SYSTIMAX® COMMSCOPE | ORACLE

CASE STUDY

# Proof of concept:

## Combining physical and logical layer visibility to drive cross-layer automated assurance

Across enterprise networks and data centers, advancing technologies like AI and cybersecurity platforms are fundamentally altering the network's physical layer infrastructure—forcing a rethink of how the networks and services are monitored and assured. Accelerating trends, such as IoT, GPU clusters, and cloud evolution, are already transforming the physical and logical layers by the sheer volume of global data being routed, processed and stored.

Consequently, network architectures, components and software are also rapidly evolving, significantly affecting network operations teams as they struggle to stay ahead of the changes. Monitoring the network's logical and physical layers involves two discrete and disconnected solutions, requiring Network Operations Center (NoC) personnel to use "swivel chair" management and manual processes.

Network performance monitoring and assurance solutions like Oracle Communications' Unified Assurance have been a critical tool for teams, enabling staff to monitor the network's logical layer performance and take corrective action to maintain network service-level agreements (SLAs).

Automated infrastructure management (AIM) platforms such as CommScope's imVision® solution provide insight into the cabling and connectivity that make up the network's physical layer. AIM systems have been used since the late 1990s and are deployed almost exclusively inside the data center and enterprise environments.

Recently, engineers from CommScope and Oracle Communications came together to explore and develop a proof-of-concept design for an integrated solution using CommScope's imVision AIM solution and Oracle's Unified Assurance (UA) solution. The goal was to demonstrate the feasibility of combining discrete physical and logical layer monitoring solutions and assess the value of such a solution for NoC teams.

This case study, developed by members of the CommScope/Oracle integration team, discusses the project and outcomes of our collaboration.

### IMVISION AND UNIFIED ASSURANCE: COMPLEMENTARY BUT DISCONNECTED DATA SETS

CommScope® imVision solution and Oracle Communications UA represent two key aspects that are critical for successful network monitoring. The imVision solution is designed to monitor and provide real-time status reporting on the network's physical layer, while UA provides real-time monitoring of the logical layer. To understand the synergistic potential of an integrated solution, it helps to know how each solution interacts with the network and the capabilities each enables.

## CommScope imVision

The imVision AIM solution detects, collects and documents changes within the network's physical layer in real time. It consists of intelligent patch panels, controllers and System Manager software.

Each intelligent panel features an electronic overlay with infrared sensors that detect and track physical layer changes at the port level, such as the insertion or removal of patch cords. Within a rack or row, panels can be assigned to monitor multiple connected devices (servers, switches, routers, etc.). Changes detected by the panel(s) are fed to the controller assigned to the panel or group of panels.

The imVision controller acts as the gateway for the imVision system, delivering the real-time information necessary to take precise control over network processes. The controller's touchscreen interface displays highly granular details allowing users to trace existing connections and the locations of patch cords and connected devices.

imVision System Manager software correlates connection data with information from networking equipment, IP endpoints, and other systems—providing a view of how network-connected devices layer map to the physical layer.

In addition, each panel port is equipped with an LED that can be activated—manually or automatically—to provide visual guidance and location confirmation for technicians managing the network.

**Intelligent Patch Panels**

**imVision Controller X**

**System Manager Software**

### Key Features

- Document cabling infrastructure
- Automatic detection of the insertion and removal of cords
- Network device discovery & their location information
- Real-time monitoring of connectivity changes

### Key Benefits

**Documentation & compliance**

- accurate documentation is essential for asset, capacity, change management
- electronic data tracking reduce human errors

**Workflow Automation**

- enforcement of IT processes
- improved efficiency
- integrations

**Remote Monitoring & Administration**

- pro-active connectivity management
- contribute to sustainability objectives

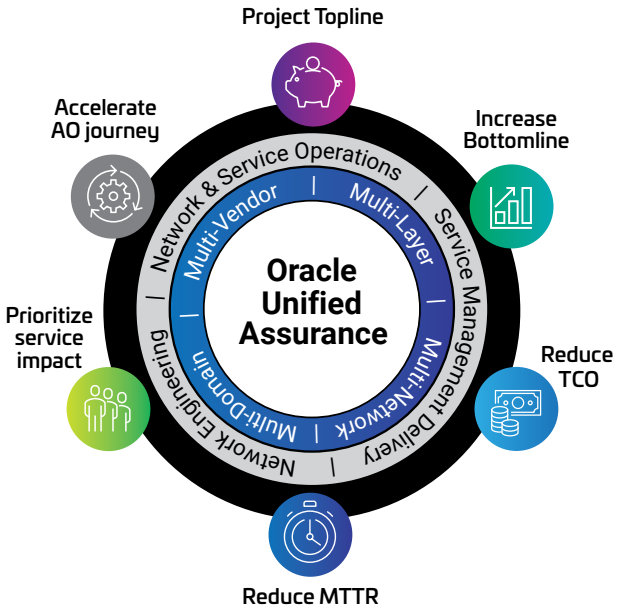
**Risk Mitigation**

- reduce MTTR (Mean time to recovery)
- lessen the effects of network outages

## Oracle Unified Assurance

Oracle Unified Assurance (UA) is a unified network and service assurance platform. It enables NoC teams to manage fault, performance, topology, and SLA management across enterprise and communications networks and services. UA ingests, aggregates and correlates a variety of data types across multiple network dimensions. Data types include events, performance, topology, flow and other observability metrics. All data is normalized into a common object model and is further processed with advanced analytics technologies such as ML and AI.

Unified Assurance enables NoC teams to leverage existing tools by federating across them and enhancing visibility by filling in the gaps using data from other systems. UA is also able to enrich visibility, incorporating other network data such as EMS/NMS and inventory. Enterprises and communications service providers can access historical views to see topological changes as they happen. Automated cross-correlation enables rapid root cause analysis, increased automation and reduce OpEx.




As an umbrella assurance platform, UA delivers holistic views, insights and cross-platform capabilities that allow NoC teams to reduce licensing and maintenance costs, consolidate assurance tools and even reduce the number of NoCs. By increasing automation, UA helps reduce the number of tickets and truck rolls required to improve mean time to repair (MTTR) and facilitate guided and closed loop automation with orchestration systems.

A unique RCA3 model encompasses topology, ML and supervised event correlation. This more robust model can deliver deeper network intelligence that can drive faster and more accurate automated root cause analysis and shorter MTTR. The generated results, available on the platform's management dashboards, can take the form of real-time insights, root cause analysis, cross-domain analytics, operational intelligence, correlation, automation and more.

## Integration development and testing

In 2024, members of the CommScope and Oracle network monitoring teams began discussing a proof-of-concept initiative to integrate imVision's connectivity monitoring capabilities within the UA framework.

The integration began with Oracle setting up an integration sandbox with a copy of the imVision database representing the imVision installation in CommScope's office in Madrid. Once the integration program was developed, the proof-of-concept environment was created on the CommScope network to allow the UA server on CommScope's network to communicate directly with the imVision server supporting the Madrid office.

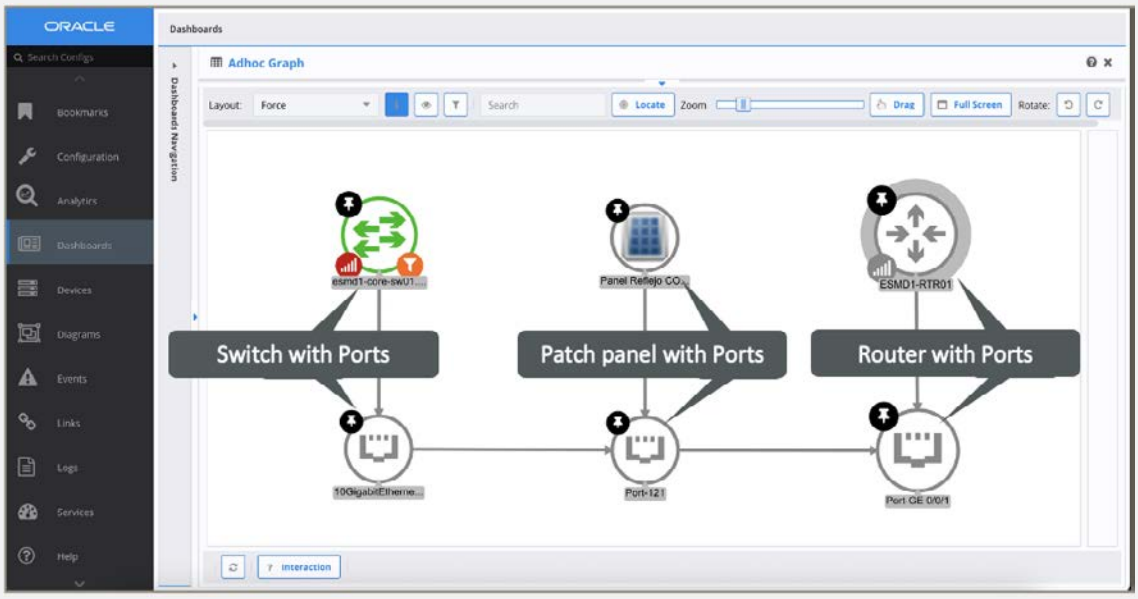
After both solutions were deployed on the network and connected to each other, Oracle and CommScope engineers tested the integration in a production environment. The test link configuration involved a single circuit with a switch port at one end, a router port at the other end, and an imVision intelligent panel in the middle.

The integration uses an imVision REST API and takes advantage of the fact that both systems use SNMP communication to discover and monitor network elements on the network, to automate object mapping between the two applications. UA queries imVision via the API and extracts the data to build a physical layer topology. Meanwhile, UA is also monitoring the logical layer and pulling network traffic performance data from the network devices. Both data sets are aggregated and normalized within UA and made available in the UA interface, which was slightly modified to incorporate the cabling and connectivity data alongside the network performance data.

Integration testing involved making sure both sets of data were being pulled into the UA environment without degradation and displaying in the dashboards as designed. Engineers also tested to ensure functionality between the two systems, enabling users, for example, to use UA to create work orders triggered by events detected in the imVision system. Once the integrated solution passed all tests, the team's attention shifted to evaluating its overall effect on NoC teams.

## Observed results

Overall, the integrated proof-of-concept solution provided a unified view of both the physical and logical network layers. The result is a deeper, contextualized understanding of end-to-end connectivity and dependencies at the interface, circuit level and device level. Combining both views also reduces the risk of blind spots across the network infrastructure.




Among other things, the integrated view enables the user to see:

- **Number of connected nodes**
- **Number and types of segments**
- **Location of nodes**
- **Media type information for cables**
- **Cable test results (when available)**

All this information is populated and maintained in the imVision connectivity database. The data is then pulled into UA and made available for display in the user interface (UI). NoC teams can discover which server communicates on a particular switch port, then trace the connectivity back to where it terminates and identify the specific server and rack. The user can also zero in on any circuit and its attached devices, communicate with the ports and devices, link devices, see live events, pull real-time metrics, etc.

The benefits of the integrated solution include:

- **Native data integration:** Both the imVision system and Unified Assurance use SNMP to discover network elements, allowing for natural data mapping between the two systems. This optimized data integration ensures accurate and comprehensive network monitoring.
- **Real-time monitoring:** The imVision system generates real-time alerts for connectivity changes, helping maintain network stability and reduce downtime.
- **Direct hardware management:** Unified Assurance directly accesses imVision hardware, streamlining operations and enhancing performance.
- **Enhanced user experience:** Users get a comprehensive, real-time view of the network, leading to better incident resolution, optimized performance, and easier management.

## Customer feedback

To confirm what the CommScope/Oracle integration team believed to be a successful proof of concept, the team scheduled three demo presentations involving members of three different NoC teams. One team was familiar with UA but not the imVision solution, one uses the imVision solution but not UA, and the third had no experience with either solution.

Input from the participants in the three groups ranged from the general to the specific and touched on various aspects of the integration. General reactions can be characterized by the following statements:

*"My impression is that the ability to map a data center's physical networking, integrate that intelligence inside UA and present it in a single pane of glass, definitely has a lot of value."*

*"I think integrating all that physical layer insight from imVision into UA's logical layer data provides a great integration no matter what environment you're looking at."*

Other participants noted how the imVision/UA solution tended to help them focus on areas of the network that had not been as visible before.

*"I've always wondered how good SNMP monitoring is in providing a meaningful understanding of the network. But what you've demonstrated is that knowing what's being detected on the patch panels and devices really draws proper attention to what's happening at the interface level."*

*"Our network is so large like the enhanced network topology. With our current tools, the volume of monitoring data can be a little too much to digest. Having the imVision information easily accessible makes it much easier to focus on what's important."*

More specific input ranged from alarm management and visual guidance to root cause analysis:

*"We get so many alarms. An AP is down, an SFP goes offline, sometimes a link or entire box is down. With imVision we're not just monitoring connections; we monitor 400,000 panel ports across 2,000 switches and tracking hundreds of high-priority events every day. Without this integration, the NoC team doesn't have that view. So, things get left behind."*

*"UA can detect degraded performance on a particular switch port. Then, using imVision's capabilities, the NoC operator can do a circuit trace to identify the specific port and activate an LED on the panel port so the technician knows exactly which port they need to inspect."*

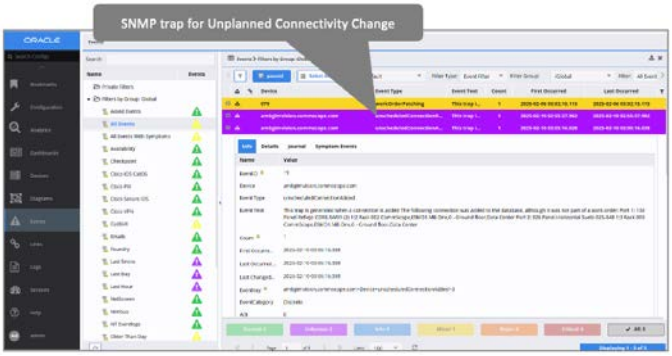
*"Let's say an access point has an issue. UA would trigger an event, and we'd get the alert. But by adding the physical layer intelligence, a technician can see the circuit from UA and confirm the AP is still connected all the way through the network. Now we know this issue isn't a network event; the problem is with the AP or someone pulled the cross-connect and that's why the AP is down."*

## Use cases

Based on a successful proof of concept and positive feedback from customers, the CommScope/Oracle integration team identified several potential use cases. Those with the greatest relevance and value include accelerated service response, performance management, faster network device troubleshooting and enhanced service assurance.

### #1 Accelerated service response

Combining the imVision solution's real-time connectivity change alerts with UA's fault management capabilities enables users to run real-time event correlation and root cause analysis more quickly and easily.




Faster fault isolation reduces the duration of service disruptions, while proactive detection of potential issues (based on automatic testing of the executed changes and combined data insights) also enhances network stability.

The combined monitoring and response of the physical and logical layers is visible within a single pane of glass that enables users to immediately assess network performance and issues without toggling between discrete platforms and dashboards. The net results are reduced MTTR, lower operational expenses and more efficient resource utilization.

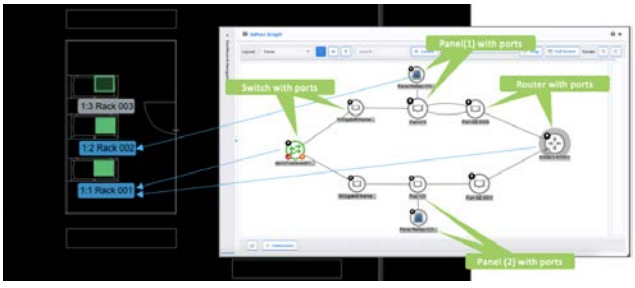
### #2 Performance management

The UA and imVision solutions work together to detect a network performance issue, locate the source and provide visual guidance to help on-site technicians quickly find and resolve the issue. When UA detects degraded performance on a switch port, for example, NoC personnel can trace the issue to the specific panel and port using UA, and to activate a port LED on the intelligent panels. Once the LED is activated, it provides visual assistance to help on-site service teams locate the port more quickly and address the issue.

| 1 | 2 | 3 |
|---|---|---|
| UA detects degraded performance on a switch port | NoC checks for the switch port in UA | NoC identifies panel port to be checked and turns port LED on |

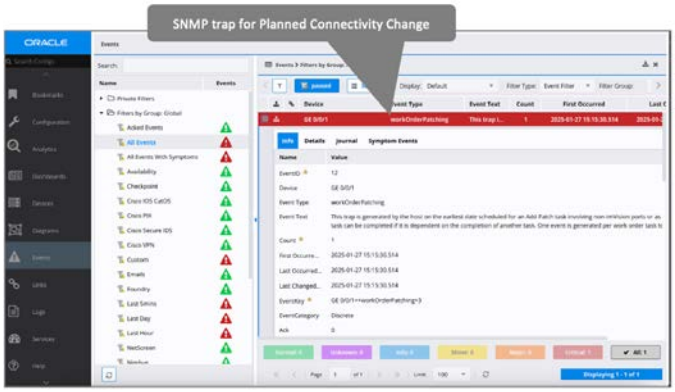
### #3 Network device troubleshooting

This use case focuses on being able to quickly determine the location of any end device that requires service. When an event indicates that a network device is down, it's crucial to triage the issue and identify the root cause. With the integrated solution, NoC operators can quickly access the unified network view to verify that the physical connections between the switch and the device are intact. If resolving the issue requires physical access to the device, the operator can quickly gather the device location information from the unified network view. Thus, the combined imVision/UA platform enables NoC teams to reduce mean time to resolution and lower the facility's overall operation expenses.




### #4 Enhanced service assurance

The fourth use case involves monitoring and responding to changes in the network to maintain service quality and meet SLAs. In this scenario, imVision creates and sends electronic work orders to the intelligent panels in real time. Next, UA's Custom Action Policy Engine (CAPE) and Alarm Journal check whether the planned network connectivity changes adhere to the change order policy and maintenance window schedule. The NoC team can also check whether the planned change may be disruptive to network operations. As a result, the integrated solution can provide NoC operators with detailed and contextualized information enabling them to identify and mitigate potential service disruptions before they impact end users and SLAs. This same capability also reduces the risks associated with provisioning errors or conflicts.




## Conclusion

Enterprise and data center networks are undergoing significant changes, which are being played out in both the logical and physical layers. In the logical layer, demand for increasing data volumes, diverse formats and real-time analytics is transforming the traditional physical data consolidation model to a more virtualized, flexible approach.

Both layers play a critical and an increasingly complementary role in the network's ability to adapt and evolve. Because the

network monitoring solutions for these layers have traditionally been siloed, however, NoC teams have not had a holistic view of the network's health and performance.

The imVision/UA integrated proof of concept demonstrates that combining physical layer monitoring and management with logical layer monitoring and management can give NoC teams unprecedented visibility into their networks. Users can now see, understand and manage how changes in cabling and connectivity affect service performance and vice versa to enable faster, more accurate analysis and response, greater network uptime and efficiency, and a more productive NoC.

As a proof of concept, more development and testing are needed, to be sure. But it confirms that a combined physical layer/logical layer monitoring and management solution is both possible and valuable. Given the lessons learned from this effort, we also believe that this success can be replicated with other SNMP-based physical and logical layer monitoring solutions.

For more information on the imVision/UA integrated proof of concept developed by CommScope and Oracle **visit ImVision** or **Oracle's UA.**



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