The background of the slide is a green-tinted image of a server room aisle. A magnifying glass is positioned over the center of the aisle, focusing on the text. The floor and walls are lined with server racks, and the scene is overlaid with a pattern of binary code (0s and 1s) in various orientations and sizes. The lighting is dramatic, with a bright light source creating a lens flare effect through the magnifying glass.

Evaluating Data Center Investments

*In-House versus Managed
Hosting Infrastructure*

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Table of Contents

1.0	Executive Summary	3
2.0	Introduction	4
3.0	Migrating to Hosted Infrastructure	6
3.1	Current market landscape in India and future potential	6
3.2	Evaluating migration to hosted infrastructure	7
4.0	Conclusion	14
5.0	Evaluating a Managed Hosted Data Center Provider	15
6.0	Case Study: Globarena	16
7.0	Appendix	18
7.1	Research Methodology	18
7.2	Components of TCO and Assumptions	18
7.3	Glossary	21
7.4	List of Exhibits	22

1.0 Executive Summary

With the ever-evolving globally competitive business environment being addressed by technology transformation, the need for an in-depth assessment of technology before its acceptance and adoption is gaining importance. As data proves to be critical for businesses today leading to increasing number of data centers with various data center deployment options available to choose from, this whitepaper attempts to understand the underlying drivers for the gaining popularity of one model over another. With both qualitative and quantitative benefits evaluated through a Total Cost of Ownership (TCO) framework, this research aims to serve as an important tool for small and medium business (SMB) stakeholders for comprehensive assessment of an SMB data center infrastructure.

Based on a realistic approach to analyzing the business value of the hosted IT infrastructure environment, we believe that SMBs will adopt managed hosting as a preferred data center deployment option to gain the following benefits:

- Significant cost savings over a 3 year TCO period, potentially in excess of 26 percent over an in-house deployment
- Maximized infrastructure utilization and minimized over provisioning
- Retained control over IT infrastructure
- Increased reliability and reduced risk
- Enhanced business competitiveness by improved focus on core business

However, quite often, the success of a deployment model strongly depends on the service provider selection. Hence, this whitepaper dives deep with an objective to not only furnish information that is required for evaluating a data center deployment but also provides a service provider selection checklist to help increase your corporate profitability and success. Parameters such as availability of robust technology infrastructure, redundancy and resilience, on site security, and guaranteed Service Level Agreements (SLAs) along with round the clock availability of skilled technical staff play a critical role in the selection of a competent service provider.

2.0 Introduction

With data emerging as the biggest asset for organizations, the need and importance of data centers today cannot be debated. The term data center is nothing but a facility used to house computing, network and storage equipment. Data centers can range from a small facility (also called a server room) in some enterprises to massive-scale infrastructure for enterprises with huge computing requirements. But in the present day, the increasingly demanding customer needs, new applications, and advanced infrastructure options and compelling organizations to rapidly outgrow their existing data centers.

Furthermore, considering the need to maintain business stability and competitiveness with fewer resources and lower budgets, today CIOs face constant pressure to increase their data center capacity and performance. This scenario is forcing organizations to carefully examine various data center scaling options and direct areas of investments that will provide highest returns. Moreover, internal factors that include a combination of a workable level of availability and security, scalability, and the level of IT expertise available to maintain the IT infrastructure are also determining an organization's data center deployment.

As a result, CIOs are constantly faced with challenging decisions, as to whether to

- Upgrade existing computing infrastructure with more powerful servers and software or lease infrastructure from hosting providers?
- Build a new data center or lease space in one or more co-location centers?
- Opt for Self Managed or Service Provider Managed? and so on

Quite often, organizations conclude that the possibility of obtaining benefits of an efficient data center only lies with a self-owned and operated approach along with an internal strategy addressing issues related to compliance, consolidation, and security, including business continuity. But little do they know that such uninformative conclusions can not only hinder the adoption of latest IT innovation but also result in higher financial implications in the long run. While an in-house data center infrastructure provides SMBs with a sense of comfort and security in managing their IT infrastructure, a hosting deployment provides enhanced flexibility, ease of scalability, and technical expertise. Furthermore, merely

outsourcing data center requirements to a third party does not complete the task in entirety; the selection of a competent service provider is likely to help materialize the targeted benefits.

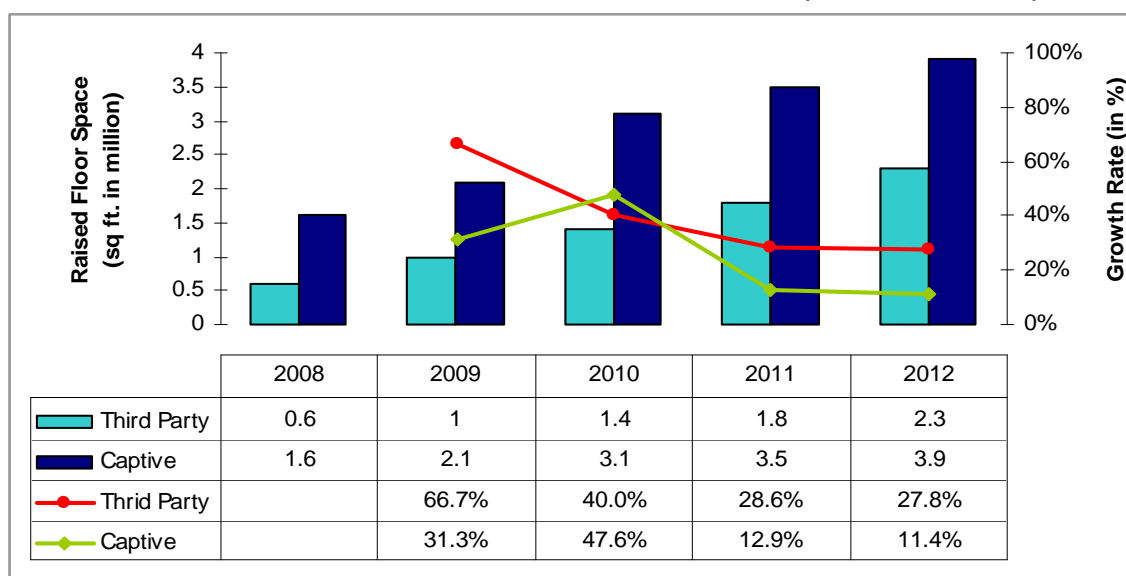
This whitepaper not only attempts to evaluate the benefits of an In-house versus Managed Hosting Infrastructure Deployment model through a TCO, framework but also showcases the future of the data center market in India.

3.0 Migrating to Hosted Infrastructure

3.1 Current market landscape in India and future potential

A hosting service provider provides a physical space in which customers can host their data center equipment (for example, servers, switches, network equipment). The service provider is responsible for heating and cooling, power (primary and backup sources), physical security, and network access, and security. Over the years, hosting service providers have evolved to provide value-added services including remote equipment monitoring and maintenance, network management tools, disaster recovery, managed hosting, and more recently, cloud services.

Chart 3.1: Indian Data Center Market Growth Forecast (CY2009 – CY2012)



Note: All figures are rounded off to the nearest decimal
Source: Frost & Sullivan

The overall data center space in India is expected to grow at a CAGR of 28.5 percent from 2,246,000 sq. ft. in 2008 to 6,132,701 sq. ft. in 2012. Third party data centers are expected to grow at a rate of 37.4 percent, which is 150 percent faster than captive data centers, indicating an increasing adoption of third party data centers by businesses.

During budget allocation, the IT departments receive a greater scrutiny than other departments, because an estimated 3-6 percent of a company’s overall operating expense budget is allocated towards IT. As a result, CIOs are exploring

opportunities of consolidating their existing data centers to make them agile and increase utilization as well as outsourcing their infrastructure requirements to third party data centers.

In line with increasing network computing and storage requirements of organizations, the data center market in India is undergoing transformation as organizations are shifting their infrastructure from owned facilities or captive data centers to third party hosted facilities.

3.2 Evaluating migration to hosted infrastructure

Today, IT is being increasingly accepted and adopted as an enabler rather than a facilitator. Therefore, IT is fast becoming an integral part of an organization's business operations, enabling organizations to achieve operational efficiency, customer satisfaction, as well as remain competitive in the market. This changing role of IT in an organization requires it to be highly available and reliable. Various factors are driving the adoption of a managed hosted infrastructure environment. While it is evident that hosted infrastructure reduces management complexity, achieves rapid scalability, and provides flexibility to SMBs, it also becomes important to ascertain the financial implications that the various data center deployment options have on the bottom line.

For a comprehensive evaluation, organizations should aim to amass and analyze both qualitative and quantitative data points. Frost & Sullivan believes that a TCO exercise could serve as a constructive tool for key decision makers to evaluate and analyze the merits and demerits of an in-house data center as against the hosted infrastructure model. A TCO evaluation is a comprehensive depiction of all cost components involved in building and maintaining an operational data center over a period of time. Hence, in order to provide a clear indication and roadmap for SMBs to determine both qualitative and quantitative business benefits measurable for future planning, we have estimated the TCO of a SMB based on a standard configuration for a 2-server data closet. Table 3-1 lists the expected TCO associated with the listed components of an in-house installation and the equivalent TCO for a hosted option. (For a more complete explanation of the assumptions behind the In-house model, please refer to Appendix).

The following highlight the direct and indirect benefits of migrating to a hosted infrastructure:

SMBs can significantly cut IT costs with over 26 percent savings

Typical costs associated with data centers include capital outlay on the computing and physical infrastructure as well as operational expenditure on electricity, personnel, internet connectivity, etc.

Table 3-1: Three Year Total Cost of Ownership Analysis of In-House versus Managed Hosting

Cost Components	In-House Infrastructure	Managed Hosting
	In INR	In INR
CAPITAL EXPENDITURE COMPONENTS		
Computing Infrastructure <i>2 quad-core servers, 6GB RAM, 2 x 250 GB Hard Disk Drive; 1 Router with integrated switch; Redundant Online UPS (2 KVA, 4 hour backup); Equipment cabinet; Open Source Licenses (OS + Database); Maintenance on hardware components</i>	612,144	Included
Security Infrastructure <i>UTM (includes Intrusion Detection- Prevention System & Gateway antivirus, Content filtering , Graphical reporting , Antispyware; Maintenance of Security components included in warranty</i>	46,510	Included
Primary Infrastructure <i>Comfort AC / Electrical Cabling / Passive Network Cabling / UPS Room / Hand Held FM 200 Extinguisher / Fire Alarm/ Access Control Biometric and Proximity Reader/ PC for BMS Software</i>	180,000	Included
Setup Costs	Included	Included
TOTAL CAPITAL EXPENDITURE	838,654	0
OPERATIONAL EXPENDITURE COMPONENTS		
Subscription Costs	N/A	1,512,000
Dedicated Internet Access <i>Dedicated Broadband Internet access of 2 Mbps for primary and backup</i>	207,315	103,658
Rental <i>Apportioned for single rack space, operations space</i>	43,200	Included
Facility Maintenance <i>Facility Maintenance Services for the UPS, Electricals, Passive Cabling and Physical Security 24 x 7</i>	128,000	Included
Power <i>Primary power for servers, security gateway, and datacenter network routers, air conditioning, and lighting</i>	597,233	Included
Personnel <i>Network engineer operating in single shift, 40 percent utilization for data center</i>	397,200	Included
TOTAL OPERATING EXPENDITURE	1,372,948	1,615,658
TOTAL COST of OWNERSHIP	2,211,602	1,615,658
COST SAVINGS THROUGH MANAGED HOSTING (%)	26.95 percent	

*Note: All figures are in Rupees and are rounded off; the base year is 2009.
Source: Frost & Sullivan*

The primary research and TCO analysis revealed the following quantitative and qualitative benefits of migrating to a hosted infrastructure model:

Quantitative Assessment of the benefits of Managed Hosting

The evaluation of the in-house versus the hosted infrastructure models has displayed significant cost savings of 26.95 percent in favor of managed hosted deployment for SMBs. These benefits are realized on the capital and operating expenses as well as soft costs such as management flexibility and availability.

Absence of upfront capital investment

With considerable investment required for a self-owned data center, an in-house deployment can be quite an expensive affair as it calls for the need to shell out capital for premise-based equipment and installation services. Unlike the in-house model, a substantial percentage of savings in a hosted deployment can be attributed to the absence of upfront capital expenditure required in purchasing computing infrastructure comprising servers, switches, and routers. Besides being economical, the subscription model offered by the hosted service provider is easier to predict and manage, affording simplified financial reporting.

Reduced resource management costs

High level of expertise is required to manage data centers as computing, storage and networking technologies are rapidly changing. The costs of hiring, training, and retaining in-house personnel contribute not only to significant costs for an SMB, but also serve as challenges where IT is not a part of its core business. However, under a hosted infrastructure model, the hosting service provider has experienced and trained personnel who are either solely responsible for a particular customer or time shared across multiple customers, based on service level agreements. Further, with key result areas and salary of technical staff directly linked to the service rating given by customers, quality of service is the parameter that is given utmost importance. The hosted model thereby enables SMBs to increase utilization and effectiveness of their investments in personnel, which otherwise would have been considered a sunk cost. Moreover, the need for 24x7 availability of on-site staff and certified, trained, and experienced technical experts' acts as an added advantage.

Qualitative Assessment of the benefits of Managed Hosting:

Besides the above financial analysis, qualitative parameters play an equal role in evaluating a hosted IT infrastructure.

Low cost of disruptions

The cost of disruptions cannot be ignored as it affects the organization at both the brand and financial levels. In a hosted infrastructure model, based on tier classification of the data center service provider, the service provider guarantees equipment availability. With redundant power supplies, network facilities as well as experienced support personnel available round the clock, the service provider is able to guarantee service levels, which are difficult to achieve through an in-house data center. Furthermore, the quality of service is secured since any non-compliance of the SLA or lapse in service below the minimum level could result in financial penalties against the service provider including termination of contract.

Reduced management responsibility

SMBs rarely have spare capacity to meet every requirement and dedicated staff for end-to-end management of their IT infrastructure. A hosted model provides IT managers with the flexibility to manage their core business applications while outsourcing the peripheral requirements to service providers who can leverage on their expertise and economies of scale to provide a robust IT infrastructure.

Table 3-2: Managed Hosting: Ownership and management responsibility

Parameter	SMB	Service Provider
Facilities, primary infrastructure		✓
Computing equipment		✓
Security equipment		✓
Network facilities, internet bandwidth		✓
Equipment management		✓
Application management	✓	✓

Source: Frost & Sullivan

Minimize over-provisioning, under-utilization

Traditionally, the norm for businesses is to build and maintain multiple fully-staffed data centers. With the computing requirements of organizations growing exponentially, the physical infrastructure and administrative staff required to support the computing infrastructure are also expected to also grow. Typical data centers take about 2-3 years to move from planning to actual implementation. Additionally, the physical infrastructure will need to be over-provisioned in anticipation of future growth, thereby causing underutilized infrastructures. By outsourcing their infrastructure to a hosting service provider, SMBs will have the flexibility to scale both their physical and computing infrastructure with changing business requirements, without being responsible for increasing the data center footprint. In addition, expenditure is aligned to actual consumption of the SMB, thereby avoiding over provisioning and under utilization.

Retained control over IT

Many businesses are skeptical about the control rendered in a managed hosting environment, simply because of the belief that an in-house and an on-site proximity to IT infrastructure would place greater control in their hands. However, what organizations fail to understand is that the premise of the hosted deployment model lies in supplying, monitoring, and managing only the platform over which the applications operate, thereby retaining the control of application with the organization itself. Therefore, with no direct implication of a data center's physical location on control, this myth does more damage than playing an instrumental role for a healthy analysis.

Increased reliability and reduced risk

There is a tendency for organizations to become complacent because of the absence of exposure to any major outage. While it is impossible to eliminate business risk, the level of probability is further reduced when third party expertise comes into play. With scale of operations and years of experience in the business brought to the table, hosted service providers strive to provide the best of class services and viability. Provision for state-of-the-art infrastructure and high uptime through SLAs enable SMBs to operate from reliable third party data centers. With Tier IV* data centers (* please refer to glossary) available in India today, SMBs can be ensured highest levels of performance for mission-critical IT systems with 99.995 percent guaranteed uptime, which is difficult to match with a in-house deployment. Also, since it's

relatively easy for SMBs to switch providers, hosted service providers have a vested interest in ensuring that services offered meet their customers' needs.

Improved competitiveness by focusing on core business

The use of IT as a business critical function mandates adequate planning, execution, and maintenance of the organization's IT infrastructure. Significant effort is spent in order to manage end-to-end IT infrastructure, including server uptime/availability, hardware, software, facilities upgrade, power disruptions, equipment failure, and so on. It is also important to note the implications of downtime; its attached costs, including managing and adhering to SLAs can also be quite a challenging task. The adoption of a hosted model relieves an SMB from day-to-day operations of IT infrastructure, thereby enabling SMBs to redirect their attention to core business activities, resulting in improving competitiveness.

Faster time to market

In the current technological environment, it is difficult to deny the important role of IT in improving time to market and its criticality for most businesses. With growing data center needs, hosted service providers have the capability of provisioning additional computing requirements to supplement existing capacity; allowing improved time to market by eliminating the need to procure hardware along with the time spent on installation, configuration, and integration.

Single vendor interface

A number of experienced and trained personnel are responsible for installation, deployment, and management of a hosted infrastructure solution. Consequently, time spent by the organization on tasks such as identifying various products and vendors, understanding the pros and cons of competing products and vendors, purchasing, deploying, as well as managing vendors of various infrastructure components is minimized.

4.0 Conclusion

In an IT infrastructure, technology changes are constant. Obsolescence of technology is rampant and it does not take long for one to realize the need to upgrade existing infrastructure. With growing business and customer requirements, organizations feel constant pressure to keep abreast with the latest technology, which in turn demands continuous search and investments for the optimum technology to suit organizations' needs. Moreover, with product warranties restricted to a limited period, SMBs may need to incur additional costs to maintain and run any legacy architecture in their data centers, in addition to incurring higher disposal costs.

Traditionally, organizations have been outsourcing critical components of their computing infrastructure such as application development, application management, etc. while being independently involved in the provisioning and management of the physical infrastructure, which is one of the most basic components of the organizations' infrastructure. It is evident from this Frost & Sullivan research that a physical infrastructure outsourcing model can offer significant cost savings as well as flexibility for organizations to leverage the service provider's expertise and achieve scalability.

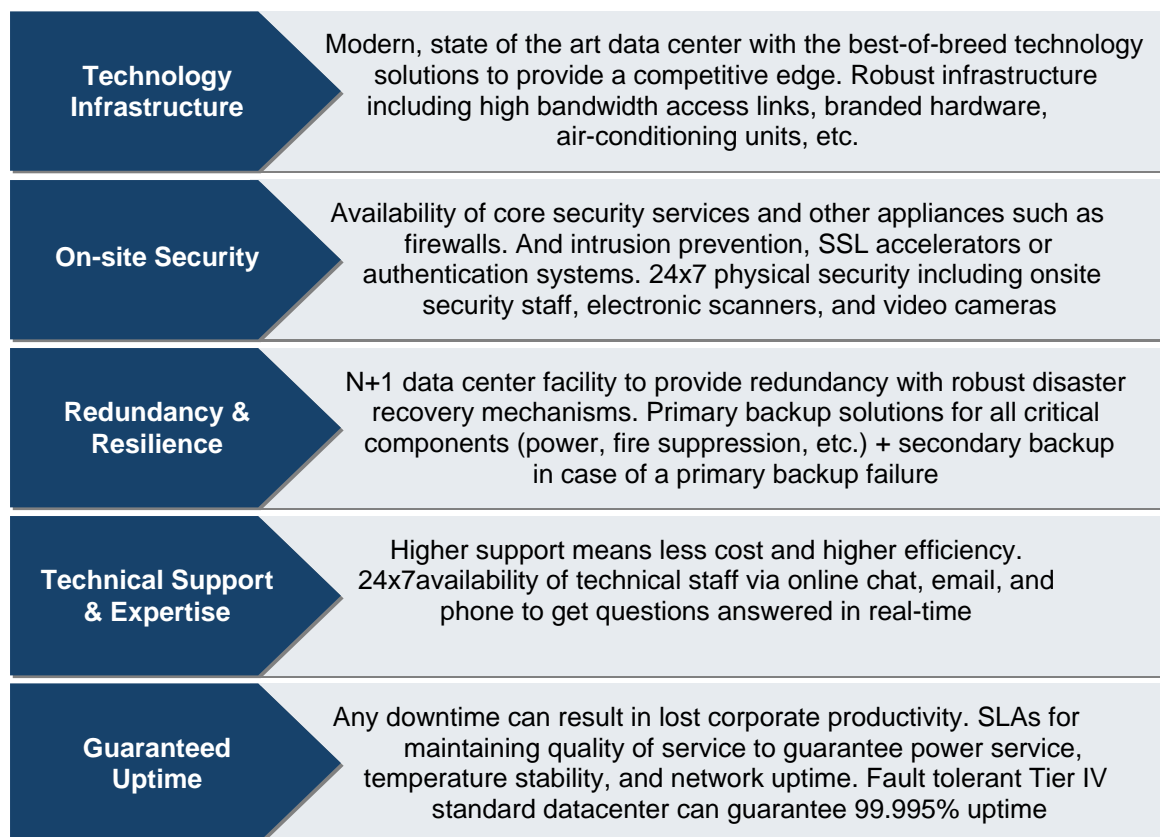
Hence, it becomes imperative for SMBs to determine the better option: investing time, money, and effort into building and managing the data centers in-house or rather entrust end-to-end manageability to third party vendors and focus on leveraging existing expertise on core competencies.

5.0 Evaluating a Managed Hosted Data Center Provider

Post the decision to adopt a hosted infrastructure environment, the next significant decision-making stage should encompass the choice of the right and most suitable hosting service provider. Picture an organization that is forced to incur high switching costs as it later discovers that current service provider does not provide services required in the near future. Hence, it becomes crucial to carefully evaluate the complete plethora of services rendered by the provider for not only current and immediate requirements but also all possible future needs. Therefore, often the success or failure of an organization is dependent on the choice of a service provider.

The following vendor selection framework outlining the essential parameters or attributes serves as a tool to analyze and determine the most appropriate vendor.

Chart 5.1: Essential attributes of a Managed Hosting Data Center Service Provider



Source: Frost & Sullivan

6.0 Case Study: Globarena Achieving Efficiencies through Managed Hosting

Company profile:

Globarena provides learning in educational institutions, corporate offices, and for individuals through world-class educational programs, e-learning courseware, and leading-edge learning facilitation systems. The company offers quality learning solutions by using state-of-the-art technology and has industry specific solutions such as employability tests, faculty enablement programs, mentoring programs, and workshops. The flagship product, Globarena E-Mentoring System (GEMS), facilitates learners' acquisition of skills that help them progress towards successful careers, employment, self-employment, or higher education.

Business requirements:

Services offered by Globarena are technology-enabled, and therefore, availability of the technology components is a critical operational factor. Globarena required robust systems and service levels, which would facilitate:

- Lower capital expenditure
- 24 x 7 availability
- Implementation expertise and management support
- Physical and network security to minimize downtime due to security disruptions
- Ease of scalability

CtrlS Solution:

Globarena adopted the managed hosting solution offered by CtrlS, which has experience in providing robust, high-performance, mission-critical solutions through its Tier IV data centers located in Hyderabad. The engagement included round-the-clock helpdesk support as well as monitoring and management to ensure a high-availability, high-performance infrastructure environment. In addition, CtrlS offered remote monitoring and management control to Globarena through which the company could manage its proprietary applications.

Benefits:

Globarena is now able to focus on its core business proposition of providing advanced learning solutions and not be concerned about the robustness, uptime, security, and maintenance, which is handled by its managed hosting partner, CtrlS. Added advantage includes the cash flow, which is well managed due to the flexibility provided by the subscription-based deployment model.

7.0 Appendix

7.1 *Research Methodology*

This research paper evaluates the benefits of a managed hosting solution as compared to an in-house infrastructure scenario. Unlike an in-house model, Managed hosting allows a SMB to choose hardware, operating system, and software, which is procured, deployed, hosted, and managed by the hosting service provider. The hosting service provider provides remote monitoring tools through which organizations can monitor and track the availability of infrastructure resources. The deployment and management of business applications remains under the purview of the organization.

Frost & Sullivan developed a conceptual framework to capture the various cost components of building and maintaining a data center. A discussion guide was developed in accordance with the TCO framework to collect all relevant quantitative and qualitative data for analysis.

In-depth interviews were conducted with key decision makers of SMBs (with less than 500 employees) consisting of senior IT professionals: CIO, CTO, Head of Information Technology, and Head of administration/facilities.

The cost inputs for calendar year 2009 (January-December) were gathered from interviews and a 3-year period has been considered for TCO analysis, based on a standard depreciation period used for equipment.

7.2 *Components of TCO and Assumptions*

Frost & Sullivan believes that a comprehensive TCO analysis should measure all costs, direct and indirect, relevant to the lifecycle of a data center, including those relevant to the successful operation of an organization's data center.

An organization's data centers require a special physical environment to operate in – optimum power, equipment cooling, cabling among equipment, racks to host equipment, and physical and network security. Air conditioners control temperature and humidity in the data center. To cater to disruptions in power, an uninterrupted power system must be installed. Based on the criticality of data hosted by the organization, physical security through access control and video surveillance as well as protection from natural hazards like fire are essential primary infrastructure components for a data center. The primary infrastructure must be designed for the appropriate amount of redundancy, based on the data availability requirements of the organization.

Data centers host networking, computing, and storage equipment that handle the operational data of the organization. Networking components such as routers and switches transport traffic within the organization and the outside world while servers, storage media, and tape backup devices are used to host and run applications such as ERP, CRM, and other customized applications. To achieve an always-on, non-congested access to an organization’s infrastructure, data centers deploy redundant and high bandwidth access links for primary and backup connectivity.

The need for efficiency and business continuity with zero downtime requires routine maintenance of the IT infrastructure. Data centers demand regular administrative supervision and management, including handling system setup, backup, upgrades, security, and other routine functions on site to ensure continuous up-time and functioning. Every data center requires enhancements to the physical plant after its initial installation. Costs for such upgrades include labor and materials for network cabling and internal wiring, additional electrical circuits, and air cooling units to support additional equipment, including vent installation.

Summing up, the components for a TCO calculation for a data center should encompass the following major cost components:

- Capital Expenditure
- Operating Expenditure

Chart 7.1: Total Cost of Ownership Model

Capital Expenditure	<ul style="list-style-type: none"> • Hardware (Servers, Management PCs, Storage, Switches/ Routers) • Software Licenses (Server + PC OS) • Security (Firewall/Anti-virus/IDS/IPS/SSL VPN, etc.) • Primary Infrastructure (Power, Cooling, physical security, etc.)
Operating Expenditure	<ul style="list-style-type: none"> • Dedicated Internet access • Electricity for equipment and cooling • Personnel • Facility upgrades

Source: Frost & Sullivan

The following assumptions were made for the cost components based on primary interviews:

- As hardware equipment such as servers, storage, and so on come with a basic 3-5 year warranty, hardware maintenance is covered in the contract.
- Any additional requirement for maintenance is assumed to be taken care of in-house.
- Operating system licenses for server and management console are assumed as OEM versions and therefore included in the bundled costs for the hardware.
- Application costs, irrespective of whether the infrastructure is in-house or hosted, are excluded from TCO calculations.
- Frost & Sullivan research showcases significant traction of the Unified Threat Management (UTM) solutions in the SME segment and therefore UTM appliances have been assumed.
- Often the IT administrator of the company has the responsibility of handling the data center as well. It is assumed that 40 percent of the IT administrator's time is utilized for data center activities.

Associated staffing costs, such as recruiting, supervision, and training have been excluded from the calculations.

7.3 Glossary

Tier Classification System

The Uptime Institute created the Tier Classification System, widely accepted as the de facto industry standard, to provide a consistent means to compare typically unique, customized facilities to each other from the perspective of expected site infrastructure availability, or uptime. The Tier Classification System is a benchmarking system to effectively evaluate data center infrastructure in terms of business requirements for uptime.

Table 7-1: Uptime Institute Tier Classification System

Tier Level	Data center requirements
Tier 1	<ul style="list-style-type: none"> • A single, non-redundant distribution path serving IT equipment • Non-redundant capacity components
Tier 2	<ul style="list-style-type: none"> • All Tier 1 requirements • Redundant capacity components
Tier 3	<ul style="list-style-type: none"> • All Tier 1 and 2 requirements • Multiple independent distribution paths serving IT equipment • Generally, only one distribution path serves equipment at any given time • All IT equipment is dual-powered and fully compatible within the topology of a site’s architecture
Tier 4	<ul style="list-style-type: none"> • All Tier 1, 2 and 3 requirements • The facility is fully fault-tolerant, through electrical, storage and distribution networks • All cooling equipment is independently dual-powered, including chillers and heating, ventilation, and air conditioning systems

About Uptime Institute

Founded in 1993, the Uptime Institute provides education, publications, consulting, certifications, conferences and seminars, independent research, and thought leadership for the enterprise data center industry and for data center professionals. The Institute pioneered the creation and facilitation of end-user knowledge communities to improve reliability and uninterrupted availability uptime in data center facilities and Information Technology organizations.

7.4 List of Exhibits

- Chart 3.1 Indian Data Center Market Growth Forecast (CY2009 – CY2012)
- Table 3-1 Three Year Total Cost of Ownership Analysis of In-House versus Managed Hosting
- Table 3-2 Managed Hosting: Ownership and management responsibility
- Chart 5.1 Essential attributes of a Managed Hosting Data Center Service Provider
- Chart 7.1 Total Cost of Ownership Model
- Table 7-1 Uptime Institute Tier Classification System

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