INVENTION DISCLOSURE

1.   **Invention Title.**

     Remote Access (VPN) to Home Network using DOCSIS CM/eRouter

2.   **Invention Summary.**
     Add a VPN server capability to a DOCSIS CM or eRouter device to enable new services such as the ability to access the home network and devices from anywhere in the Internet.

3.   **Invention Description**.

     a.   Describe the invention in detail.

     The main idea here is to add a VPN server to the DOCSIS CM or eRouter (see green box in the above diagram). This will enable users to connect to their home Network and then access their data.

     The remote user will connect using a VPN technology to the DOCSIS device (CM or eRouter) in the home. The VPN server on the DOCSIS device authenticates the remote user and then connects the user to the home network, providing access to the data and services in the home.

     The DOCSIS CM or the eRouter already support many of the IP protocols to host a VPN server. Also a lightweight VPN server should not be a huge burden on the device in terms of processing power and memory requirements

     The following describes the method such a VPN service on DOCSIS CM/eRouter could work and the way a user establishes a connection to the home.
     - Initial Setup
         1. MSO provides the customer home with a DOCSIS CM or eRouter with the proposed VPN server functionality.
         2. User sets up his remote access username & password on the home DOCSIS CM/eRouter and enables the VPN server functionality.
     - User establishes remote connection from the internet
         1. User connects to the VPN server in the DOCSIS device.
             a. This could be using client software or using a web-browser.
             b. User Authenticates himself to the VPN server with the username/password.
         2. Once authenticated by the server, a VPN Tunnel is established between remote Client and server
         3. The remote client gets an IP address which is in the local LAN. When clients connect to the server, the virtual Ethernet interface at their end can be assigned an IP address from the actual subnet of the to the home network.
     - Traffic Bridging/ Routing

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1. The VPN server (within in the CM or eRoueter) bridges (or routes) the traffic between the home network and client on the VPN tunnel. It is almost as if the remote client is present on the same LAN as the devices in the home.
2. The DOCSIS CM/eRouter needs to forward all upstream packets destined to the remote client to the VPN server which can encapsulate the packet before forwarding it to the RF interface

The kind of VPN used could be one of the following common remote access technologies:
- IP Sec VPN
- SSL VPNs
- PPTP VPNS

The case where the DOCSIS device deployed in the home is an eRouter, this VPN service becomes easier to implement than when the device just a plain CM.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?
Cloud based data sharing services like Drop Box are gaining traction. All of these require user to upload their data piecemeal to the Cloud. But is there a need to make the user upload their data to the cloud in the first place to access it from anywhere, when instead they could directly access all the data in their home network itself.

Other over-the-top VPN services to gain access to home machines need complex using configuration like dynamic DNS, installing and setting up VPN servers on machines etc or buying an expensive VPN broadband router.

The problem to solve here is to enable a user to access their home network and data using the DOCSIS devices in the home. Instead of cloud based solutions or other over the top VPN solutions to this problem, the Cable MSO who is already providing the Internet connection to the home now can add the remote access service capability to the equipment already in the user home.

c. Briefly outline the potential commercial value and customers of the invention.
Instead of being just offering a simple internet connection pipe, there is more revenue opportunity for the MSO in selling remote access services. The amount of data users have is tremendous and constantly increasing. The MSOs can easily increase their revenue streams, by getting into this market for remote access services. Instead of third party solutions which need user to upload data to the cloud or install and configure complex tunneling applications, this idea allows the user to connect remotely to all their data in the home using an MSO provided service.
 Example use cases could be: Retrieving photos remotely from grandma's house, or remotely playing music/videos stored in the home network, remotely troubleshooting the home network for someone in the home, accessing the home security/baby

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monitor video local to the home network etc. Providing a secure connection back to the home, really enables many services using that connectivity.

4. **HOW is this invention different from existing products, processes, systems?**

Today there is no solution to VPN into the home using the DOCSIS devices. All VPNs into the home are over-the-top and need significant networking knowledge for the average user.

This disclosure intends to make this a common feature using equipment already present in the user's home.