateway (serving as a TWAG/TWAP and an ePDG), Affirmed Service Automation Platform (ASAP), Affirmed Virtual Probe and Analytics Solution, and the Affirmed Virtual Slice Selection Function (vSSF). These virtualized solutions have come to represent the present and the future of virtualized mobile networks with extreme scalability, remarkable flexibility, comprehensive network orchestration, and future-proof solutions for a 5G architecture.

Please find more information at www.affirmednetworks.com.