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WAN Migration Techniques

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Contents

Abstract

Today's changing business models are forcing more and more enterprises to find different ways to utilize WAN more effectively and efficiently. Countless number of IT functions including data center, remote office connectivity and cloud computing are entirely dependent upon an efficient WAN. But any change in Wide Area Network (WAN) can raise anxiety in the IT administration team. WAN migrations can be a costly and time consuming process. However, multiple options are available for either selecting a right WAN service provider for a business or to do WAN migrations. The aim of this white paper is to present the best practices to achieve scalable, reliable and better performing WAN.

Introduction

In today's competitive environment enterprises are under constant pressure to become more agile. Mergers and Acquisitions are common among business to reduce cost, pursue growth, expand their portfolio, diversify, avoid bankruptcy and many more. These factors have a direct impact on the Information Technology (IT) infrastructure of these businesses. Enterprises are responding to these new challenges by re-structuring their business processes and designing better IT infrastructure.

Today the approach to WAN design is changing. Now a days, WAN is not only for connecting multiple geographical locations together instead more sophisticated WAN technologies are introduced to streamline business processes, reduce cost and improve customer experience by creating an advanced delivery platform for other services.

Why focus on WAN?

For a majority of the enterprises Wide Area Network (WAN) infrastructure forms one of the biggest operational expenses in terms of total cost of network ownership. Considering that, selecting the most appropriate wide area network solution and provider is a decision that enterprises can't afford to undertake lightly.

How to choose a WAN service provider

WAN Applications and WAN Services become more and more pertinent to business to provide connectivity between multiple offices, remote workers and to access centralized hosting of data and services in the data centers. As a result, a need for more reliable and brisk WAN and Internet connection is needed. Though it is a business imperative to carefully select the WAN and Internet Service provider. There is no such baseline to pick up a service provider as it is entirely dependent upon the business requirements. Therefore a good approach it to look for all or some of the below points while selecting a WAN/Internet service provider.

Geographical Presence	• Service provider should be able to support the network in multiple countries.
Response Time	• Service provider should have a rapid response time.
Downtime history	• Minimum downtime history
Monitoring	• Service provider should offer 24x7 monitoring and reporting services.
Cost Effective	• Solution should be cost effective

It is really important for the customer to read the service level agreement (SLA) very carefully and asks the WAN/Internet Service provider to amend the document if something is not agreed upon.

Choose the right WAN technology

How does an enterprise decide what WAN services are best for them? Choosing a correct WAN technology is a lengthy and complicated process. There is no single best definable solution that gets fit into the need of the business. The decision should be based upon the cost/benefit analysis to the business along with other factors like geographical locations, type of communications and security, etc. which makes WAN design a highly customized solution.

WAN Circuits (MPLS/VPN/Leased lines)

- Cost – Leased lines are expensive, Internet based VPNs are cheaper.
- Security – Leased lines are most secure, as they are dedicated to a customer. MPLS are least secure as there is no inherent encryption but WAN service providers create VPNS on MPLS to encrypt the traffic.
- Reliability – Leased lines and MPLS are both reliable.
- Scalability – MPLS is widely accepted as a technology that is easy to scale compared to Leased lines which are most difficult to scale.

WAN and Internet Circuit Bandwidth

- Existing WAN utilization report from last couple of months should be analyzed carefully to determine the current usage of WAN circuit if any.
- For voice and video technologies, bandwidth requirements should be calculated for the number of concurrent users.
- Cloud services also should be taken into account while calculating bandwidth requirements.

Quality of Service (QOS)

- This is a must feature If the network has to carry voice and video traffic over the WAN.
- QOS is needed to differentiate data applications to prioritize business critical traffic compared to normal network traffic.

Network Optimization Techniques

- It improves the performance of critical applications over the WAN and Internet by accelerating applications and data transfers, local caching and data compression.

Security

- Firewalls and Intrusion Prevention System (IPS) are must for any network that connects to Internet to protect the company from outside and inside threats.

High Availability and Load Balancing

- High availability and Load balancing solutions are certainly not cheap if all of the components are considered. They are dependent upon an enterprise's disaster recovery and business continuity policy.

Preparing Design Documents

A well written document makes things clearer and improves the efficiency of a team by explaining multiple concepts of a project. Typically for a WAN migration, three different types of documents are required: High level design document, Low level design document and templates for diagrams, migration processes etc.

High Level Design Document

A high level document should include an overview of the goals and objectives of the WAN Project. It should also provide short explanation about each component of the project and process to be developed/implemented under the WAN project.

Low Level Design Document

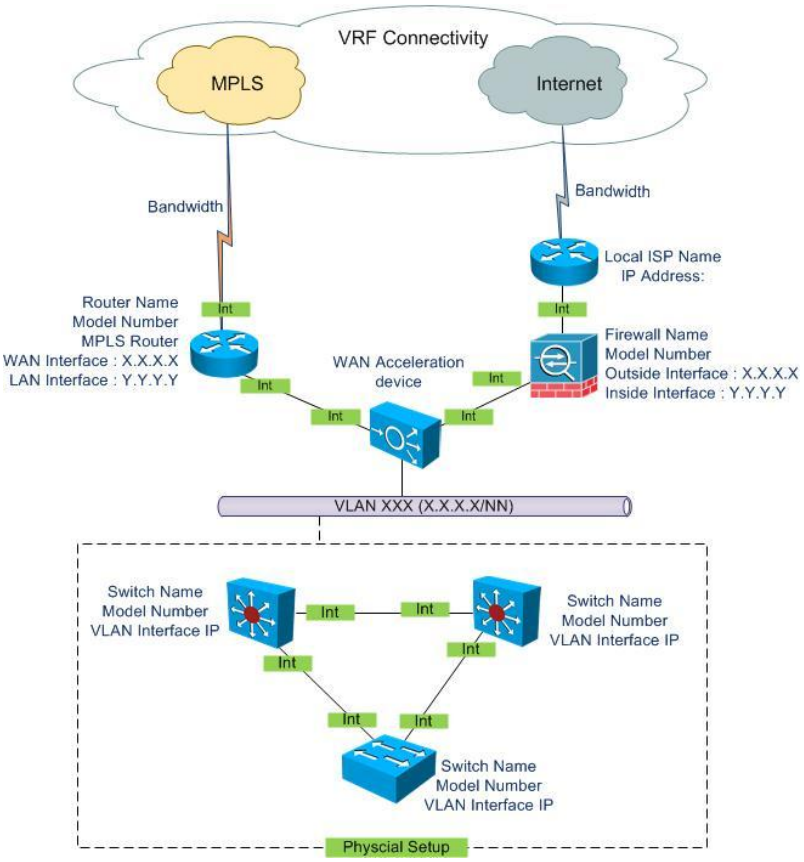
A low level design document should be done to explain the integration of the new Network elements into the end user network environment based on the HLD (High level design) document.

Some of the common designs which should be included in a LLD (Low Level design) are:-

- General Network design
- Physical Network Topology design
- Detailed Logical Network design
- Network Protocol design
- High Availability design
- Network Security design

Below, Diagram -1 show a logical network design of a site having a primary MPLS circuit and a backup Internet circuit.

Diagram-1 Logical Network Diagram



Migration Process Document Templates

Migration document and diagram templates need to be built using standard documentation formats (building standards with standards). The templates need to look the same so they can be easily understood. Before doing the actual designs for the templates, it has to be decided how the templates will look. The most important thing is to keep these templates up to date with the latest information learned during site migrations.

Pre Migration Activities

Pre migration activities are a very important process and have a direct impact on the success and failure of any migration. Below points should be covered as part of the Pre Migration activities:-

- Analyze the current network bandwidth and determine if it needs to be upgraded.
- List all the devices from the site and check if needed to order any, based on the new topology.
- Prepare a current network diagram - this diagram should cover physical details like port numbers, model number, physical connectivity of the network nodes, IP addresses of the nodes etc.
- Prepare a list of all the WAN and Internet based applications required to support the business and understand how they are accessible from LAN. Changing the WAN will have a direct impact on the functioning of these applications, therefore impact the user experience.
- Prepare a document to capture the routing behavior in the LAN and over the WAN and how the routing will be affected after changing the WAN.
- Prepare a document to capture the existing (if any) or new requirements to have a firewall in the network. The document should clearly specify what network subnets, protocols need to be allowed through the firewall. This document is site specific as the requirements of the business varies from one office to another.
- Prepare a final network diagram which should reflect all the nodes in the new setup, new IP addressing, new connectivity etc.
- Communication with the local site management is really important. Communicate with the site manager and explain them the impact of this project on their applications, services, access to the office etc. and how the new setup will improve the overall experience.
- It is important that all the new hardware should be installed (if possible) prior to the migration window to minimize the risk of operational issues.
- Raise a change request involving responsible approvers, make sure this is reviewed and approved.
- Prepare a migration document with a roll back procedure, listing all the steps to be performed.
- It is advisable to communicate with all the parties in advance about the time and date of the migration along with the number of hours for change window.

Migration Document

The migration activity document should be prepared in advance and must include the below points.

- List of names and contact details of people attending the migration call.
- Separation of duties should be included in each step of the migration activity document to avoid any confusion during a migration call.
- The document should clearly include the application, service and network testing before, during and after the WAN migration window.
- All the technical changes on the routers, switches, firewalls, IPS, should be very clearly listed in the document to avoid any ambiguity during configuration changes.
- Time allocation for each section must be required to keep an eye on the time to avoid over run of the change window.
- Current and new, physical and logical network diagrams should be part of this document to help everyone on the call to understand the migration steps.
- Roll back procedure is a must for any migration document to revert the network back to the original state in case of failure.

Migration Activities

The migration of a WAN is an administratively and technically challenging process. During the Migration window the migration document should be followed step by step to complete the changes. After completion of all the changes make sure to test all the major applications and services. The migration is a success or failure based on the application testing and other testing results.

In case of a migration failure, the site should be rolled back to the original design by using the Roll back procedure defined in the migration document.

Post Migration Activities

After the migration, original migration template should be updated with the lessons learnt during migration process. The new updated template can be used for future migrations. It is also advisable to monitor the application and network performance on the new WAN infrastructure. If migration is failed, then all the failure reasons need to be carefully examined to fix the problem for a next attempt.

Project handover

Handing over the project related documents to the support team is a must for any project. Below documents should be provided to the Business As Usual (BAU) and maintenance team for smooth operations afterwards.

- ✓ Site Diagrams – Per site diagrams should include the switch infrastructure with port details of the connections, WAN Router/Firewall/Wan acceleration device details like Hostname, Model number, IP address etc.
- ✓ WAN diagram – Over all WAN diagrams that should include the bandwidth of each site and how the sites are interconnected.
- ✓ Migration documents – All migration documents per site.
- ✓ General Information spreadsheet – Site details addresses, contact person etc., Public IP address range, Public IP addresses of the devices, LAN subnet range etc.
- ✓ Security Audit of the Internet Firewall – This spreadsheet should clearly contain the standard firewall rules and the exceptions per site.
- ✓ Project checklist – should be matched with the hand over checklist.

Conclusion

WAN Migrations are lengthy and painful processes but if well thought and designed carefully, WAN problems can be tackled with ease. Tradeoffs need to be made between performance, cost and risk. Sufficient time spent on design can yield reliable and scalable WAN. Security should be applied carefully as it may stop normal users to work efficiently. WAN optimization is a proven technology that can help the business when WAN bandwidth is a major constraint. Therefore, full-proof preparation of the migration process works towards ensuring a smooth transition and an effective WAN environment to meet the rising business needs.

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