Self-Optimizing 5G IP/ Transport Network

Overview

With the rapid introduction of new high-bandwidth services such as AR/VR and 4K video, together with the growth of user base expected as 5G networks roll out, service providers face significant challenges to be able to deliver services economically and to maintain service level agreements across their complex multivendor, mixed legacy/SDN networks.

Sedona's NetFusion™ Hierarchical Network Controller provides a pragmatic solution to these challenges, allowing service providers to implement programmable automated service-aware networks to make the most economical use of network resources and to guarantee end-to-end quality for a broad mix of services. NetFusion's support for both modern SDN-based network solutions and legacy management systems and equipment means that service providers can enjoy many of these benefits immediately.

Challenge

As new use cases for Augmented Reality and Virtual Reality (AR/VR) and other high-bandwidth services such as Intel® True View and 4K Video are introduced to the market, service providers are faced with challenges to increase bandwidth, lower end-to-end network latency, and improve overall quality of service. These challenges will be further accelerated with the introduction of 5G networks that provide high-bandwidth access to a much larger and more mobile user base.

In addition to much greater overall bandwidth requirements, networks also need to support network slicing in order to provide concurrent support for a range of different service types with widely varying bandwidth, performance, and availability requirements. Underpinning the success of any network is the ability to deliver services economically in a market with steadily declining revenue per bit. Service providers must minimize cost by making much more efficient use of network assets.

The industry recognizes that programmable automated service-aware networks are the solution to these challenges, providing a basis for more efficient scaling and reducing time to market for new services. The challenge is that while this is theoretically achievable in a modern homogeneous network, practical networks are a very different story. Large Tier 1 service providers have very complex heterogeneous networks consisting of multiple layers, vendors, and domains (metro, regional, long-haul). Complicating this further is that real networks consist of both legacy systems and more modern SDN-based solutions, challenging the ability to guarantee end-to-end bandwidth, performance, and availability. How can service-level requirements be supported across these essentially separate sections of the network?

Finally, even with service-awareness and programmable control available, how can networks be optimized intelligently to anticipate changes and find the optimal overall configuration to support the vast range of different services in play at any given time?

Solution

Sedona's NetFusion Hierarchical Network Controller was developed as a solution to provide service delivery and assurance in complex heterogeneous service provider networks. It automatically discovers topology, traffic, and services for all network layers and domains and maps the cross-domain and cross-layer relationships, resulting in a single abstracted and unified network model. This considerably simplifies the role of service orchestrators, which now have only to deal with a single interface to the network.
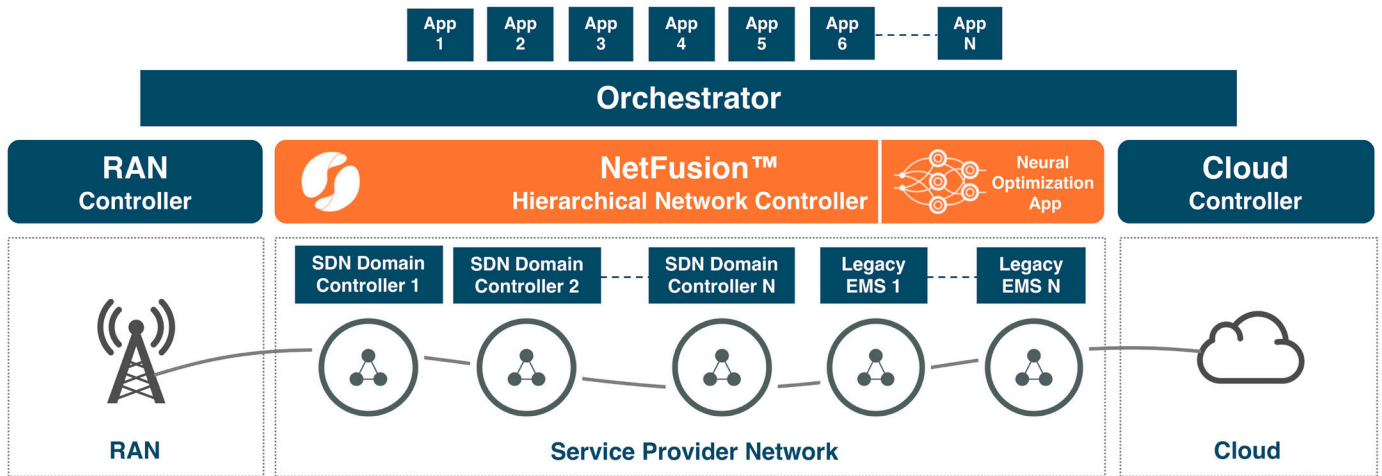
Figure 1. End-to-end service orchestration with NetFusion as Hierarchical Network Controller[1]

NetFusion orchestrates multiple services through the network in compliance with network policies and service-level requirements from the orchestrator. It also dynamically provisions and optimizes network capacity based on the unique requirements of each service, and the composite traffic matrix as whole. Where applicable the system makes use of machine-learning-based predictive analytics to achieve very high levels of optimization.

NetFusion's ability to abstract a unified multivendor network model consisting of both SDN-based solutions and legacy equipment and management systems also provides a powerful bridge as service providers upgrade their networks to support new high-bandwidth services.

Use Case Example

Sedona and Intel demonstrated NetFusion's ability to optimize 5G Transport network capacity and latency during a hypothetical "game day" scenario at major sports stadium.

The stadium is outfitted with Intel® True View technology, with thirty-six 5K video cameras installed around the arena.

The data center that processes the massive amounts of Intel True View camera data is located in a different location in the metro area.

During a game, there is a massive increase in traffic across the metro network between the stadium and the data center as the Intel True View cameras send image data to the data center for processing, and users in the stadium download Intel True View replays to their smart phones.

The downstream traffic is delivered over the metro network to a 5G baseband unit (BBU) pool located at the stadium, with last-mile delivery of replays to smart devices through the 5G wireless network.

Before the game commences, a predictive analysis by a NetFusion neural net optimization app recognizes that a possible game-day scenario is in play. Further analysis confirms this assessment and determines that additional capacity with low latency is required between the stadium and the data center.

As a result of the analysis, NetFusion provisions a high-capacity express-link between the data center and stadium locations, providing an outstanding mix of cost, capacity, and low-latency.
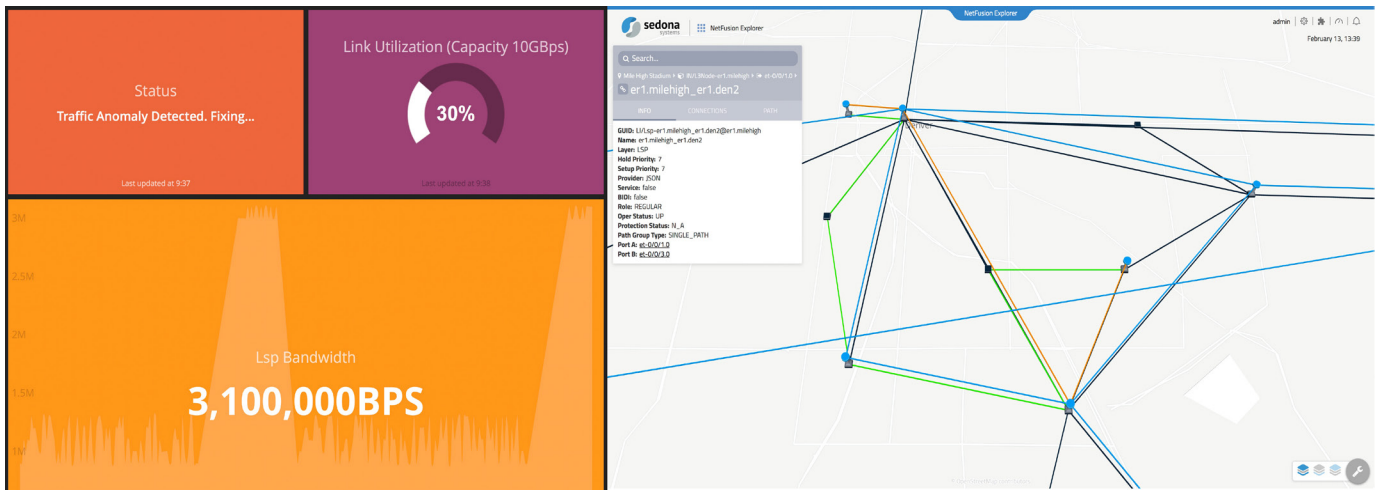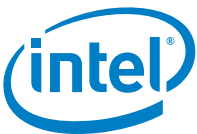
Figure 2. "Game-Day" example with Intel® True View

As the game completes, the NetFusion optimization app assesses that the game has ended and reconfigures the network to a standard "weekend-day" configuration. NetFusion decommissions the express link returning the capacity to the resource pool.

This market-ready solution is delivered via Lenovo's Intel® Select Solution for NFVI. Featuring Lenovo ThinkSystem SR650 servers that have been engineered to deliver outstanding reliability and performance[2] with Intel® Xeon® Gold 6138T processors or higher, low-latency Intel® SSD Data Center P4500 Series 2.0 TB, dual port 25 GbE Intel® Ethernet Network Adapter XXV710 SFP28+, and Intel® QuickAssist Adapter 8970, the platform provides a workload-optimized stack tuned to take full advantage of Intel architecture for network applications.