



SciSports leverages SD-WAN service from SDNbucks to deliver real-time data intelligence for professional sports

About SciSports

SciSports is a leading provider of data intelligence for professional soccer (football) organisations. It leverages data intelligence to understand football with the goal of improving the game on the pitch and enriching the experience for billions of fans around the globe. SciSports' product portfolio consists of the sport tracking application, BalJames, the player recruitment platform, Insight, and sports data intelligence API services.

BalJames tracks the movement of all players, the ball, and referees in 3D. The system uses multiple high-resolution cameras and advanced deep learning and computer vision technologies to generate accurate on-pitch data. The system works autonomously, so there is no need for human interaction in the stadium or requiring sensors on the players or the ball.

Insight is a sophisticated platform that quantifies the quality and potential of all professional football players around the world, supporting football experts in expanding their scouting scope. The platform can suggest viable trade (transfer) targets and identifies player talent at a young age by calculating their potential using advanced machine learning algorithms. The goal is to increase the trade (transfer) success rate.

SciSports' data intelligence services are used by clubs, agents, associations, players, and other football-related parties. Clients include Royal Belgian Football Association, Olympique Lyonnais and Ajax, as well as other clubs from Europe's top leagues and the MLS.

The BallJames application

The BallJames system works by sending multiple live 4K video streams, recorded at a football match, to SciSport's proprietary analytics engine (AE) hosted in Google Cloud Platform (GCP). Feedback is produced very quickly and incrementally through its deep learning algorithms. The AE in GCP will start to produce analytical results after 10 seconds of analyzing video streams allowing a coach to dynamically see the results of his tactical moves on the bench, or empowering fans with next generation statistics, or providing visuals displayed on the TV or web.

To provide a couple of deployment examples, the system has been successfully installed at the Polman stadium of Dutch Eredivisie club Heracles Almelo and the stadium of a large English Premier League club. In addition, in collaboration with the University of Twente, a test field is equipped with the system for academic research.

BallJames will have far reaching applications in the future extending beyond football, including providing advanced statistics for online gambling, as well as revolutionizing the way players are chosen and leveraged for professional sports teams.

Network challenges and requirements

The essence of the BallJames application requires the visibility, control and delivery of high-definition video streams from different cameras to an AE in GCP. The real-time nature of this application puts enormous demands on the network to deliver guaranteed performance without risking the security or integrity of the data.

Some of the network requirements that need to be satisfied for the BallJames application include:

- **Performance** – the network needs to provide sufficient guaranteed bandwidth, latency, and jitter to meet the prescribed service level agreement (SLA) from each video stream.
- **Security** – each video stream needs to be encrypted to secure the data from hackers and other threats.
- **Reliability** – the network has to be architected in a highly available manner so that the application can survive equipment and link failures.
- **Visibility and control** – SciSports must have full control and visibility of each video stream, in real-time, to measure performance, analyze for research purposes, and to be able to troubleshoot issues.
- **Flexibility** – as SciSports business expands in both locations and applications, the network must be flexible enough to adapt to different location requirements and cloud capabilities.

Simply put, the critical and time-sensitive requirements of the BallJames application demands the highest performance, reliability, and security, leaving no room for error.

SDNbucks and Nuage Networks

SDNbucks is an SD-WAN managed service provider that operates across 220 countries worldwide. As a key partner of Nuage Networks, SDNbucks leverages Nuage Networks SD-WAN 2.0 technology to deliver managed SD-WAN services. SDNbucks deployed their managed SD-WAN service to meet all of the stringent network requirements of the BallJames application.

SDNbucks private highly available SD-WAN hosting center

SDNbucks hosts all of the essential multi-tenant elements needed to offer its managed services to its enterprise customer base from its own highly available (HA) hosting center. SDNbucks owns and maintains this infrastructure and offers secure multi-tenant SD-WAN services from it. Specifically, it hosts the following Nuage Networks SD-WAN 2.0 capabilities:

- **Virtualized Services Directory (VSD)** – provides SDNbucks with a multi-tenant centralized policy control engine, services directory and network analytics engine that is used to provide visibility and control of entire enterprise networks.
- **Virtualized Services Controller (VSC)** – represents SDNbucks multi-tenant centralized control plane and communicates directly with each enterprise network to instantiate and update the SD-WAN VPN overlay and other services.

- **Enterprise SD-WAN portal** – represents SDNbucks multi-tenant SD-WAN portal enabling secure visibility and control to each enterprise customer so that they can create, manage and monitor their own SD-WAN services.
- **Network Services Gateway-Underlay Border Router (NSG-UBR)** – this multi-tenant router bridges SDNbucks secure datacenter securely to each enterprise customer’s SD-WAN overlay VPN.
- **OpenStack Powered VNF market place** – this multi-tenant telco cloud service provides highly available VNF’s, and with the Nuage Virtual Routing and Switching (VRS) integration, full network automation exists including service chaining into specific SD-WAN VPNs. With this service, a complete ecosystem of value-added services are just one-click away including Firewalls, Load-Balancers, Anti-DDOS, and Secure SSL remote access VPN’s.

The solution

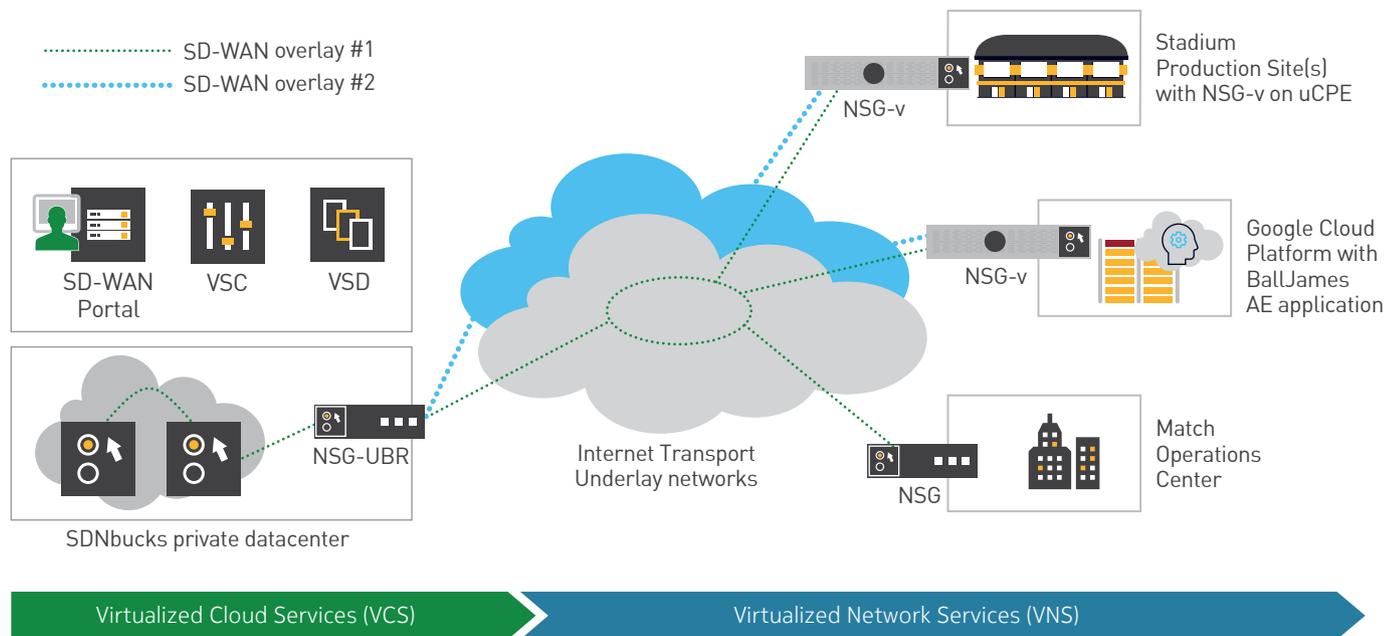
The SD-WAN implementation

As part of the BallJames application, each connected stadium uses high-definition video cameras that are streaming the actions on the football pitch. The enormous bandwidth required for all video streams is sent directly to the SciSports Analytics Engine (AE) hosted in Google Cloud Platform (GCP) where they are analyzed.

To accommodate this requirement, a full mesh SD-WAN overlay VPN is deployed leveraging Nuage Networks Network Services Gateway (NSG) vCPE endpoints from each stadium to the AE in GCP. In addition, the SD-WAN overlay extends to include a test stadium at a local university used for academic research purposes. Lastly, several SciSports offices use Nuage Networks NSG uCPE devices to securely connect to the SD-WAN overlay for research and troubleshooting purposes.

The underlying WAN transport networks (i.e. underlay network) are high speed broadband internet connections.

FIGURE 1. SD-WAN solution unlocking SciSports data intelligence sports application



Meeting the requirements of the BallJames application

The SD-WAN 2.0 implementation deployed by SDNbucks addresses all of the key requirements discussed earlier including providing a robust and adaptable infrastructure that will meet SciSports current and future requirements. Here is how SDNbucks SD-WAN 2.0 service addresses the BallJames application requirements:

- **Performance** – the SD-WAN link performance is monitored in real-time by the SD-WAN platform for packet loss, latency, and jitter to ensure that the WAN links performance meets the video streams requirements. If the platform detects any degradation in link performance that violates the video stream's SLAs, it will automatically switch the affected video stream to an alternate overlay path that runs across a different underlay WAN.
- **Security** – every SD-WAN link is encrypted via IPSec to secure the video content and each video traffic flow is isolated from the rest of the network (micro-segmentation), providing an additional level of protection. Finally, SciSports can enable dynamic security capabilities that can take automatic remedial security actions based on suspicious network behavior that is detected in real-time and without user action.
- **Reliability** – there are multiple SD-WAN vCPE endpoints (NSG-v) for each stadium as well as for to the AE in GCP. These SD-WAN vCPE endpoints run on independent uCPEs and are deployed as an active/active pair with direct connectivity between them. Using this deployment model, there is full resiliency when either a WAN link fails or even when an entire uCPE fails.
- **Visibility and control** – using the SD-WAN portal, SciSports has full visibility and control of each video stream. From the portal, network admins have access to real-time network statistics and performance to better understand the overall health of the overlay network. In addition, network and security policies can be programmed to control each video application's behavior in the network and multiple SciSports users in remote offices have the ability access the portal and analyze each live video stream for research and troubleshooting purposes.
- **Flexibility** – inherently flexible, the Nuage Networks SD-WAN 2.0 offers multiple branch deployment options such as a vCPE instances (NSG-v), and a variety of physical x86 uCPEs (NSG-C, NSG-E, NSG-X) that can fit small, medium and very large sites with capabilities such as hosting third party VNFs, built-in Wi-Fi AP and built-in LTE. In addition, flexible cloud capabilities exist such as deploying vCPEs at the edge of a public cloud (i.e. GCP, AWS and Azure) thus extending all of the visibility, control, and security that SD-WAN offers to include Public Clouds. Finally, the Nuage Networks SD-WAN 2.0 solution is the industry's only solution that offers a single platform for SDN connectivity within a datacenter (Virtualized Cloud Services) as well as SD-WAN across the WAN, SaaS and public cloud (Virtualized Network Services).

The SciSports video application described above represents the early days of what data intelligence and real-time analytics can do for professional sports. It is exciting to think about the potential use cases that this type of technology will enable. Soon each prospective athlete will have an analytics profile to accompany the rest of her resume and accomplishments. One thing is certain, the demands of the network will only become more stringent. With a flexible foundation based on SD-WAN 2.0 technology from Nuage Networks, SDNbucks will be able to meet and exceed the future network requirements of cutting edge enterprise customers like SciSports.