Emerging Trends in Network Design and Effective Performance Monitoring

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In the ever-evolving landscape of network design, the demand for enhanced performance and flexibility is driven by advancing technologies and a corporate drive for growth within an increasingly competitive landscape. Many different components in design are evolving, among the most important to consider include:

#1
Software-Defined Networking (SDN)

Software-Defined Networking as an approach has evolved from the romantic view of network functions using white-box solutions that completely abstract the software control- and data-plane to more vendor-orientated solution-based platforms offering centralised management that brings programmability control to network devices. While SDN as a solution brings numerous benefits, it also presents new capabilities for network performance monitoring.

The era of looking at your network for simple up/down and historic capacity issues is in the past. People want to know what is happening now, how to manually or dynamically recover quickly from those frustrating packet drops or congestion challenges, and, more importantly, who or what applications it affects.

Through centralised controllers, real-time monitoring and analytics of network traffic and performance are available, allowing for proactive detection and resolution of potential bottlenecks. By integrating enhanced network and application performance monitoring tools with the centralised management-plane, you can gain further insights into network behaviour, ensuring a comprehensive understanding of performance.

Advancements in Machine Learning and AI will pave the way for enhanced network performance monitoring with SDN solutions. These evolving technologies excel at analysing vast volumes of network data, unravelling valuable insights into network behaviour. The result? A future where network management becomes proactive and more

efficient. Moreover, the integration of SDN with cloud technologies is poised to expand, unlocking opportunities for comprehensive performance monitoring across on-premise and cloud-based environments with the potential for network optimisation and seamless monitoring across diverse landscapes.

If you are in the process of planning an SDN solution for your organisation, you may want to check out our Network Assessment.

#2
Network Function Virtualization (NFV)

Network Function Virtualisation is an architecture that enables the virtualisation of network functions, such as routers and firewalls, allowing them to operate as virtual appliances instead of dedicated hardware. This adoption trend presents its own unique challenges for consumers when it comes to monitoring. Due to the number of teams and components involved, traditional monitoring may not yield the required metrics to assess performance properly.

The key challenges that NFV architectures present differ based on their deployment type. A dynamic deployment, where network functions can be spun-up or -down based on demand, may result in constant network changes, making it difficult to track and monitor over time. Whereas static, always-on deployments may make problems harder to isolate within shared environments, as previous hardware functions or features are offloaded to software, requiring more robust metric collections.

This is where real-time monitoring and visibility become paramount. The capability to swiftly adapt to changing conditions by bringing together all aspects of the NFV function, such as the underlying network and compute infrastructure, with better-shared monitoring capabilities and insights, is critical to understanding what is happening when troubleshooting performance issues.

Potential solutions to these challenges include specialised monitoring tools designed for NFV environments, such as virtual network probes and virtual network analytics. These tools can provide real-time visibility into the network performance of individual virtualised functions and the network as a whole.

Many of today's solutions provide monitoring capabilities that employ Machine Learning to provide improved analysis of current and potential faults and recommendations. However, artificial intelligence may take this one step further to allow for faster detection and response based on reasoning.
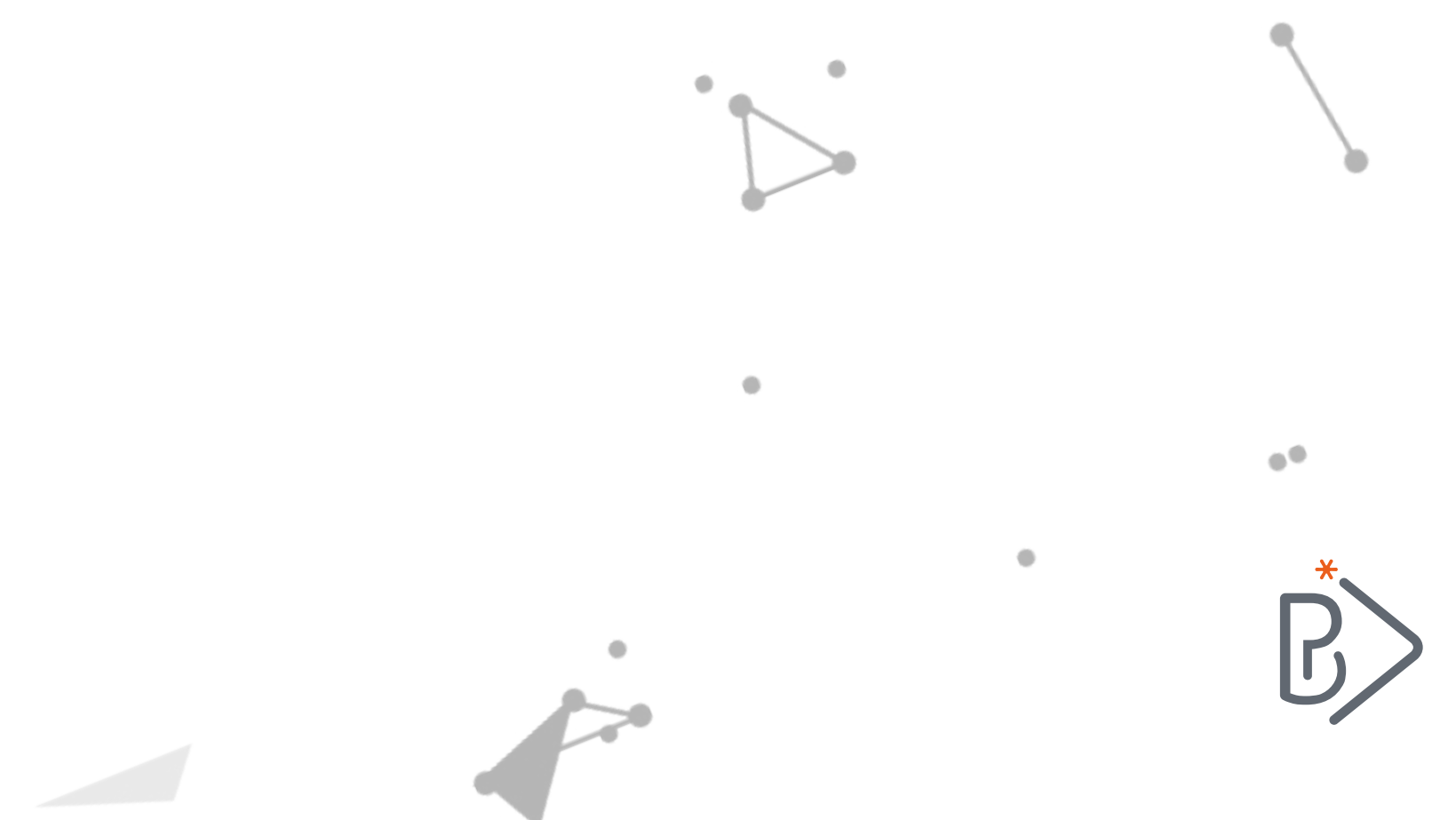
#3
Intent-based networking (IBN)

By some, intent-Based Networking is considered the evolution of SDN. However, for most, it is often about translating and simplifying the languages of business logic and IT systems into a single entity to bring greater efficiencies irrespective of the underlying technologies used.

As a result, this brings greater relevance to the reliance on automation to activate that language or policy abstraction between the business, its applications and the traditional configuration of network components and their critical functionality. Ultimately, it allows the network to be comprehensive, flexible and intelligent, focused on delivering the intended business outcome.

To function optimally, it needs the correct data. IBN relies heavily on platform-rich telemetry data exported to dedicated monitoring platforms that use a mixture of ML and AI processes to review, analyse and visualise the vast amounts of information produced to give assurances as to how the network, its applications, and its components, such as micro-services, are performing alongside any associated risks that businesses might encounter.

Done correctly, IBN overlayed on top of leading SDN solutions coupled with the abstracted policies and data allow businesses to react faster and be more proactive when introducing closed-loop automation, enabling them to predict issues before they occur.

#4
Edge Computing Networks

Edge Computing Networks, by any other name, simply involves getting servers or services as close to the application, its components and consumers as possible. It provides the ability to process data as close as possible to its source of origin, offering low-latency performance that allows increased processing speeds, enabling vast volumes of data to be processed, leading to considerably improved action-led results.

If we consider e-commerce businesses, the distributed architecture that Edge Computing Networks require can be far-reaching and complex, both geographically and technology-wise. Whilst the architecture brings many benefits to organisations compared to a rigid centralised platform, geo-expansion can bring challenges when monitoring and securing them.

Monitoring these different edge locations is imperative for gaining end-to-end visibility of real-time dispersed applications. Without this, effective troubleshooting of performance issues is not possible. Introducing monitoring systems that perform synthetic application testing that include business transaction logic capabilities allows organisations to simulate the different interactions that applications, their components and end-users might experience. Businesses then have the necessary visibility and insights to make quicker decisions to prevent key customers from moving to a competitor.

#5
Hybrid Cloud

Hybrid cloud networks are distributed environments that often span on-premise data center locations, third-party platforms, and public cloud services. This single environment architecture allows businesses to move workloads and their applications on-demand between platforms based on their sensitivity, cost, or latency demands, offering them greater flexibility, scale and speed.

The dynamic nature of hybrid cloud networks, where workloads rapidly move between on-premise and cloud environments and new services and applications are spun-up quickly, can create challenges. This constant change across multiple vendors and service providers can fracture monitoring and insights' data. It is difficult getting a comprehensive view of configuration compliance and performance across the whole network, when monitoring and analytical data is being extracted from different platforms.

To address these challenges, many organisations are finding ways to bring all their services and service providers into a unified view allowing them to get consistent information and data about their compliance and performance, irrespective of the workload and application location. Whilst performance is critical, understanding the various solutions' costs alongside different variables can make it hard to create an accurate costs/benefits analysis of a hybrid cloud model. To assist in your assessment, we've created a handy checklist to effectively determine the true cost of running your network.

The growing availability of SaaS solutions combining AI and ML, along with improved connectivity and enhanced monitoring capabilities, empowers businesses to proactively take control of their hybrid cloud environments like never before.
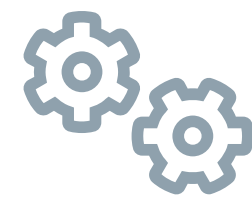
The Impact of Network Design and Performance on Key Business Functions:

And finally, when considering the overall performance of your network it is important to think about ways in which this information can be used to inform strategy within the other areas of the business. Key Performance Indicators which influence other departments include:

1. Operations:

are focused on keeping mission-critical systems and applications up and running, reducing mean time to repair (MTTR), and improving overall service levels

2. Finance:

sharing usage patterns and identifying areas of over-provisioning or underutilisation allow finance teams to make informed decisions about where to allocate resources and investments in the network

3. Procurement:

are focused on customer satisfaction, reducing churn, and driving revenue growth - optimal performance and reliability of customer-facing applications and services are essential

4. Sales:

are focused on customer satisfaction, reducing churn, and driving revenue growth - optimal performance and reliability of customer-facing applications and services are essential
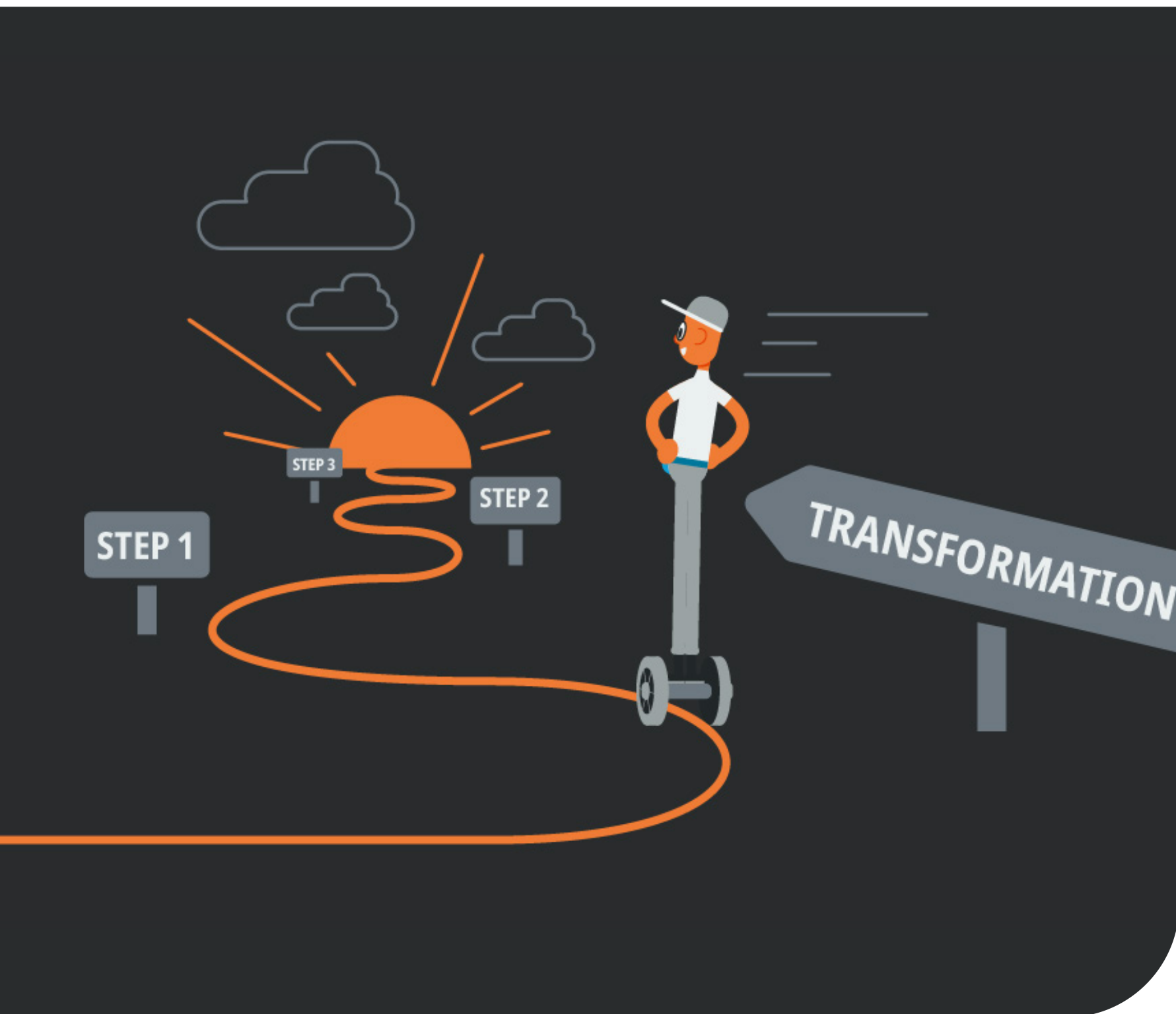
5. C-Suite:

insights into the performance and health of the data centre network, including usage, capacity, and security can help executives make informed decisions about resource allocation, risk management, and overall IT strategy

Cisco Live:

Recently we had the opportunity to present at the Cisco Live Event in Amsterdam on the topic of [Driving Business Outcomes with the Latest Tech](). To find out more about driving business outcomes with the latest tech providing the visibility necessary to make true hybrid cloud automation possible [click here]().

BESTPATH

We're BestPath. The unsung heroes, working quietly and competently behind the scenes to inspire and empower our clients. Combining curiosity with innovation we deliver agile, secure and trusted network infrastructures that enable businesses to deliver exceptional services and outstanding customer experiences. Let's chat about how we can do just that, for you.