



# SoftEther VPN

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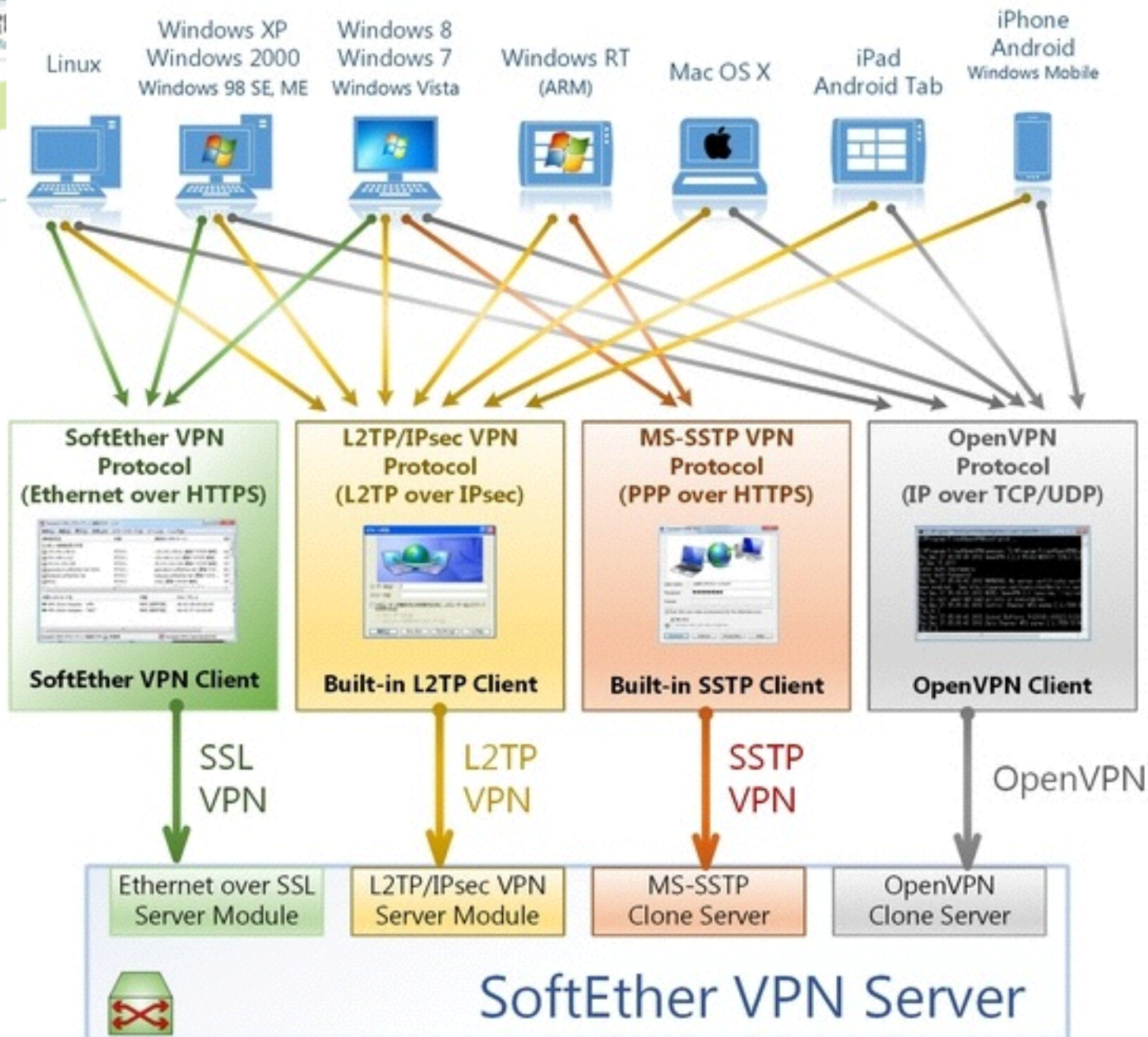
# Introduction

- **SoftEther VPN Project**
  - ▶ Develops and distributes SoftEther VPN
  - ▶ An Open-Source Free Cross-platform Multi-protocol VPN Program
  - ▶ An academic project from University of Tsukuba
- **SoftEther VPN**
  - ▶ "SoftEther" means "Software Ethernet"
  - ▶ any personal or commercial use for free charge



# SoftEther VPN

- **An alternative VPN server to existing VPN products**
  - ▶ OpenVPN
  - ▶ IPsec
  - ▶ MS-SSTP
- **Original strong SSL-VPN protocol**
  - ▶ Ultra-optimized SSL-VPN Protocol
  - ▶ very fast throughput
  - ▶ low latency
  - ▶ **firewall resistance**



# Features of SoftEther VPN

- Free and open-source software.
- Easy to establish both remote-access and site-to-site VPN.
- SSL-VPN Tunneling on HTTPS to pass through NATs and firewalls.
- Revolutionary VPN over ICMP and VPN over DNS features.
- Resistance to highly-restricted firewall.
- Ethernet-bridging (L2) and IP-routing (L3) over VPN.
- Embedded dynamic-DNS and NAT-traversal so that no static nor fixed IP address is required.
- AES 256-bit and RSA 4096-bit encryptions.
- Sufficient security features such as logging and firewall inner VPN tunnel.
- 1Gbps-class high-speed throughput performance with low memory and CPU usage.
- Windows, Linux, Mac, Android, iPhone, iPad and Windows Mobile are supported.
- SSL-VPN (HTTPS) and 6 major VPN protocols (OpenVPN, IPsec, L2TP, MS-SSTP, L2TPv3 and EtherIP) are all supported as VPN tunneling underlay protocols.
- The OpenVPN clone function supports legacy OpenVPN clients.
- IPv4 / IPv6 dual-stack.
- The VPN server runs on Windows, Linux, FreeBSD, Solaris and Mac OS X.
- Configure All settings on GUI.
- Multi-languages (English, Japanese and Simplified-Chinese).
- No memory leaks. High quality stable codes, intended for long-term runs. We always verify that there are no memory or resource leaks before releasing the build.
- RADIUS / NT Domain user authentication function
- RSA certificate authentication function
- Deep-inspect packet logging function
- Source IP address control list function
- syslog transfer function



# Architecture of SoftEther VPN

## Hardware

Ethernet Adapter



Ethernet Cable

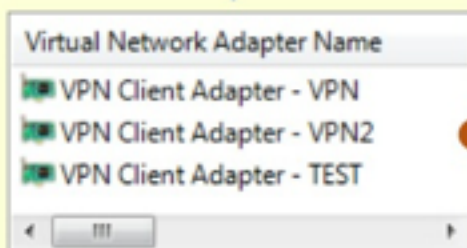


Ethernet Switch



Virtualization with SoftEther VPN

## Software



Virtual Ethernet Adapter

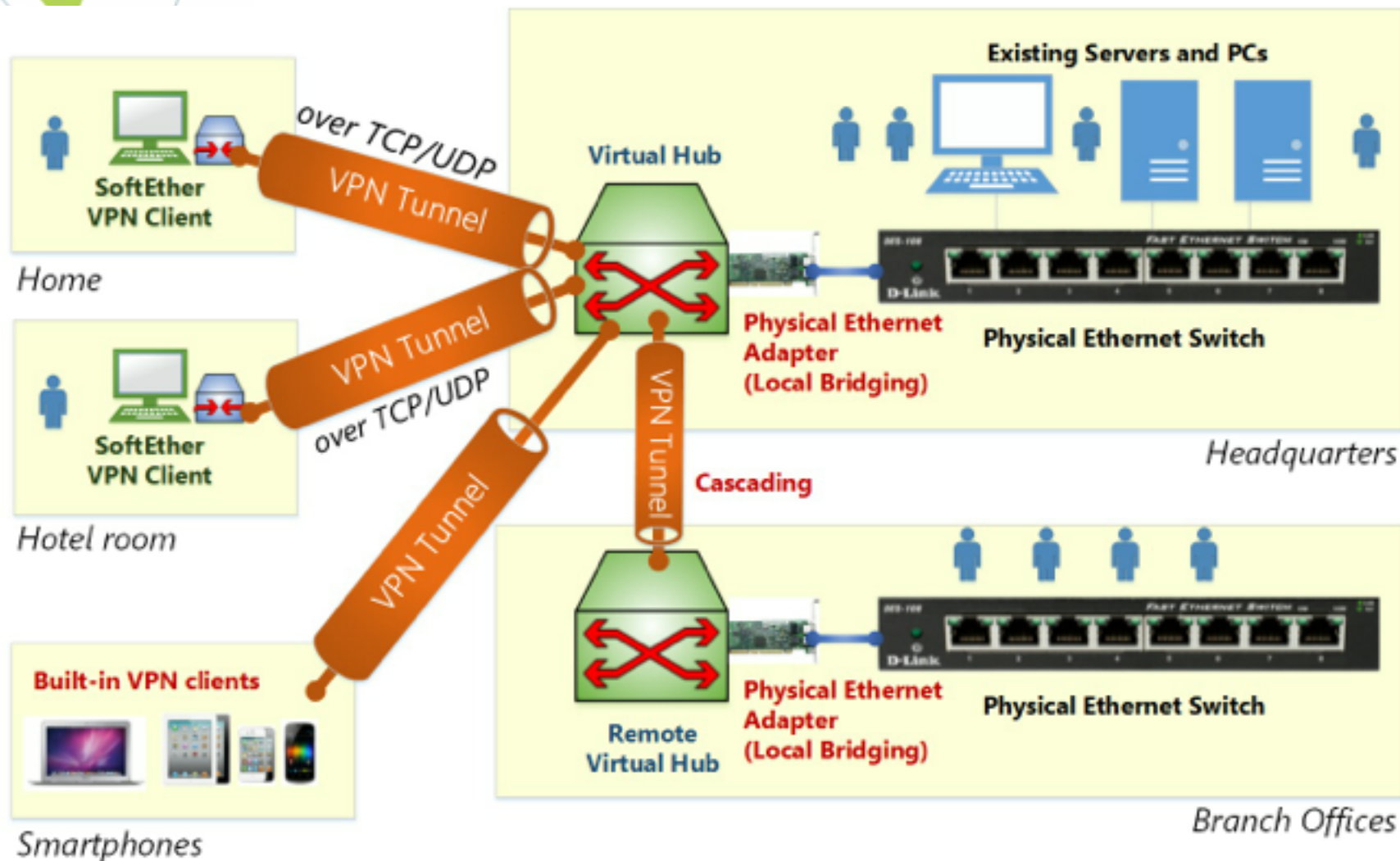


VPN Session  
over TCP / UDP

Virtual Hub Name	Status	Sessions	MAC Tables	IP Tables
BEIJING_SEGMENT	Online	0	0	0
CHINATEST	Online	2	0	0
moosta	Online	3	3	5
Okkoto	Online	0	0	0
SoftEther Network	Online	20	474	430
TEST1	Online	0	0	0
UT	Online	0	0	0
VLAN	Online	3	514	2

Virtual Ethernet Switch  
(Virtual Hub)

# Architecture of SoftEther VPN





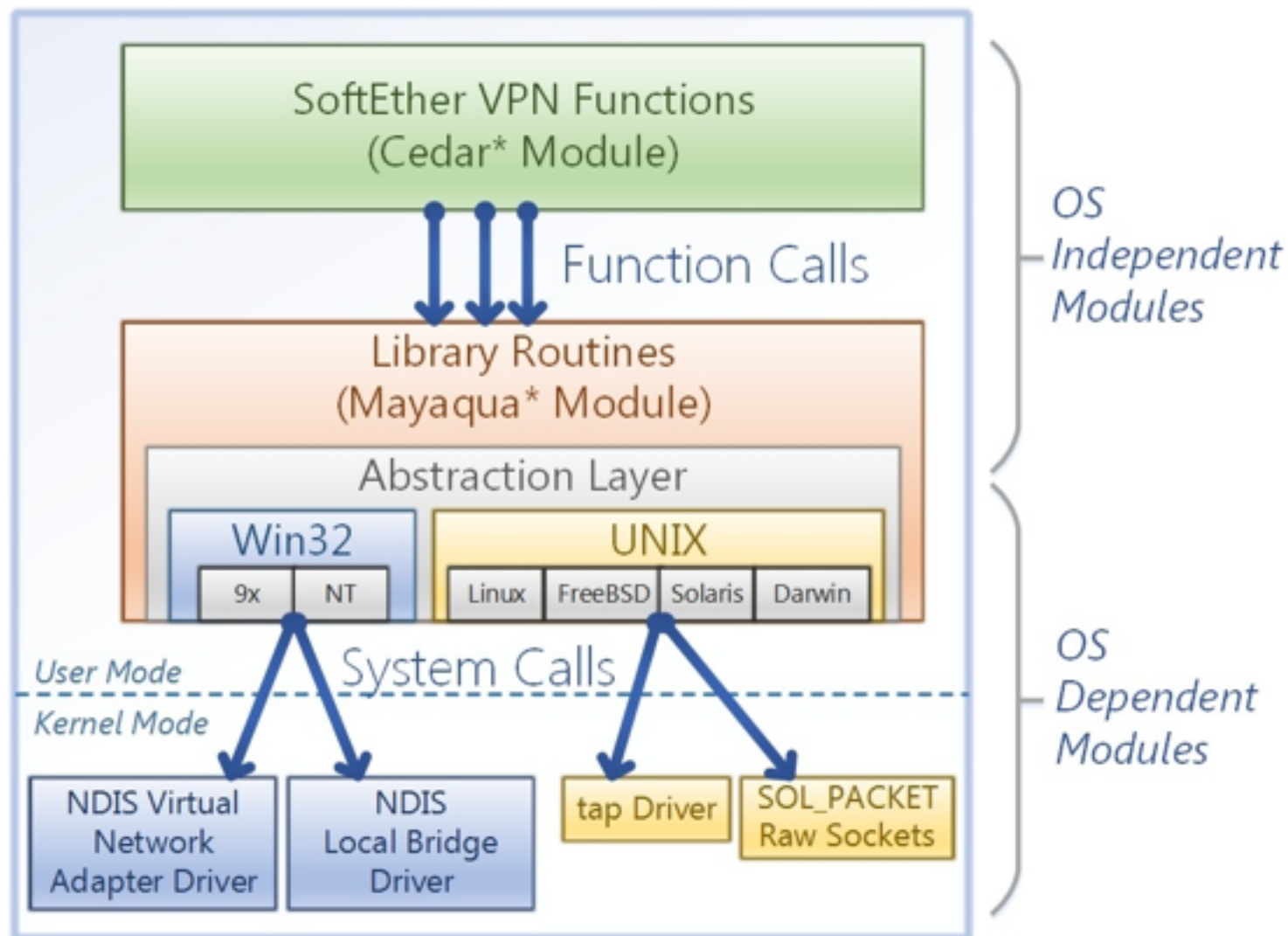
# OpenVPN vs. SoftEther VPN

	OpenVPN	SoftEther VPN
Initial Release	2002	2013
License	GNU GPL	GNU GPL
Developed by	OpenVPN Technologies, Inc.	SoftEther VPN Project, University of Tsukuba, Japan.
Source Code	C 91,000 lines	C / C++ 378,000 lines
Supported VPN Protocols	• OpenVPN only	• OpenVPN • L2TP/IPsec • L2TPv3/IPsec • EtherIP • Microsoft SSTP • VPN over HTTPS (SSL-VPN) • VPN over DNS • VPN over ICMP
Supported Native Built-in VPN Clients of Operating Systems	No	• Windows (L2TP, SSTP) • Mac OS X (L2TP) • iOS (L2TP) • Android (L2TP)
Throughput	< 100Mbps	> 900Mbps
NAT Traversal Function (UDP Hole Punching)	No	Yes
Dynamic DNS Function	No	Yes
VPN via HTTP Proxy	Yes	Yes

IPv6	Yes	Yes
Packet Filtering	No	Yes
Multi-Tenants Support	No	Yes
Delay, Jitter and Packet Loss Generator (Simulation Function)	No	Yes
Virtual DHCP & NAT Function	No	Yes
Listen on Multiple TCP/UDP Ports	No	Yes
Security Layer	OpenSSL	OpenSSL
Smartcards & USB Tokens	PKCS#11	PKCS#11
GUI Management	No	Yes (VPN Server GUI Manager)
CUI Management	Limited	Yes (Dynamic Configuration like Cisco IOS)
RPC over HTTPS Management	No	Yes
Config File Hand Writing	Yes	Yes
Multi-Language on UI	English only	English, Japanese, Chinese
Platforms	<ul style="list-style-type: none"> <li>• Windows</li> <li>• Linux</li> <li>• FreeBSD</li> <li>• Solaris</li> <li>• Mac OS X</li> <li>• iOS</li> <li>• Android</li> <li>• NetBSD</li> <li>• QNX</li> </ul>	<ul style="list-style-type: none"> <li>• Windows</li> <li>• Linux</li> <li>• FreeBSD</li> <li>• Solaris</li> <li>• Mac OS X</li> <li>• iOS</li> <li>• Android</li> </ul>



# Implementation



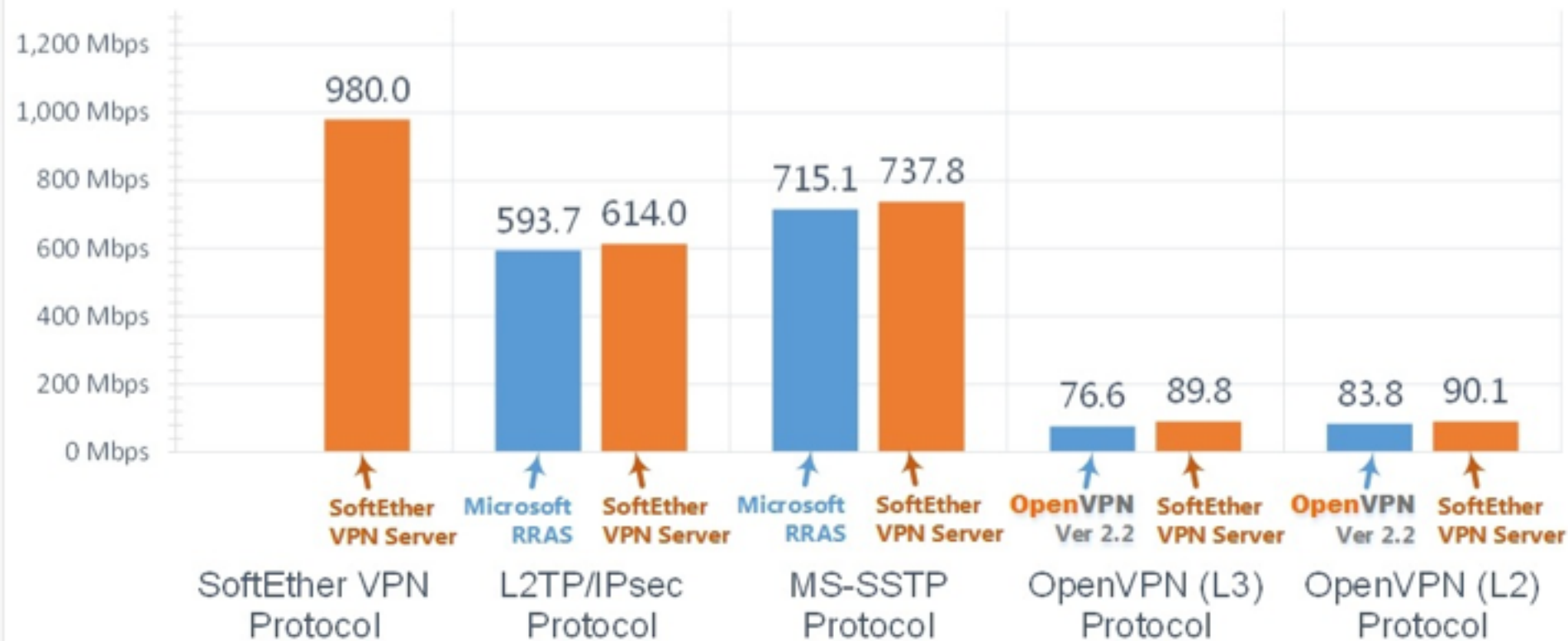


# Installation

- <https://www.digitalocean.com/community/tutorials/how-to-setup-a-multi-protocol-vpn-server-using-softether>

# Performance

Performance: SoftEther VPN's implementation v.s. Microsoft's & OpenVPN's implementation



Windows Server 2008 R2 x64 on Intel Xeon E3-1230 3.2GHz and Intel 10 Gigabit CX4 Dual Port Server Adapter.

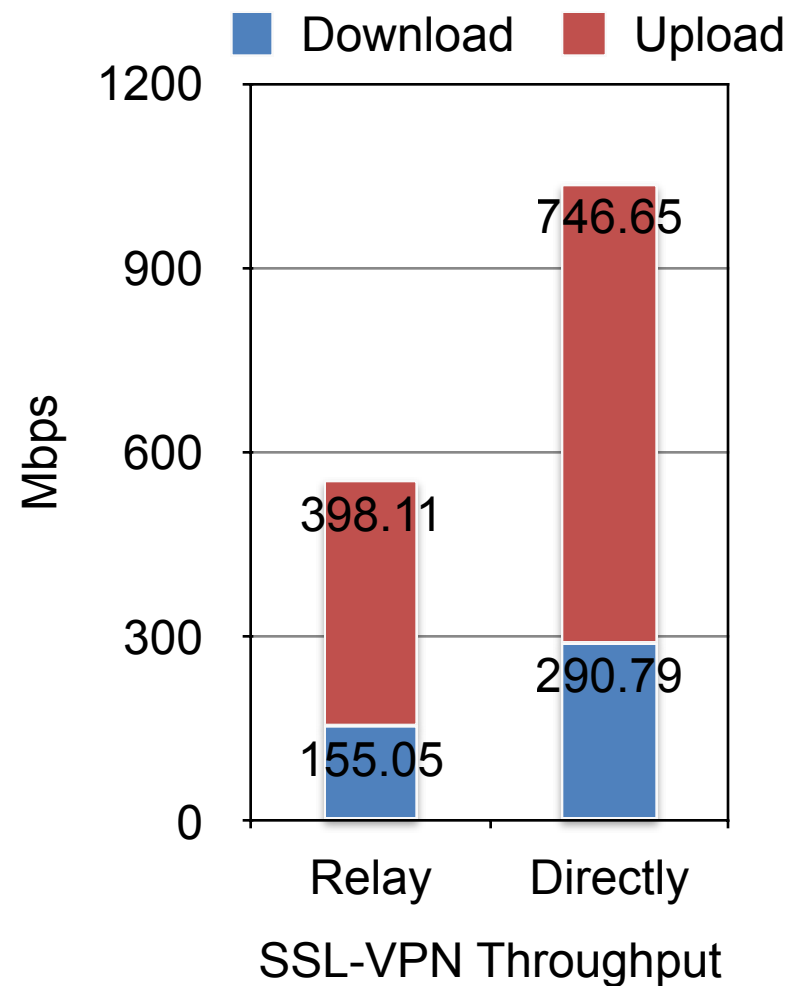
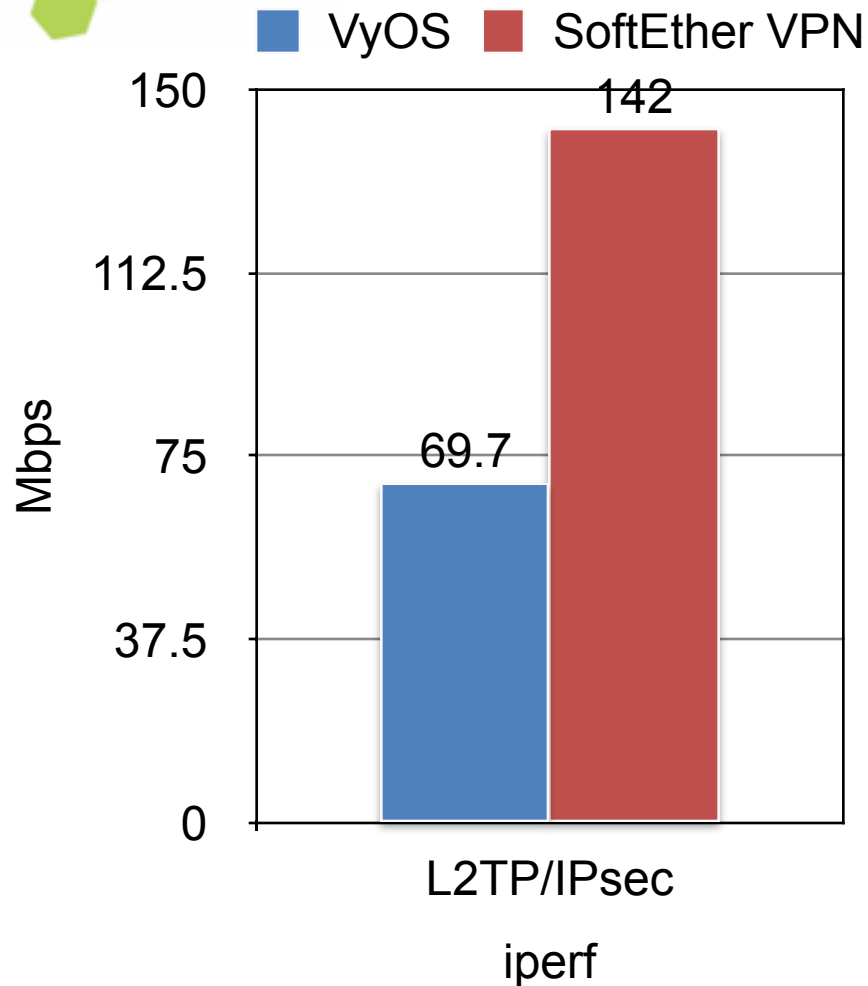
Microsoft RRAS: L2TP and SSTP VPN Server of Routing and Remote Access Service.

OpenVPN: OpenVPN Technologies OpenVPN 2.2 (open-source version).

Performance Test by Daiyuu Nobori at University of Tsukuba, Japan.



# Benchmark







# Future work

- Compare SSL-VPN with OpenVPN
- Compare SSL-VPN with VXLAN
- Compare SSL-VPN with GRE
- Pass through NATs and firewalls