

# Managed Solutions for End Users in Networked Based Business

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**ABSTRACT:** Business clients do expect a managed solution for the technology related issues. We in this study focused an enterprise organization for the Internet connection issues. End users are likely to select a set of the predefined solutions that network operator already has in his service portfolio. There are instances where the clients have a particular interest and there is a requirement to manage the solution to overcome the request. During this instances, the user defined request depends on the head office location. In the trial process we balance between different solutions and observe the developments and take decisions.

**Keywords:** Business Customer, Internet Connection, Network Operator, Tailor made Solution

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## 1. Introduction

Traditional network operators need to rethink their current strategies for delivering solutions for connecting business customers to the Internet [1]. They need a new strategy and instead of selling services from the service portfolio, they have to think of how to sell whole packet of telecommunication services to the specific customer and to satisfy their specific needs more carefully. Practice has shown that if operator satisfy customer needs more, the quality of experience (QoE) will be better. In these competitive environment the fulfillment of customer demands and QoE are becoming the main differentiators for the effectiveness of telecom operators [2]. Modern network operators made a decision to listen the voice of the customers and implement in the final product customer requirements and experience of using different services. In this way, operator will manage to provide to the customer additional performance and security improvements. This is very important in the term of customer engagement [5]. At first, operator will perceive the business customer network. According to this, operator will provide the best solution from the service portfolio. After that, operator will ask business customer about his impression of using this service. If the specific need arises from this questionnaire, operator will try to satisfy this need by changing existing solution to the new one that is more adjusted to the business customer needs. In this way, the operator develops and grows together with the business user to whom he provides his services.

Each company has its own specific requirements concerning networking and connecting with their central location and pulling data from a central server, as well as in terms of Internet access, which must comply with certain rules and restrictions. To satisfy these requirements company must have highly specialized persons or whole team to deal with establishment of service, monitoring and solving every issue. Enterprise retail companies have large number of branches geographically dislocated throughout the country and abroad. Because of all these facts, managing of the telecommunication services within the company is becoming a challenging issue. More often business customers want to shift the responsibility for managing telecommunication services to the service provider – network operator [3].

The second major request concerning retail companies is higher availability of head office location for access by the branches. Branches have need to achieve sensitive and permanently necessary information and to be always updated so they could have business continuity and earn their income.

Critical issue for enterprise retail companies is also voice of the customer measured through Quality of Experience (QoE). In order to satisfy their customers, the company itself need to be satisfied as a customer, concerning the telecommunication services. Because of that, QoE is becoming crucial for delivering good service and stay competitive.

Many retail companies are evolving and spreading their business by opening their stores across the country even abroad, and every competitive telecommunication operator need to be ready to respond to all requests they have. According to our experience with one of the biggest network operator, we manage to signify some of the major requests that big retail company have. Further, in this paper will be describe one example of retail company and its needs and how the operator is adjusting to this. As a result, one tailor made managed solution will be created and modified for specific customer. Moreover, in the last chapter will be pointed the importance of measuring QoE and its application in creating new solutions for connection business customers to the Internet.

## **2. Managed Solutions for Business Customers**

### **2.1 The Advantages of Managed Solutions**

Sometimes it is better for both, network operator and for business customer, to have predefined business solutions for connecting to the Internet. In this way business customers who do not have specialized person or persons in IT field, could easier choose suitable packet of services for their business. This packet very often does not fully match customer requirements, but it is the closest one to ideal packet of telecommunication service for specific business customer.

On the other side, some specialized enterprises like retailers, have their own specialized team of competent persons who know exactly what are their needs and the operator have to adjust according to their needs. They expect from the operator to provide and manage the solution for connecting to the Internet and finally to change the solution if the specific need occurs.

The leading operator has a platform that could on the highest level provide innovative and high quality ICT services and solutions for business customers. The service portfolio is based on a regional multi-service network, supported by its own optical infrastructure, modern telecommunications equipment and modern data centers. The primary goal for the operator is to provide a comprehensive portfolio of services to all business customers regardless of the type of activity or size of company. Beside all of this, it should take into account the specific requirements of individual companies and provide flexible services and customized business solutions [3].

In order to achieve high-quality performance of the services, the operator provides fiber optic infrastructure at the all customer locations, head office and branches. These services are designed for organizations that need a reliable, highly available and fast Internet service. Due to the increasing needs of large companies for symmetric Internet access download and upload, speeds in this type of services are identical. An important feature is the SLA (Service Level Agreement), which guarantee the required level of service availability. The optical infrastructure provides the ability to add other services that the operator has in its services portfolio easily by virtual local area network (VLAN) separation. Equipment configuration and activation of the service need to be provided by a team of experts on the operator side, on the equipment collocated at the customer premises. This is so called managed service.

The main advantages of managed solutions must be defined and presented to the customer. Clearly it must be pointed out the cost savings as the most important fact as well as the improvements in the quality of service. Some of the main advantages of

managed equipment that is collocated at customer premises.

4. Compatible solution: the business customer gets from the operator managed solution that is easy to upgrade on the existing network design,
5. Technical support 24/7/365: They integrate, install and maintain all equipment and its configuration,
6. Business customer outsource solution for the connecting on the Internet: This way they have to focus on their core business [3].

Advantages and cost savings achieved through the implementation of a managed services are both short-term (reflected in the initial investment) and long term (lower monthly subscription fee in respect of costs before the introduction of managed services) [3]. The tendency of savings in terms of telecommunications and the growing demands in terms of quality leads to the development of innovative model for connecting the large number of locations through a Managed Layer 3 Virtual Private Network (L3VPN) with a central location. This involves setting up the Internet connection at the central location (head office) and create virtual connections - tunnels (L3VPN) through the operator's network to all other branches. In this way, it is achieved that IT administrator at the central location can easily and securely access data stored on remote locations and vice versa.

As a leading regional provider of information and communication technologies (ICT), the observed operator's network is able to offer to the business customers complete IT solutions and systems for unified communications between head office and all branches with no concern for the connections and equipment. Specific demands of the retail company will be explained in next chapter, but first the network configuration will be explained and the specific requirement will arise itself.

## 2.2 Enterprise Retail Network Configuration

In this chapter we will present one specific enterprise retail company and their requirements for the connecting on the Internet. Retail company has 50 branches that are connected with the head office through firewalls. Head office communicates with the central servers through leased lines (Figure 1). It is obvious that head office represents key point of the network, and it is necessary to protect this location as much as possible.

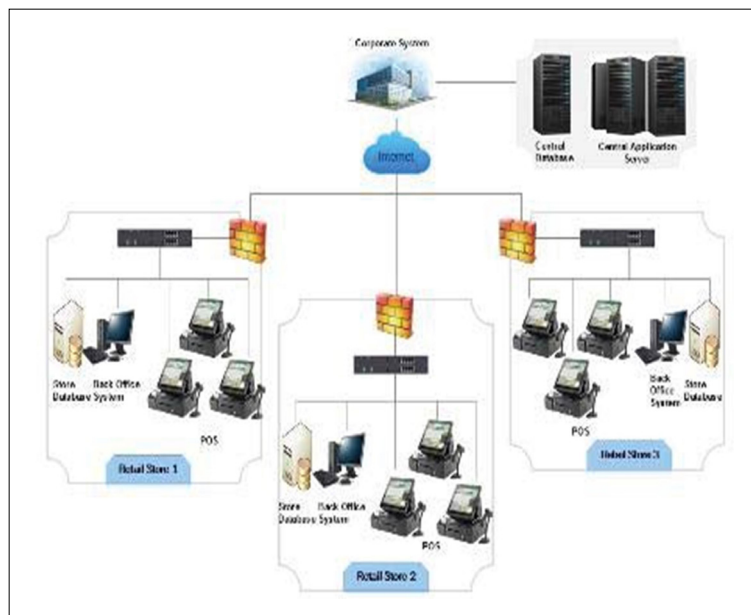


Figure 1. Organization of the enterprise retail network

At first, operator creates managed L3VPN solution for connecting all location in star topology to the central location – head office. Operator provides optical cable to the all locations of the business customer in order to connect them on his network. After that, he provides manageable equipment – routers at all location of the business customer. Also, the operator configures

manageable routers according to the policies of the company and specific requests from the retail company. After putting the equipment in the operation, network operator documents in contract some Service Level Agreement (SLA) parameters that will be guaranteed. Some of these parameters related to the availability in time are illustrated in the Table 1.

The availability is defined on a monthly basis, representing a percentage of the time in which the service was fully operational. For different types of SLA, the operator guarantees the following levels of availability [6]. Retail company chooses the Gold SLA that has the maximal availability offered by the operator (Table 1).

Type of the SLA	Availability (A)
Standard	98,5 %
Silver	99 %
Gold	99.5 %

Table 1. Availability levels according to the policy of the observed network operator

To calculate the availability of a service, it is important to define the following terms:

**Billing Period (OT):** Represents the period in which the SLA parameters are measured. It is expressed in hours (h). The accounting period is the same for all three types of SLA, which depends only on the number of days in the month, for the month that lasts 30 days  $OT (h) = 24 \times 30 = 720$ .

**Total Loss of Service (TTSL):** Total loss of service is the total time the service was inoperative at the level of one month. This time is obtained when the service repair time (TTR) is summarized for all Trouble Tickets of critical severity (Severity 1) at the level of the month for which the billing is performed [6].

The availability of the service is calculated using the following formula:

$$TTSL = \sum TTR ;$$

$$A (\%) = (OT - TTSL) / OT * 100 \tag{1}$$

**Example:** As an example we calculate the availability (A) during the month that has 30 days during which there were two critical incidents (TTID-1 and TTID-2), with the correction times for these incidents being  $TTR (TTID-1) = 2h$  and  $TTR (TTID-2) = 1h$ .

$$OT = 30 \times 24h = 720$$

$$TTSL = TTR (TTID - 1) + TTR (TTID - 2) = 3h$$

$$A (\%) = (720 - 3) / 720 * 100 = 99.58$$

This calculation shows that requested availability level is achieved because it is more than it is guaranteed by the contract i.e. 99,5% (Tab.1.). But still this is much time for the presented company, to stay without the connection to the central location and they requested from the operator to redefine the solution for them so they could get better performances, according to availability, for the head office. The operator conducted a questionnaire in a specialized team for telecommunication services of a retail company. As a result of customer requests, the operator suggests and implements tailor made solution with redundant backup wireless link on the head office location in order to incise the level of availability.

### 2.3 Tailor made Solution with Redundant Backup Wireless link on the Head Office Location

Although the presented managed solution is very reliable and well designed, the business customer still needs an additional level of security in the form of a separate and completely redundant link. Since the configuration of network equipment is not a focus of the operation of the retail company, it is also necessary to have equipment that will be preconfigured by transferring all services from the primary to the backup link if an interruption occurs. Bearing in mind that large amounts of

data are transmitted in 24/7 working time and the backup link should have guaranteed quality and symmetric flow. In order to provide a backup link, it is suggested for an operator that an additional Internet link be provided to the user through another access technology, in this case of wireless technology, which would be connected to another optical hub of the operator [6]. Its realization is shown in Figure 2.

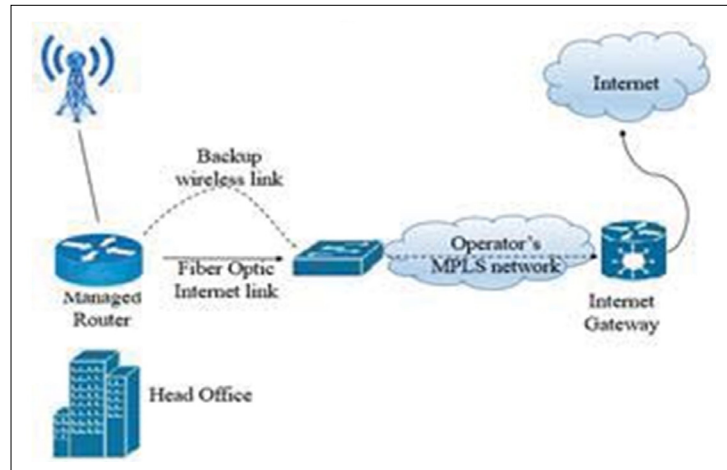


Figure 2. Managed solution for connecting to the Internet with wireless backup link for head office [6]

#### 2.4 QoE as a voice of the Customer

The retail company that we observe in this paper every year confronts IT budgets that are increasingly limited. It is requested from IT department to meet the needs of companies that are more specific and to cut the budget. At other side demands for higher availability is constantly growing, demanding as much secure connection as possible. In this specific case, cloud services are imposed as a logical step forward.

Cloud services for the business customer mean the rental of IT and communications infrastructure and services from the network operator. This service excludes making capital investments in their own infrastructure, software and human resources. This is becoming more profitable and more common business model of companies and organizations around the world. They are best suited for companies that have a need for implementation of new IT services. Services are flexible and formed towards the specific needs [3].

The network operator conducted the survey and according to the answers find out about the future growth of the retail business customer, as well as budget cuts. According to this new findings, operator is on one side faced with need of the customer for more reliable head office location, and at the other side requests for virtualization and reduction of costs. According to this findings, network operator has to propose the improvement of the existing solution and more suitable tailor made managed solution for the customer.

#### 2.5 Tailor made managed Solution for connecting Remote Locations through L3VPN with Virtualized Central Location in the Operator's Data Center

Retail business company needs maximal reliability and availability of the head office location. By choosing predefined managed solution they get the availability of 99,5%. The second, tailor made managed solution with redundant backup link increases the availability, because when main link is not operational, they have a redundant wireless link and the same percentage of availability as the mail link. But, specific demand is placed to the operator to cut the cost and increase the availability at the same time.

The specific requirement is maximal availability of head office location. Also, it is very important to constantly run updates so branches have business continuity and earn their income. At the head office the server through a special application keeps track of the state of the warehouses, current prices and updated information as soon as changes occur. Current and accurate information are necessary at each branch office location and at any time. In order to achieve higher availability of head office location network operator takes into consideration to install one or more back-up links. The introduction of multiple optical

links from different operators has proven to be an unjustified costly solution. Suggested solution by the expert presales team is to take a central server with all applications and data and virtualize it in operator's data center (Figure 3) [3]. This solution achieves uptime reaches the number 99,999% and this is practically maximal uptime that could be guaranteed by the operator. Head office and branch offices have access to this virtualized server through managed L3VPN tunnel. All these results are exactly what the business customer was looking for.

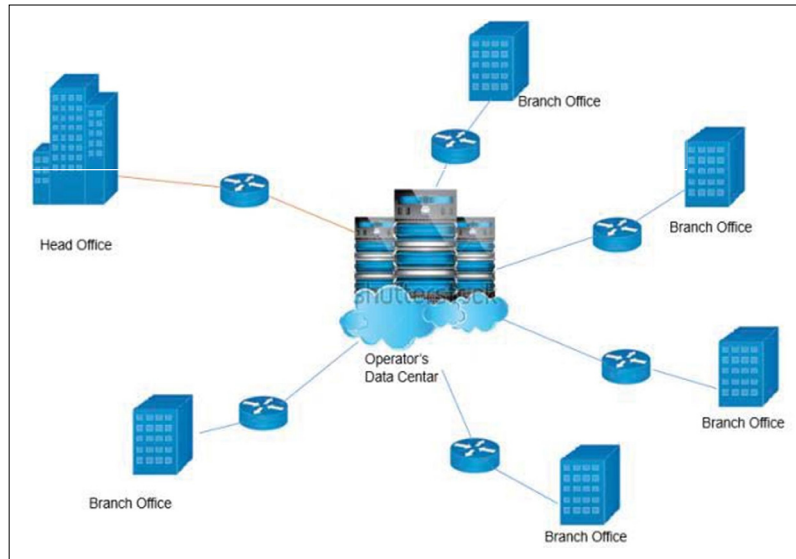


Figure 3. Managed L3VPN Solution with central location in the operator's Data Center [3]

In order to meet the customer needs, the network operator has made tailor made managed solutions (Figure 3). In the data center is installed adequate virtual router with all the necessary applications and data. This virtual machine establishes a managed connection through L3VPN from a central location to all remote locations (had office and branch offices) which also have the managed equipment that was configured and monitored by the operator's expert team. Routers communicate over L3VPN tunnel that is established between the central site and all remote locations [3].

Thus configured solution ensures maximum performance for business customer and absolute availability of virtual servers in the data center. Also, it offers various advantages for administrator of the business customer side. Tailor made managed solution simplifies the work of administrator and allows him to devote additional time improving business applications and to introduce a new system in order to improve sales and facilitate the work for his employees [3].

### 3. Conclusion

Virtualization of the head office location in the network operator's data center provide the maximal possible availability of the central location and hence it is located in modernly equipped data center, offering maximal protection. This tailor made managed solution provides connection from the head office of the customer to the virtual central location in the network operator's data center. The virtual site is also connected to the branch offices providing them with maximum data availability. Costs and engagement of technical resources have not been taken into consideration in this paper. For the next survey, it is necessary to perceive the costs and justification of technical resources exploitation for service improvement. The proposal is to achieve this analysis using the Quality Function Deployment (QFD) method.

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