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## The Mindful IT Company
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# NETWORK ORCHESTRATION & DEPLOYMENT

## *Unlock the potential of agile networking*

# INTRODUCTION

In today's fast-paced digital world, network orchestration is driving automation to the next level.  It is helping technologies like SDWAN, Cloud services, DevOps, and many others to achieve significant operational efficiencies, improve service agility, enhance reliability, and reduce costs.

Network Automation has now become a crucial global feature for the Network platform. As per the CAGR survey, the Network Orchestration market is estimated to be around 32.5 billion USD by 2028. Network orchestration will empower network administrators to focus on strategic initiatives, innovation, and value-added tasks rather than spending time on manual and repetitive network management activities. This whitepaper provides a detailed view of network orchestration and its deployment process. Before diving into the topic, here are various types of infrastructure orchestration.

# PROMINENT INFRASTRUCTURE ORCHESTRATION:

DevOps

Process

Release

ORCHESTRATION

Network

Service

Cloud

Before exploring the different types of infrastructure orchestration, let's first understand the technicality of this term in IT. It is very well known that the complexity of evolving hybrid environments has become more chaotic and ubiquitous with the adoption of the Cloud. Therefore, this situation demands the setting up of multi-task processes across multiple software with minimal human intervention. This is when Infrastructure Orchestration comes into play which is simply the coordination of large-scale IT systems.

IT systems are complicated and require customization of their orchestration approaches. Here are some significant orchestration techniques that manage high-level sequences of interdependent tasks across multiple systems.

## CLOUD ORCHESTRATION:

Cloud orchestration is the automated management and coordination of cloud resources, services, and workflows to optimize cloud infrastructure and application deployment. It involves using orchestration tools and frameworks to provision, configure, monitor, and manage cloud-based resources in a unified and efficient manner.

## DEVOPS ORCHESTRATION:

DevOps orchestration automates and coordinates various tasks and processes involved in a DevOps workflow. It streamlines and optimizes software application development, testing, deployment, and operation while promoting collaboration and agility between development (Dev) and operations (Ops) teams.

## SERVICE ORCHESTRATION:

Service orchestration means coordinating and automating multiple interconnected services and their interactions to achieve a desired outcome or fulfill a specific business process. It involves integrating and managing various internal and external services to deliver end-to-end functionality and meet business requirements.

## PROCESS ORCHESTRATION:

Process orchestration involves defining, executing, and monitoring complex workflows that involve multiple tasks, systems, and participants. It can coordinate and automate business processes across different systems, applications, and stakeholders.

## RELEASE ORCHESTRATION:

Release orchestration, also known as release management or deployment orchestration, refers to the streamlined process of planning, coordinating, and deploying software releases across various environments and infrastructures. It involves managing the end-to-end release lifecycle, including planning, scheduling, building, testing, and deploying software releases.

## NETWORK ORCHESTRATION:

Network orchestration is a critical component of IT services which involves the automation of network services and execution over devices. It enables automatic configuration, coordination, and management of network resources, making it easier to operate the network. It is gaining popularity in streamlining business network management and performing efficient operations.
It defines the role of the orchestration and control planes, through centralized management, real-time monitoring, and installation of multiple devices/systems with automation across multiple layers. The purpose of Network Orchestration is to enable specific platforms of devices, applications, and systems.
For example, in an Enterprise or Datacenter Network, Core devices (like Routers or Network Controllers) establish connectivity through automation tools and monitor it via the centralized managed dashboard, due to which downstream network management and soft updates push become easy.

# FEATURES OF NETWORK ORCHESTRATIONS

Below are the key features which can make your network more robust and secure by enabling orchestration in your network:

For any technical environment, it is important to keep its network secure with smoother operations. Network Orchestration makes the task easy by frequently pushing security patches/policies and necessary soft changes. Real-time monitoring in terms of network - by checking network health, quality of services, identifying and prioritizing traffic (e.g., VOIP traffic over Video and Data traffic) is one of the key features.

Automation is helpful to push soft updates of network or security for a specific device or group. But on the other side, an Automation cannot perform a single task simultaneously. To overcome this limitation, the concept of orchestration comes into the picture. Orchestration is to take automation up to the next level by pushing a set of soft configurational changes to multiple groups of devices or domains, or systems.

In SDWAN terms, Network Orchestration uses the concept of Automation for the next level through various components.

If there is a requirement to push the update of policies to a group of devices instead of a specific device, it can be possible through policy-based automation. The Template can be defined and create or mention the updated values within. The advantage is that one doesn't need to find out the specific device, instead, can add required devices with updates.

For a core layer network performance, it is necessary to manage operations efficiently. As such, Control plane and Data plane functionality can be defined through Software-Defined Networking (SDN). Due to this installation, configuration and monitoring can be done with ease.

For ready to adapt production approach, it is good to define the objectives of the devices. To achieve the goal of business, pre-defined objectives for configuring devices, deployment and manage management necessary and can be achievable through Intent-based networking systems, an advanced level concept.
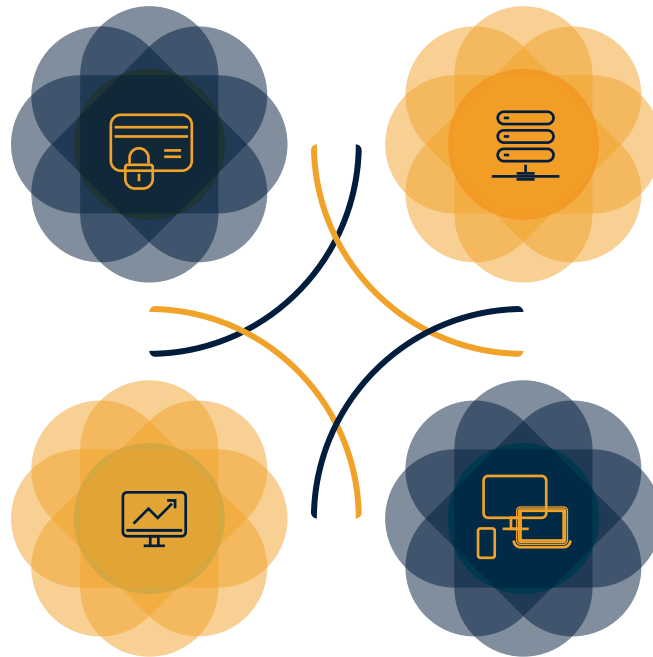
# DEPLOYMENT PROCESS

Network Orchestrator performs authorization and authentication of various components like the Orchestrator, Controller, Management Dashboard and User End Device. All these components work on different planes, as mentioned below. Orchestrator – Orchestration Plane (Authentication and Authorization)

Controller – Control Plane (Routing, Policies and Security updates)

Management Dashboard – Management Plane (centralized dashboard and management)

User end device – Data Plane (Forward Traffic)

As reflected in the below diagram, the orchestration deployment is not related to any specific OEM in the network. It is performed through 4 Components - Orchestration Plane, Control plane, Management Plane & Data Plane

Controller

Controller

Dashboard (Centralized Management)

User end device

User end device

Orchestration Plane

Control Plane Device

Management Plane

Data Plane - User end Device

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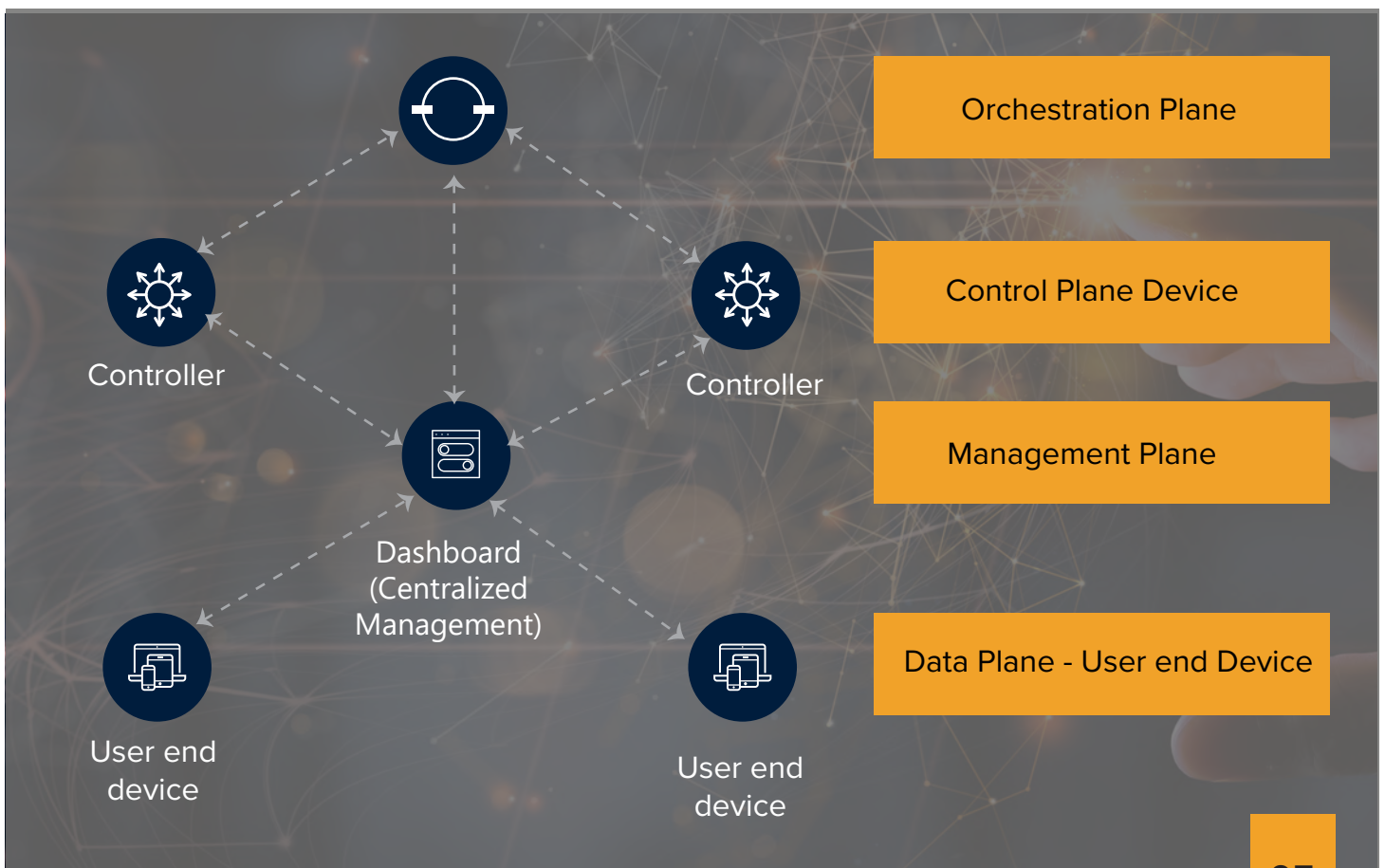
# PHASE 1: PROVISIONING AND AUTHENTICATION

The role of an Orchestrator is to whitelist the end device, as per the given serial number and organization name, which is pre-configured inside of its. Standard checklists for Orchestration to authorize the connection, among other components, are Site ID, Device Serial Number, and Organization Name. The process is called ZTP – Zero Touch Provisioning for authentication and authorization. Once the device is authorized, it can establish a connection to all other devices in the same network.

**ORCHESTRATION PLANE CHECKLIST**

- Site ID
- Organization Name
- ZTP
- Authentication
- Authorization

# PHASE 2: POLICY MAPPING AND TEMPLATE PREPARATION

Control Plane is the core component and brain of Network Orchestration. It defines how the traffic should flow across a network. The flow is decided based on policy, routing and quality of service, which can be defined through a template. The standard configuration can push through the template to enable the device functionality. Once the device is onboarded, the necessary updates and configuration tasks can go through a template. No manual intervention is required apart from template selection.

**CONTROL PANE**

- Policy ( Traffic Flow )
- QoS
- Routing
- Standard Configuration Template

# PHASE 3: EDGE DEVICE CONNECTIVITY AND ACTUAL TRAFFIC FORWARDING

Another component is Data Plane, which forwards the traffic through multiple changes across the network.. Data Plane is represented by Hardware or Customer end device. The configuration of the device is automatically updated once authorized and maintains connectivity through multiple tunnels to other devices on the same network.

## DATA PLANE

- Actual Traffic Forwarding

- Physical Device Connectivity

# PHASE 4: CENTRALIZED MANAGEMENT, REAL-TIME MONITORING AND SOFT UPGRADE

The vital component in the deployment of orchestration is the Management Plane. Once the device is onboarded on the network, it is essential to keep monitoring the status of the device. The crucial part is performed by the Management Plane, which is represented in the centralized dashboard as per vendor API.  The troubleshooting and operation part depends more on the Management plane as it is able to check device connectivity through the dashboard and  perform soft changes of upgrade or reboot, in case to restore the connectivity. The most significant advantage is the less human effort required to keep the device operating smoothly.

## MANAGEMENT PLANE

- Centralized Management
- Real Time Monitoring
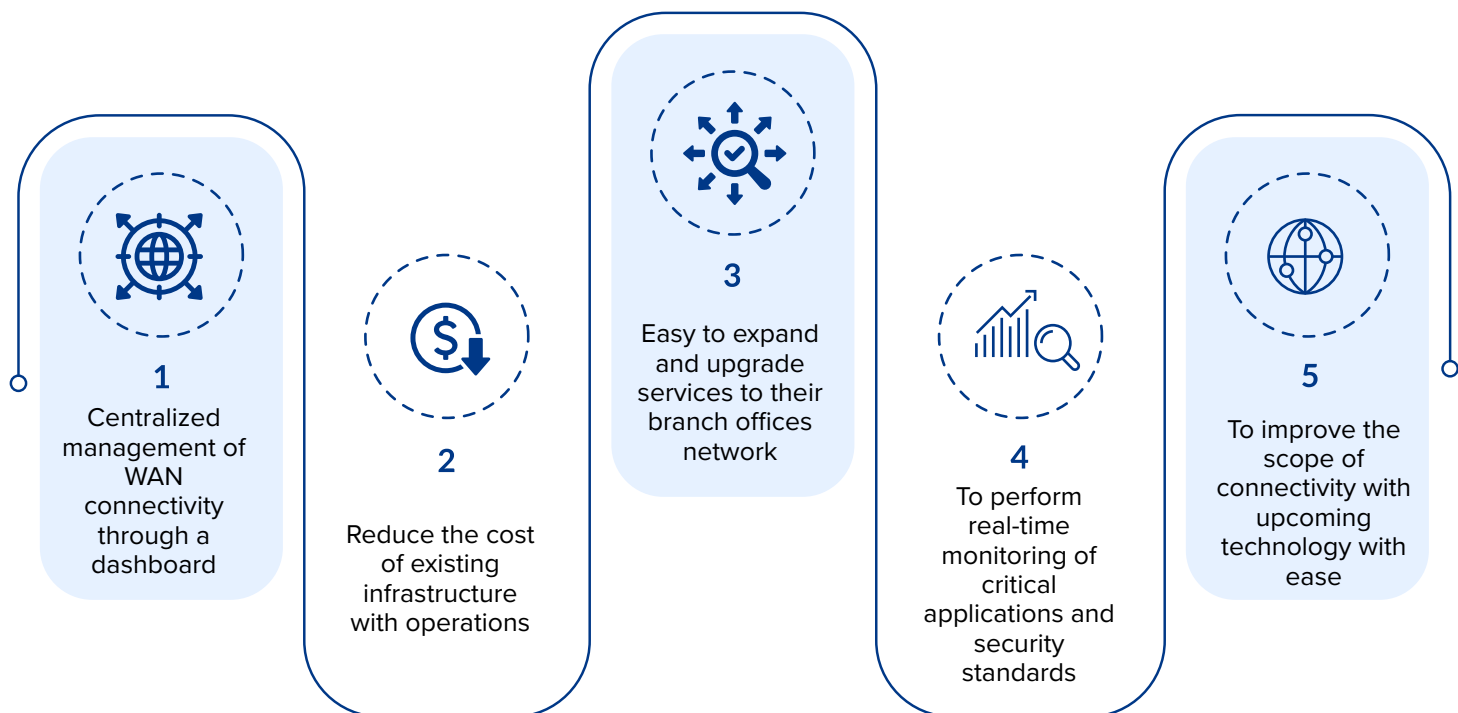- Soft Upgrades
- Operations

# USE CASE STUDY:

A global financial firm wanted to upgrade its WAN infrastructure connectivity for flexibility, mobilization, remote users' connectivity, digital desktop, and centralized management of its network. They have connectivity with more than 100 offices worldwide with three data centers (DCs).

## PURPOSE OF INFRASTRUCTURE UPGRADE:

The company wanted to move their WAN connectivity standard as per next-generation technology by using network orchestration through SDWAN and which benefits them as follows:

**1**
Centralized management of WAN connectivity through a dashboard

**2**
Reduce the cost of existing infrastructure with operations

**3**
Easy to expand and upgrade services to their branch offices network

**4**
To perform real-time monitoring of critical applications and security standards

**5**
To improve the scope of connectivity with upcoming technology with ease

## ASSESSMENT:

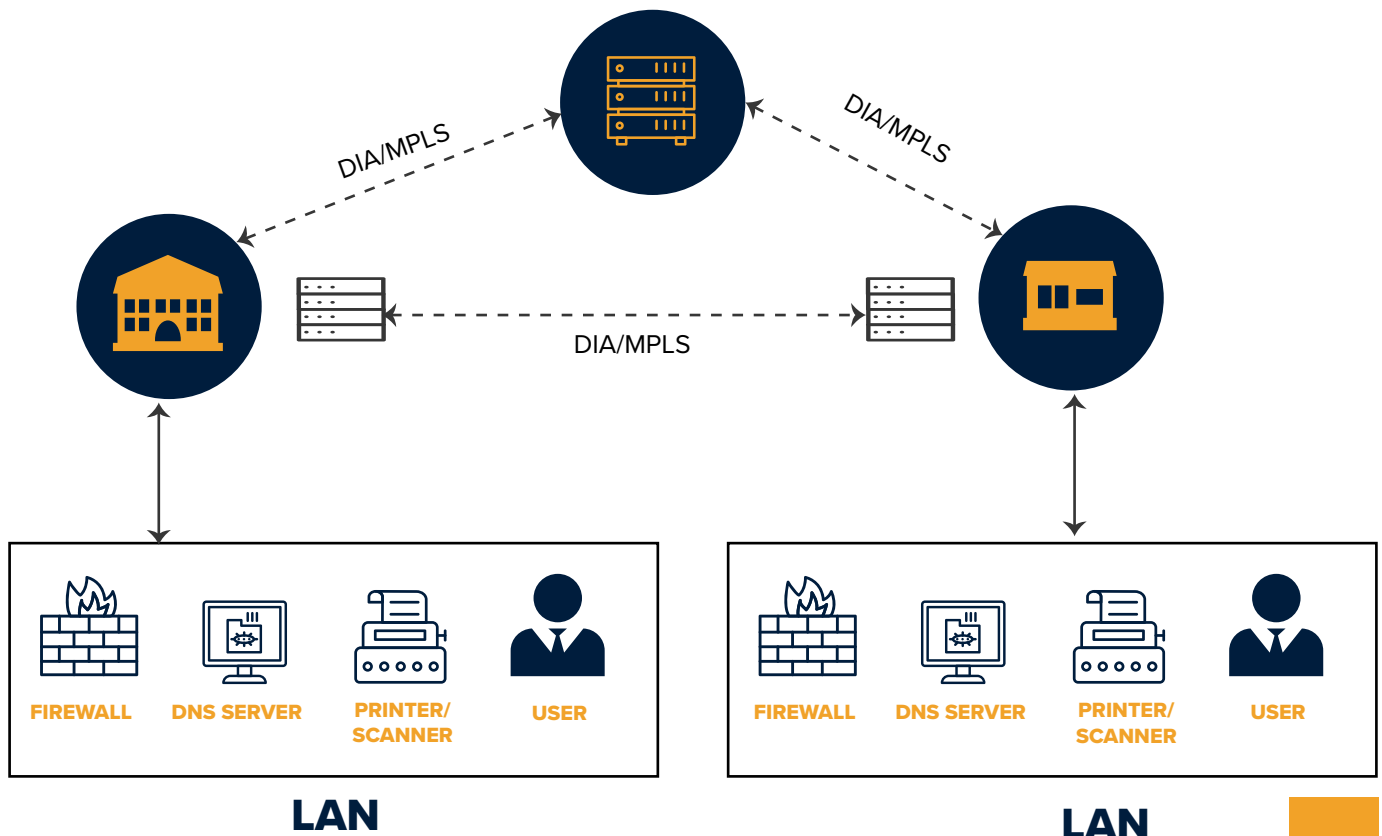During the assessment, it was found that most the offices relate to expensive MPLS links, as management and operations become hectic. The use of finance-critical applications with redundancy was a priority, as downtime for a fraction of a second is a major concern in financial firms. Support for remote areas was also critical, which was resolved with the implementation of the SDWAN network.

The assessment was useful to suggest an SDWAN solution, which helped to fill up the gaps:

**1**
Centralized management and monitoring of the network

**2**
High availability and failover for critical sites

**3**
On-premises security for each site

**4**
Remote users' connectivity

**5**
Integrated wireless solution for mobile and wifi users
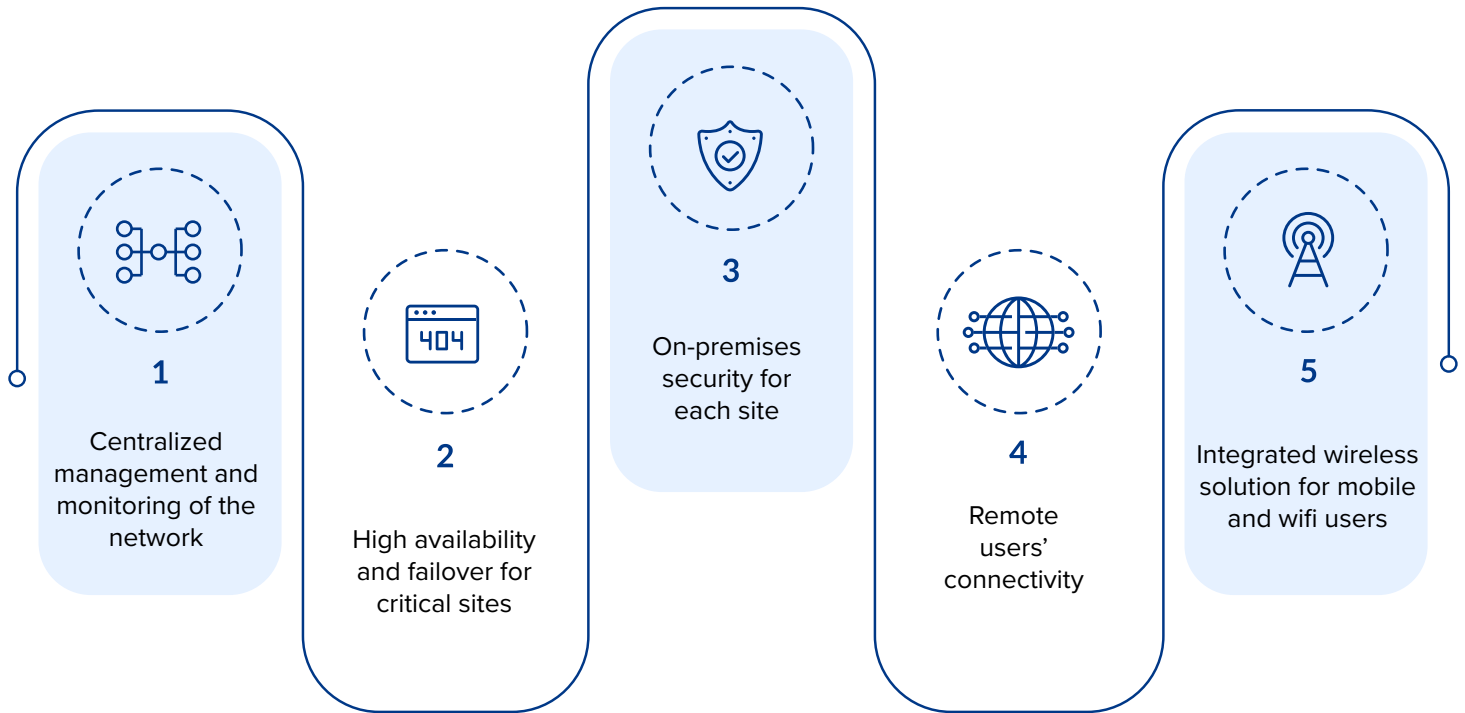
## TRADITIONAL WAN CONNECTIVITY (PRE-MIGRATION)

DIA/MPLS

DIA/MPLS

DIA/MPLS

FIREWALL    DNS SERVER    PRINTER/ SCANNER    USER

FIREWALL    DNS SERVER    PRINTER/ SCANNER    USER
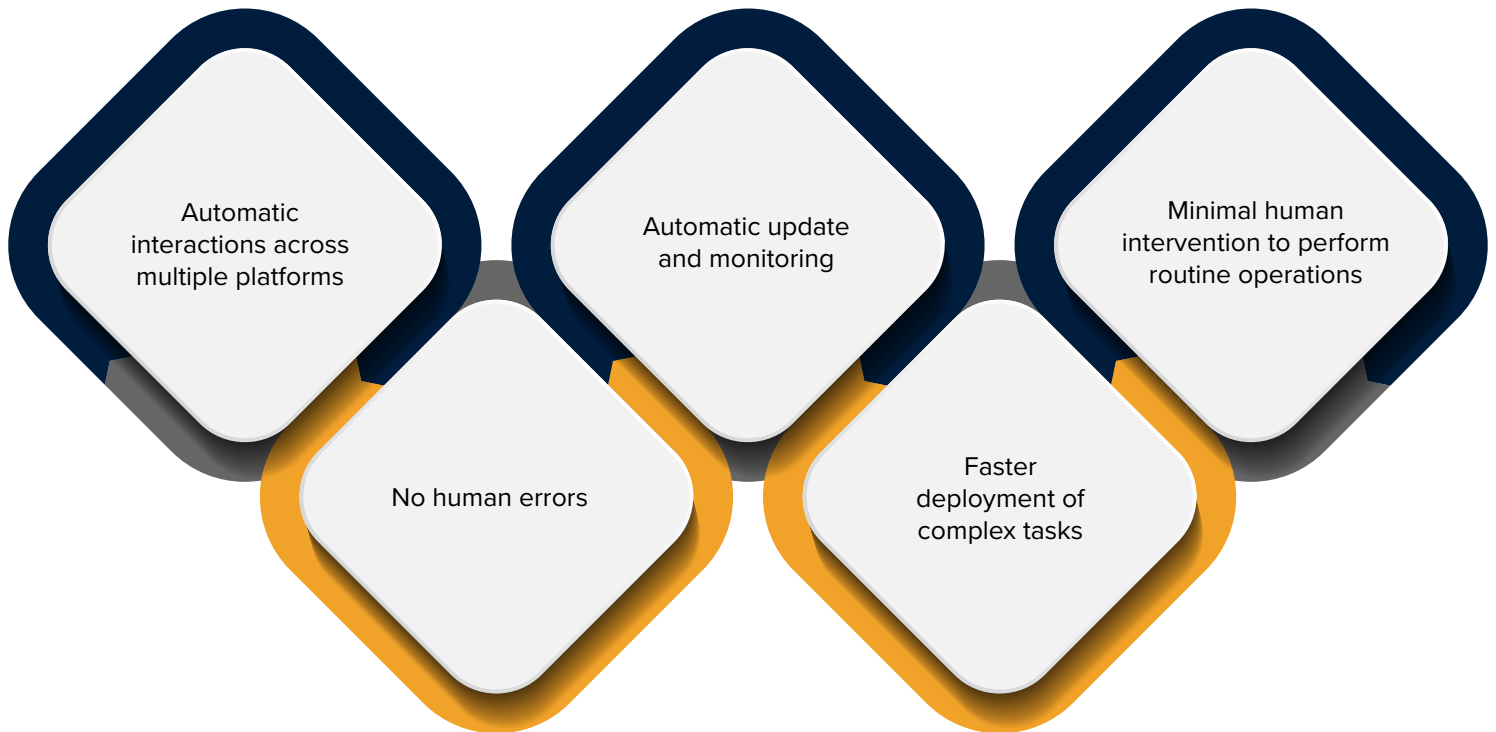
**LAN**

**LAN**

## POST MIGRATION:

During post-migration, the orchestrator is automatically able to cover edge devices through the internet. Information related to authentication, authorization, policy mapping, routing, DHCP and DNS- fills up automatically as per template selection. The device will be added to the centralized dashboard with all the hardware details and configured technical specifications. It can also troubleshoot directly through the dashboard and capture a packet through it. For any upgrade, it can pull the necessary hardware and configuration information while comparing the same  post-migration.

## NETWORK ORCHESTRATION CONNECTIVITY (POST-MIGRATION)

Printing and Scanning

DNS and DHCP Services

Configuration Policy

Authentication

NETWORK ORCHESTRATION CONTROLLER

Template

Security

Virtual Desktop

Centralized Monitoring

Auto Discovery

DIA/MPLS

DIA/MPLS

DIA/MPLS

**HEAD OFFICE**

**DATA CENTRE**

**BRANCH OFFICE**

# BENEFITS OF NETWORK ORCHESTRATION:

Automatic interactions across multiple platforms

No human errors

Automatic update and monitoring

Faster deployment of complex tasks

Minimal human intervention to perform routine operations

# CONCLUSION:

Overall, Network Orchestration is a technical, faster, and cost-effective solution to ease manual tasks for multiple purposes. It plays a significant role by enabling automation, management, and coordination and reducing the risk of errors for network resources and services. By understanding the above parameters, Network Orchestration not only focuses on task automation but also integrates and connects a digital enterprise by simplifying its control and management.

# AUTHOR BIO:

Darshan Pancholi has more than 17+ years of experience in the IT industry, with a special focus in telecom and large-scale enterprises. He is an expert in the technologies of enterprise network design, deployment, and transition from legacy to next generation of SDWAN, Cloud connectivity, and extensive enterprise networks. Additionally, Pancholi demonstrates an in-depth understanding of SDWAN design and deployment, AWS, and Azure cloud. He is working with Happiest Minds as a senior technical lead in the Network team. His work involves designing and driving global project solutions, engaging in team building, and mentoring young talents.

He has core skills in BGP, OSPF, Policy-based Routing, Router on the stack, STP, VTP, HSRP, Etherchannel, VPN, IPsec, ACL, Routemap, NAT, QoS, & preparing technical documents and presentations.

# About Happiest Minds

Happiest Minds Technologies Limited (NSE: HAPPSTMNDS), a Mindful IT Company, enables digital transformation for enterprises and technology providers by delivering seamless customer experiences, business efficiency and actionable insights. We do this by leveraging a spectrum of disruptive technologies such as: artificial intelligence, blockchain, cloud, digital process automation, internet of things, robotics/drones, security, virtual/augmented reality, etc. Positioned as 'Born Digital . Born Agile', our capabilities span digital solutions, infrastructure, product engineering and security. We deliver these services across industry sectors such as automotive, BFSI, consumer packaged goods, e-commerce, edutech, engineering R&D, hi-tech, manufacturing, retail and travel/transportation/hospitality.

A Great Place to Work-Certified™ company, Happiest Minds is headquartered in Bangalore, India with operations in the U.S., UK, Canada, Australia and Middle East.

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