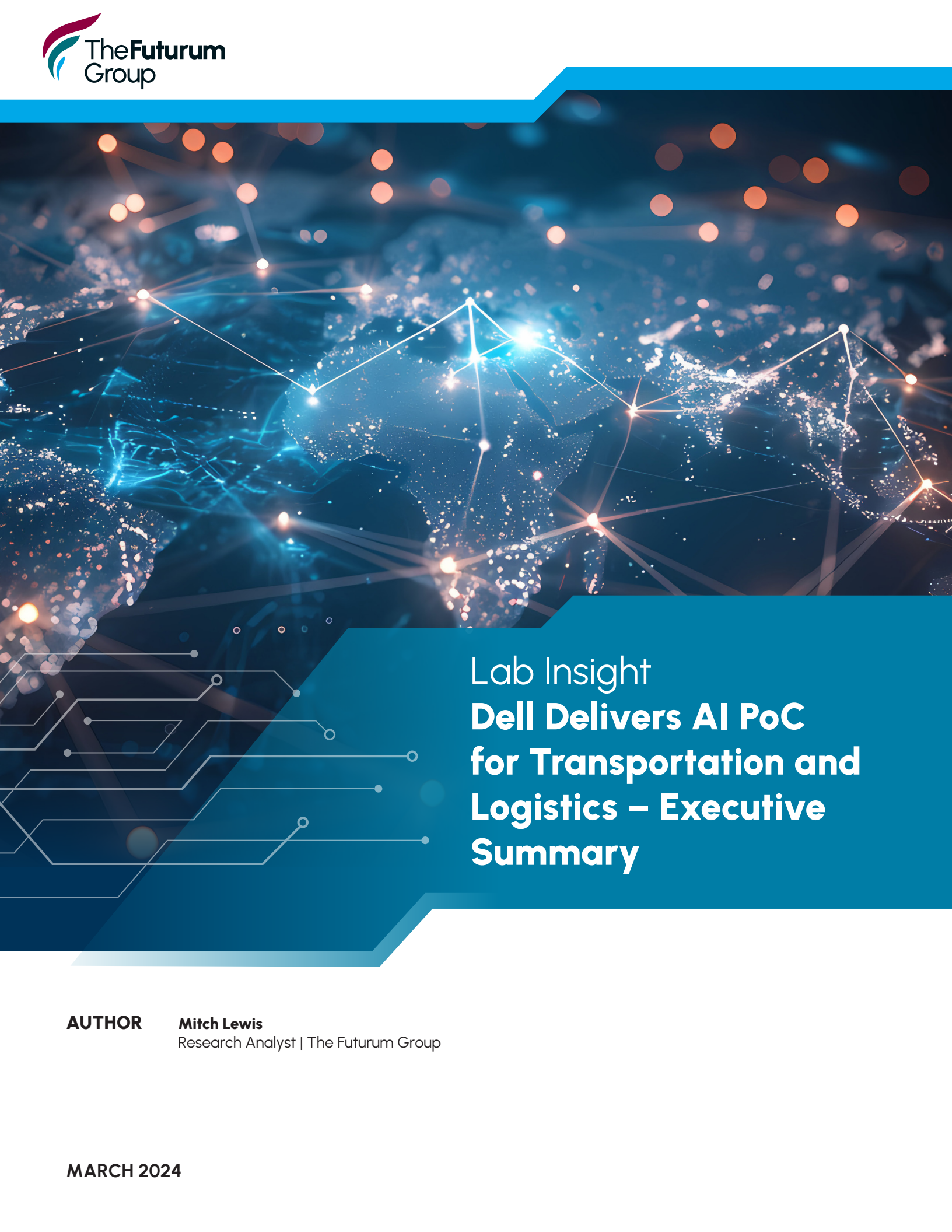




Lab Insight **Dell Delivers AI PoC for Transportation and Logistics – Executive Summary**

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AI for Transportation and Logistics

AI technology presents a significant opportunity for innovation within the transportation and logistics markets, including areas such as public transportation, cargo shipping, supply chain management, and more. Futurum intelligence projects a 24% growth of AI in the transportation industry in 2024 and a 30% growth for logistics. The two industries cover a broad range of applications and include complex processes that can be optimized by leveraging AI.

Optimization of such processes relies on a multitude of possible variables, such as specific routes, number and types of goods transported, compliance regulations, and weather conditions. By utilizing AI, organizations can process this information, provided by sensors, cameras, and other sources, to create quicker and more accurate decisions than would otherwise be possible. AI-powered solutions for transportation and logistics can lead to time savings, lower costs, increased compliance, and lower risk.

A major challenge with new AI applications is overall unfamiliarity with the technology and its hardware and software requirements. Further complicating AI deployments for transportation and logistics is that these solutions commonly require edge-based deployments. This requires additional hardware constraints, requiring durability and compactness, while maintaining the computational power required to run AI workloads.

The following presents a maritime cargo monitoring PoC deployed using edge-ready Dell™ servers and Broadcom™ connectivity to showcase an AI-powered solution for the transportation and logistics market.



Solution Overview

To demonstrate an AI-powered application focused on transportation and logistics, Scalers AI™, in partnership with Dell, Broadcom, and The Futurum group implemented a proof-of-concept for a maritime cargo monitoring solution. The solution was designed to optimize container monitoring, enhance worker safety, and accelerate end of voyage compliance reporting. Details of the PoC are as follows:

- Sensor data for both refrigerated and dry containers is generated and sent to an OPCUA server.
- Data from refrigerated containers is used to monitor temperature fluctuations and predict future power usage.
- Humidity data from dry containers alongside weather forecasts are used to create a dew point calculation and monitor for container sweat.
- On Board video monitoring of workers is streamed to an AI image detection model to detect workers entering into hazardous cargo zones.
- Container monitoring and worker safety data is transmitted to a visualization dashboard for real time monitoring and alerting.
- Upon voyage completion, this data is leveraged by an LLM to rapidly generate an automated compliance report.

The solution was designed to address several common issues in maritime cargo shipping. Monitoring of both refrigerated and dry cargo is vital to ensure fluctuations in temperature or humidity does not damage or spoil cargo during the voyage. Worker safety is also significantly enhanced by using AI to detect workers entering into hazardous zones. Finally, by using an LLM to enhance report generation, this information can be rapidly documented for compliance purposes. Testing of the PoC demonstrated that reports could be generated in 46 seconds, dramatically accelerating the reporting process compared to a traditional approach. Reports are generated utilizing the Zephyr 7B model, customized with Retrieval Augmented Generation (RAG), to provide voyage specific information.

The solution was deployed utilizing Dell PowerEdge XR7620 and XR12 servers and scalable, high bandwidth Broadcom Ethernet. The Dell PowerEdge servers provide a compact, rugged chassis suitable for edge deployment, while simultaneously providing NVIDIA™ GPUs to power the AI workloads. The high Bandwidth Broadcom NICs utilized provide the crucial connection between the data processing pipelines and the visualization and alerting dashboard.

Figure 1 shows a high-level diagram of the solution.

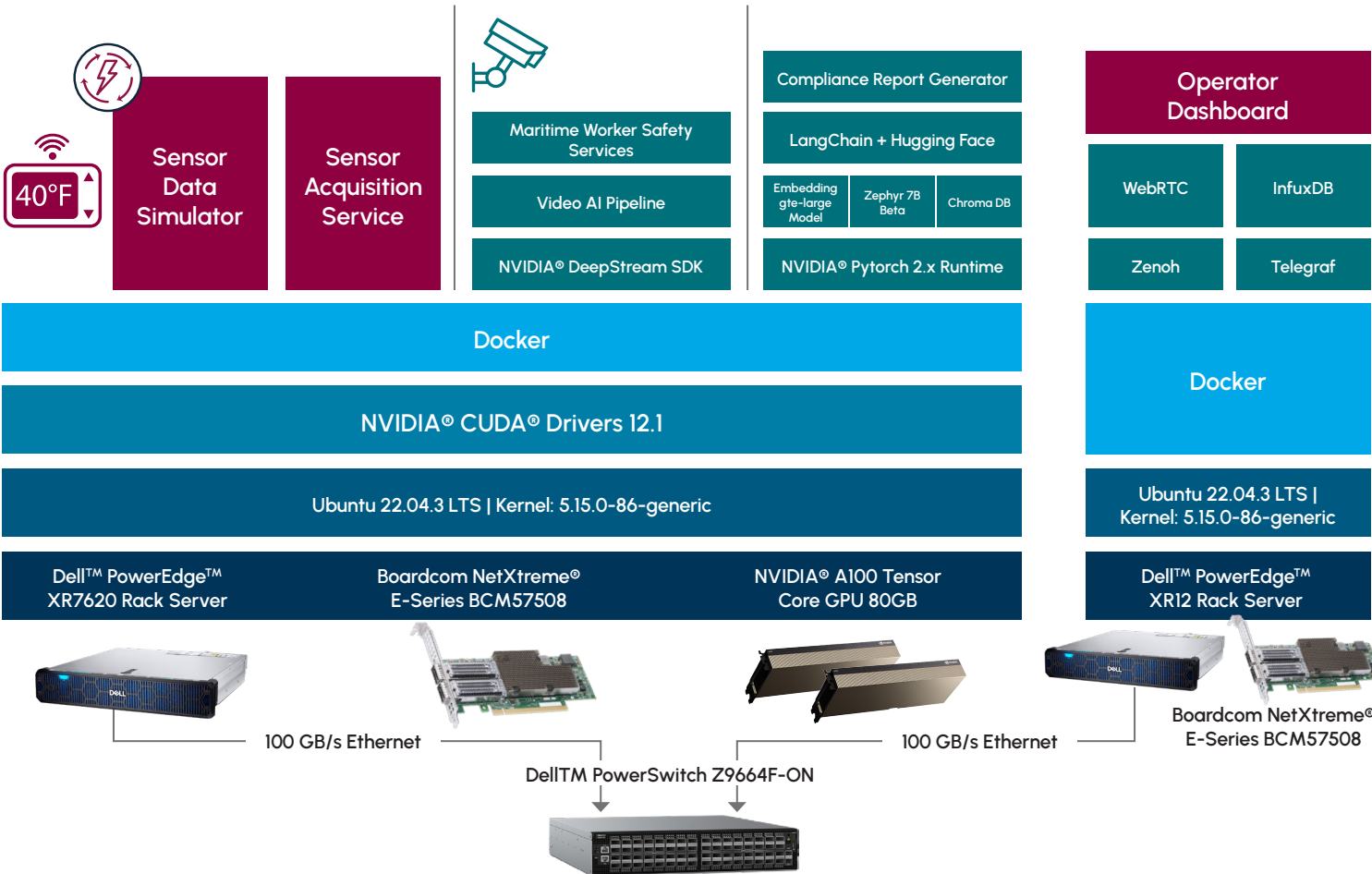


Figure 1 Maritime Cargo Monitoring (Source: Scalers AI)

The key hardware components used in the solution included the following:



Additional information about the PoC, including sample code and performance results, has been made available by Dell on [GitHub](#).



Solution Highlights

The maritime cargo monitoring PoC solution provides valuable insight for both AI practitioners and IT operations working in transportation and logistics environments. Notable highlights from the solution include:

- The solution leverages edge-ready Dell XR7620 servers that can withstand edge conditions while providing the GPU-powered compute needed to run AI workloads.
- Broadcom NetXtreme-E Series NICs provide high bandwidth connection between the data processing service and the visualization dashboard, facilitating quick insights and critical alerts.
- The POC utilizes readily available software solutions that provide quick implementation of AI models. The voyage report is generated using the pretrained Zephyr 7B LLM model and the worker safety detection is built with NVIDIA DeepStream and the YOLOv8s model.
- The Zephyr 7B model used to create the AI generated voyage reports is augmented using RAG to provide voyage specific context. The solution demonstrated voyage specific report generation in 46 seconds.

Conclusion

Transportation and logistics are areas with great opportunity for AI innovation. Lack of familiarity with AI and the components required to deploy an AI solution, especially at the edge, present a challenge for many organizations. This PoC serves as a starting point and a reference to implement similar AI-powered solutions for transportation and logistics using hardware available from Dell and Broadcom along with readily available tools to create AI applications, such as Zephyr 7B, YOLOv8s, and NVIDIA DeepStream.

Important Information About this Report

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