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# **MIKROTIK FOR UNIVERSITIES**

**BY : BOSCO MULWA**





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St. Paul's University is an ecumenical private chartered University offering competitive academic programmes in various fields including computer science and IT. SPU has a long standing reputation which is known and respected for providing quality education.

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# Why Mikrotik?

St. Paul's University began implementing Mikrotik based solutions in 2011. This was motivated by the following key aspects;

- ✓ Cost considerations
- ✓ Ability to Integrate with other equipment and technologies
- ✓ Remote administration
- ✓ Relatively easy to setup and administer (GUI)
- ✓ Intercampus Connectivity



## Mikrotik Products deployed on our Network

1. Routerboard 1100AHx4
2. Routerboard RB2011UAS
3. Routerboard RB/951
4. Mikrotik SXTs
5. Mikrotik CAP 2Ns





# Cost Benefits

Mikrotik comes in handy with a variety of free solutions such as;

- ✓ Virtual Private Network
- ✓ Inbuilt Firewall
- ✓ Secure dedicated tunnels
- ✓ Mikrotik products are relatively cheap



# Integration with other services

We have integrated Mikrotik with the following services;

- ✓ Squid proxy server
- ✓ Radius AAA with Windows AD
- ✓ Digital VoIP service
- ✓ University Web based applications



# Squid proxy server

Squid is a caching proxy for the web that reduces bandwidth and improves response times by catching and reusing frequently requested web pages. Being in a University setup Squid offers extensive access control to web pages ensuring that the internet is restricted to academic use.

We have subscribed for online journals and ebooks. Catching them ensuring that we provide good browsing experience to the students while at the same time saving on bandwidth.



# Microsoft Active Directory and Mikrotik

To guarantee security and ease administration of user accounts. We have a centralized Active directory and a radius service that provides Authentication, Authorization and Accounting for the following services;

- Mikrotik VPN Users
- Mikrotik Wireless users
- University portals
- E-learning (Moodle)





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# Digital VoIP server and Mikrotik

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The University has a total of four campuses situated in different counties across the country. Each campus has its own VoIP infrastructure. To enable communication between all the campuses, we have implemented Ethernet over IP tunnels and Mikrotik Bridge to facilitate the connectivity.





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# Web based Applications

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Using Mikrotik Dst NAT feature, we have made our servers available to the outside world without assigning them Public IP addresses directly.

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# WAN Using Mikrotik

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## Intercampus Connectivity

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# Intercampus Connectivity

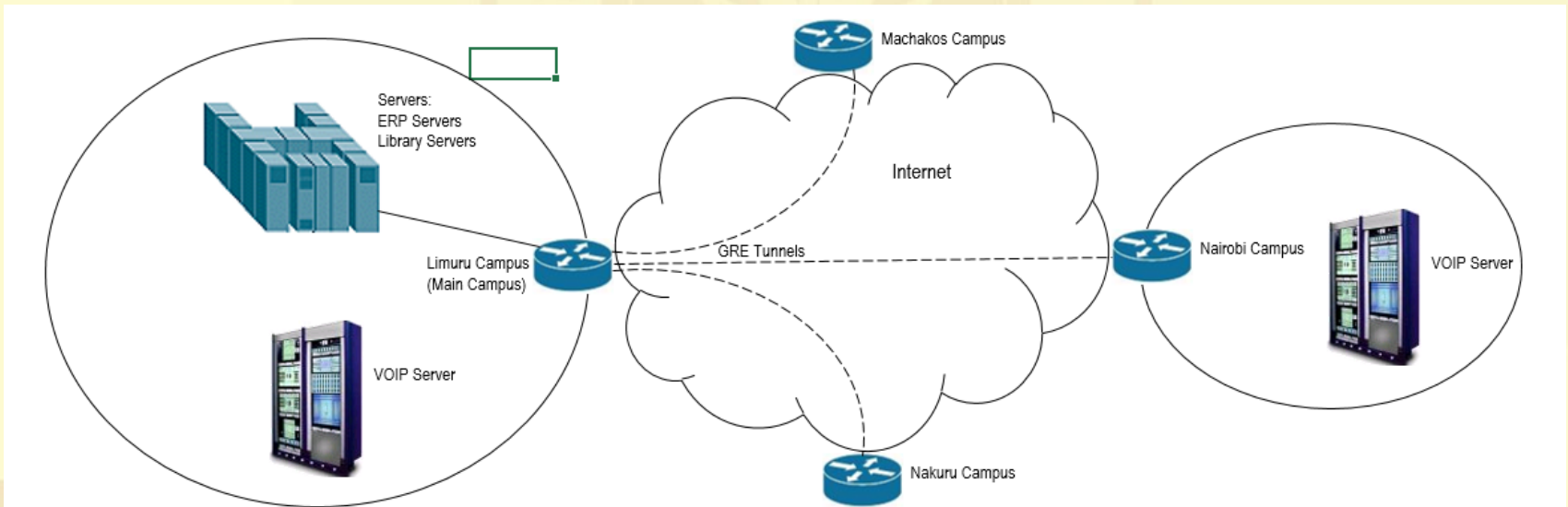
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SPU has deployed a wide area Network connecting all our three campuses to our main campus in Limuru.

We have accomplished this using Mikrotik GRE Tunneling Protocol.



# SPU WAN Connection





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# Services using GRE

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1. ERP
2. FTP Server (*Folder redirection*)
3. Library Servers (*Opac*)
4. VoIP Server

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# What you need

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1. Mikrotik Router IOS
2. Public IP Addresses on both sites
3. Private IP Addresses preferably /30

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# Create/Add a GRE Interface

The screenshot shows a 'New Interface' configuration window with the following fields and options:

- General** / **Traffic** tabs
- Name:** SITE\_A TO SITE\_B
- Type:** GRE Tunnel
- MTU:** 1476
- L2 MTU:** (empty)
- Local Address:** SITE A PUBLIC IP
- Remote Address:** SITE B PUBLIC IP
- Keepalive Interval:** (empty)
- DSCP:** 0
- Buttons:** OK, Cancel, Apply, Disable, Comment, Copy, Remove, Torch
- Status:** enabled, running, slave

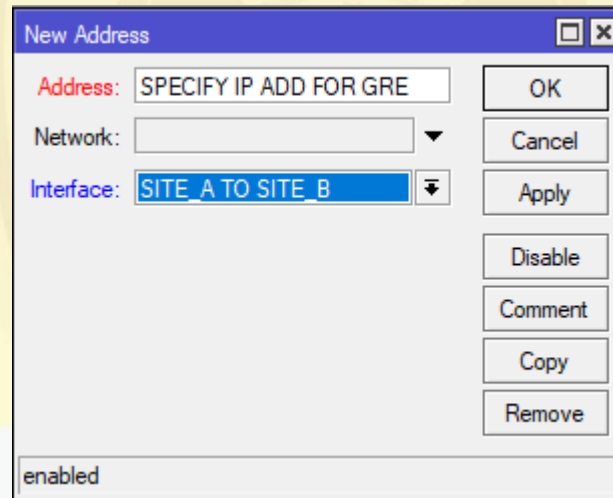




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# Assign IP address for your GRE Interface

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A screenshot of a 'New Address' dialog box. The dialog has a blue title bar with the text 'New Address' and standard window control buttons. It contains three input fields: 'Address:' with the text 'SPECIFY IP ADD FOR GRE', 'Network:' with a dropdown arrow, and 'Interface:' with the text 'SITE\_A TO SITE\_B' and a dropdown arrow. To the right of these fields is a vertical stack of buttons: 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Copy', and 'Remove'. At the bottom left of the dialog, the word 'enabled' is displayed.



# Adding a Route

New Route

General | Attributes

Dst. Address: SPECIFY SITE A NETWORK TO BE ACCESSED FROM SITE B

Gateway: SITE\_A TO SITE\_B TUNNEL

Check Gateway:

Type: unicast

Distance:

Scope: 30

Target Scope: 10

Routing Mark:

Pref. Source:

OK  
Cancel  
Apply  
Disable  
Comment  
Copy  
Remove

enabled active



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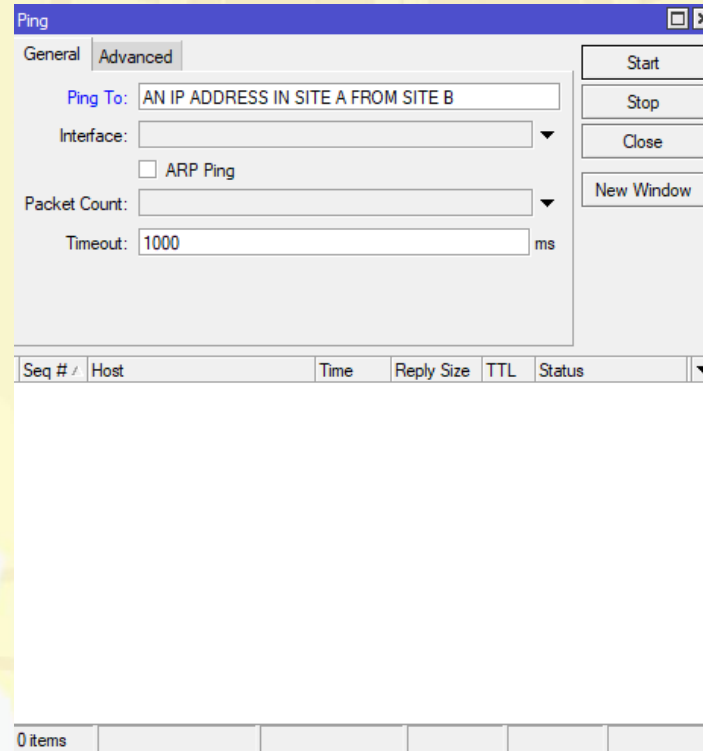
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Repeat the same procedure on site B.

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# Testing your Tunnel



The screenshot shows the Windows 'Ping' utility window. The 'General' tab is selected. The 'Ping To:' field contains the text 'AN IP ADDRESS IN SITE A FROM SITE B'. The 'Interface:' field is empty. The 'ARP Ping' checkbox is unchecked. The 'Packet Count:' field is empty. The 'Timeout:' field is set to '1000' ms. On the right side, there are buttons for 'Start', 'Stop', 'Close', and 'New Window'. Below the settings is a table with columns for 'Seq #', 'Host', 'Time', 'Reply Size', 'TTL', and 'Status'. The table is currently empty, and the status bar at the bottom indicates '0 items'.

Seq #	Host	Time	Reply Size	TTL	Status
0 items					



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# Testing your Tunnel

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Access a resource on site A from site B.

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