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Using MikroTik with GNS3

PRESENTED BY:

RICK FREY, MIKROTIK TRAINER

Background

- **Rick Frey**
  - 20+ years in IT & Communication Industries
  - 10 years in the US Navy
  - Designed and implemented a wide array of networks all of the world
  - Introduced to the MikroTik product line in 2008
  - Areas of Focus:
    - Wireless services integration
    - ISP Solutions
  - Certifications
    - Certified –MTCNA, MTCRE, MTCTCE, MTCWE, MTCT

IP ArchiTechs Managed Services

- The first Carrier-Grade 24/7/365 MikroTik TAC (Technical Assistance Center)
  - Three tiers of engineering support
  - Monthly and on-demand pricing available
  - 1-855-MIKRO-TIK or www.iparchitechs.com
- Air MPLS - Private Nationwide 4G LTE MPLS backbone
  - Partnership with Verizon Wireless - available anywhere in the Verizon service area
  - Not Internet facing – privately routed over our MPLS infrastructure
  - Point-to-Point or Point-to-MultiPoint
- Proactive Monitoring / Ticketing / Change Control / IPAM
- Carrier-Grade Network Engineering / Design in large (10,000+ nodes) environments

Objectives

- Introduce GNS3
- Introduce Virtual Box
- Explain how use MikroTik with GNS3

GNS3

- Graphical Network Simulator
- Combines other open source platforms to visually and cohesively simulate network environments
  - Dynamips – Cisco IOS emulator
  - VirtualBox – Runs RouterOS and other x86 software
  - Qemu – Machine Emulator to run Cisco ASA, PIX, and IPS

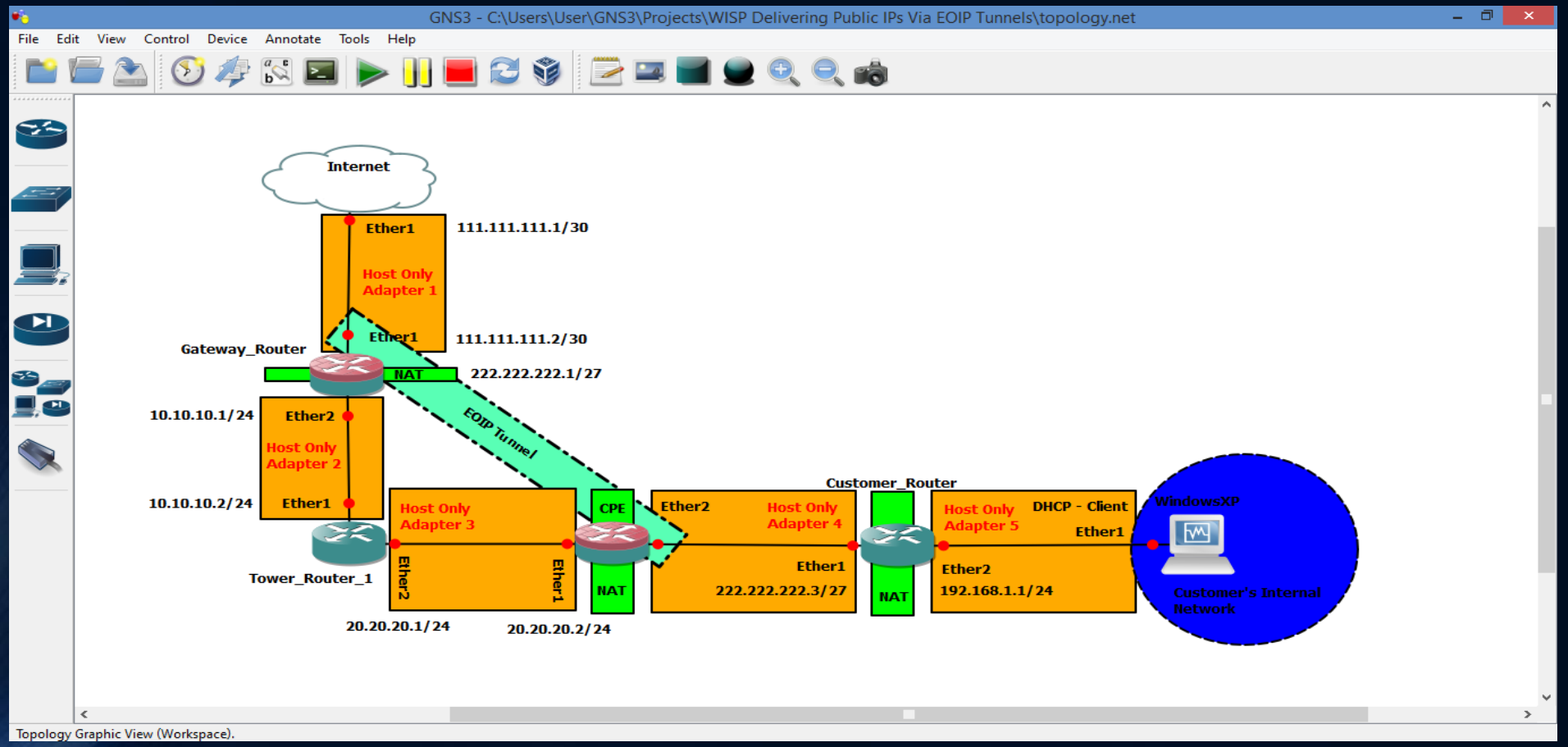
Why Use GNS3

- Training – Almost as realistic as building a mock network with real equipment
  - Most cost effective tool for teaching networking available
- Network Validation – Allows you test network designs and changes before they are applied to a production network
  - Reduces downtime
  - Increases ROI
- Network Design Collaboration

GNS3

- First released in Sept of 2007 as V0.3
- Current stable version is GNS3 V0.8.7
- Beta Version is GNS3 V1.0 Beta 2

First Look at GNS3

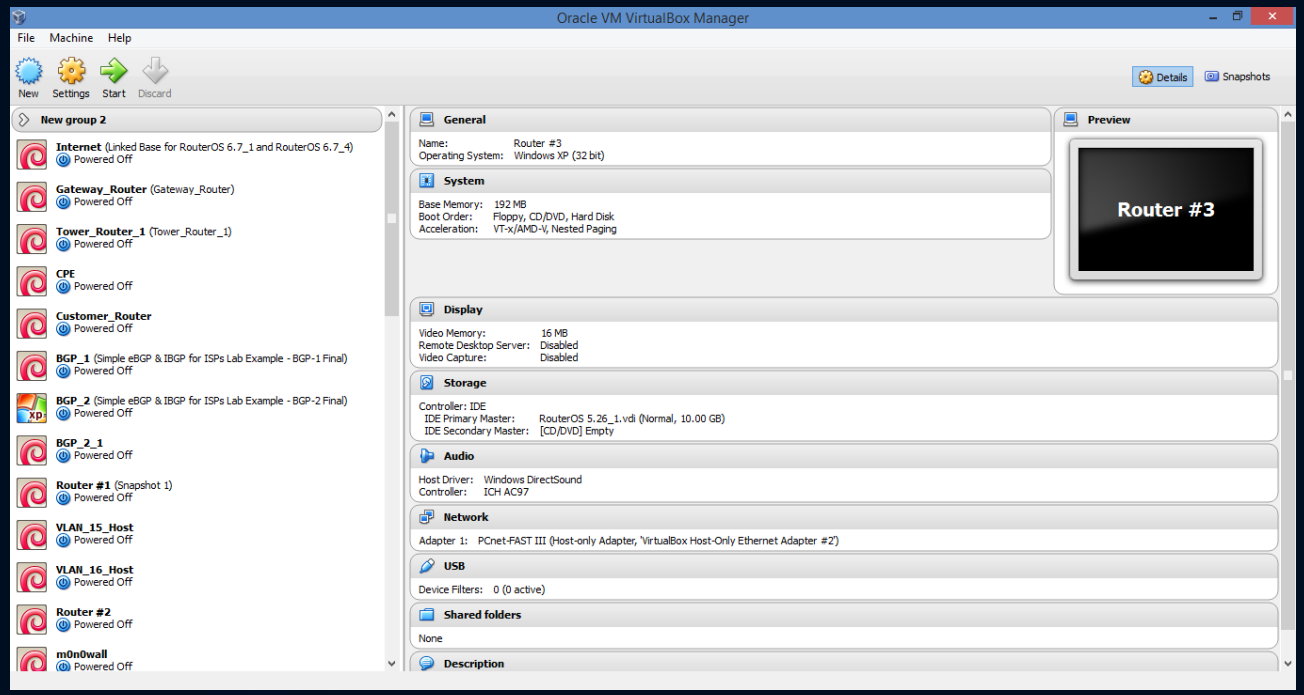


Virtual Box

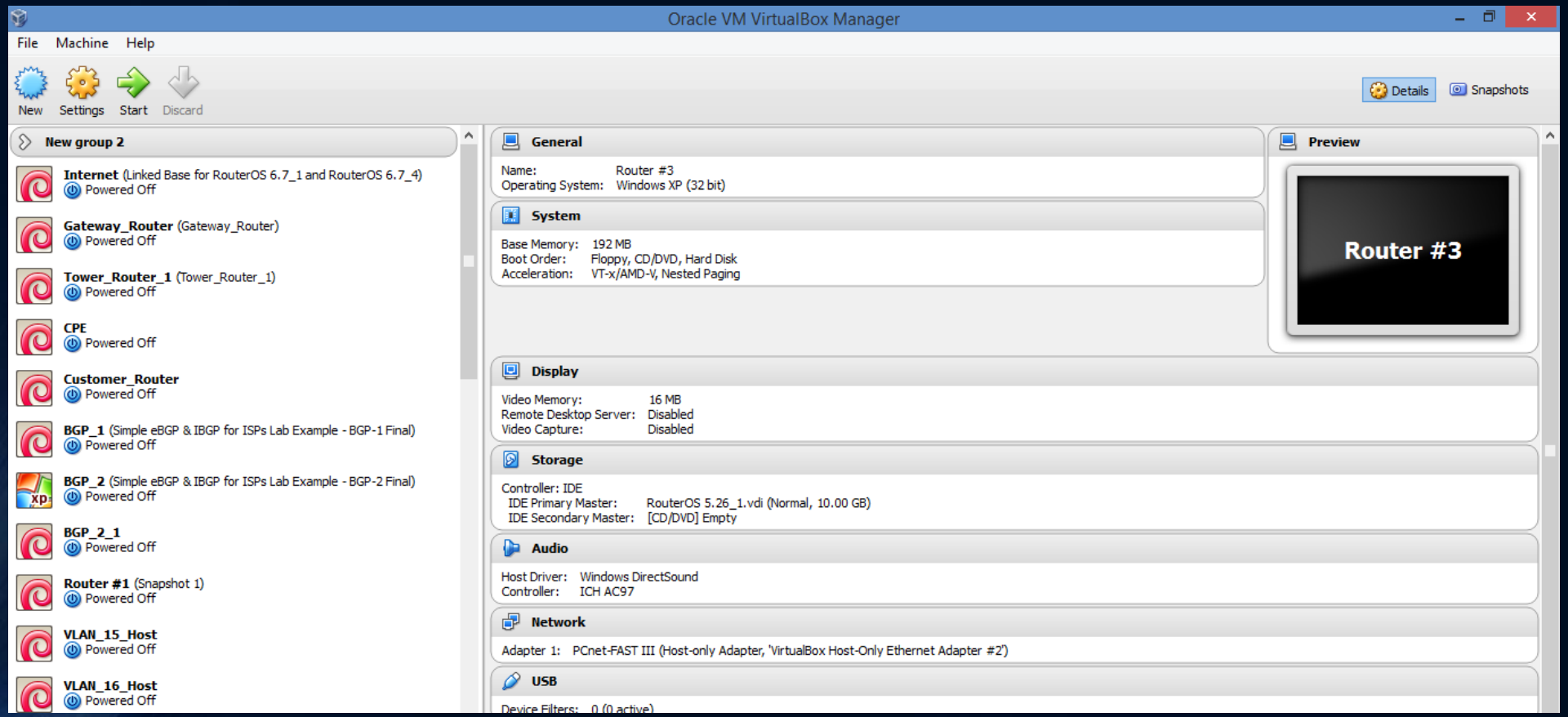
GNS3 uses Virtual Box to run MikroTik's RouterOS and other x86 compatible software

Intro to Using Virtual Box

- Currently owned by Oracle
- Virtualization Software
- Can run any x86, Intel64, AMD64 Software

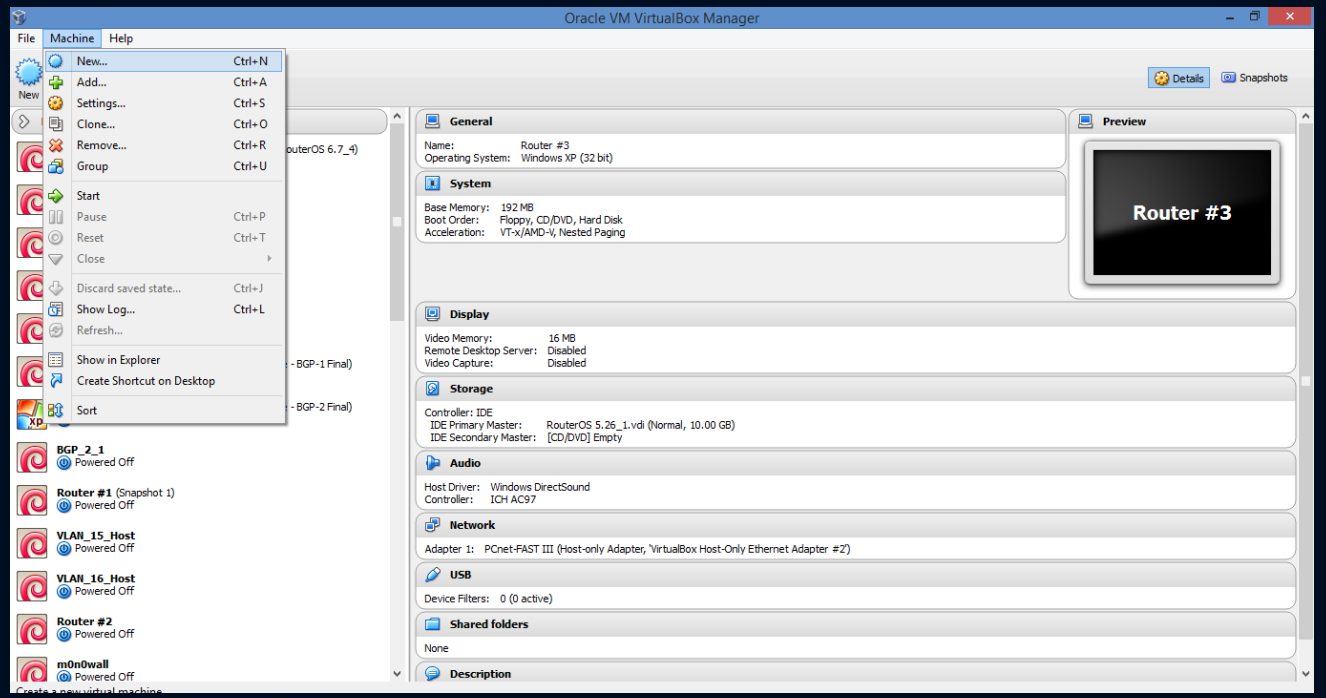


Intro to Using Virtual Box

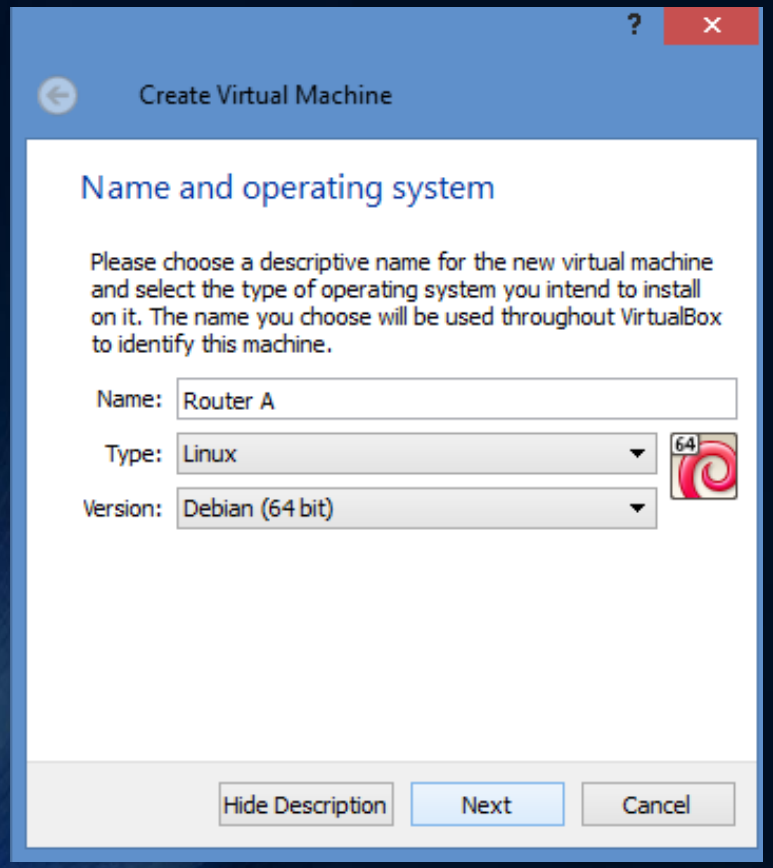


Installing RouterOS to Virtual Box

- Start by Selecting Machine -> New
- Follow the Wizard
- Default Settings will be adequate for most people

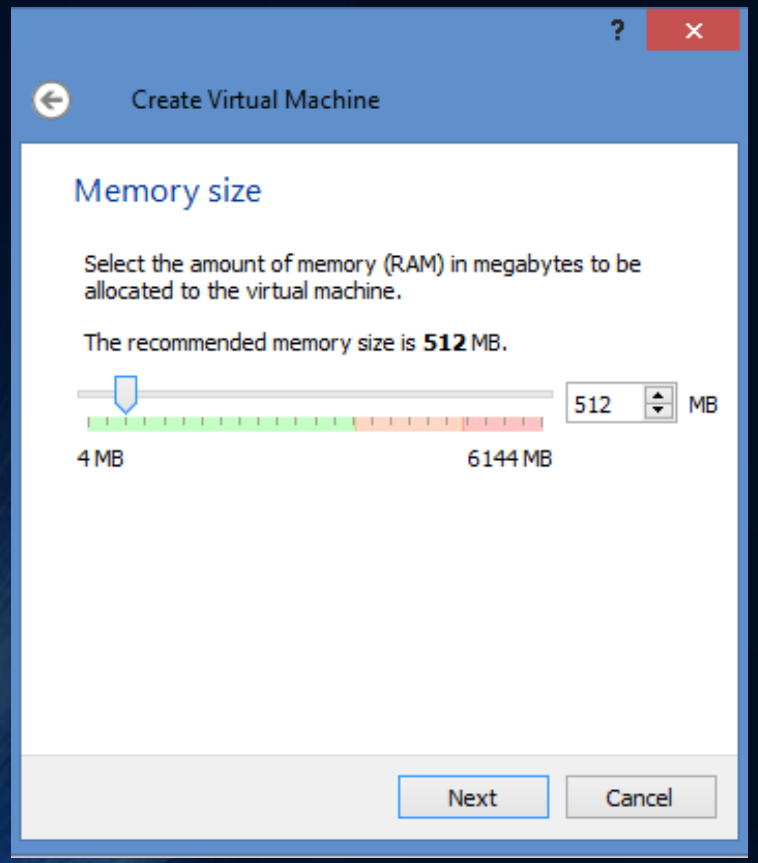


Installing RouterOS to Virtual Box



- Give your VM the same name you will want it to have in GNS3
- You can also change the name latter

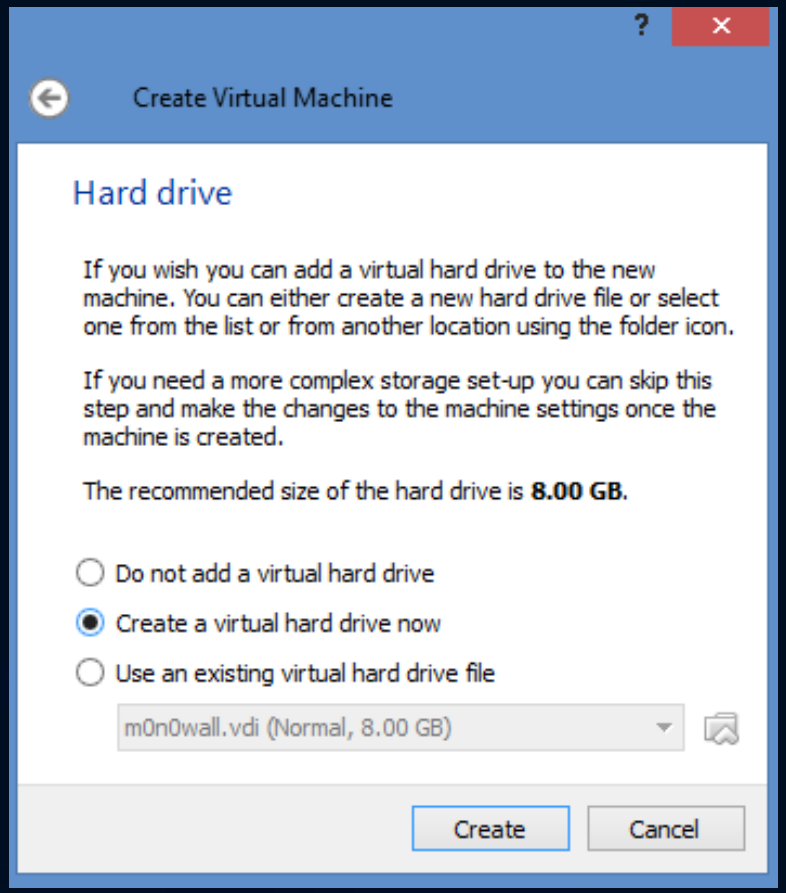
Installing RouterOS to Virtual Box



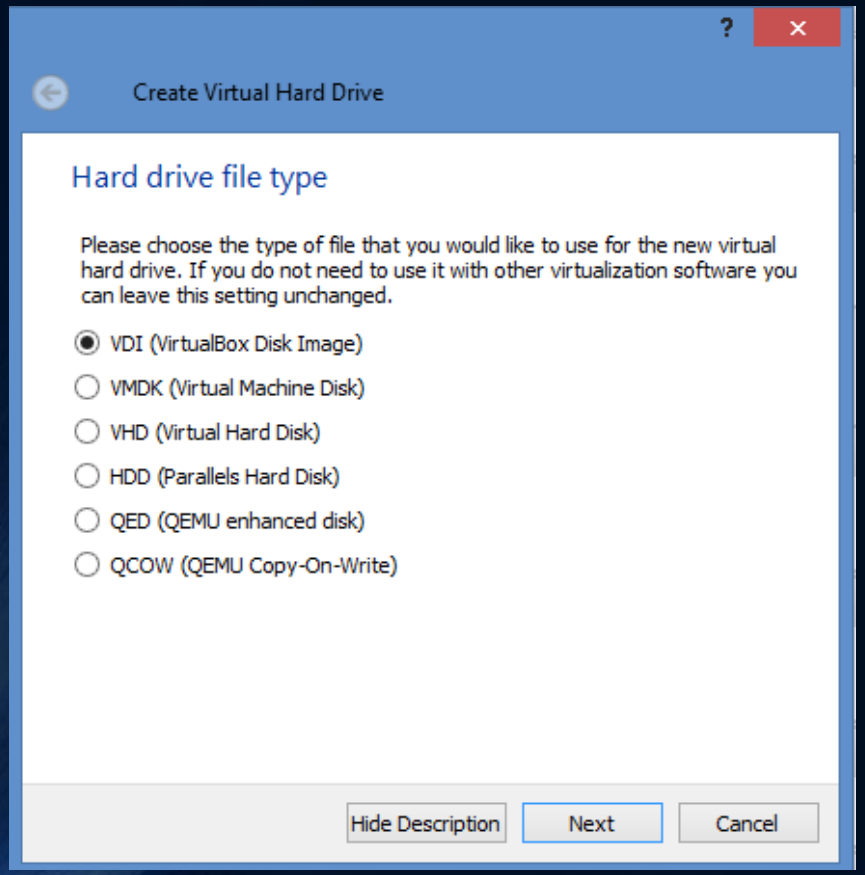
- Default Memory size is 512MB
- The recommended "Green" & "Red" portions are based upon the amount of memory installed on the physical machine

Installing RouterOS to Virtual Box

- Select virtual hard drive now

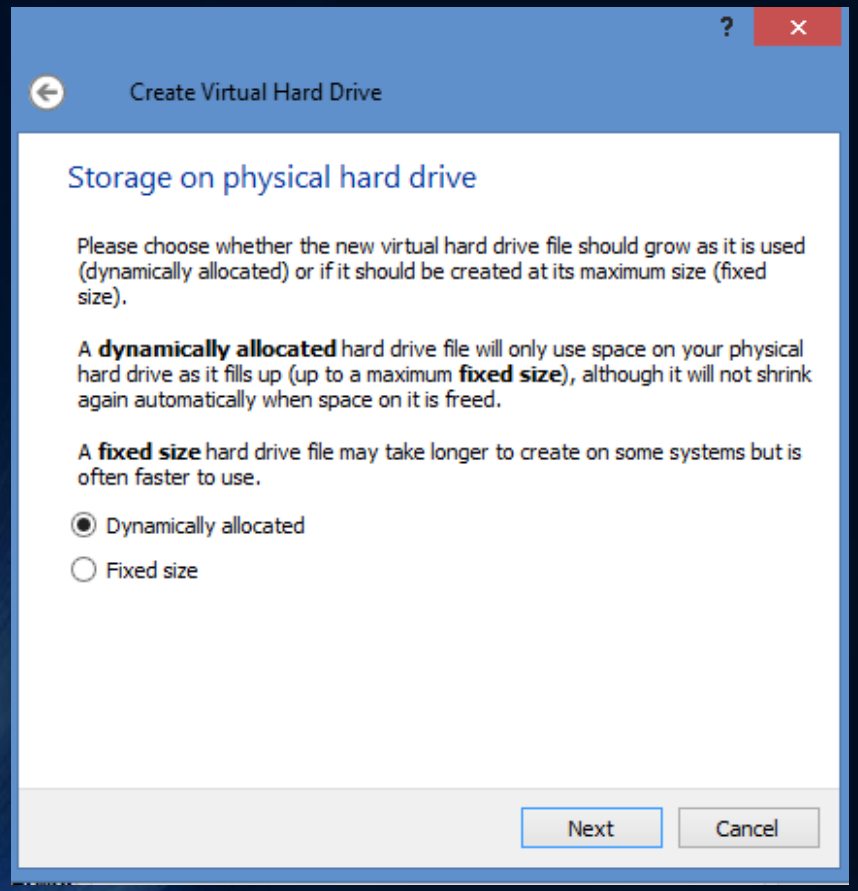


Installing RouterOS to Virtual Box



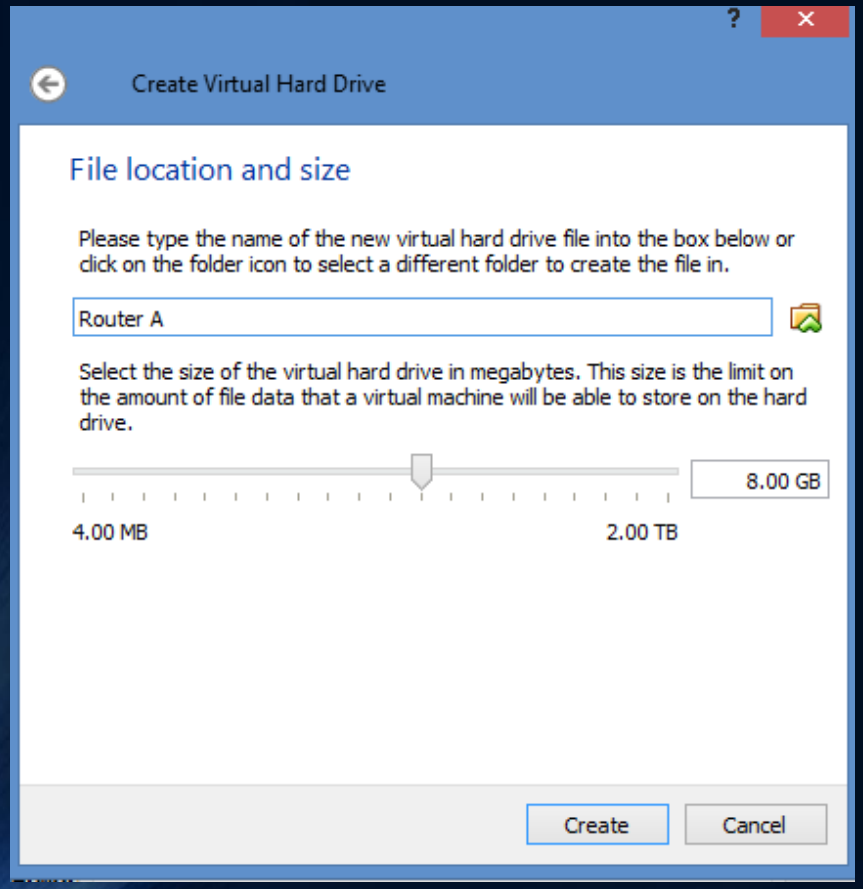
- VDI – VB's Native format
  - The correct choice 99% of the time
- VMDK – Used by products like VM Ware
- VHD – Used by Microsoft Products
- HDD – Used by Parallels
- QED – Used by Qemu
- QCOW – Used by Qemu

Installing RouterOS to Virtual Box



- Dynamically Allocated – Saves space on your physical machine and is the best choice for most cases
- Fixed Size – X size HD on the VM will = X Size space used on the physical machine

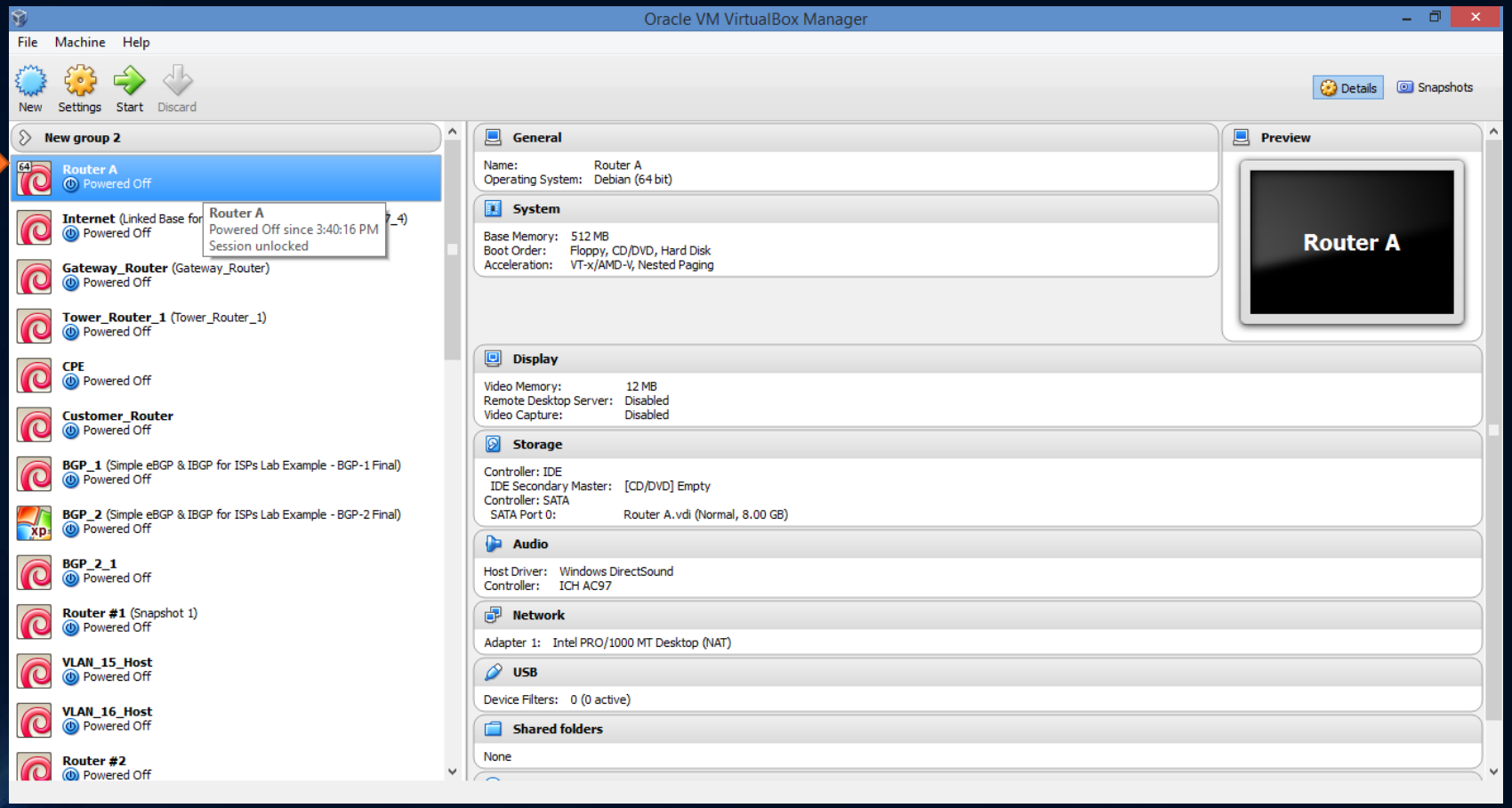
Installing RouterOS to Virtual Box



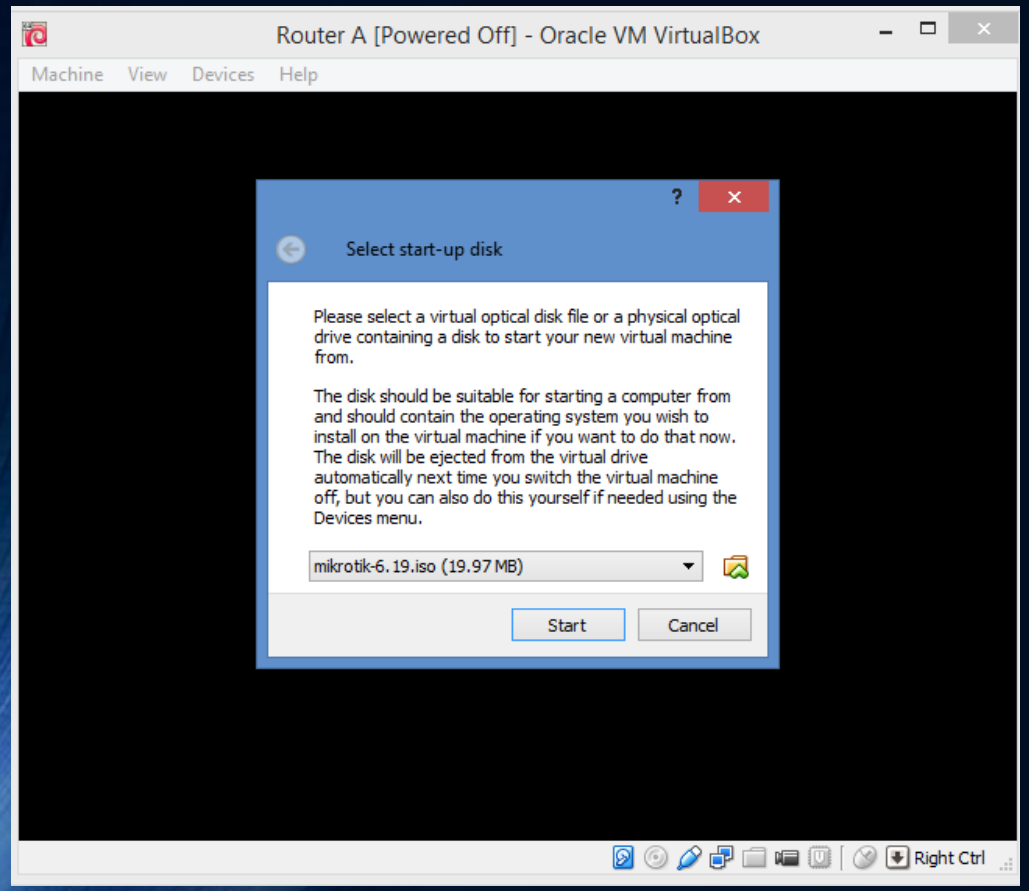
- Set HD limit to something reasonable

Installing RouterOS to Virtual Box

New VM

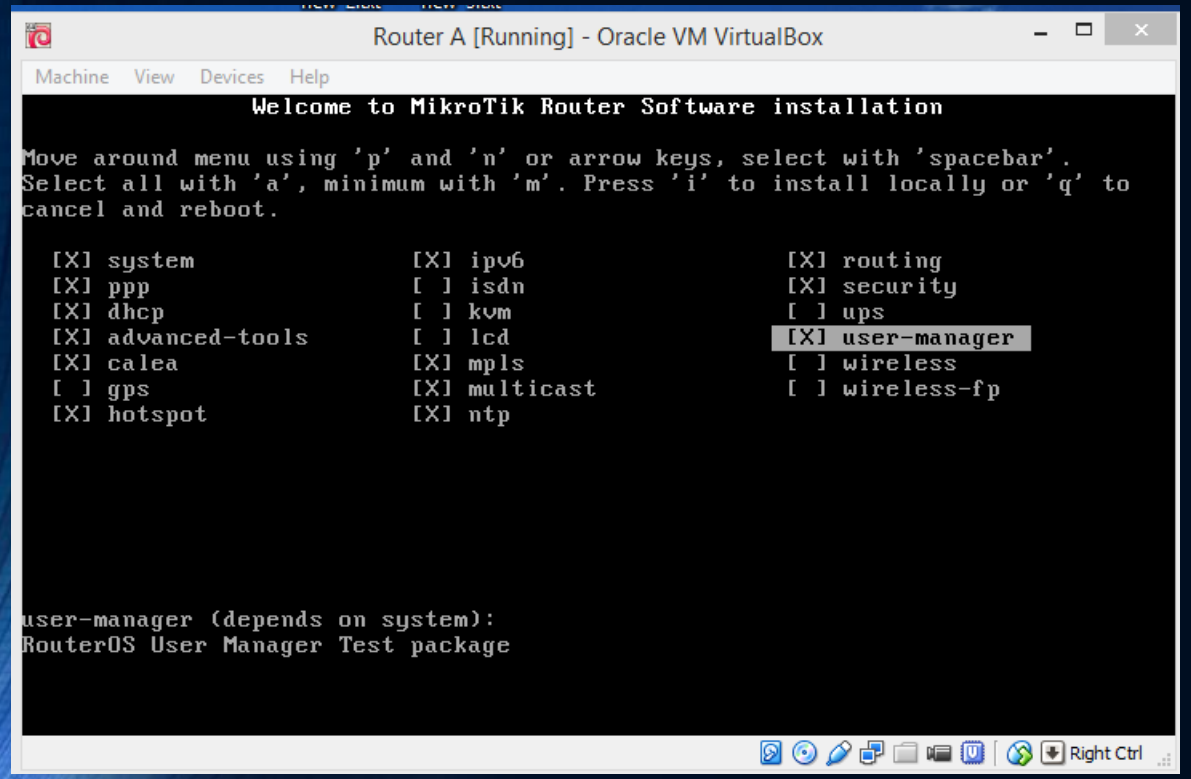


Installing RouterOS to Virtual Box



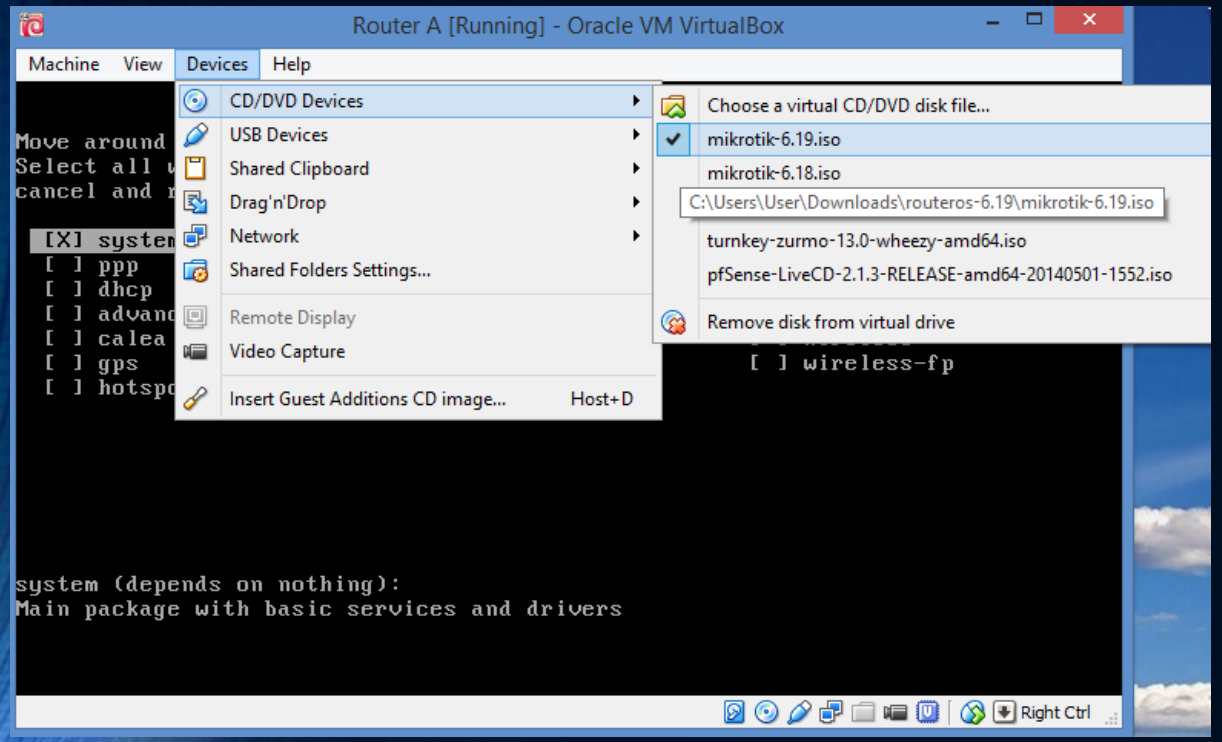
- Select the ISO for RotuerOS
- Installation will identical to using a CD on an x86 machine

Installing RouterOS to Virtual Box



- Selected Desired Packages
- Press "I" to install

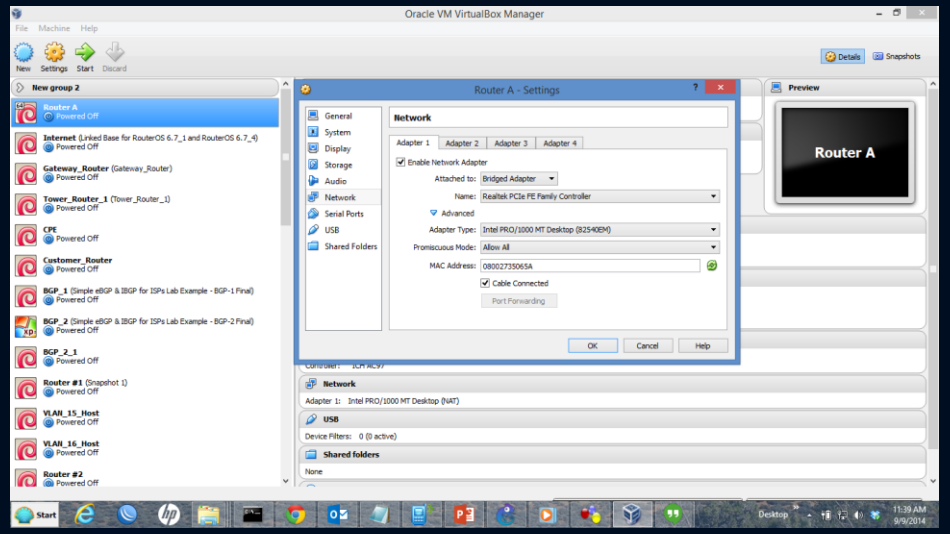
Installing RouterOS to Virtual Box



- Remove the installation media by selecting Devices -> CD/DVD Devices & Un-checking the ISO
- Reboot the VM

Accessing the Virtual Router for the 1st Time

- Stop the VM
- Right Click and chose Settings
- Select Network
- Change "Attached to" to Bridged Adapter
- This will Bridge the VM's adapter to your physical adapter – Allows Internet access, Winbox, and Webfig

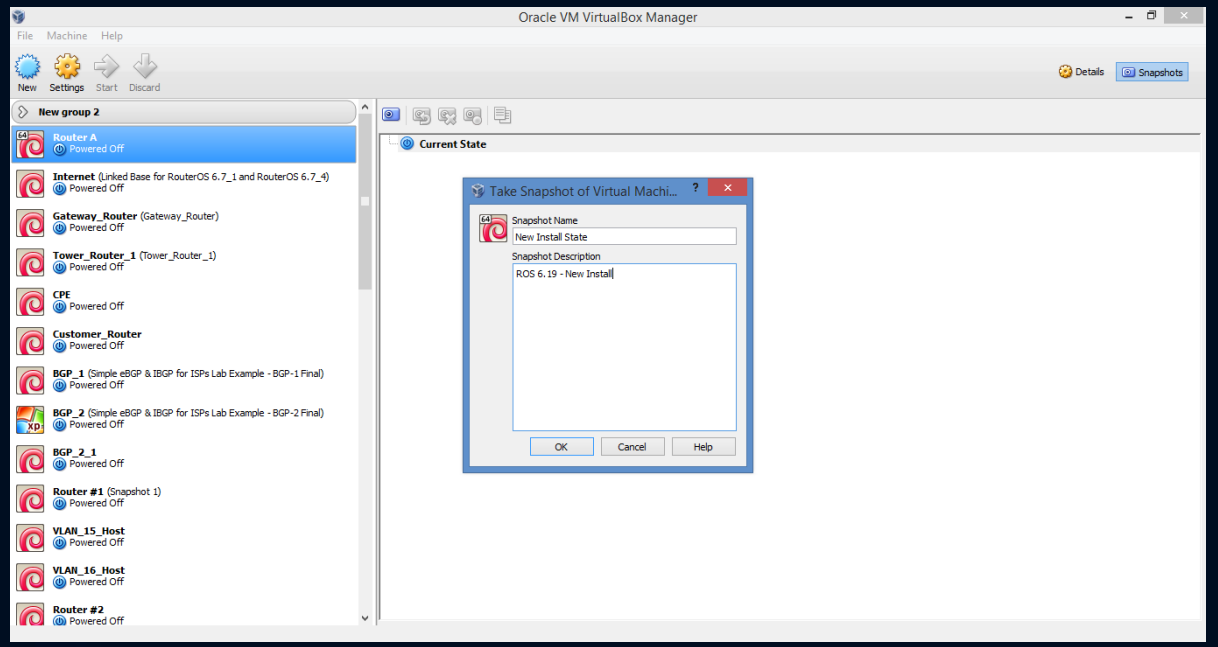


Notes about Licensing

- The best time to apply the apply the license would immediately after installation
- For training and evaluation purposes, MikroTik offer a 24 Hr License
  - This allows for full functionality for 24 hours of use (not from 8am Mon to 8am Tue)
  - You can build up complicated virtual networks using the Demo License

Stop! Take a Snapshot!

- Snapshot save everything in there current state
- Save Earlier. Save Often



Configuring GNS3

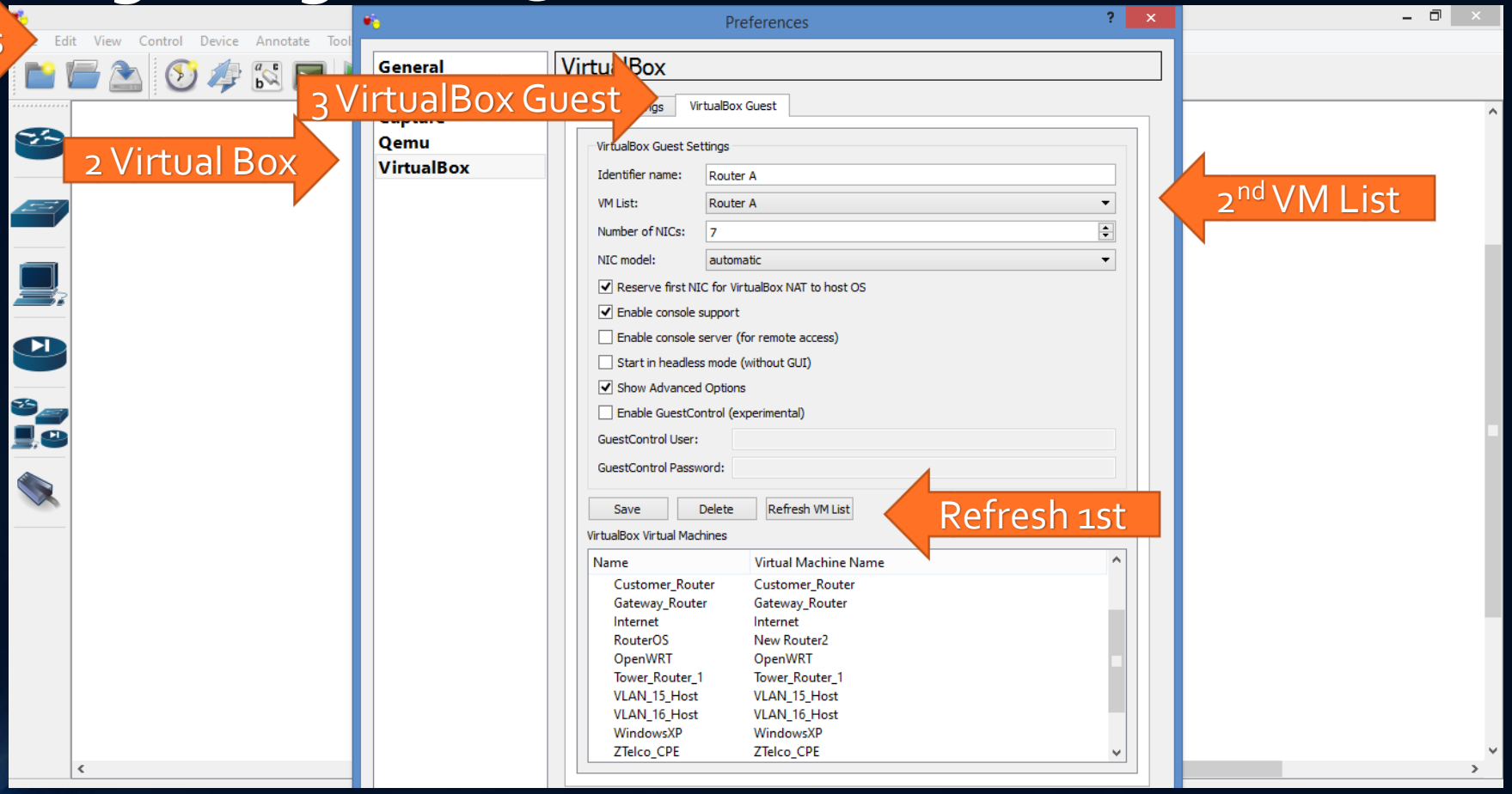
1 Edit -> Prefrences

2 Virtual Box

3 VirtualBox Guest

2nd VM List

Refresh 1st



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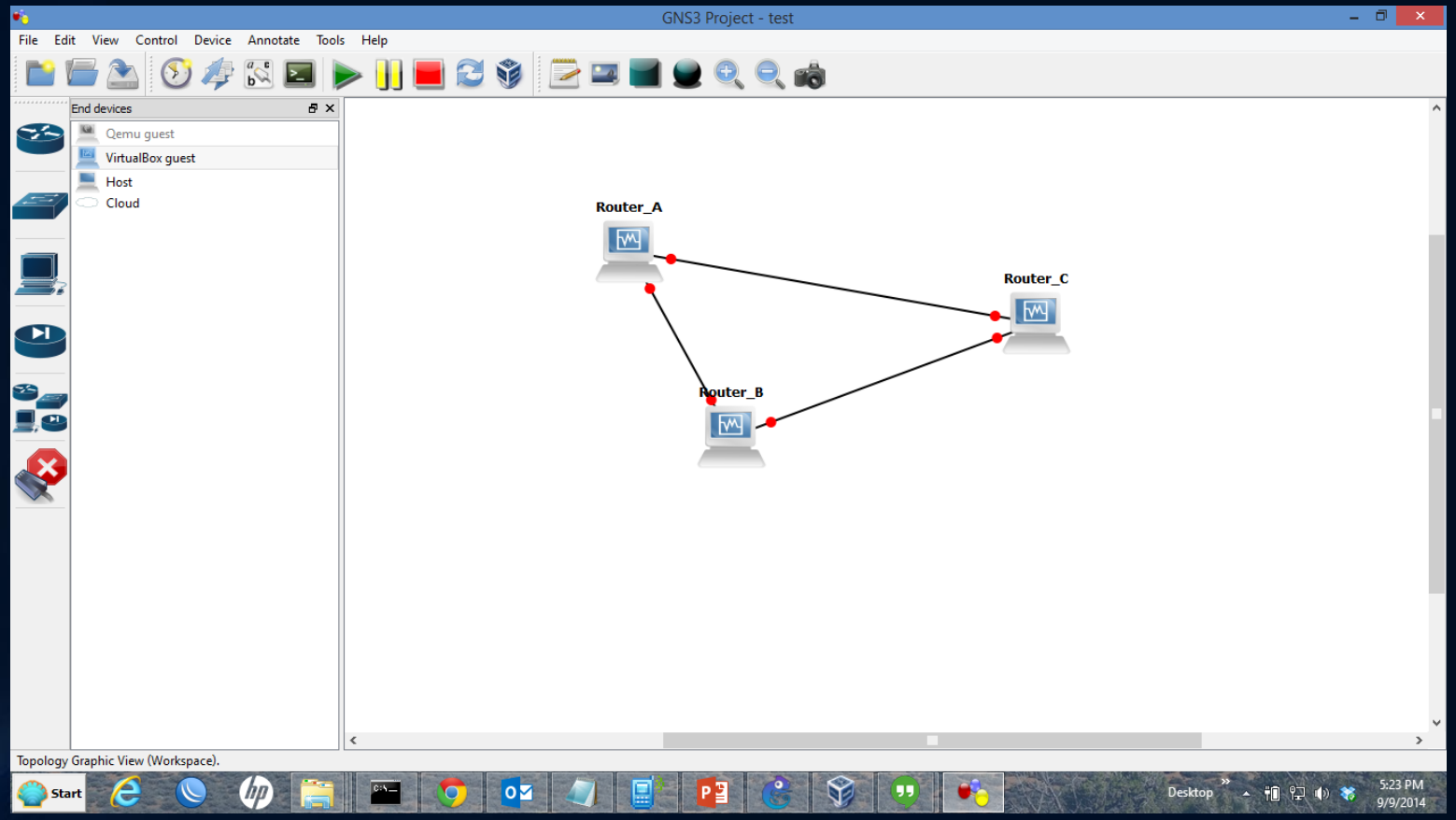

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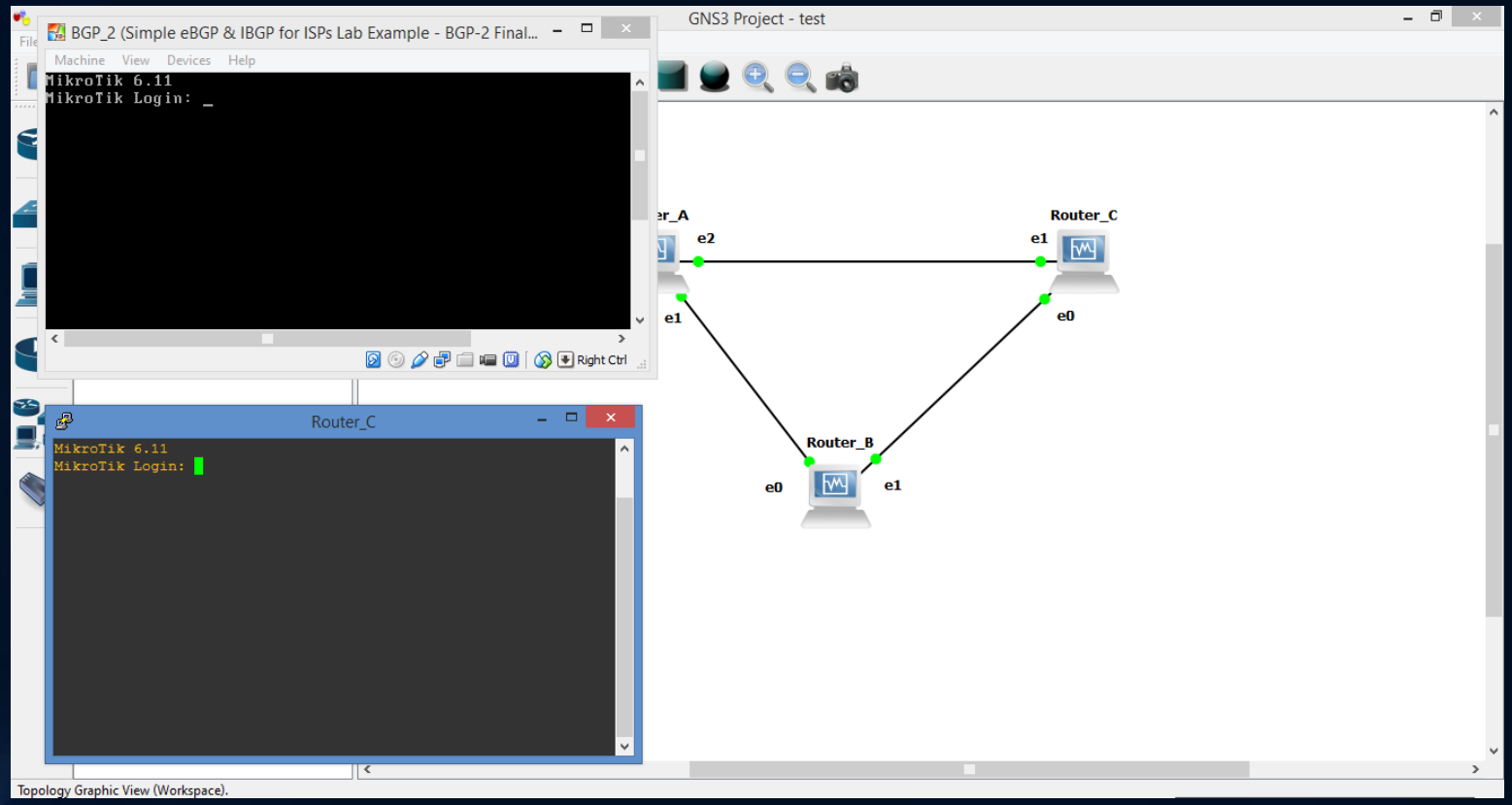
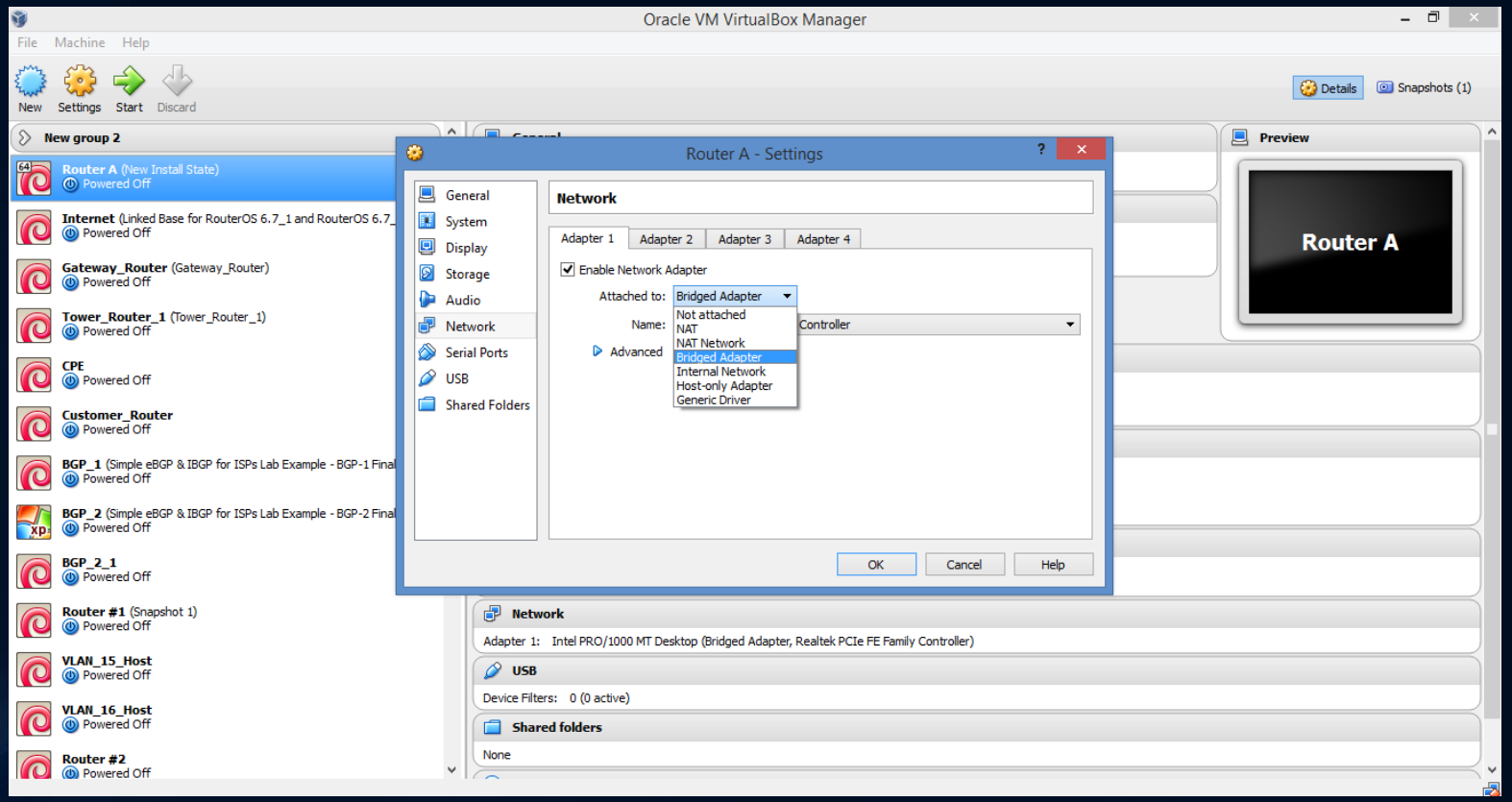


The Nuts & Bolts of Networking the VMs

- VB has limit of 8 network interfaces (GNS3 may reserve one)
- In VB, only 4 NICs can be configured in the Network Settings
- The other 4 can only be configured from the command line (GNS3 handles this for you…mostly)
- VB has limited support for "Jumbo Frames" (>1500 bytes)
- Have a plan ahead of time for which NICs will need to access resources outside of GNS3 such as the Internet, other vendors' VMs, or real network resources

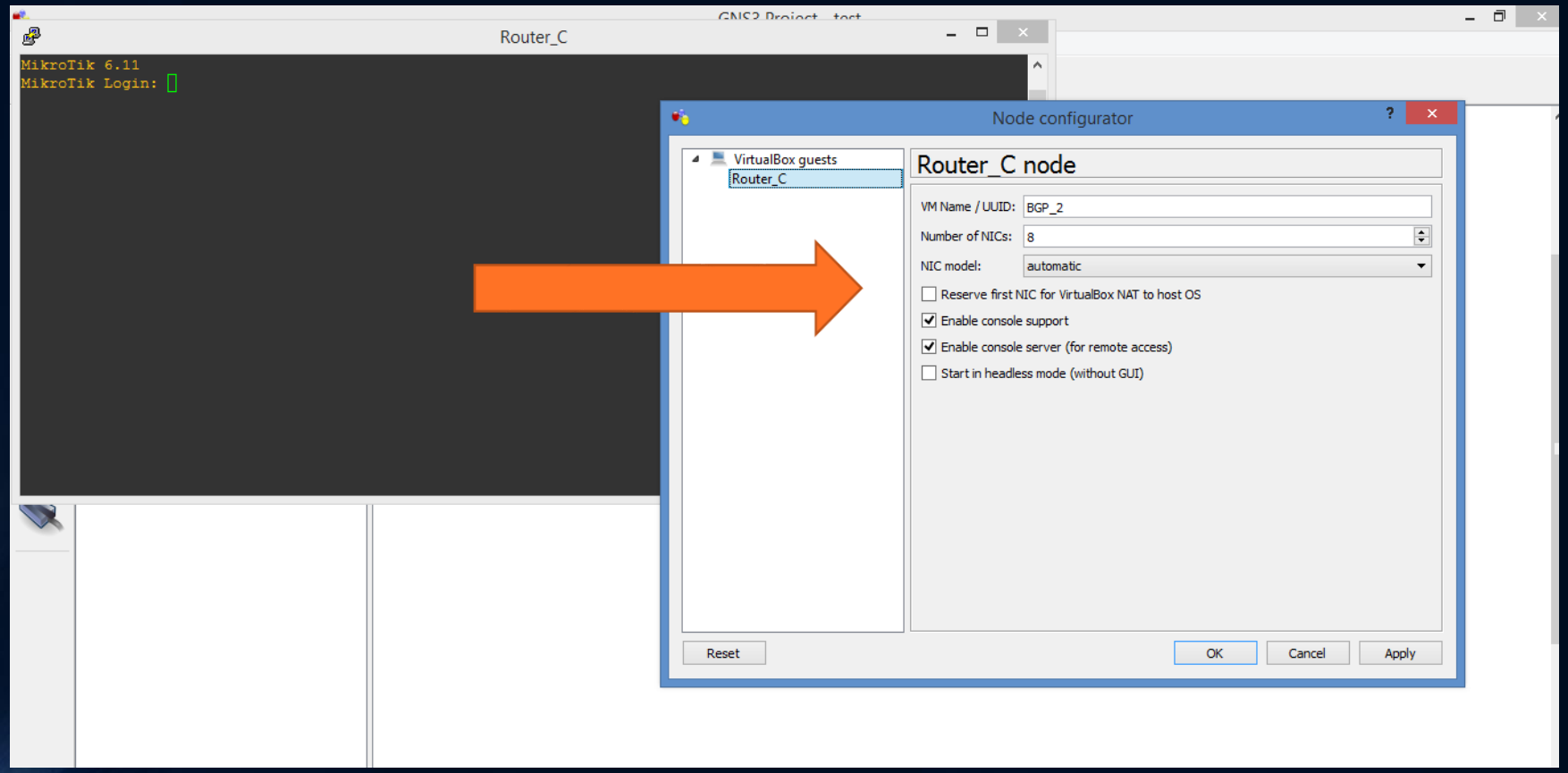
VB NIC Networking Modes



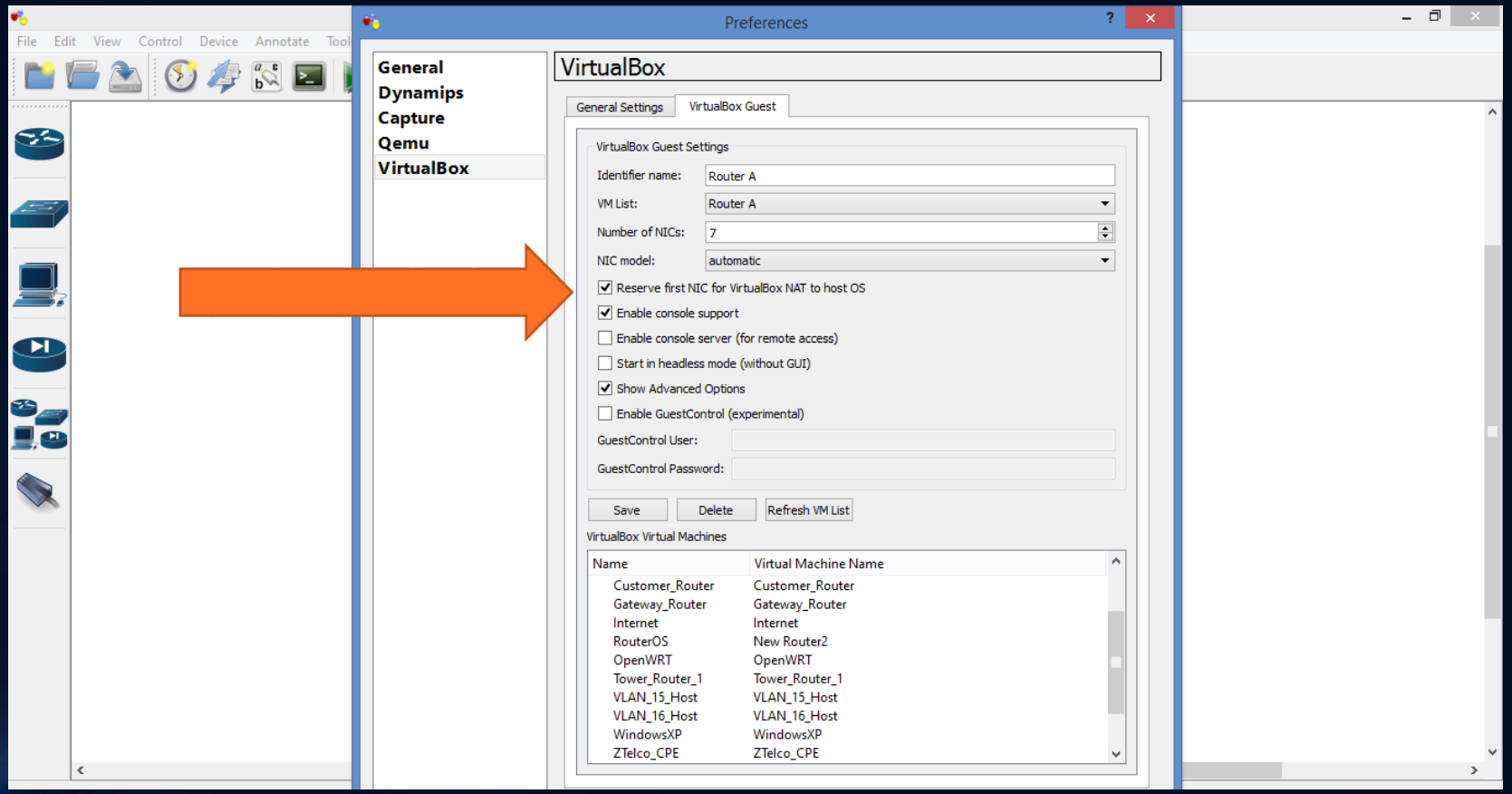
VB NIC Networking Modes

- Not attached – Not needed when using GNS3
- NAT – Deceptive… Should not be used due to high limitations such as ICMP failure, no support for GRE, unreliable UDP broadcasts, etc.
- NAT Network – Similar to a home router, same limitations
- **Bridged – Works well and is probably the best choice for connecting outside the VM environments**
- Internal Networking – Creates a sudo interface, should be avoided
- **Host Only – Creates a private network between the host any VMs with that interface – Very Useful**
- Generic – Used in the background by GNS3, should not be selected by user

Reserving the 1st NIC Inside GNS3



Reserving the 1st NIC Inside GNS3



Reserving the 1st NIC Inside GNS3

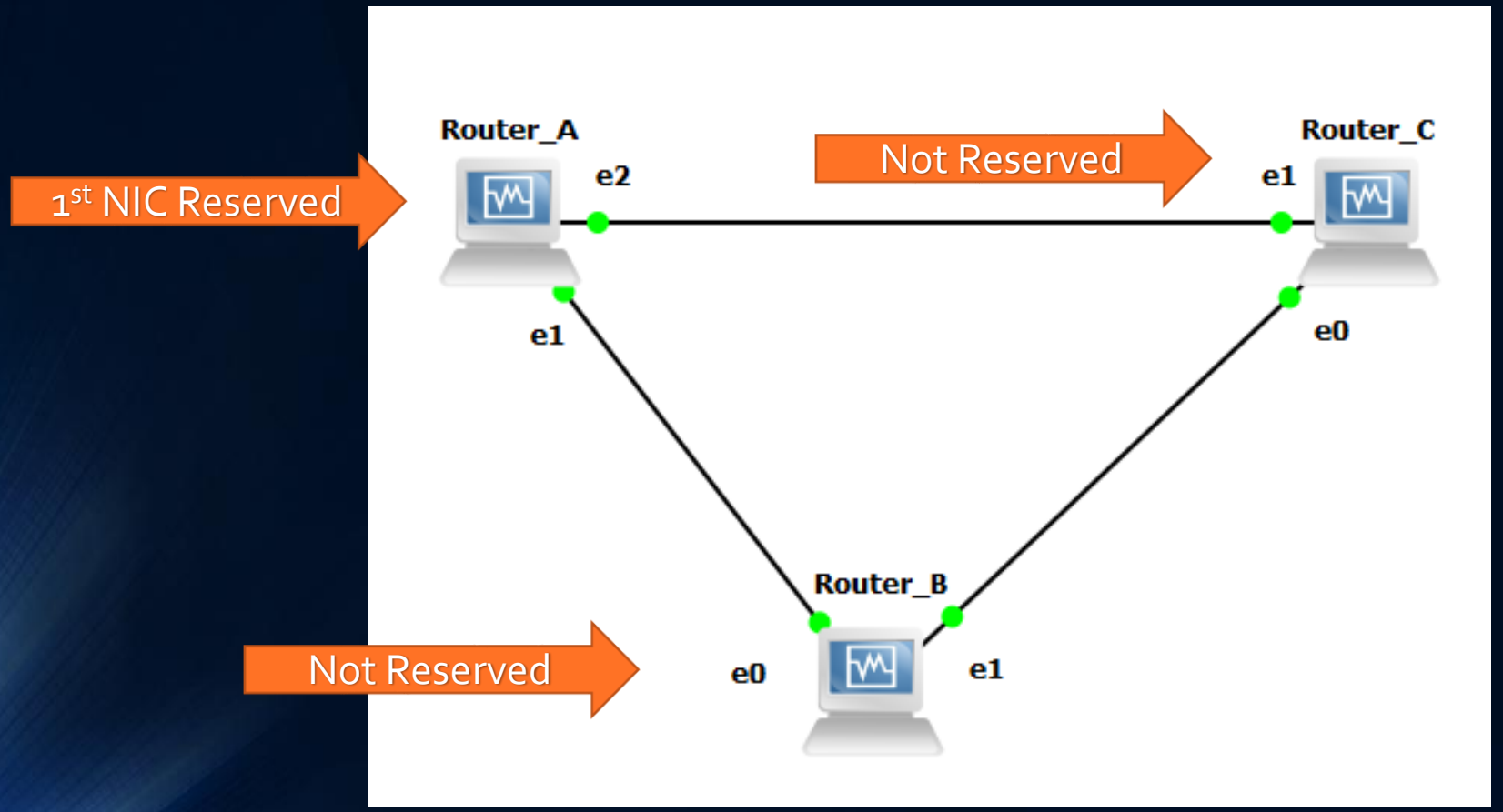
PROS

- Reserving the 1st NIC allows you to easily manage the settings for NIC 1 in VB
- The use of PuTTY or similar tool can still be used as long as Layer 3 connectivity exsists
- Ether1 in ROS = Ether1 in GNS3
- Good choice for Gateways

CONS

- Without it, the NICs stay in the virtual environment
- Without it, you can console into the VM natively from GNS3
- Ether1 in ROS = Ether"0" in GNS3
- Not as favorable for all other nodes

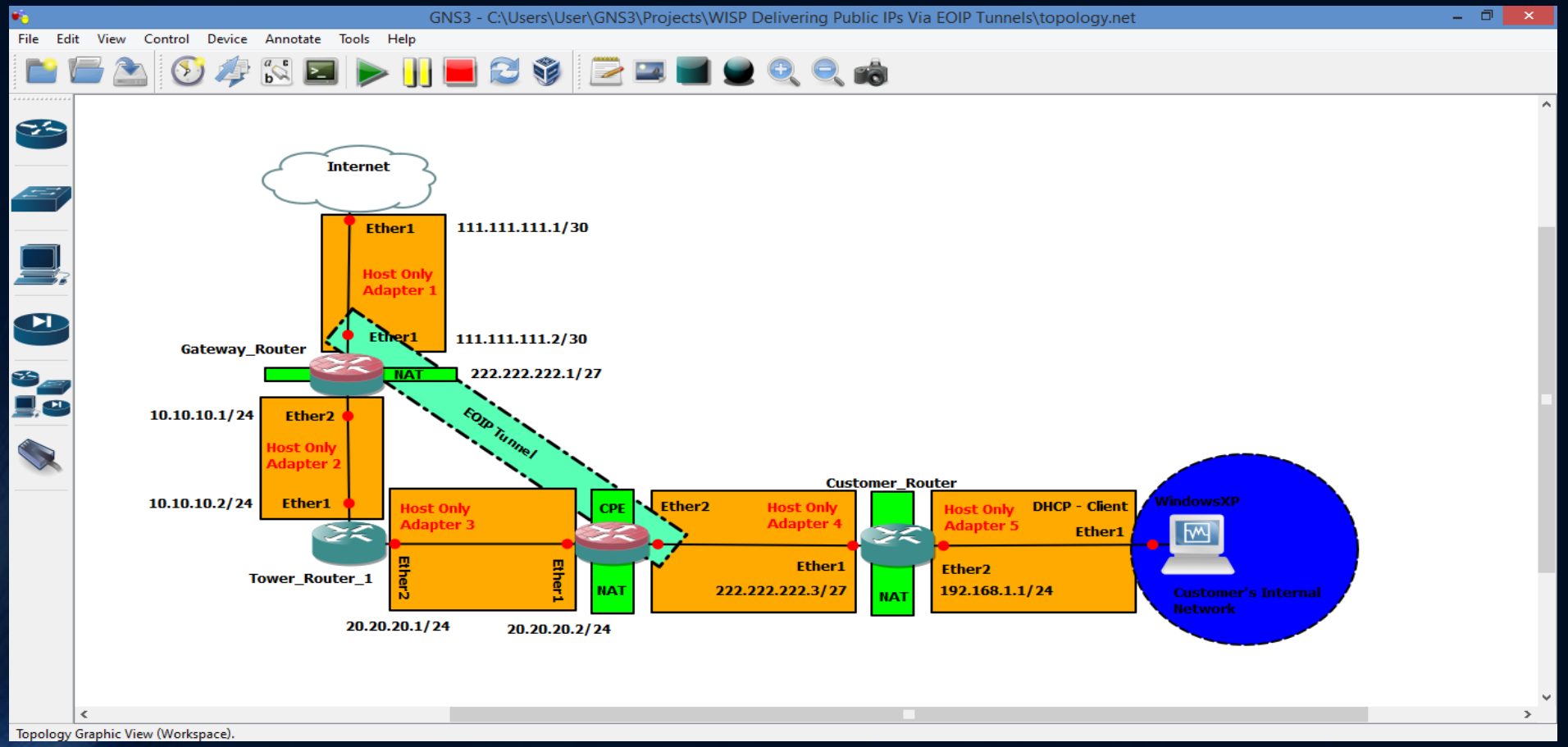
Reserving the 1st NIC Inside GNS3



Using Host Only Adapters

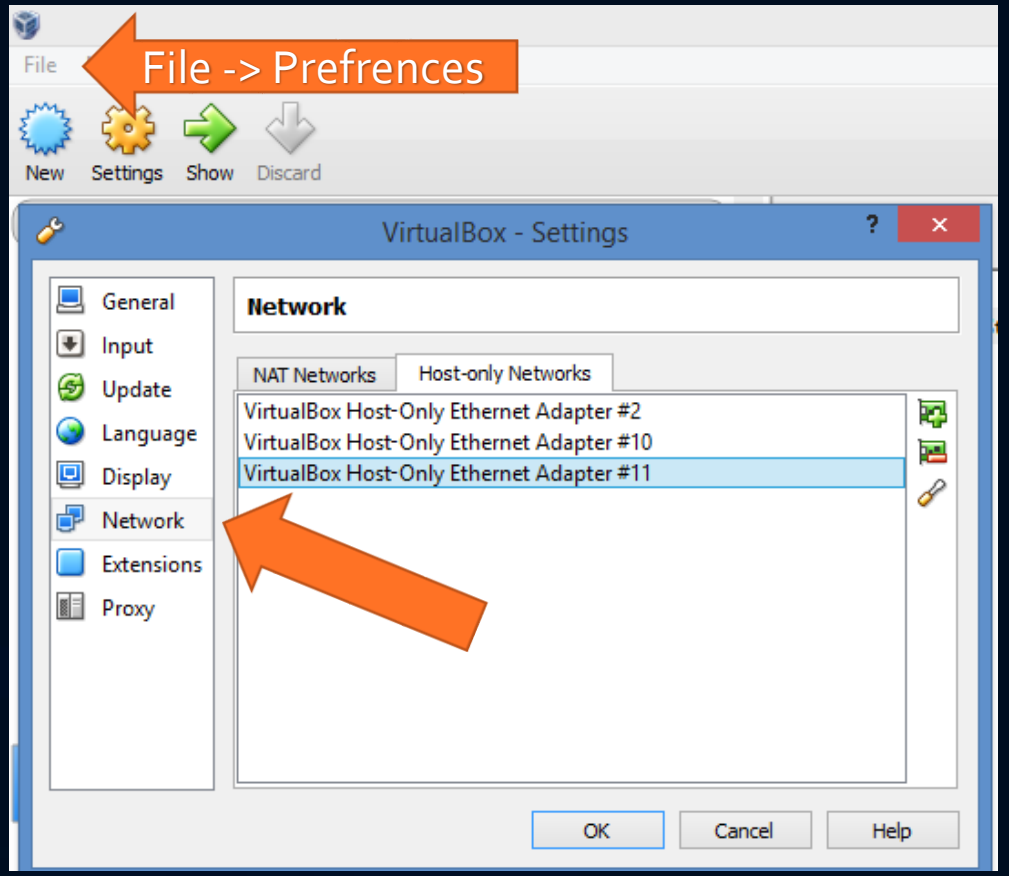
- Only necessary if you want to have Layer 3 access to nodes which are not bridged onto a real network
- Not needed if you are comfortable with the CLI
- Can be used to access the virtual router with Winbox, PuTTy, or Webfig
- Configured in VB
- Can be used to put to two or more NICs on the same broadcast domain
- Can be a little time consuming to setup

Using Host Only Adapters



Using Host Only Adapters

- Configures a Virtual Ethernet Adapter on the host PC
- If its disabled on the PC, it will not show up in VB again
- If everything seems right, but its still not working, reboot the PC



Limitations of GNS3

- Can only virtualize wired connections
- Limited and weak support of switching
- It only performs well on hardware designed for VMs
- Limited support
- VM environments are not 100% identical to the real environment
  - Focus on the network methodology, don't expect it to be 100% perfect
  - Take the time to understand why there is a difference

Conclusion

- GNS3 can compliment most network environments and provide valuable insight before a network change
- GNS3 can be the single best platform for training
  - Portable
  - Scalable
  - Can be shared with others
- Lots of resources available for becoming proficient with both GNS3 & VirtulBox

Questions?