CHAPTER 4

PROBLEM STATEMENT

4.1 Introduction

Enterprises and business organizations in today’s scenario are enabled through IT communication, enterprise infrastructure, applications and security infrastructure for their enterprise and business needs. IT infrastructure and global users connects to these systems and application through network and communication infrastructure facilities for processing their business data.

4.2 Enterprise communication network components

A typical enterprise communication network for a business organization would comprise of the following major line items:

- Enterprise Network Components like LAN and WAN
- Enterprise Services like data, voice, video and collaborative mediums like chat
- Enterprise Features and capabilities
- Enterprise Global presence – Multi-geography or single geography sites
- Enterprise Metrics

These enterprise components can be further broken down into sub components as listed below:

a) Hardware Components, classified under the following
   a. Local Area Network comprising of the following sub-system like
      i. Servers – For authentication and local file storage purposes
      ii. Switches – segregation of customer and enterprise traffic
      iii. Firewall – allow and monitor the customer and enterprise traffic
b. Wide Area Network comprising of the following sub-system like
   i. Routers – distribute, allow and monitor customer and enterprise traffic across networks
   iii. Firewall – allow and monitor the customer and enterprise traffic

c. Collaboration Systems comprising of the following sub-system like
   i. Messaging – Business communication within and outside of enterprise
   ii. Intranet / Extranet / Internet Services – web enabled internal corporate services

d. Enterprise Application Systems like
   i. Enterprise Resource Planning systems like SAP, Oracle etc
   ii. Legacy client server systems like HRMS, Financial systems
   iii. Knowledge Management Systems like Share point portals

b) Enterprise Services components for the Business needs, like
   a. Data Services
   b. Voice Services
   c. Video Services

However the demand of the enterprises and their business in today’s world is on the following criteria and factors

c) Enterprise Features like
   a. Availability
   b. Scalability
   c. Redundant and Resilient
   d. Convergent
d) Enterprise Presence
   a. Multi-geography
   b. Single geography

e) Enterprise Metrics
   a. SLA
   b. Monitoring and Measurements

In today’s world most of the IT and ITES consulting firms and enterprises have disparate and multiple technologies which they are required to manage. These enterprises and the IT and ITES consulting firms currently have one primary objective which is to consolidate their multiple networks into a single infrastructure to achieve significant cost reductions and enhance communications through a high speed global communication network.

Apart from this objective, these enterprises and business organizations also look at redundancy and resiliency which is very key and critical to their line of business. For those enterprises and business organizations which offer these as services to their customers, these services can become an added value.

One of the major and key requirements which these enterprise organizations have is how to provide strict isolation between their various customers’ networks and their enterprise networks. Because each of these customers would like to have high level of security apart from providing them with the freedom to access their business applications without any or minimal changes. Also these enterprises would like to have these networks available to them in a very cost effective, efficient way and also in the shortest possible time frame.

For example, a banking customer would expect that the back office user assigned for his project logs into the company’s secured banking system and access their banking application. While there would be another manufacturing customer who would expect that the back office user assigned for his project logs into the production system and accesses the ERP application to track the material supplies.
To further complicate this there could be business organizations which would like to restrict the login and access to the specific individual departments or division within their enterprise network. Also there would be instances where the access to production and development systems within the business organization would need to be restricted for the same group of offshore users to cater to their regulatory, legal and administrative reasons.

Many of these IT and ITES consulting firms and enterprises would have global data centers and they would need to be accessed by other center users within the company or by users who are maintaining and/ or supporting their customer environments out of these data centers. Furthermore, communication would be needed between these data centers for inter office communication or messaging or backup or business continuity reasons. There could be business instances where customers would like to leverage these networks for voice and video applications as well. Hence the quality of services, class of services and reliability are absolutely essential considerations to be kept in focus while keeping the bandwidth costs and operations costs down.

Currently, IT and ITES consulting firms, enterprises provide various business support services like data, voice and video support directly to their business or for their end customers, covering America or Europe or Asia Pacific. Many of these business and customer support activity happen across business domains, technology platforms and other support areas. During the last couple of years, more and more customers have been looking at these IT and ITES consulting firms to provide cost effective and optimal business solutions to them, as services as well.

Also with the advancement in technology and technology platforms, customer business environments have migrated themselves to virtualized platforms. Many of these enterprises and customers have their virtualized environments accessible over secured extranet, which apart from providing newer challenges has also provided alternate solutions or options.
4.3 Need for Independent Infrastructure Requirements

The reason for the enterprises to go with independent infrastructure requirements could be due to the following:

- Customer demands

Many of the banking and financial customers prefer to extend their existing infrastructure setup to the offshore vendor or request the vendor to provide separate infrastructure setup which gets terminated in their data center demark location. The reason and rationale behind adopting such a practice is basically to address the concerns around data confidentiality concerns. While there has been advancement in technologies which provide controls to overcome these concerns. However, customers prefer to keep their infrastructure and vendor infrastructure quoting the above data confidentiality as a major concern.
• Easy management of customer bandwidth and infrastructure

As the infrastructure and communication network are separate from the other networks within the enterprise or vendor. Customers can easily pull the reports as and when they require and can be self aware of the capacity utilized and plan for any future requirements, thru suitable downgrades or upgrades.

• Security requirements

One of the key requirements which drive the customer or the outsourcing vendor to opt for an independent infrastructure is the security requirements. These security requirements could be mandated out of the regulatory and compliance requirements of the business and or specific country or state requirements, as in the case of United States of America or United Kingdom.

4.4 Disadvantages

Disadvantages of such an independent infrastructure setup are:

• Complex and segregated infrastructure (servers and network)

Enterprises and especially third party vendors need to manage separate infrastructure and communication network for their customers. This could mean investing in additional workforce (both operational and tactical workforce) apart from the management time and effort required to oversee these infrastructures. Apart from the time and effort spent on reviews and oversight into issues (inclusive of break down, technology upgrade, change management and other risks) which can arise while maintaining these infrastructures.

• Non effective utilization of infrastructure resources (hardware or network or manpower)

Most of the occasions these independent infrastructures get built up or setup considering the likely future ramp up in the near future and due to other operational /
business reasons does not get effectively utilized or leveraged. This could also happen where the offshore environment for the same customer cannot be leveraged for another line of business. This could be due to non-availability of appropriate charge back mechanism (from a finance perspective) or because the lines of business do not have the same vision or goal from an offshoring perspective.

This quite common both from a hardware or network perspective and sometimes gets cascaded to physical manpower utilization as well. Many times outsourced vendors do take this up with their customers to explain the background and in some cases these gets accepted but in couple of cases these do not get addressed due to reasons beyond the vendor or customers control.

- Ineffective infrastructure and network management

As explained above due to non effective utilization of infrastructure resources it will lead to ineffective management. This leads to ineffective capacity planning and management of infrastructure. Most of the total cost of ownership for the infrastructure gets underutilized thereby leading to ineffective management of infrastructure

- Ineffective cost management

The above leads to poor cost management of infrastructure resources, where in servers procured at high cost get underutilized, and similarly this gets replicated in network and other manpower resources. This leads to more costs being incurred and not meeting the overall business objective in reducing costs for the business.

With the ever growing complexity due to newer products or technology or infrastructure, there is a growing business need and requirement for enterprise business / consulting firms to come up with a globally agile infrastructure communication model.
4.5 Benefits of Leveraging Common Enterprise Infrastructure

Based on the above, we could list out the following benefits which enterprise and business organizations could gain by leveraging common enterprise Infrastructure. These are listed below:

- Agile and scalable

As infrastructure capacity planning and management for any enterprise would be based upon the standard tenets of planning, provisioning and engineering. Enterprise could built and deploy similar hardware to meet the common enterprise infrastructure needs. These common infrastructures could be leveraged for providing prospective customers with infrastructure capacity for their short term and immediate business needs and requirements. This would very much help the customer in meeting his immediate business demand and also provide an opportunity for the enterprise to showcase its infrastructure capability from an agility and scalability perspective.

- High availability

Enterprise infrastructures are provisioned keeping in mind that they need to meet the high availability needs of their business demands. While building the common infrastructure for their prospective customers, enterprises could leverage these high availability features for supporting the business and mission critical production systems.

- Easy manageability

As most of the enterprise infrastructure would be managed by a central pool of resources which would pro-actively monitor and manage these infrastructure assets. The same manageability and features, with appropriate consideration for access and security controls, could be made available with the existing support staff.

- Stringent security requirements

Enterprise infrastructures are built with stringent and strict security standards. The same security or similar security requirements could be met for the common infrastructure as well.
• Reduced operating costs

As the enterprise infrastructure is being centrally managed by a team, the same could be leveraged for the common infrastructure. This would help in bringing down the overall cost of management and maintenance for these infrastructures.

• Readily available infrastructure

Enterprises typically have alternate and backup hardware which could be effectively and efficiently leveraged for meeting the customer business need. For short term business requirements, customers prefer to go with operating expenditure costs rather than preparing a business case for capital investment as the approval process may take time and effort.

• Reduce infrastructure deployment time

Deployment time for the common infrastructure would be that much reduced and can be made available on demand. This would reduce the overall deployment time and save the business from reaping short term cost benefits.

• Infrastructure capacity available for BCP and sudden demand

Enterprises can plan for provisioning additional infrastructure capacity on their environment based on the market and business needs of their customers. This would help them to meet any business continuity requirement and plans and also to take care of sudden, critical, unforeseen and immediate customer infrastructure demands.

• Cost effective ‘Go To’ market solution

Enterprise could leverage this as a cost effective “Go To” market solution, where apart from fulfilling the customer business process needs and requirements. The enterprise sales teams could offer these as a viable, cost effective, out of the box alternate options to fulfill the customer’s unforeseen business requirements.
4.6 Key Drivers for Network Evolution

Recent survey conducted on enterprise organizations across the Globe by IDC’s WAN Manager Survey in 2010, revealed the following factors:

There has been a growing demand on the network security requirements, irrespective of whether the enterprise wanted to move into a MPLS or not. About 42% of the enterprises realized that network security requirements are key for their enterprise. About 34% of enterprises which moved into the MPLS services had an improvement in their WAN application performance. For those enterprises which did not want to move into the MPLS services the improvement on WAN application performance came down to below 25%. About 27% of enterprise wanted to have simplified network structure irrespective of whether they wanted to move into MPLS service or still wanted to continue to be in their existing network service. About 28% of the MPLS service organizations intend to move into enterprise application virtualization or datacenter virtualization. There has been more occurrence of voice / data convergence, about 29%, on those who have migrated to MPLS Services as compared to others. There are other factors like network optimization, video conferencing, new enterprise application and video over WAN which have been around 17 to 24% overall.

![Key Drivers - Network Evolution]

Figure [4.2] Key Drivers for Network Evolution
4.7 Root Cause Analysis for Network Availability

As part of the problem definition, we had done a root cause analysis on Network Availability for enterprise communication infrastructure. The gathered data was analyzed and classified based on the following parameters:

- Enterprise business requirements
- Enterprise operations requirements
- Infrastructure and technology requirements.

These requirements where classified and entered into a data sheet so that the root cause analysis parameters for enterprise network availability can be obtained. Given below is the list of various requirements which were classified and entered under the appropriate headings.

Table [4.1] Inputs for Network Availability - Root Cause Analysis

The generated fish bone diagram for enterprise network availability has been depicted below
From the fish bone analysis, it is clear that the following are key and critical factors for ensuring the network availability for any enterprise. They are:

- **Business Requirements**: Resilient and redundant networks, meets data and voice requirements,

- **Operational Requirements**: Globally available, on demand and scalable network, instant connect to customer locations, and should support multiple technologies

- **Infrastructure and Technology Requirements**: Future ready, efficient Service Levels, pro-active monitoring and instant failover

### 4.8 Root Cause Analysis for Network Cost

As part of the problem definition, we had done a root cause analysis on network cost for enterprise communication infrastructure. The gathered data was analyzed and classified based on the following parameters:
- Enterprise business requirements
- Enterprise operations requirements
- Infrastructure and technology requirements.

These requirements were classified and entered into a data sheet so that the root cause analysis parameters for enterprise network cost can be obtained. Given below is the list of various requirements which were classified and entered under the appropriate headings

**Table [4.2] Inputs for Network Cost – Root Cause Analysis**

![Data Entry Sheet for Fish Bone Diagram](image)

The generated fish bone diagram for enterprise network cost has been depicted below

![Network Cost – Root Cause Analysis](image)
From the fish bone analysis, it is clear that the following are key and critical factors for ensuring the network cost for any enterprise. They are:

- **Business Requirements**:

  Cost Effective, High Availability, Credits for unavailable periods

- **Operational Requirements**:

  Periodic Billing Forecasts, Uptime Monitoring, and Network Availability

- **Infrastructure and Technology Requirements**:

  Standard Technology Platform, Standard Change Management and quicker technology resolutions

4.9 **Solution Design & Development**

**GLOBAL AGILE INFRASTRUCTURE COMMUNICATION MODEL (GAICN)**

Based on the above described enterprise problem definition and understanding of the root cause analysis for both network availability and network costs. There was a need felt to come up with Global Agile Infrastructure Communication model which could be leveraged by enterprises and business organizations. Enterprises could build a fully resilient and redundant infrastructure network across the world.

By adopting and implementing this Global Agile Infrastructure communication model, an enterprise could basically leverage one of the existing available enterprise network connectivity models. Build their own multi site network between their different global office locations and also interconnect from these to their customer locations. This would actually remove the need for multiple infrastructure setups being currently managed by enterprise for their business needs.
This would also give way for cost effective and efficient along with scalable and easily manageable enterprise infrastructure.

![Global Agile Infrastructure Communication Model](image)

**Figure [4.5] Global Agile Infrastructure Communication Network Framework**

In order to build this proposed model, an enterprise would have to do the following:

- Identify its global or offshore delivery centers

  This would need discussions with business and operations management teams of the enterprise based on consideration of couple of other parameters like future growth and business plans for the enterprise.

- Identify and adopt an appropriate enterprise communication network technology

  Based upon the business needs, technology and organization growth plans / road maps and also dependent on the existing infrastructure available within the
organization, Enterprise infrastructure engineering team would need to plan and adopt appropriate technology road map. This technology road map should also take into consideration the future readiness of the organization apart from taking into consideration other parameters like high availability, scalability and resiliency.

- Identify an appropriate telecom service provider / partner

Most of the global communication infrastructures are managed by telecom service providers so it would be worthwhile for the enterprise to identify its local and global partners. The reason for identifying both local and global partners is for the fact that not all service providers have global presence. Hence it would be beneficial to identify telecom service providers / partners who can match the enterprise business requirements.

- Finalize and agree upon an enterprise wide transformation program

One of the key components for the success of global agile communication framework model is to finalize and agree upon the high level costs, effort and timelines with business and other stakeholders like operations, security and enterprise IT. Also this model needs to be driven as a transformation program across the enterprise so that the final benefits can be shared with all stakeholders.

Some of the key business and operational drivers which would benefit the enterprise by adopting the global agile infrastructure communication model are the following:

- Remove independent and disparate infrastructure (redundant and silo)
- Reduce infrastructure deployment time frame
- Increase resource utilization and cost optimization
- Flexible cost model – Fixed or Usage based on service option chosen
- Reduce infrastructure costs
- Reduce supporting manpower costs
- Reduce hardware and software support costs
• Ability for customers to leverage enterprise infrastructure
• Flexibility to operations and business.
• Ability to add infrastructure in case of a Business Continuity scenario
• Flexibility to increase/decrease/terminate infrastructure on demand
• Easy manageability

Apart from the above the other factors the following would indirectly benefit the enterprise

(i) Leverage and optimize existing enterprise communication technology services
(ii) Provide ready and secure infrastructure for customers
(iii) Flexible and easy to deploy for the service provider
(iv) Hybrid models can also be deployed for specific customer requirements
(v) Integrates with customer infrastructure environment
(vi) Fully secure, agile, resilient and redundant

With the implementation of the global agile infrastructure communication network model, we expect enterprises to benefit in the following ways:

**Infrastructure availability**

By adopting this framework model, enterprises do not need to wait for infrastructure availability. Since this would be available and implementable immediately from their enterprise global offices, without any wait period. The only time required to implement this is to extend the local last mile into the customer facility from the nearest access node at US or Europe or Asia.
Application Access Issues

This can be covered as part of the overall testing plan for the customer. With specific request to the customer to provide the TCP / IP port numbers and details about the applications which need to be accessed over this network.

Voice Infrastructure

With the implementation of global model, voice requirements can also be met immediately as only additional network bandwidth needs to be allocated. It would be much easier to deploy IP based voice communication networks leveraging the enterprise IP PBX Infrastructure network. However, in some countries this may need prior regulatory clearances which need to be duly considered prior to implementation.

Scalability

The global agile model allows a fully scalable solution as only the network bandwidth needs to be increased or decreased almost instantaneously for any customer. The only upgrade which might need to be done is the last mile upgrade between the access node and the customer location. If there are sufficient capacity already available by way of Ethernet or DS3 last miles, then this also would not be an issue.

SLA and Management Support

Depending on the SLA’s mutually agreed between the enterprise and telecom service provider, immediate support can be provided for any critical network issues. Moreover, monitoring would be done on a pro-active mode, with monthly / quarterly/ annual reports being published by telecom service provider. However, the network management can be either with telecom service provider or with enterprise based on the skill availability.
Risk Management

With enterprises migrating into this global agile model, risk management (more from a entire office location not being available) can be appropriately addressed as the network bandwidth required for such situation would have been addressed as part of the infrastructure setup. However, this would be limited to network connectivity and may not be applicable for other resources, like manpower and servers at customer end.

With customers also being aware of this risk management scenario, they encourage enterprises to connect to their alternate data centers which they would have setup for overcoming such critical business situations.

4.10 Conclusion

In this chapter current enterprise technology problems faced by business and operational teams were covered. The advantages and disadvantages of independent and common infrastructure were covered. The design and benefits of GAICN framework model were shown. In the forthcoming chapter, we would be covering how the GAICN framework was actually implemented under different scenarios. The forthcoming chapter would also cover the program timeline and cost benefit arising out of this actual implementation in enterprise environment.