VIRTUAL PRIVATE NETWORKS

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UFS

VIRTUAL PRIVATE NETWORK (VPN)

- Isolate networks through **Authentication**
  - Certificates (Private Key, Public certificate)
  - Password
  - Source IP Restrictions
  - Password and Certificates

- “Route” Private IPs over the Internet
  - Need only one Public (routable) IP address

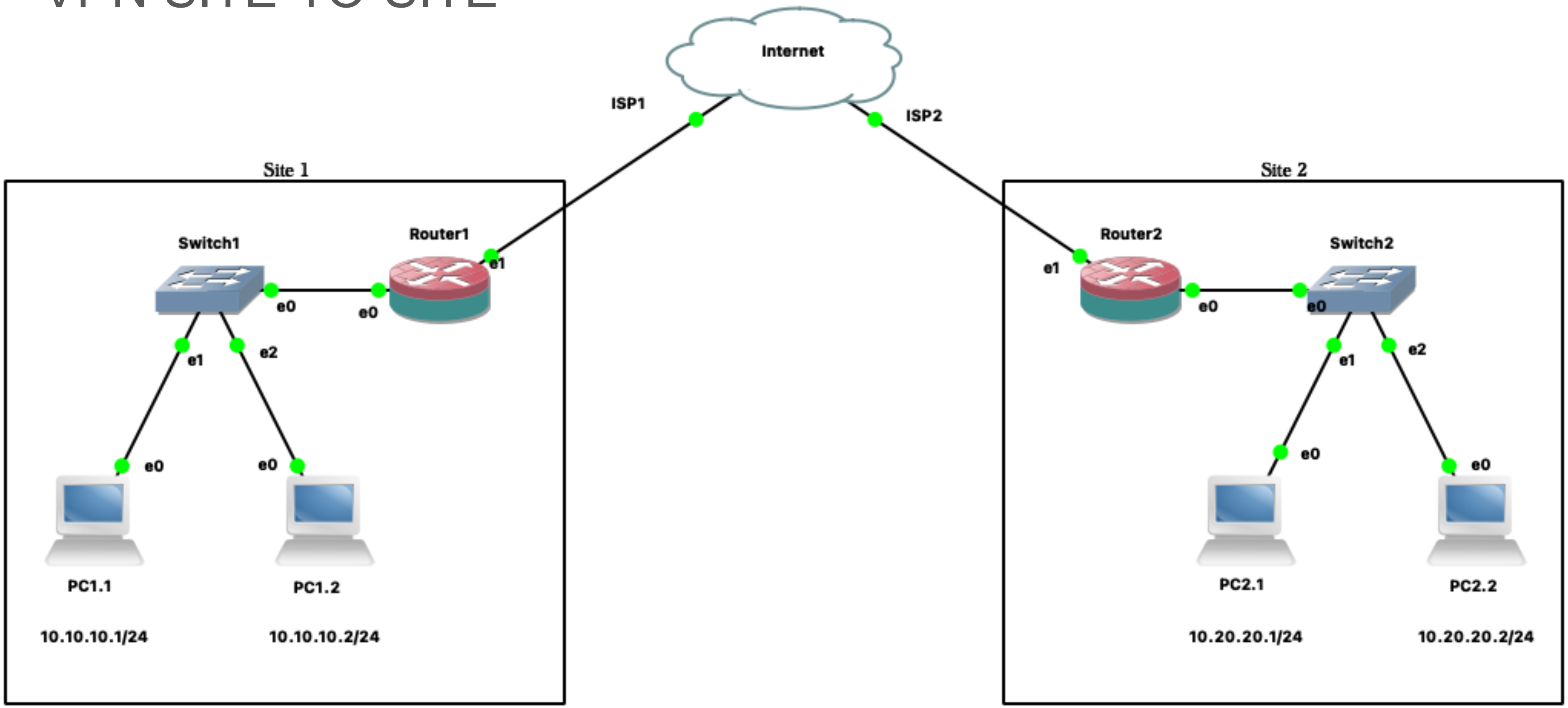
- End-to-end encryption

- Less legitimate (grey area) use cases:
  - “Hide” your IP
    - NordVPN
    - Tor Network
  - “Hide” geolocation
    - Netflix, Disney+

VPN USE CASES

- Present certain parts of the network to authenticated parties
  - Isolate Datacentre
    - Giving privileged access to Systems administrators
    - Only exposing certain services/devices
  - Isolate Lab equipment from the rest of the network
    - A higher level of control than a VLAN
- Remote Login to corporate network
  - E.g.: Global Protect
- Share corporate networks between two or more organisations

VPN SITE-TO-SITE



<u>Depending on the configuration:</u>

Site 1 can access Site 2
Site 2 can access Site 1

Site 1 can access Site 2
Site 2 can’t access Site 1

Site 1 can access whole of Site 2
Site 2 can access only parts of Site 1

OpenVPN

- Open-Source VPN Server
- https://www.openvpn.net
- Community & Enterprise versions
- Encryption using OpenSSL 3+

- Client:
  - OpenVPN Connect
    - Windows (7, 8, 10, and 11)
    - Mac OS
    - Linux
      - Script for Debian/Ubuntu included, others from:
      - https://openvpn.net/cloud-docs/owner/connectors/connector-user-guides/openvpn-3-client-for-linux.html

INSTALL OpenVPN CLIENT

- Download the client from the event page:
  - https://events.ufs.ac.za/event/3500
    - Software: openvpn-connect (1st = Windows, 2nd MAC)

- Download your OpenVPN profile:
  - https://gw.examplesdomain.com:3443

    » Or
  - https://events.ufs.ac.za/event/3500
    - Software: certs.zip

- Install the profile and connect to the VPN

GNS3

GNS$_3$

- Graphical Network Simulator-3 (GNS$_3$)
- Emulator to design and deploy network topologies/software solutions
- Used by industry professionals
- Runs on MS Windows, Mac OS, GNU Linux, Unix, FreeBSD
- Open Source
- Downloadable from:
  https://gns3.com/
- Appliances (*.gns3a files) on the marketplace:
  https://gns3.com/marketplace/

GNS3 USAGE

- Test your networks before you build them to reduce the time needed to get a production network up and running
- Run the OS that emulates the actual behaviour of network hardware
- Test 20+ different network vendors in a risk-free virtual environment
- Customized topologies and labs within GNS3 for network certification training
- Connect GNS3 to the actual network
- Can load unlimited devices, only limitation is host’s CPU & RAM
- Can be installed on a dedicated server or workstation

GNS$_3$ TERMINOLOGY

GNS3 → GUI (Graphical User Interface)
Dynamips → Emulator for hardware - IOS (Cisco OS)
Dynagen → Beginning Front End for Dynamips
Pemu → Cisco PIX Firewall Emulator Based on Qemu
(Win)Pcap → Packet Capture Library (Driver for Sniffer)
Wireshark → Network Monitoring / Listening to Network
VPCS → **Virtual PCs (Virtual Computer)** → Adding a virtual computer.
VMware VMS → VMware Virtual Machines → Including virtual machines in topology with VMware Workstation.
VirtualBox VMS → VirtualBox Virtual Machines → Including virtual machines in topology with VirtualBox.
IOU Devices → A real Layer2 and Layer3 Switch lets you use all the features of your network device by adding an IOS image.

GNS$_3$ LAB PRACTICE

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GNS3

- Download from: https://gns3.com/ or Events page
  - Linux: https://docs.gns3.com/docs/getting-started/installation/linux/

- Perform standard installation,

- **Don’t install (We will only use the remote server)**
  - Local VM / Server
  - Dynamips

- Add/enable:
  - GNS WebClient
  - WinPCAP
  - Wireshark
  - VCPS
  - TightVNC Viewer
  - Solar-Putty
  - Virt-viewer

SERVER INFORMATION:

- Connect to the VPN first
- Open GNS3
- Preferences >> Server
- Disable Local Server
- Add the following as server:
  - Host: 10.200.0.1**xx**
  - Port: 3080
  - User: ern_admin
  - Password: Leggings:Nutcase:Daybed:Cut3:Gradation
- Replace **XX** with your user id
  - E.g.
    - Host: 10.200.0.1**05**

ACCESS GNS3 FROM VNC

- If you are unable to connect/install the VNC client.

- Connect to a VNC session: https://gns3.examplesdomain.com/

- User: usrxx
- Password: Your:Password:Provided:On:The:Events:Page

- Replace **xx** with your user id
  - E.g.
    - usr**05**

BUILD GNS3 LAB

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  - E.g.
    - Host: 10.200.0.1**45**

CREATE A PROJECT: **Week07**

- Using the VNC session (https://gns3.examplesdomain.com)
- Install the following appliances:

- Firewalls
  - pfSense (2.7.0)

- Routers (Switch)
  - Dell OS9
    - Import from .gns3a file

- Guests
  - Chromium

  - Rocky 8.8
    - Create New Version: 8.8
    - Keep the **rocky-cloud-init-data.iso** as is
    - ISO: Rocky-8-GenericCloud-Base.latest.x86_64.qcow2

  - TrueNAS – Formally known as FreeNAS
    - Create New Version: 13.0-U5.3
    - ISO: TrueNAS-13.0-U5.3.iso

TOPOLOGY