

ETSF05 2014

The routing lab

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The Project

- Study two different routing protocols for intra domain Internet routing in two error situations
- Hands-on experience
 - ◆ configuring and managing routers
 - ◆ how to set up routing protocols
- Devided in three parts
 - ◆ Hands on
 - ◆ RIP
 - ◆ OSPF

Projektet och dess deadlines

- **2014-09-14: M1** Formering av grupper
- **2014-09-21: M2** Lära känna labbet, statusrapport
- **2014-10-05: M3** Hands on, svar på uppgifter
- **2014-11-16: M4** RIP, svar på uppgifter
- **2014-11-23: M5** OSPF, svar på uppgifter
- **2014-11-30: D1** Slutrapport

Milestones och leverabler

- Milestones:
 - ◆ Projektinternt dokument
 - ◆ Underlag för leverabel (*deliverable*)
- Leverabel/ *Deliverable*
 - ◆ Projektresultat
 - ◆ Riktat till beställare/projektägaren

Tidigare avslut

- Extra föreläsning
 - ◆ I slutet av september
- Möjligt att avsluta projektet redan under lp1 (rekommenderas)

Supervision

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

Groups of one-two

Sign up on course web

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

Need a lab partner?

- Use moodle!

How to book

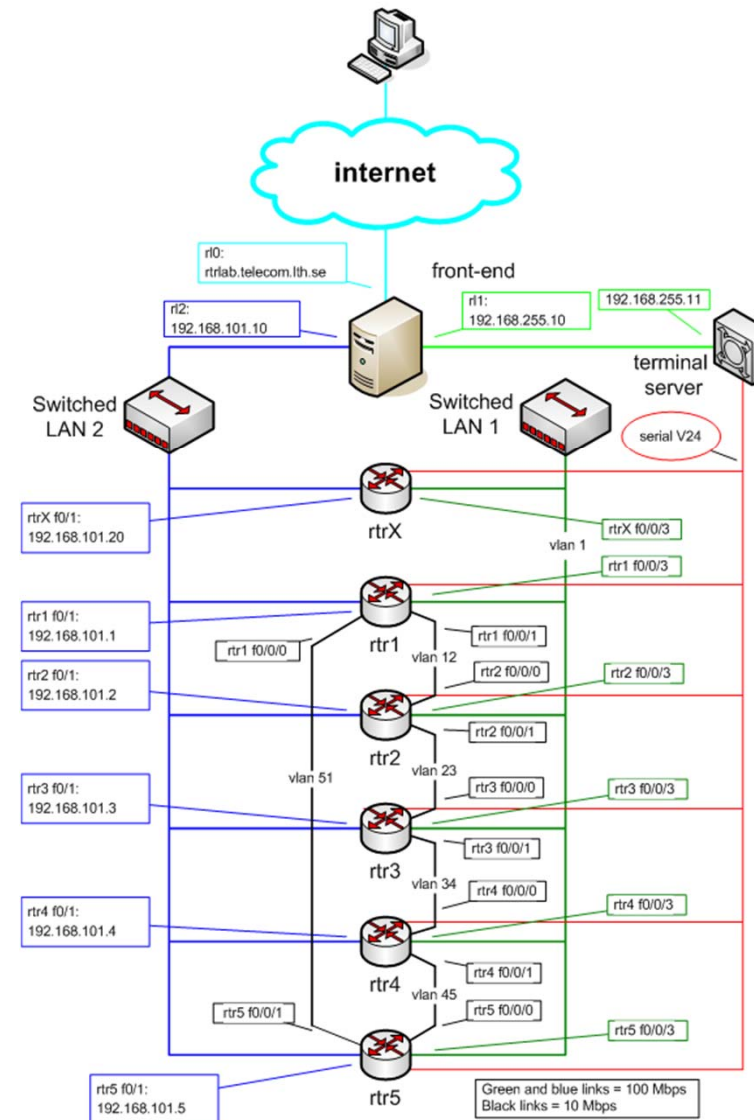
- ◆ <https://rtrlab.eit.lth.se>
 - Link found on routerlab homepage
- ◆ You can book
 - Each slot 1 hour
 - max per session = 4 slots = 4 hours
 - Extend ongoing session if free slots available
 - Slots available 24/7
- ◆ Warning before time out
- ◆ **Free unused bookings ASAP!**

Project dissemination

- Project milestones and deliverables
 - See lab manual and assignment
- 1st deadline M1: 14/9
 - Start making groups today
- Hand in via moodle.
 - PDF-format.
 - M2-M5 **Only the questions (incl points!) and answers!**
 - **All other methods discarded. Lengthy answers discarded.**
- Read more on course home page

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`

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: **w**rite **m**emory
 - 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**

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/etsf05>
- <https://rtrlab.eit.lth.se/>