

Cloud Based Remote Service Provider for Village Empowerment

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ABSTRACT

Remote Service Provider (RSP) is a device which will provide intranet or networking facilities in remote or village area. With the use of Virtual Private Network (VPN) connections with the company's distant node can be established, so that the work could be done right from the remote area or village area. Services based on cloud can also be used once network connection is established. The device will act as a bridge between village or remote area and city making village or remote area socially powerful as city is.

Keywords: Remote Service Provider, Remote area, Virtual Private Network, SXTLite5.

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INTRODUCTION

INTERNET services for each person even in remote area or in rural area is the need of the time. The hope that everyone on the globe could experience this phenomenon is truly a remarkable wish and, for sure, it will happen. Right now, majority of the areas have the ability to access or connect with the Internet, but there are still many remote locations that do not have access to the Internet. Rural and remote areas have struggled to keep up with digital connectivity advancements. Procuring a Cell Tower for a remote place is costing minimum 30-40 Lakhs in India. The proposed work is implementing the concept of village social empowerment which will provide network services (Intranet) in village or remote areas. Remote areas are backward in comparison with cities so there is a need of providing network services to make village or remote area as smart as cities are. Due to the wish of modernization and urbanization people migrate from rural or remote areas to city for different facilities such as education and employment. Many of businesses need good internet connectivity to reach their customers and provide better services so that the business flourish well. With the concept of remote internet service provider people will be able to run their businesses

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from the remote places also so, there would be no need to migrate to urban areas for such facilities.

In recent years, a new wide-area networking technology has been created that takes advantage of ubiquitous networking to connect networks at a reduced cost. By using the concepts of Virtual Private Network (VPN) connects the remote area to any part of the World [1][2]. The proposed work, Cloud Based Remote Service Provider, provides many facilities to make a remote area smart. Now a days there are four basic needs of human instead of three needs those are, food, shelter, clothes and good network services.

LITERATURE SURVEY

Digital connectivity and digital inclusion are becoming increasingly important in the digital age, but 'offline' social and economic developments will continue to resonate in the field of rural development [3].

Virtual Private Network (VPN)

VPN allows one or more parties to exchange controlled information that is protected by a variety of security methods. Because data travels via common public networks rather than totally dedicated private connections, VPN is referred to be a "virtually" private network. It simulates a private network over a public network and lets users to access the private network remotely from anywhere on the planet. When compared to traditional leased lines or dial-up networking, the key benefit of a VPN is the potential for significant cost reductions. VPN is a mechanism of employing encryption, authentications and integrity protection during communication over a public network.

Due to traffic on the public network, VPN performance is typically more erratic and slower than dedicated lines. In addition, unlike a closed private system, a network-based VPN might suffer from a variety of additional sources of failure. Using any public network for communications raises new security problems that aren't present in a more controlled setting like leased lines. VPN can help you save money in a variety of ways. Security can be provided in two ways. Either using IPsec or Tunneling. IPsec is a protocol that offers authentication and encryption between IP network endpoints. Tunneling protocols allow a secure tunnel to be established between network endpoints.

There are two types of VPNs: Remote access VPN - A virtual private dial-up network (VPDN) is a type of remote access VPN. Individual hosts or clients, such as telecommuters, mobile users, and extranet consumers, can safely access a company network via the Internet using Remote-access VPNs, as shown in Figure 1. Typically, each host has VPN client software installed or utilizes a web-based client.

VPN client software is often installed on a remote-access VPN host or client. When the host attempts to communicate data, the VPN client software encrypts and wraps the data before sending it over the Internet to the VPN gateway at the target network's edge. When the VPN gateway receives the data, it processes it in the same way as it would data from a site-to-site VPN.

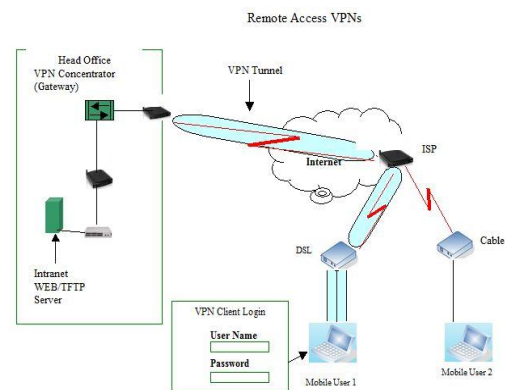


Figure 1: Remote Access VPN

b. Site-to-Site VPN - A site-to-site virtual private network (VPN) connects two or more networks, such as a corporate network and a branch office network. Companies with many offices in different geographic areas that need to access and use the corporate network typically employ site-to-site VPNs. As shown in Figure 2, an organization can use a site-to-site VPN to securely connect its corporate network with its remote offices, allowing them to communicate and share resources as a single network. A site-to-site VPN is a permanent IPsec network connection that serves as an encrypted link between two sites.

Companies traditionally use site-to-site VPNs with a hub-and-spoke topology to connect their corporate network and remote branch offices. This approach is worth when a company has an in-house data center, highly sensitive applications and less bandwidth requirements [2]. However, now a days most companies have moved their applications and data to the cloud and have large mobile workforces. Therefore, it no longer makes sense for users to go through an in-house data center to get to the cloud when they can directly go to the cloud with less efforts.

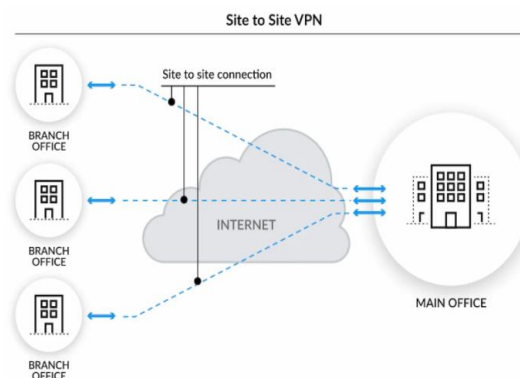


Figure 2: Site-to-Site VPN

Virtualization with Cloud Computing

Virtualization, a crucial Cloud Computing Technology, was created by IBM in the 1960s to make the best use of hardware resources when powerful and expensive mainframe computers were unused. By separating a physical system into many virtual machines, virtualization abstracts the physical resources required to perform a request from the underlying hardware utilized to offer the service. A virtual machine can be defined as a software implementation of a computer environment in which an operating system or program can be installed and run [4]. Virtual machines use a centralized operating system known as virtual servers. A host operating system can operate many virtual machines and share system hardware components such as the CPU, controller, disc, memory, and I/O. Virtualization runs a virtual machine's whole operating system, known as the guest operating system, on another operating system, known as the host operating system. The real machine is essentially a host system without virtual machines [5].

Cloud Services Needed

Cloud computing is a network access model that enables convenient on-demand network access to a shared group of configurable IT resources such as networks, servers, storage, applications, and services that can be delivered and released quickly with minimal administrative effort or service provider interaction. It supports the virtualized infrastructure environment. Cloud technology is a promising technology to provide internet services to a remote place or a rural area. For a low-cost solution as proposed in this work suitable services should be utilized. Network-as-a-Service (NaaS) and Desktop-as-a-Service (DaaS) techniques are useful for the village empowerment purpose [6].

a. Network-as-a-Service - To provide network services to clients, NaaS makes advantage of virtualized network infrastructure. The NaaS provider is responsible for maintaining and managing network resources. A customer's workload is reduced when a supplier works for them. Furthermore, NaaS provides the network as a utility with a pay-per-use basis. To use the NaaS model, the client must first log in to the web portal, from which he can get the API. The customer can personalize the route here.

Advantages of NaaS

The NaaS model has following advantages:

- Lowered Costs
- Proactive Maintenance
- Enhanced Security
- Higher Levels of Uptime
- Improved Quality of Service
- Enhanced performance and productivity
- Optimized Systems
- Access to Expertise and Experience

b. Desktop-as-a-Service (DaaS) - DaaS is a cloud computing service in which a third party manages the virtual desktop infrastructure (VDI) implementation's back end. Desktop operating systems run within virtual machines on servers in a cloud provider's data centre with Desktop as a Service. The cloud houses all of the essential infrastructure, including storage and network resources. A DaaS provider distributes virtual desktops across a network to client endpoint devices, where end users can access them using client software or a web browser, just like with local Virtual Desktop Infrastructure. The DaaS architecture is multiuser, and businesses pay for services on a monthly subscription basis, usually depending on the number of virtual desktop instances used. In the desktop delivery model as a service, the cloud computing provider manages the back-end responsibilities of data storage, backup, security and updates [7].

These concepts of cloud computing along with the concept of VLAN are deployed to build a structure to provide the internet-based services to a remote place. Some additional devices will also be needed that are described in the next section.

PROPOSED WORK

To provide the services of internet at a remote place like a village a low-cost solution is the SXTLite5 device (called as SXTLite here onwards). The transmitter part of SXTLite is connected with a router or a gateway in a city which establishes a wireless network connection with the SXTLite receiver available in the remote place or village.

SXTLite5

SXTLite is like a bridge for a point-to-point connection. The coverage of SXTLite is up to 12 kilometers which can be extended using cascading more SXTLite transmitter-receiver pairs.

The SXT Lite5 is an outdoor wireless device with an integrated antenna that is small and light. Perfect for up to 12 kilometre point-to-point links or as a CPE unit. It's small, weatherproof, and simple to install. The SXT Lite5 features a 16dBi antenna and a new design that

is lower in size. It's a low-cost addition to the 802.11ac product line. The machine contains a 650MHz processor, 64MB of RAM, a 10/100Mbps Ethernet connector, and a 5GHz 16dBi antenna.

To provide more speed with the same frequency breadth as 802.11 devices, the SXT Lite5 supports 256-QAM modulation and 80MHz channels. It also works with all legacy RouterBOARD devices and supports 802.11a/n, Nv2, and Nstream modes. It works in different modes to improve point-to-point and point-to-multipoint wireless links. The QCA-9892 is a new industrial wireless chip that supports the 802.11a/n standard's 5/10 MHz channel width.

The cloud server can be available at some place with good internet connectivity, like some city. It can be accessed at a remote place with the help of SXT Lite by just using a thin terminal. Company people can access their organization network with the help of NaaS services of cloud. Schools at a remote place can save the infrastructure cost by using DaaS type of service from cloud. A cross platform is set up at the receiver end of SXT Lite through which the network services can be provided to individual homes also. If some company has its office in some remote area, then they can set up a VPN for accessing the company infrastructure and do secure communication by tunneling [8]. Branch offices can use the private network of the organization at some village with this technique [9].

Block Diagram and Architecture

The Figure 3 below shows the block diagram of such an arrangement. SXT Lite 5 Device 1 is acting as a signal transmitter deployed in a city and SXT Lite 5 Device 2 is acting as a signal receiver to establish a point-to-point connection and distribute the network facility among various consumers in village.

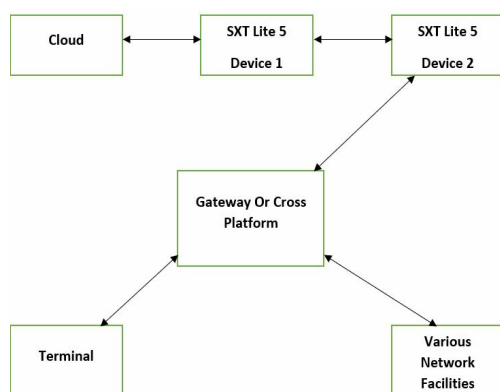


Figure 3: Cloud Service Provider Block Diagram

Figure 4 shows the implemented architecture through this work. Connectivity is provided to a school- Raising Star School, an office and some individuals. Server end consist of ids created for different users to whom services are provided. School can save substantial infrastructure cost as thin terminals will be sufficient to access the applications hosted on the cloud. The cloud will be hosted by the IT company available in city. Pay-per-use technique will be used for billing purpose. A Gateway or a cross platform can be used for distributing the network facility among different users in the remote place. Receiver device of SXT Lite works like an internet service provider (ISP). It is low-cost solution for extending the networking services.

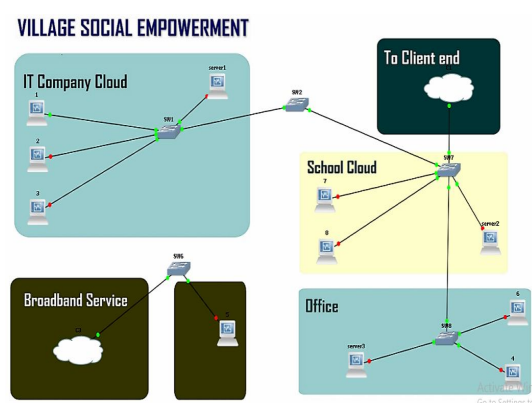


Figure 4: Cloud Service Provider Architecture

A website is created for providing different services for a virtual school environment as shown in the figure 5 below. The server end maintains the website, the database of different users and any queries by the users. Children at school can explore themselves more with this technique.

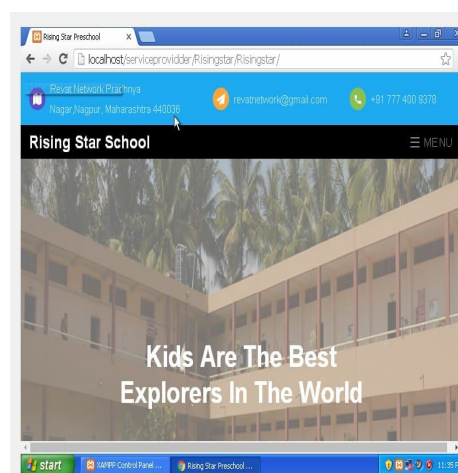


Figure 5: Virtual School Environment

BENEFITS OF CLOUD SERVICE PROVIDER

1. Cloud Service Provider can empower the village or remote areas where there is insufficiency of network services.
2. Cloud Service Provider bridges the gap between remote or rural areas and the urban areas.
3. With the help of Cloud Service Provider you can work from remote area terminal which is connected in city without the use of VPN.
4. The main advantage of Cloud Service Provider over Virtual Private Network is it does not need all the resources like processor, memory and all. All u need is a terminal and a monitor.
5. With the deployment of virtual school in Cloud Service Provider all the contents will be accessible to children to explore themselves more.
6. Cloud Service Provider provides various network facilities by which it is now easy for remote or rural areas to know or gather all the information needed or do some productive work in field of IT.

CONCLUSION

Use of devices like SXTLite proves to be an efficient solution for extending the network services to a remote area or a village and empower the social community with the power of the Internet. People belonging to an organization and sitting at a rural area can use either a VPN or a cloud-based service to access the organizational network. Range of the device SXTLite is 12KMs which can be extended by using multiple devices. There are other devices like SXTsqLite5, OmniTIK-5-ac which can also be used for the similar purpose. By implementing the Cloud Services with the help of point-to-point long-range wireless communication device in a cost-effective way, villages can also be empowered. The idea of Virtual Private Network (VPN) is useful to be able to use organization's private network from some remote place by extending the network.

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