

# ETSF10 2013

## The routing lab

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# The Project

- Study two different routing protocols for intra domain Internet routing
- Hands-on experience
  - ◆ configuring and managing routers
  - ◆ how to set up routing protocols
- Devided in three parts
  - ◆ Hands on, RIP, OSPF
- Deadline 2013-12-09 but start *ASAP!*
  - ◆ Remote/distance lab

# Supervision

- Supervisors
  - Jens Andersson
  - William Tärneberg
- Open office hours: See course home page
- Mail
- **Book** visits

# Groups of two

Sign up on course web

A mail with userid/passwd for the group in return  
(have some patience ...)

Need a lab partner?

- Meet here after lecture
- Mail me. I'll try to connect you (no promise!)

# How to book

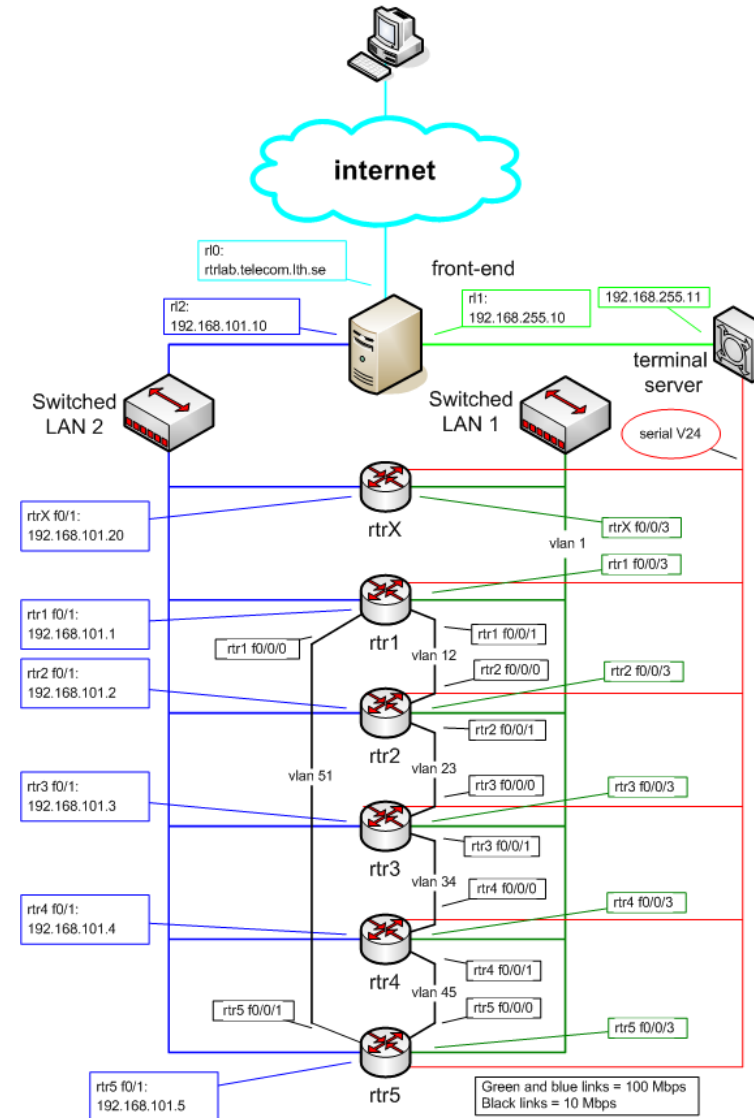
- ◆ <https://rtrlab.eit.lth.se>
  - Link found on routerlab homepage
- ◆ You can book
  - Each slot 1 hour
  - max per session = 4 slots = 4 hours
  - Extend ongoing session if free slots available
  - Slots available 24/7
- ◆ Warning before time out
- ◆ **Free unused bookings ASAP!**

# Lab dissemination

- Lab report with your answers to the questions...
  - See lab manual and assignment
  - Hand in via moodle. PDF-format. **Only the questions (incl points!) and answers!**  
**All other methods discarded. Lengthy answers discarded.**
- Read more on course home page
- Lab is open

## Router Lab

# The Lab



# The lab (cont ...)

- 5 (6) routers
  - Cisco 1841
  - IOS vers 15
- Many links (vlans)
- Front-end server
  - Access to router lab
  - tftp and ftp server for the lab
  - Web site for bookings
- <http://www.eit.lth.se/index.php?id=rtrlab>
  - Link from course web site



# The Front-End

- ◆ Connect using ssh
- ◆ Address rtrlab.eit.lth.se
- ◆ From there:
  - **telnet -e# term <TCP port #>**
    - Port 2001 = rtr1
    - Port 2002 = rtr2
    - ...
  - **#** char to use to escape to telnet prompt
  - **close** to end telnet session
  - telnet **mode character**
    - .telnetrc

# Ssh clients

- PuTTY for windows
  - Specify hostname (or ip address)
  - Select SSH
  - Hit Connect
- ssh on \*nix and MacOS
  - In Terminal: `ssh <username>@<hostname or ip address>`

# Router interfaces: two types

- "Normal"
  - f0/0
  - One port, one IP address
- "VLAN/Switched"
  - f0/1/<n>
    - Physical interface
    - IP cannot be configured here
  - 4-port switch with VLAN support
  - Default config: One vlan per switch port
  - One vlan, one IP address

# IOS CLI: Modes

- ◆ EXEC
  - Limited access
  - Prompt: `rtr1>`
- ◆ PRIVILEGED
  - Full access
  - Prompt: `rtr1#`
  - Command: **enable**
  - Revert to Exec Mode: **disable**
- ◆ CONFIG
  - Privileged mode required
  - Command: **config terminal**
  - Sub modes
  - Revert to Privileged Mode : **Exit /ctrlZ**
- ◆ To log out from router: **Exit** or **Quit**

# IOS CLI: Command completion

- ◆ HELP
- ◆ TAB
  - Example: sh<tab>
- ◆ ?
  - Example: s?
  - Example: show ?
- ◆ --More--
  - Space bar = continue
  - q = quit

# The Show Command

- ◆ **show interface** <if name>
- ◆ **show ip interface**
- ◆ **show ip interface brief**
- ◆ **show running-config** (only in PRIVILIGED mode)
- ◆ show ip route
- ◆ show ip protocol
- ◆ **show cdp neighbor**

# ping and traceroute

- `ping <remote host>`
  - ◆ Example `ping srv`
- `traceroute <remote host>`
  - ◆ Tip:
    - Can end up in a loooong wait
    - Cisco esc seq Ctrl+Shift+6 + x can work
    - Set a "working" escape character before using this command;
    - `terminal escape-character <0-255>`
      - Example: `escape-character 64 ->@`
      - To escape hit @

# The debug command

- ◆ `debug <cdp | ip ...>`
- ◆ To turn off debugging: `no debug all`
- ◆ Send debug output to console:  
`terminal monitor`  
Turn off monitoring:  
`terminal no monitor`



# Config terminal

- ◆ `[no] <command>`
- ◆ The “no version” might be default
- ◆ Default not always shown!
  - Some feature may be active but not shown in config list!
- ◆ Some commands take you to config sub-modes:
  - `interface <if name>`
    - `ip address 192.169.101.102 255.255.255.0`
- ◆ Revert: `exit`
- ◆ Revert directly to PRIVILEGED mode: `ctrlZ`

# Configure interface

- interface f0/0
  - ◆ ip address 192.168.101.202 255.255.255.0
  - ◆ (no) shutdown
- interface vlan 51
  - ◆ ip address 192.168.110.111 255.255.255.0
  - ◆ (no) shutdown
- interface vlan 1
  - ◆ no ip address

# Configuration files

- ◆ Running-config
- ◆ Startup-config
- ◆ Config commands apply directly
  - Running-config changed
- ◆ Copy Running-config to Startup-config
  - Command: **write memory**
  - If used wisely, easy way to revert to earlier version
    - Copy to startup-config
    - Make changes in running-config
    - reload
- ◆ **show running-config** / **show startup-config**

# Configure replace

- Replace running-config with configuration file
- Examples
  - ◆ Revert to default configuration on rtr1  
`config replace flash:rtr1-config`
  - ◆ Download lab config to running-config on rtr1  
`config replace tftp://srv/rtr1-lab-config`
  - ◆ Download own config to running-config on rtr1  
`config replace  
ftp://<userid:passwd>@srv/myconfig`
  - ◆ Note! Connectivity to srv (=front-end)!

# Copy with ftp

Copy to/from your directory on the front-end

- ◆ `copy running-config \`  
`ftp://<username>:<password>@srv`
- ◆ `copy \`  
`ftp://<username>:<password>@srv/ \`  
`<filename> startup-config`
  - If filename omitted you are asked for one
- ◆ Only possible inside lab
  - router  $\leftrightarrow$  front/end

# Copy configs with tftp

- ◆ IP connection router – front-end required
- ◆ Commands:
  - `copy tftp://srv <startup|running>`
  - `copy <startup|running> tftp://srv`
- ◆ Files available in /tftpboot
  - temp-1.cfg
  - ...
  - temp-9.cfg
- ◆ Front-end hostname = **srv**

# Copy default config from flash:

- `Config replace flash:rtr1-config`
- **Do not copy anything to flash!!!**

# The reload command

- ◆ Reboot of router
- ◆ Overwrites running-config with startup-config
  
- ◆ To restore startup-config:
  - **copy tftp startup-config**
  - Remote host: 192.168.101.10 or srv
  - Filename: rtrn-config ( $n = 1..5$ )
- ◆ or
  - **copy flash:rtr1-config startup-config**



# In case of emergency

- **If router hangs completely only**
  - ◆ Cold restart required
- **Front-end shell command:**
  - ◆ `$ k8056 [-S | -C | -T] <router number>`
    - S = set/on
    - C = clear/off
    - T = toggle (change to the other state)
- **Not to be used if traceroute can't be stopped!**
- Report via mail when forced to use!

# Tip

- ◆ Prepare before lab!
  - Read the manuals!
  - Prepare config commands in advance
  - Use a session just to get familiar with the lab environment
- ◆ Use one window per router!
  - One ssh session per router

# Demo of booking system

- <http://www.eit.lth.se/course/etsf10>
- <https://rtrlab.eit.lth.se/>