

SONY

nevi**o**n



VideolPath

Media Orchestration Platform
for broadcast and telecoms

April 2024



The Future Virtualization Real-time Deliver Content Freedom to Create Vision

What is VideoPath?

As viewers have more and more choice, distribution rights are skyrocketing and the pressure on the production efficiency is increasing, broadcasters and media organizations must be increasingly nimble to remain competitive. To achieve this, they need to be able to orchestrate their media in a way that will support increasingly flexible, dynamic and complex workflows.

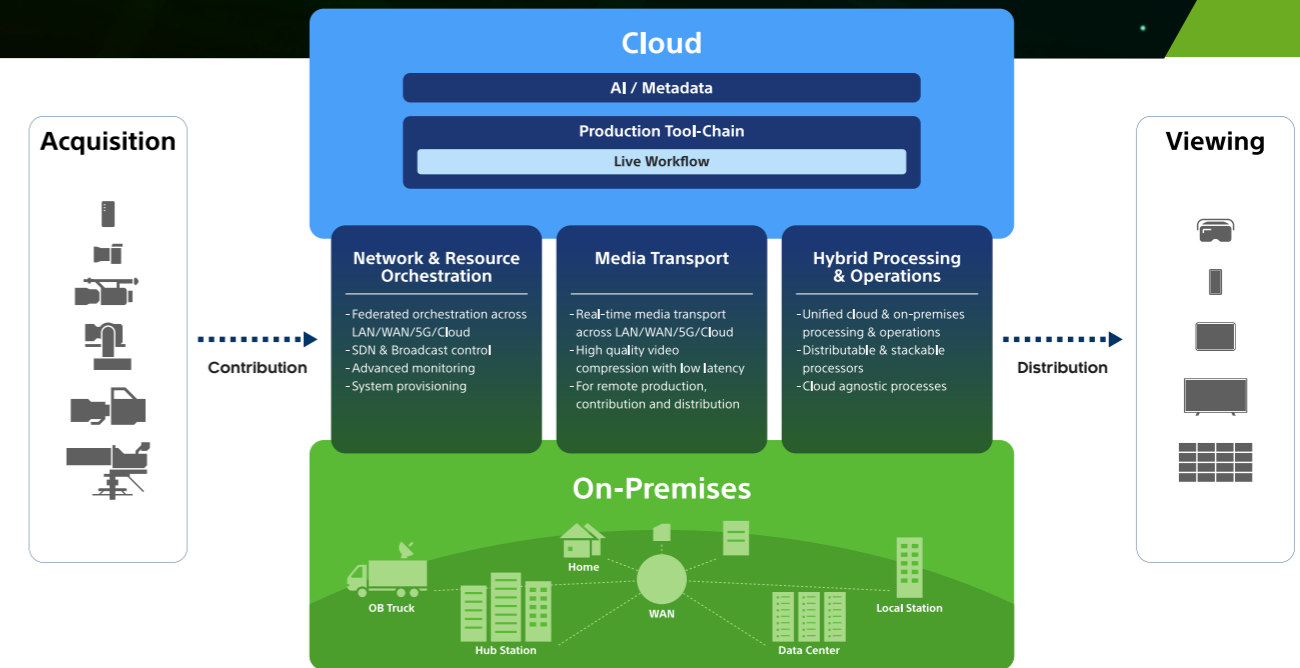
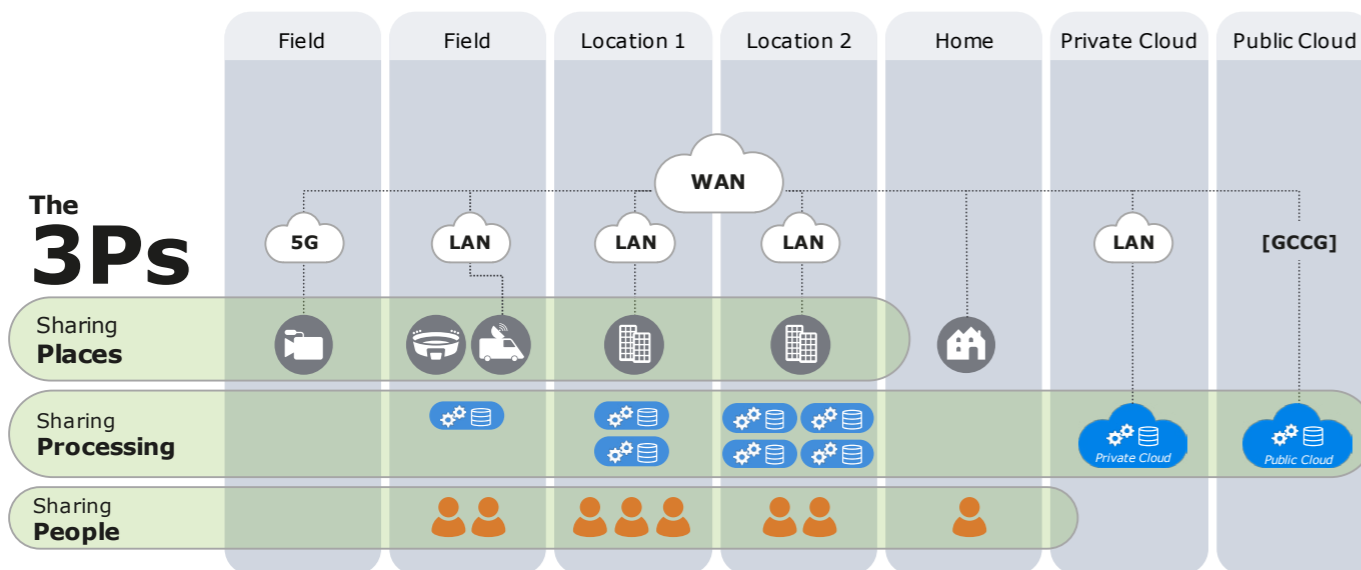
VideoPath is a media orchestration platform that uniquely combines broadcast operations, orchestration and monitoring capabilities, while giving customers full freedom to deploy all or parts of the capabilities as an integrated part of their environment. This vendor-agnostic and highly scalable system supports hybrid workflows across SDI and IP – enabling a smooth migration towards IP-optimized workflows.

Live Production is changing

The future is distributed production

Content production is moving progressively towards a distributed model whereby workflows can tap into production resources (places, processing and people) almost anywhere on the ground and in the cloud. This is transforming the logistics and economics of production, enabling multiple models for production, which can best suit medium/long term business needs and short-term production requirements.

The right orchestration is the key to enabling flexible, distributed environments – as well as helping to get there. It needs to make sure signals reach the right locations, whether on the ground or in private or public clouds – across LANs, WANs and 5G networks; it must ensure that all the equipment in the production is controlled; it should check that everything is working as planned; and much more.



NETWORKED LIVE

Networked Live is an ecosystem of solutions, products, services and partners that combines hybrid on-premises and cloud processing with network connectivity to transform the logistics and economics of high-quality mission critical live production.

Networked Live is based on 3 main pillars, supported by Sony's and Nevision's experience and expertise.

- Network and Resource Orchestration
- Media Transport
- Hybrid Processing and Operations

The VideoPath media orchestration platform is a key component of the Network and Resource Orchestration pillar of Networked Live.



Where is VideolPath used?

With its ability to combine LAN/WAN/5G/cloud and handle both IP and SDI, VideolPath is suitable for facilities, outside broadcast, major events, contribution, remote production and distributed production (a combination).

Facilities and OB-trucks (LAN)

In facilities (studios, control rooms, MCR, etc) and OB-trucks, VideolPath can support operational workflows to prepare and execute live production. This includes advanced routing of signals, control of broadcast devices, GPIO and tally workflows, resource scheduling and customized operational interfaces. The system helps streamline daily operation and use media resources most effectively.

Contribution (WAN)

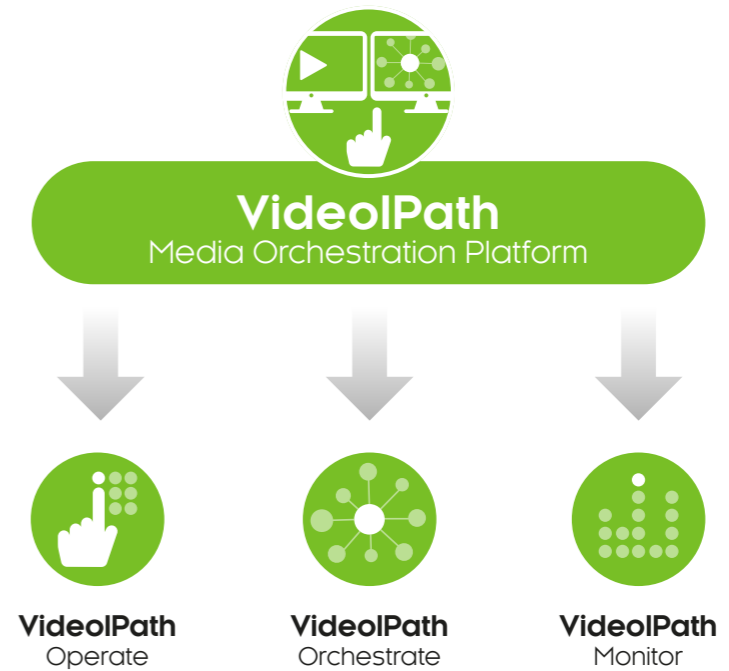
VideolPath can be used to connect media devices (encoders/decoders) across WAN networks. This includes support for protection mechanisms that are typically used in WAN environments and flexibly handling a wide variety of compressed formats, including format conversion and bridging between LAN and WAN networks (typically between uncompressed and compressed worlds).

Remote production (LAN/WAN)

In the context of remote production, all the capabilities applicable to the facilities, OB-truck and contribution apply. In addition, VideolPath can combine this with the capability from the contribution space to support remote locations as if they were on-prem, hiding the impact of distance from the operational workflows.

Cloud

With private and public cloud processing and transport becoming ever more important, VideolPath provides the ability to allocate resources in cloud infrastructure and support ground-to-cloud-cloud-to-ground routing scenarios. Cloud is a rapidly evolving area and VideolPath provides a future-proof path towards hybrid ground/cloud workflows.



Why VideolPath?

As media networks move to IP technology, and workflows are created from logical rather than physical connectivity, the management layer needs to have a much closer relationship with the network, and broadcast operations needs to undergo a reinvention.

VideolPath is unique in combining orchestration, broadcast operations and monitoring designed specifically to take full advantage of IP and IT technology in LAN, WAN, 5G and cloud, while hiding the underlying technical complexities of the infrastructure from the users.

Benefits

VideolPath brings real benefits to production:

Workflow transformation

- Puts users in control by hiding complexity
- Easy connection management
- Supports existing workflows
- Enables new efficient workflows by unifying in-house, remote and cloud production
- Supports the progressive transition from SDI to IP

Resource optimization

- Resource sharing in distributed production
- Bandwidth reservation with load sharing in the network
- Avoid overprovisioning with explicit routing
- Advanced routing finds the right resource

Investment for now and the future

- Proven platform
- Vendor agnostic
- Based on open standards
- Handles SDI and IP
- Designed to support multiple production video and audio formats
- Highly scalable



Features and functionality

VideolPath is a media orchestration platform that provides broadcast operations, vendor-agnostic orchestration, and monitoring.

VideolPath

User Interfaces

Web-apps

- Connect
- Matrix
- Operate
- Inspect
- Alarms
- Topology
- Profile
- Inventory
- Security

- Soft Panels
- Sony Panels
- 3rd Party Panels
- External Systems

APIs & Northbound Interfaces

- REST API
- NS-BUS
- Quartz
- Ember+
- MRP
- LRC
- SW-P-08

Core Functionality

Operate

- Tally
- Destination Monitoring
- Alias Naming
- Salvos
- Endpoint Grouping
- Direct Matrix Control
- Virtual Junction
- GPIO
- Clean Switching

Orchestrate

- IP & SDI
- Endpoint Configuration
- SDN Control
- Bandwidth Management
- Resource Management
- Scheduling
- Protection
- Redundancy Control
- Maintenance

Monitor

- Service Monitoring
- Alarm Management
- Metrics
- Grafana/Prometheus
- Thumbnails

System

- Redundancy
- Security
- Federation
- Clustering
- Scaling

Southbound Interfaces

IP Switches

- Openflow
- Arista OpenConfig
- Cisco NX-API
- Netconf/Yang

SDI

- MRP

Cloud

- AWS Media Services
- txedge

Broadcast Equipment

- NMOS
- Ember+
- SNMP
- Custom Drivers
- NDCP

Integrated with Networked Live

VideolPath comes with tight integration with other Networked Live products from Sony and Neviion. This reduces the cost of integration and time taken to deploy the VideolPath media orchestration platform.

At the same time VideolPath is a vendor agnostic system that allows integration with any kind of network and production equipment, giving our customers complete freedom of choice.

VideolPath Operate broadcast operation re-imagined

Leveraging Sony's extensive experience in broadcast control, VideolPath has evolved to provide broadcast operations functionality for IP based broadcast facilities, MCR, PCR, outside broadcast (OB), etc.

The broadcast operations functionality may be used in combination with orchestration or independently. The system focuses on the broadcast operation capabilities that maximize the benefits of an IP based infrastructure.

Customizable user interfaces

VideolPath provides several customizable user interfaces (Apps) for broadcast operations:

- **Panel** – widget-based software control panel interface
- **Matrix** – matrix style interface that can display logical routing views
- **Connect Studio** – advanced routing interface for scheduled or immediate workflows

The choice of control panels

VideolPath can be used in combination with a variety of panels, including the system's own configurable soft panels (using touch screens), or hardware panels from Sony and 3rd party vendors. This allows users to pick their favorite way to control their resources, including extending the use of the panels they have for their SDI environment to control a new IP network (thereby providing a smooth transition for the operators).





Tally/UMD

VideolPath can be a tally master or get tally information from external tally masters. VideolPath can also handle multiple tally systems at the same time. The system supports TSLv5 to exchange tally information with other systems.

VideolPath supports multiple tally colors simultaneously on sources and destinations. The tally color can be calculated and propagated from the destination to the source and then to all destinations connected to that source.

GPI with RCP preview

VideolPath supports GPI (General Purpose Interface) workflows where GPI inputs can be connected to one or more GPI outputs. There also exists some special GPI blocks to make connections based on GPI.

VideolPath can detect changes on the GPI input and generate an event that is propagated to the GPI output. For more advanced GPI workflows, logical building blocks like AND, OR, XOR, inverter or latches can be added.

Parameter control

VideolPath allows control of parameters in production devices using standard protocols or via custom protocols supported by drivers. Operators may use this capability to adjust relevant parameter values on-the-fly during setup and live production.

The Panel app supports widgets like sliders, get/set buttons and toggle switches to perform parameter control all from a no-code interface. Parameter control widgets may also be combined with widgets for connection management, service listing, monitoring thumbnails, and so on to support entire workflows.

Virtual junction

Often equipment or groups of equipment will be used by different locations at different times in an identical manner (i.e. connected in the same way). It can be time-consuming to recreate all the logical connections between the pieces of equipment every time.

VideolPath offers the possibility to create virtual sources and destinations, which create the workflow logic common to each location, without specifying the exact devices used. The specific pieces of equipment can simply be associated with these virtual endpoints, and the desired workflow will automatically be established, making the process simpler, faster and more consistent.

Grouping of endpoints

VideolPath includes an advanced function to group endpoints into source or destination groups (e.g. combining multiple video and audio signals). When doing connections between these groups, VideolPath will match equivalent endpoints (e.g. type, format) to enable smarter and faster connections based on endpoint tagging.

For example, the grouping concept can help establish SMPTE ST 2110 connections, while hiding the individual essence streams for the operator. The VideolPath grouping concept is highly flexible though and can be used to group any combination of individual endpoints making it suited also for other workflows besides SMPTE ST 2110.

Other broadcast operations functionality

VideolPath offers familiar broadcast operations functionality adapted to work in an IP or mixed IP/SDI environment, including:

- Salvos (macros)
- Alias names
- Destination monitoring

VideolPath Orchestrate market leading orchestration for IP media networks

VideolPath is a comprehensive orchestration system that provides connection management (SDN and IGMP) across a variety of networks ranging from international or national contribution networks (WANs and 5G) to broadcast facility, OB-vans or campus infrastructures (LANs, both SDI and IP). It can also be used to control the flow of signals to private or public cloud infrastructures (GCCG) and within a private or public cloud.

The orchestration functionality may be used in combination with the broadcast operations or independently. It manages end-to-end video, audio, and data services across any IP infrastructure. Media nodes are managed using NMOS or vendor specific APIs, while streams are routed across the underlying IP infrastructure using SDN (or alternatively IGMP/PIM). The system is proven to scale to thousands of nodes, transporting 100,000s media streams across the network.

Connection management

In the past, production workflows usually involved devices connected by cables carrying just one signal each. With IP, workflows are no longer simply defined by the cabling, as pieces of equipment, often located in datacenters, are effectively always physically connected with each other, and only the "logical" connectivity determines whether signals flow between devices. Connection cables now carry multiple signals – with bandwidth being the only limitation.

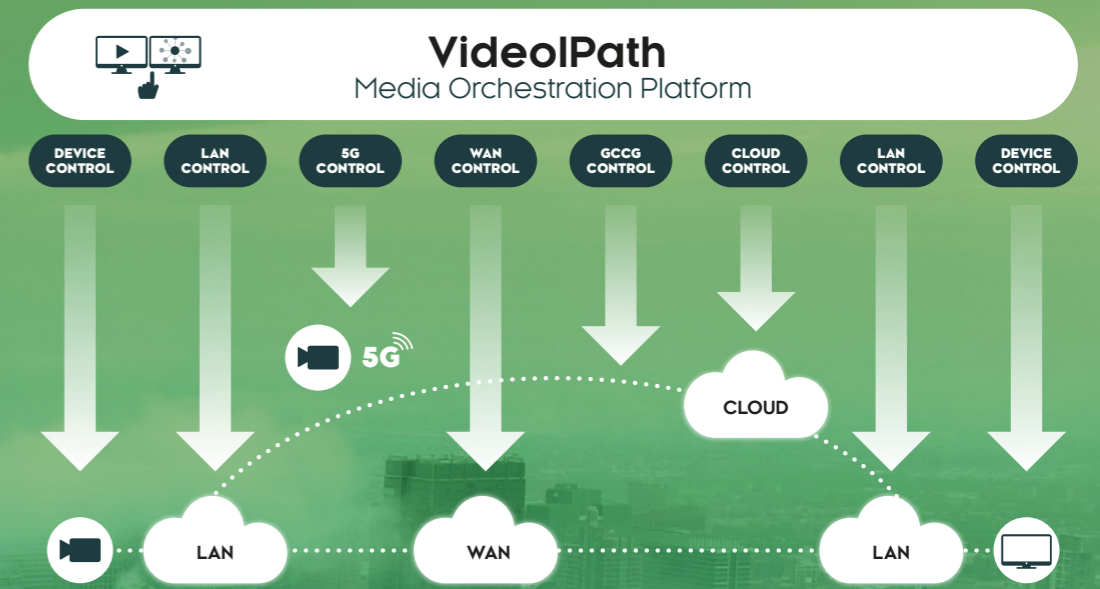
These new workflows require a more advanced connection management tool that simplifies the task of connecting sources and destinations across an IP or mixed IP/SDI based infrastructure – which is exactly what VideolPath is. While establishing connections and using the network resources efficiently

are complex tasks, from an operator point of view, it is as simple as setting a cross-point in an SDI router.

SDN control

VideolPath can make intelligent routing decisions across any network topology (including spine/leaf commonly used in IP facilities). The system takes full control of both existing and planned media flows, enabling the most efficient utilization of the IP infrastructure, at any point in time.

The system comes with a highly optimized routing engine and can provision routes across all major switch vendors (Cisco, Arista, Nvidia, etc). This gives customers the deterministic performance needed in broadcasting, and also simplifies maintenance and troubleshooting of the IP infrastructure.

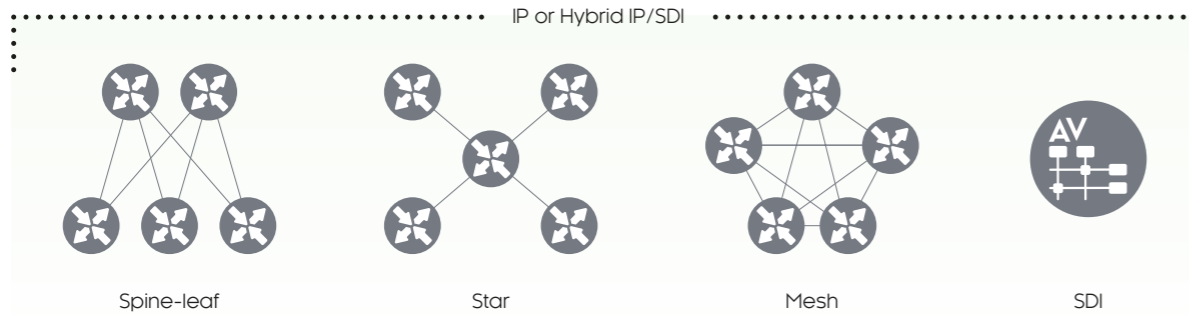




VideolPath

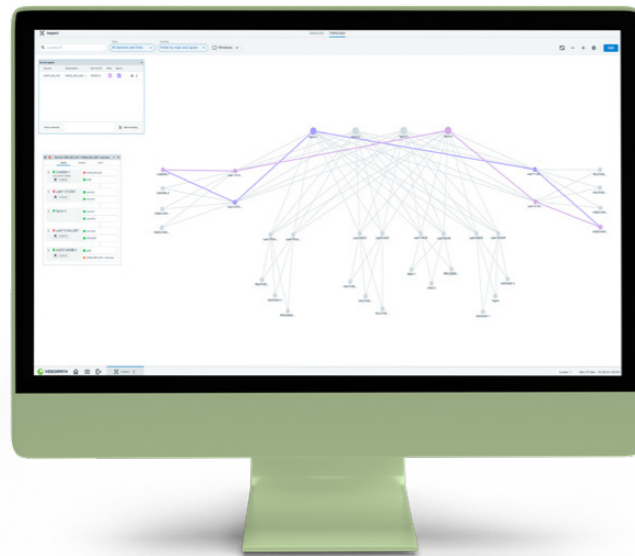
Media Orchestration Platform

Any Network, Big or Small



Resource and bandwidth management

VideolPath manages media resources (e.g. encoders, decoders, audio processors, etc) and network resources such as bandwidth and ports optimally. It is aware of existing and planned usage and can route signals accordingly.



Scheduling

VideolPath includes a scheduling engine that works in conjunction with the resource and bandwidth management to guarantee that scheduled services can be delivered at the activation time. The scheduler supports both recurring and one-time services.

Protection

VideolPath has multiple functions to help guarantee connections of mission-critical services. From simple SMPTE ST 2022-7 to more advanced dual encoder protection, whereby dual senders, paths and receivers can be configured based on one connection in the VideolPath GUI.

Redundancy control

The system includes a redundancy controller that can intelligently re-route services when failures occur in the network or at the edge. The behavior of the redundancy controller is customizable to fit a wide variety of redundancy scenarios.

Maintenance

VideolPath allows maintenance on links, devices, modules or even ports to be scheduled. VideolPath will inform the user about services affected by the maintenance, and provide the option to reroute these sources affected by the maintenance.

Multicast and VLAN management

VideolPath can be configured to auto-assign multicast and VLANs to connections from one or multiple pools. When a connection is ended, the multicast or VLAN is released so it can be reused for other services. This removes the possibility of human error in assigning addresses and also gives a more optimized way of using addresses.

NMOS

VideolPath comes with a built-in NMOS RDS (Registration and Discovery Server) for easy onboarding of NMOS IS-04 devices. An external 3rd party NMOS registry can also be used.

NMOS IS-05 is also used extensively by VideolPath to perform connection management for media devices. This can be combined with device specific drivers when specific functionality is required. There is even the possibility to combine NMOS with other APIs for flexible integration.

VideolPath provides true end-to-end capability for all your orchestration needs. The table below highlights the substantial difference between what VideolPath provides and other systems are capable of.

	VideolPath	Others
Multicast routing (with bandwidth awareness)	✓	✓
Bandwidth management (reservation now)	✓	✓
Link load balancing	✓	✓
Red and blue spine/leaf topology	✓	✓
Flow policing (restrict ingress bandwidth for flows)	✓	✓
Alarm management	✓	⚠
Co-exist with PIM/IGMP networks	✓	⚠
Any network topology (Including purple spine/leaf)	✓	
End-to-end service monitoring (correlate alarms to affected media services)	✓	
Multi-vendor network (Cisco, Arista, Nvidia, Huawei, Nevion)	✓	
Scheduling and future reservation	✓	
Device and link maintenance (plan for outages and move critical flows)	✓	
Hybrid IP and SDI support (route end-to-end across hybrid IP/SDI networks)	✓	
Automatic multicast assignment (avoid configuring senders with static addresses)	✓	
Multicast NAT support	✓	
Data service tunneling (bi-directional routing of VLAN across network)	✓	
Two stage clean switching (avoid double bandwidth)	✓	
Media-aware re-routing (prioritize re-routing of critical flows)	✓	
Routing constraints (steer different traffic profiles certain way)	✓	

✓ - full support ⚠ - partial support



VideolPath Monitor integrated monitoring of IP based services

IP technology introduces more flexibility to establish new production setups on-demand by utilizing the same underlying infrastructure. This enables broadcasters to make better use of available resources and work more efficiently, but at the same time introduces more complexity.

VideolPath is there to help tackle this complexity to proactively prevent problems and assist in the troubleshooting process to quickly identify the root cause of problems in the infrastructure, and how it impacts ongoing operations.

Alarm management

VideolPath combines alarm monitoring for integrated devices with control of services, which means that broadcasters do not need to consult multiple systems to get an accurate overview of the current status. The system keeps track of all open alarms on integrated devices, and maintains a log of historic alarms with appropriate retention mechanisms.

Service assurance

VideolPath provides extensive service assurance building on the alarm management functionality in the system. The system automatically correlates alarms with running services.

This allows operators to focus on problems that affect services. Customized monitoring and connection management GUIs can be created for easier action when a fault is happening.

The system also includes service-templating functionality that enables customization of how alarms are correlated against services. This includes the ability to generate summary alarms such as loss of service, loss of protection, etc.

Grafana/Prometheus integration

VideolPath allows integration with Grafana and Prometheus for external analysis of collected data both regarding the system itself and services managed by the system.

This allows customers to create customized Grafana dashboards combining data from VideolPath and other systems. Nevision professional services can also assist with the creation of dashboards.

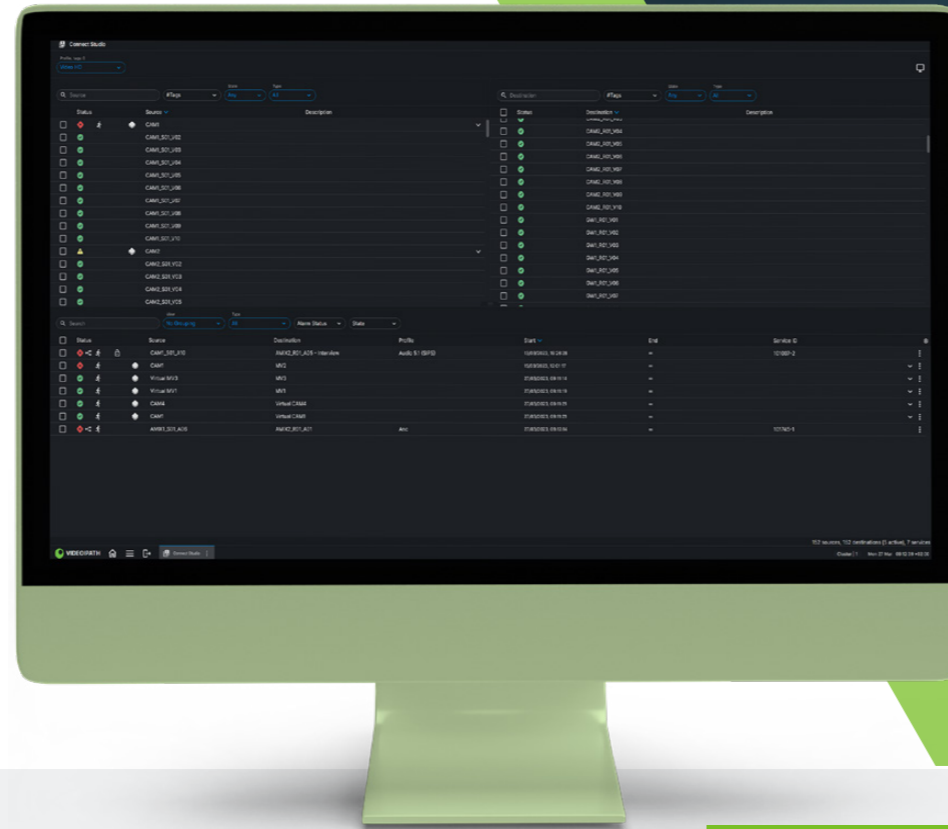


Modern and ergonomic user interface

A key focus of Nevia VideoPath is accessibility and ease-of-use for users.

VideoPath offers an ergonomic HTML5-based web-interface, which is divided into different modules called "Apps". Each App is dedicated to a particular type of functionality – whether it's handling operations, connectivity, monitoring or managing the system's settings.

All the Apps are combined onto a common desktop (available in light and dark themes), which provides a consistent look-and-feel and the possibility to exchange data between them.



Web-apps highlights

The apps that are within VideoPath are as follows:



Connect Studio

Allows the operator to connect endpoints and/or groups, including scheduling of connections and viewing of on-going and scheduled connections.



Matrix

Allows the operator to connect multiple endpoints and/or groups from a familiar matrix oriented interface. VideoPath does not restrict the user to statically defined matrixes, but these may be created dynamically on-demand by the user.



Panel

A customizable user interface where the operator can build their own user experience using pre-defined widgets. This no-code approach to UI customization allows operators to create their control panels combined with widgets that display monitoring and other information.



Alarms

Traditional alarm-based user interface showing current, service-affecting, historical alarms, etc.



Inspect

Advanced monitoring application that allows the operator to perform high-level monitoring of services combined with the ability to drill-down and inspect details to pinpoint service-affecting problems.



Inventory

Manage devices that are on-boarded into the system. This includes backup/restore and software upgrade for supported devices.



Topology

Manage the network connectivity model that is fundamental to the system's advanced SDN functionality, in addition to metadata edit for media devices added to the system.



Profile

The system allocates a profile to each connection. This application allows customization of different profiles for uncompressed and compressed services, including video, audio and anc types.



Security

VideoPath has an advanced security model that can be managed using this application. This allows administrators to define access rights for users, authorization roles, support multiple tenants and integrate with directory and SSO providers.



Import/Export

This is a powerful tool for administrators to quickly import and export larger amounts of data to/from the system.



Maintenance

This application allows operators to define maintenance intervals for different system resources, which provides a controlled way to plan upgrades and other potential service-affecting activity.

IT-centric platform and interfaces

Hosting platform

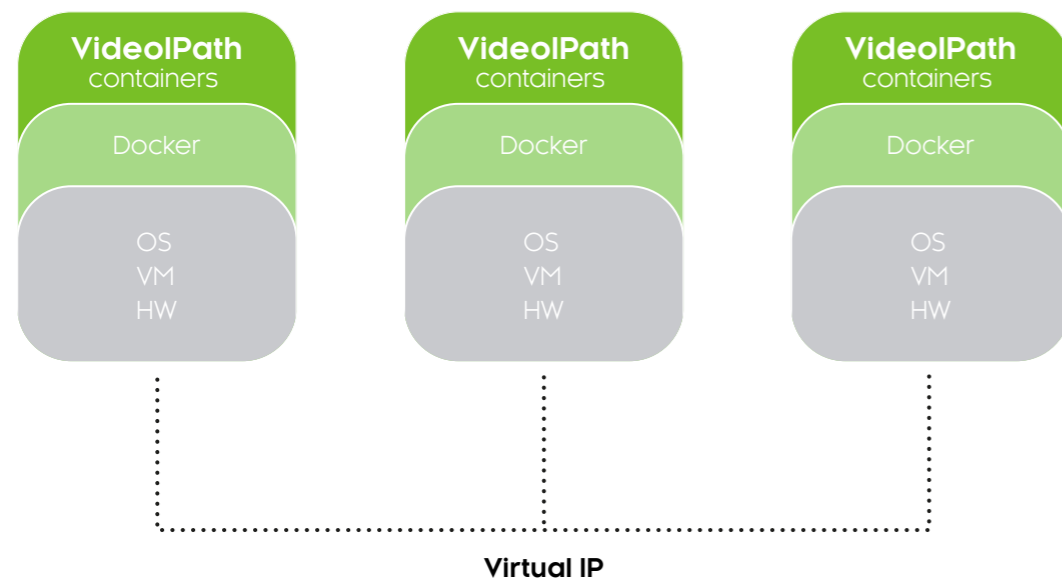
VideolPath can be hosted on standard suitably sized and powered COTS hardware (either bare metal or virtualized), or in the cloud. VideolPath has been deployed on all major clouds and hypervisors.

VideolPath can be deployed on Red Hat Enterprise Linux for customers seeking a commercially supported OS or Rocky Linux for customers looking for a free OS alternative.

Clustering

VideolPath can work in clusters, meaning multiple instances of the system can share the workload. Clustering is adding resilience against server failure.

The cluster is based on standard components like Docker, HAProxy, and Zookeeper with a Cockroach datastore. All necessary software components are installed.



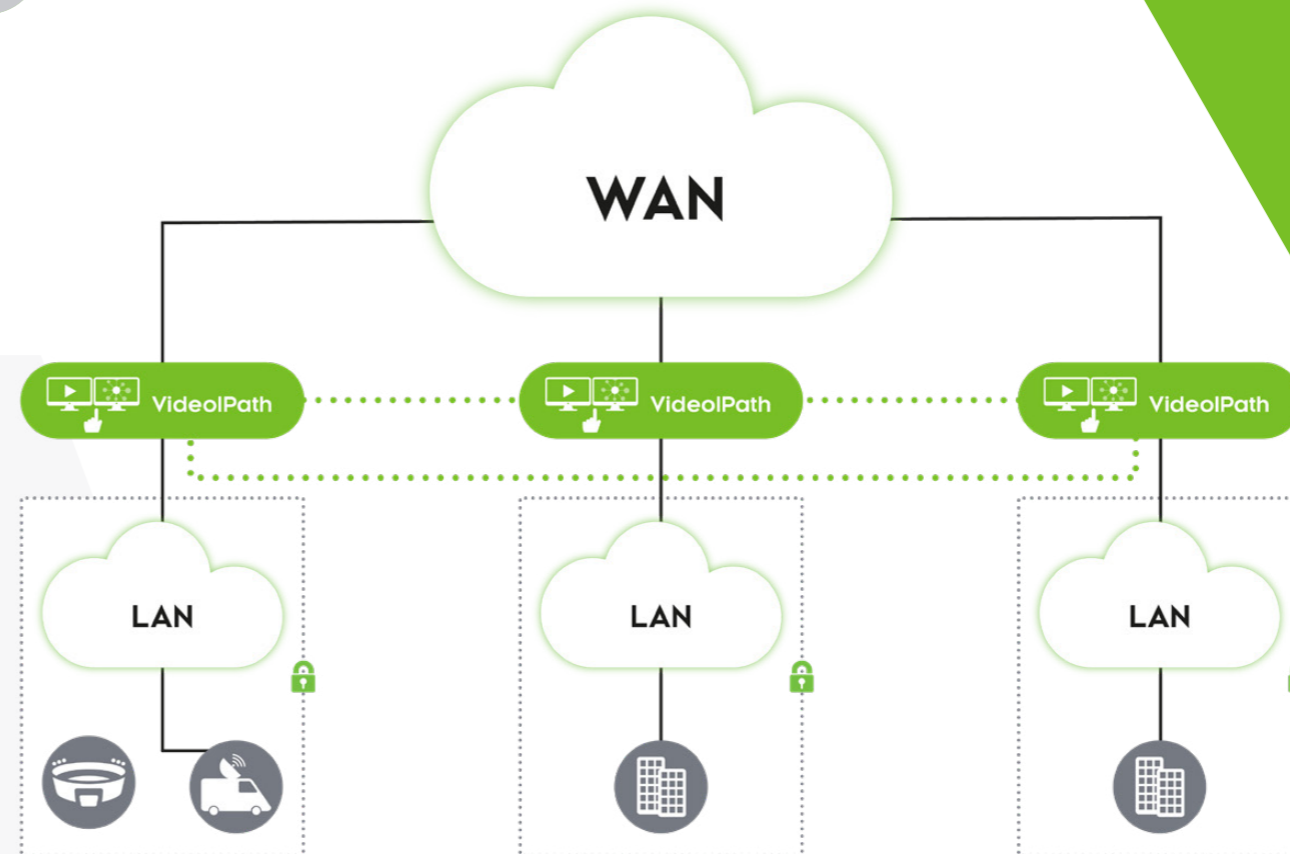
The federation capability also enables VideolPath to reach new heights in scalability

Federation

VideolPath's federation is a unique capability that enables multiple autonomous instances of VideolPath to collaborate within and across locations.

As each system is autonomous and in charge of its own resources, it continues to function and collaborate, even if problems occur in other parts of the federation. It can be used to compartmentalize several locations, or indeed areas within facilities, for example ingest, production and playback.

The federation capability also enables VideolPath to reach new heights in scalability, to handle all the production resources and all the media streams involved.



Security

VideolPath software is designed to be secure in accordance with OWASP guidelines for secure coding. The software and third-party libraries are continuously scanned for vulnerabilities and security fixes are rolled into the next release or made available immediately if critical. The software is also compliant with EBU recommendations.

All external system communication, within a VideolPath cluster, between federated systems, northbound with other systems and user interfaces, and southbound with equipment may be encrypted using TLS or similar.

The federation concept also adds a layer of security by compartmentalizing the infrastructure, enabling different parts of an organization or different organization to cooperate in an autonomous and secure way.

Role-based access control

Given the central part played by VideolPath in controlling media networks, security is paramount. VideolPath has a role-based system, which ensures that authorized personnel can only access the resources they have been assigned to. The role-based security function allows a user to be assigned to only part of the system.



Multi-tenanting

An important aspect of VideolPath's security and role-based access, is that it is possible to do multi-tenanting, i.e. provide restricted access to specific departments or outside organizations. This feature can be used, for example, by broadcasters to provide access to certain production capabilities to production companies they are working with. It can also be used by telecom service providers to allow multiple media companies to control some part of the network, for example to set-up their own connection. In all cases, each tenant is only able to "see" the resources to which they have been granted access.

Northbound APIs

VideolPath can interface northbound with a variety of systems and panels thanks to its own API and its support for interfaces such as NS-BUS (for Sony equipment), Ember+ and MRP. This allows existing and familiar user interfaces or broadcast operations surfaces to be used together with the network orchestration part of VideolPath.

Southbound APIs

VideolPath interfaces to network and broadcast devices, as well as to cloud services. This allows the system to handle networks built on combinations of switches from leading vendors, including Arista, Cisco, and Nvidia (Mellanox), and media nodes from a variety of vendors. It also allows it to control production equipment, such as cameras and video and audio mixers from Sony and other vendors.

Software updates

VideolPath has one Long Term Support (LTS) release per year. Security updates and corrections will be provided for LTS releases for a 3-year time period following its release, before the LTS version is discontinued. This is the best choice for systems in a production setting.

In addition, NeviOn provides stable intermediate releases every quarter. These releases are for customers in the implementation phase or who need access to new functionality not available in the current LTS. Normally systems are upgraded to an LTS release as soon as this is available.

All updates are provided to customers that have a valid maintenance agreement. In addition, customers with premium support get upgrades performed by experienced NeviOn engineers.

VideolPath has multiple functions to help guarantee connections of mission-critical services

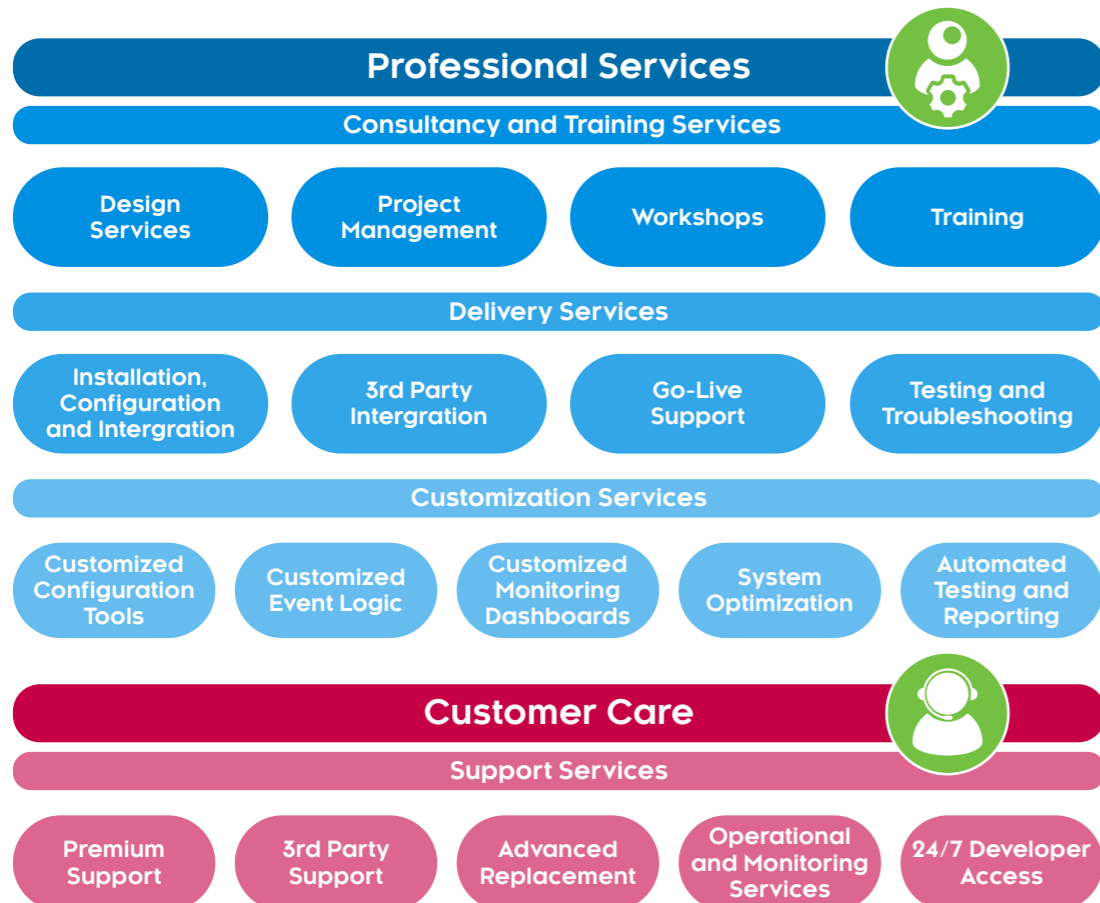
Services

Sony and Nevia provide an extensive portfolio of services before, during and after product or project delivery.

Specifically relating to VideoPath, Nevia's services include:

- VideoPath setup and installation
- VideoPath configuration ie network, topology, nodes, endpoints, NAT, users etc
- 3rd party device integration where the device(s) are not already supported by VideoPath
- Training
- System testing
- Monitoring and reporting
- System optimization
- Handling software upgrades

And much more...



For a full overview of the support offered by Nevia, visit nevia.com/services

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