

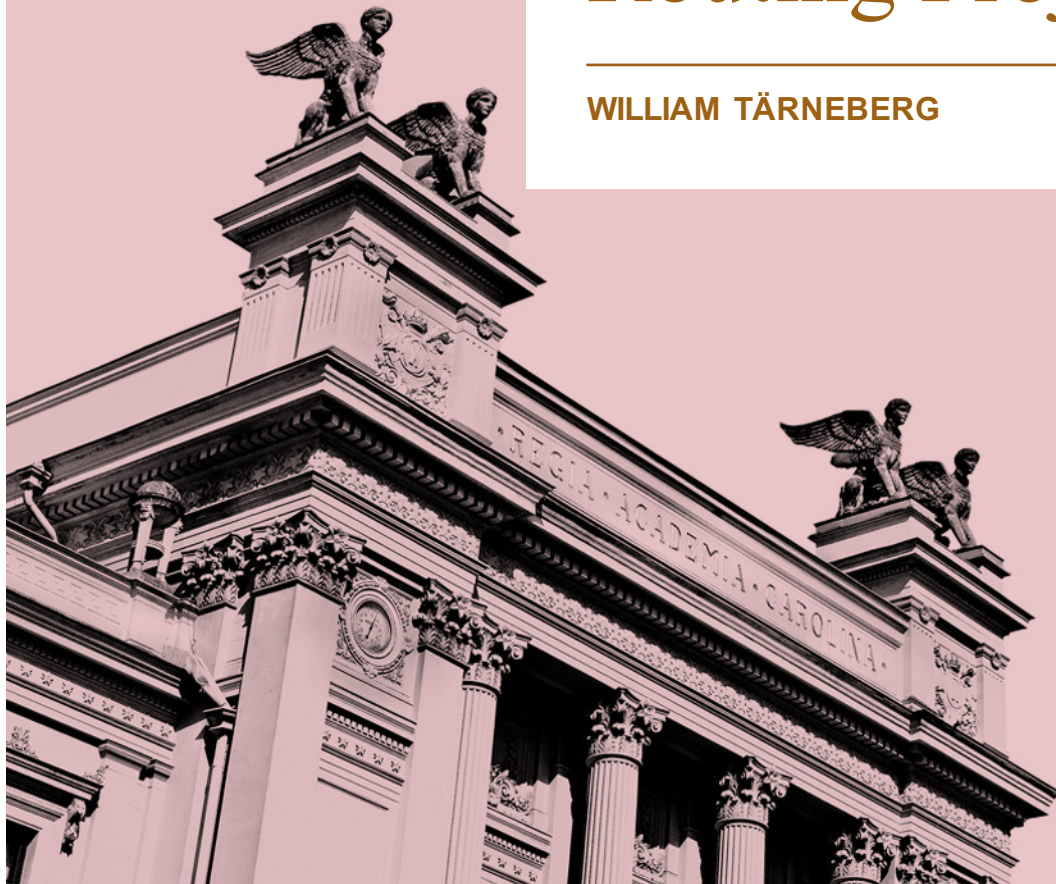


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# ETSF10 2015 Routing Project

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WILLIAM TÄRNEBERG



# The project

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- 19 tasks
- Explore two different routing protocols and observe how they deal with failures and changes in the network.
- **First phase – Getting familiar with it all**
  - Configure the routers and the lab environment
  - Configure the routing protocols
- **Second phase – Experimentation**
  - RIP (Routing Information Protocol)
  - OSPF (Open Shortest Path First)



# Groups of two

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Register on the course web page

Shortly thereafter you will receive one set of username and password for your group

One report



# Supervision

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- Supervisors
  - William Tärneberg
  - Jens Andersson
- Open-office: See website
- E-mail for support, see format on website
- E-mail to book a time if you need hands-on support outside of office hours



# Submission

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- **Deadline - December 11 2015**
- Submit through elearning.eit.lth.se (a.k.a. Moodle)
  - PDF-file
  - File name: ETSF10-15-[Group number] :  
*e.g. ETSF05-15-14*
  - **Your answers must include the question and the maximum score for that question.**
  - **All other formats are rejected**



# How to reserve the lab

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- Reserve at: <https://rtrlab.eit.lth.se>
- 24 slots in a day.
- Policy:
  - Reserve 4 slots concurrently
  - Use or cancel slots to make new reservations
  - Book consecutive slots as you consume them.



# Warning before you are kicked out

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**While in the lab, you will be warned before your reservation ends.**

**WARNING!**

Your booked session will END in 15  
(FIFTEEN) minutes.

Remember to save all your work, since you  
will be FORCIBLY disconnected  
at the end of this session.

(You can prevent this by booking the next  
session, if it is available.)



# The lab environment

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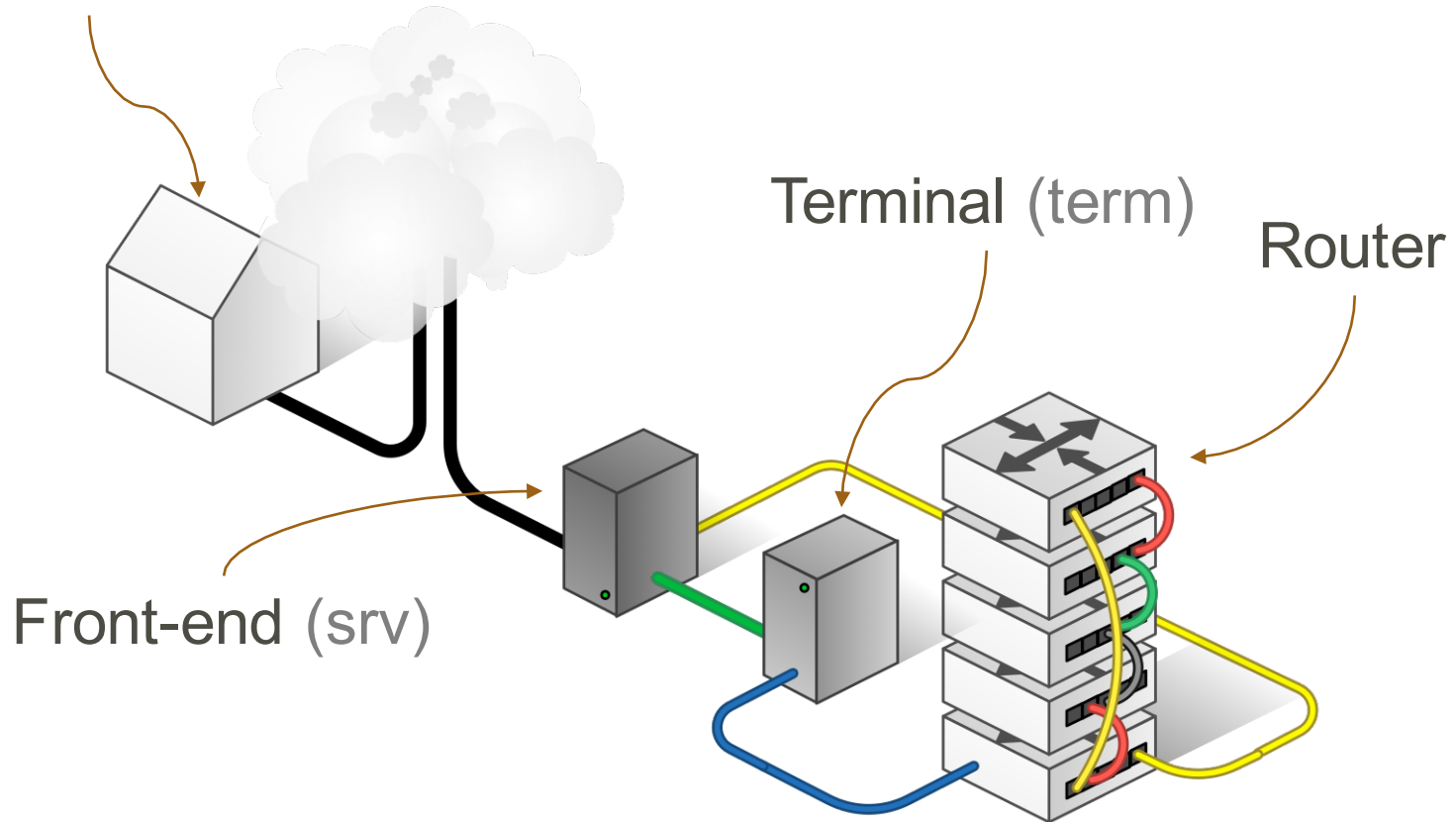




# The lab environment

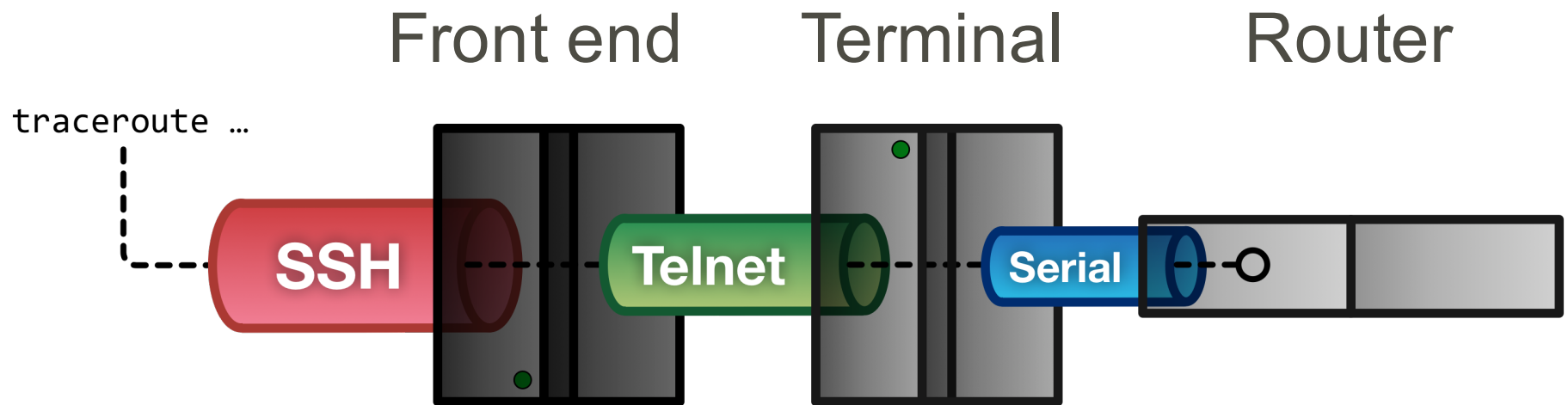
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Student



# Accessing the lab

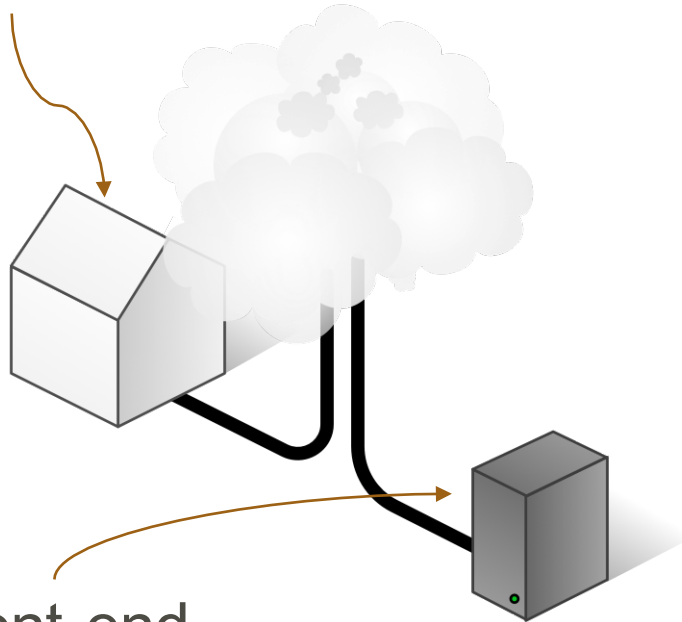
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# Student to Front end - SSH

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Student



Front-end

- Point of entry to lab
- SSH (Putty for Windows)
- `rtrlab.eit.lth.se`
- User name
- Linux terminal
- Exit to leave

```
ssh <username>@rtrlab.eit.lth.se
```

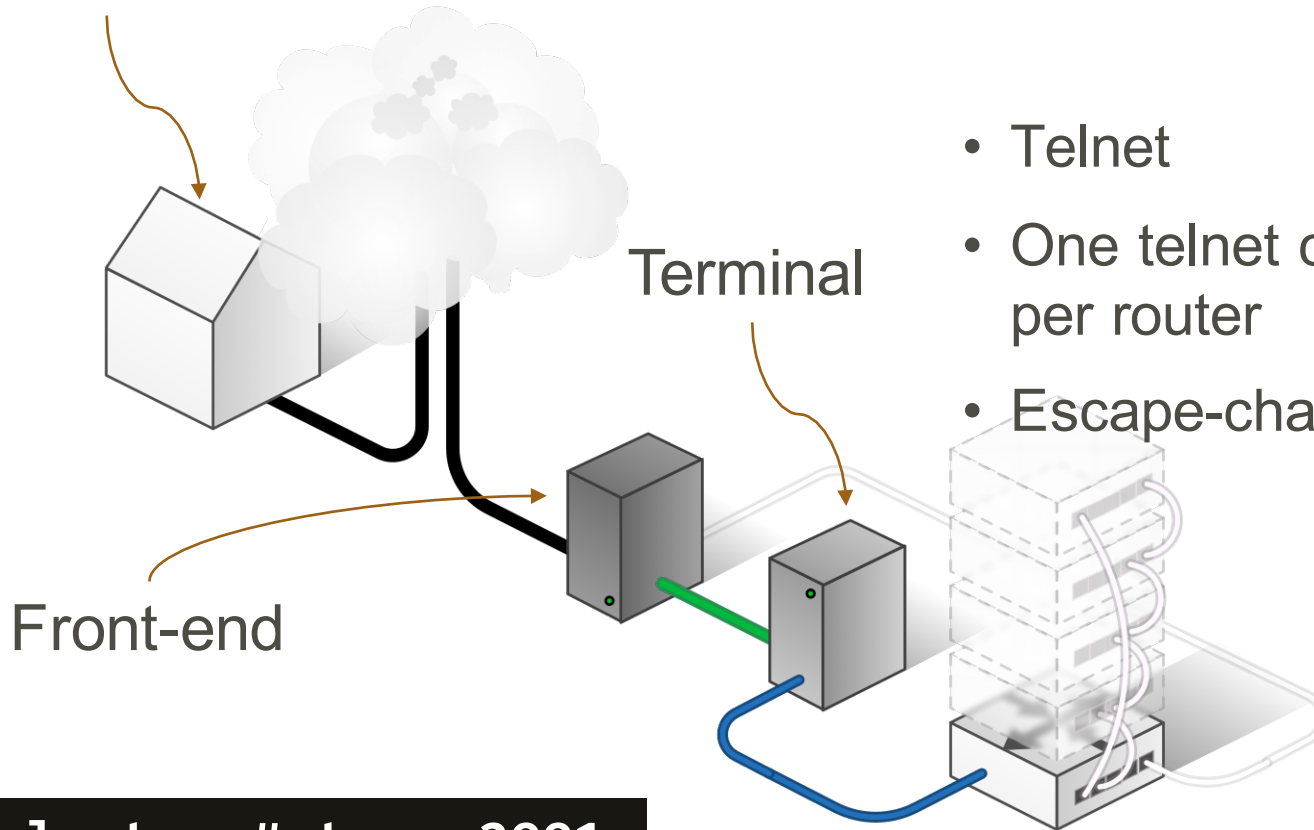


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# Front-end to Terminal - Telnet

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Student



- Access the routers
- Telnet
- One telnet connection per router
- Escape-character

```
telnet -e# term 2001
```

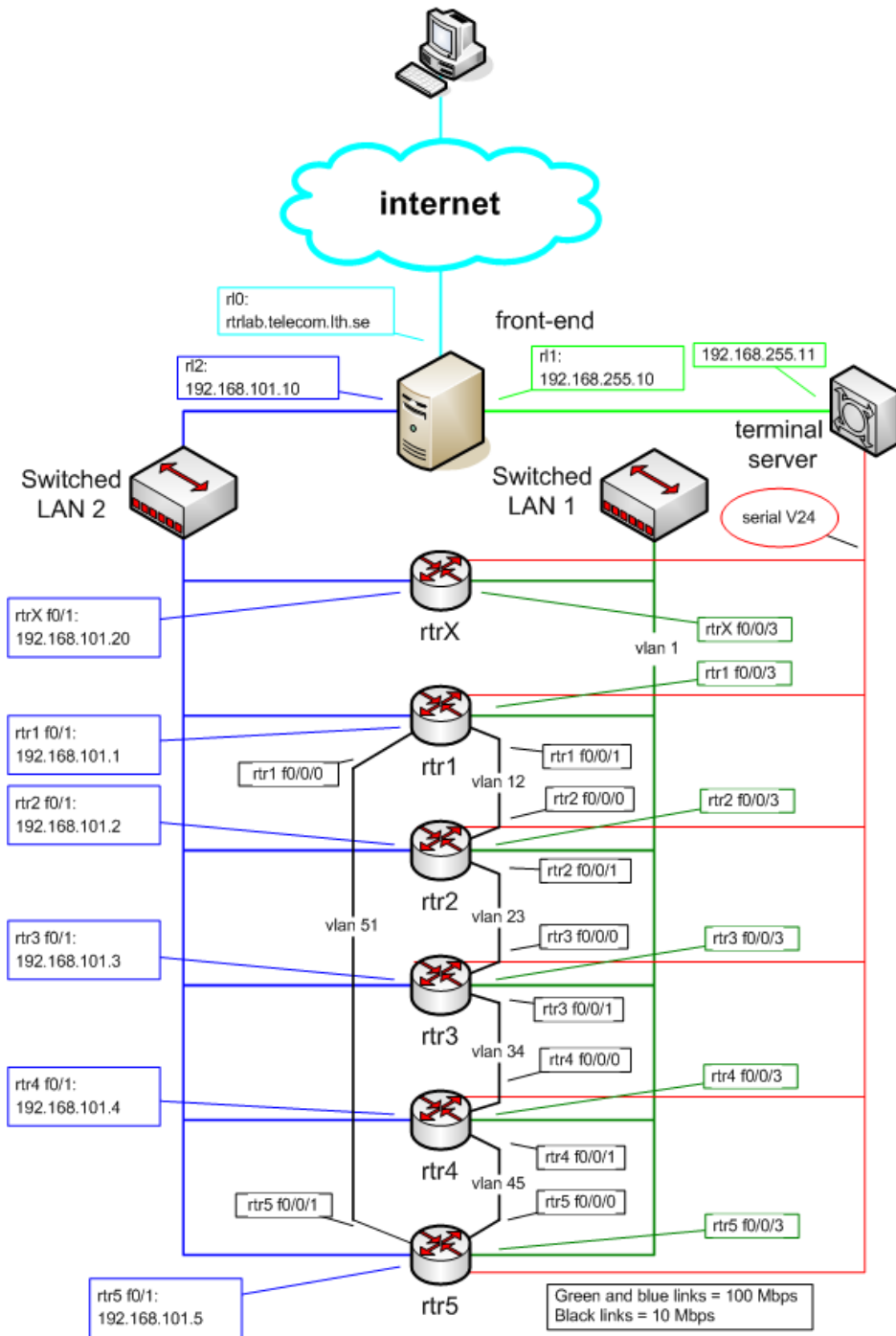


# On port per router

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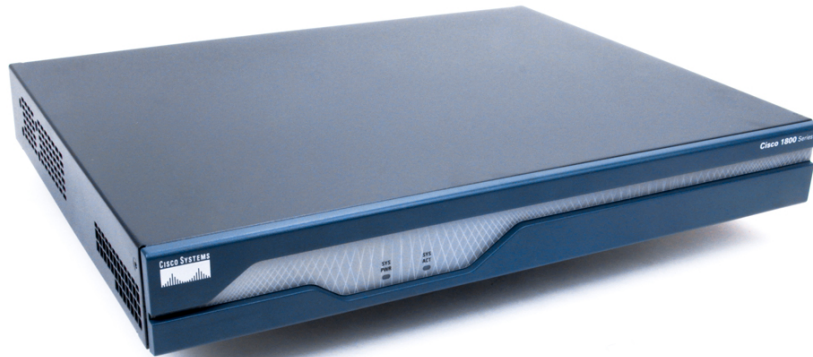
- rtr1 = TCP port 2001
- rtr2 = TCP port 2002
- rtr3 = TCP port 2003
- rtr4 = TCP port 2004
- rtr5 = TCP port 2005





# The routers

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- Cisco 1841
- IOS version 15



# Router interfaces: Two types

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- "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





# Using the lab environment

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# IOS CLI: Modes

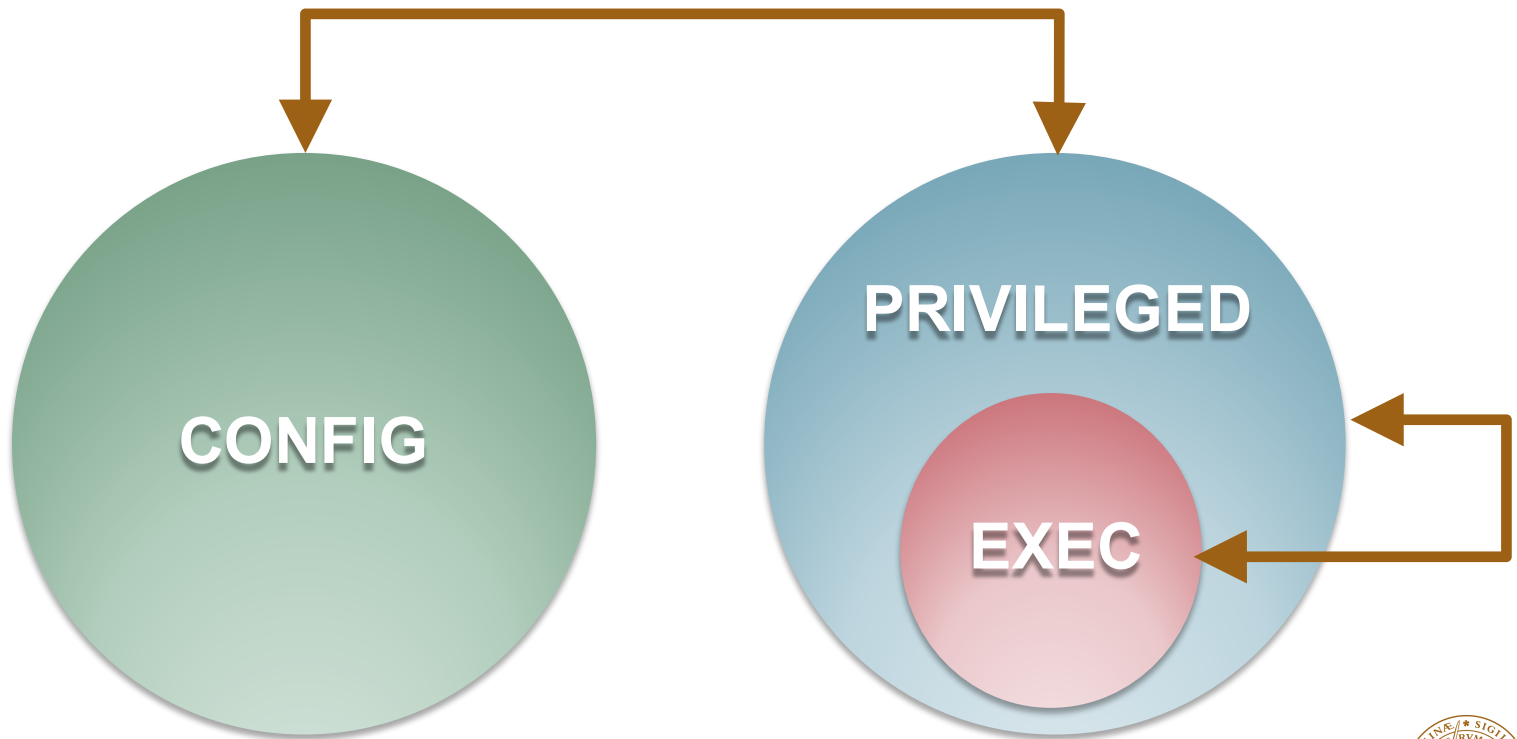
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- EXEC
  - Limited access
  - `rtr>`
- PRIVILEGED
  - All Access
  - `rtr#`
  - Activate: enable  
password: enable
  - Deactivate: disable
- CONFIG
  - Activate: `config terminal`



# IOS CLI: Modes

---



# The show command (EXEC)

---

- **show interface** <if name>
- **show ip interface**
- **show ip interface brief**
- **show cdp neighbor**
- **show running-config** (PRIVILEGED)



# Ping and Traceroute (EXEC)

---

- **ping <remote host>**
  - Exampel: **ping srv**
- **traceroute <remote host>**
  - Very long timeout
  - Cisco esc seq Ctrl+Shift+6 + x
  - Introduce escape character
    - » terminal escape-character <0-255>
    - » Example: terminal escape-character 64 ->@



# The debug command (PRIVILEGED)

---

- Activate debug:
  - **Debug <cdp|ip...>**
- Enable debug output:
  - **terminal monitor**
- Deactivate debug:
  - **no debug all**



# CONFIG

## Overview

---

### On-line configuration

- Accessible from PRIVILEGED mode
- Activate:
  - `config terminal`
- Revert to PRIVILEGED mode:
  - `exit`  
`ctrlZ`



# CONFIG

## On-line interface configuration

---

- **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

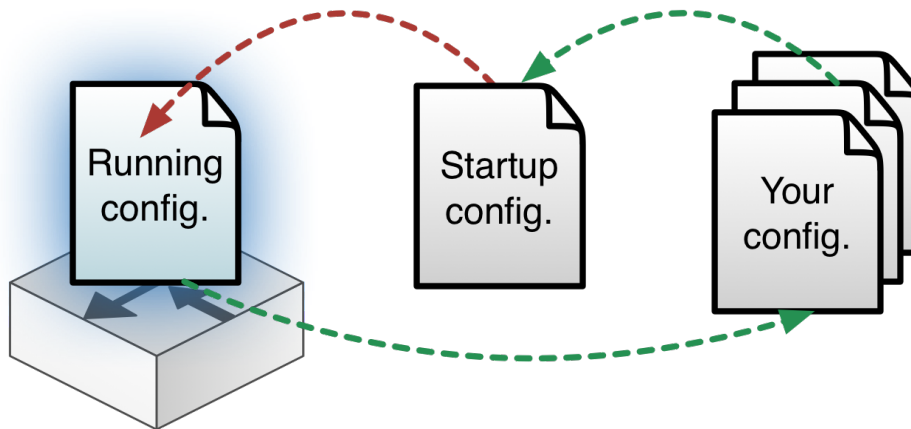




# Configuration files

## Overview

---



```
show running-config  
show startup-config
```

### **RUNNING-CONFIG**

On-line

Changes made in CONFIG-mode are directly made to RUNNING\_CONFIG

### **STARTUP-CONFIG**

Activated after restart

Own configuration file in /tftpboot under your home directory



# Configuration files

## Revert

---

```
config replace  
flash:rtr1-config
```

```
config replace  
tftp://srv/rtr1-lab-  
config
```

```
config replace  
ftp://<userid:passwd>@s  
rv/myconfig
```

- Revert to the default configuration from flash
- Revert to default configuration on front-end over TFTP
- Revert to default configuration on front-end over FTP



# Configuration files

## Copy and backup

---

```
copy running-config  
\ftp://<username>:<pass  
word>@srv
```

```
copy \  
ftp://<username>:<passw  
ord>@srv/ \  
<filename> startup-  
config
```

- Copy RUNNING-CONFIG to your home directly on front-end over FTP
- Copy your configuration file from your home directly on front-end to RUNNING-CONFIG over FTP

*(How to resume a lab)*



# Konfigurationsfiler

Kopiera till front-end

---

```
config replace  
flash:rtr1-config
```

```
config replace  
tftp://srv/rtr1-lab-  
config
```

```
config replace  
ftp://<userid:passwd>@s  
rv/myconfig
```

- Återgå till default-konfigurationen
- Med en fil från front-end-servern över TFTP
- Med en fil från front-end-servern över FTP



# If “something” is not working

---

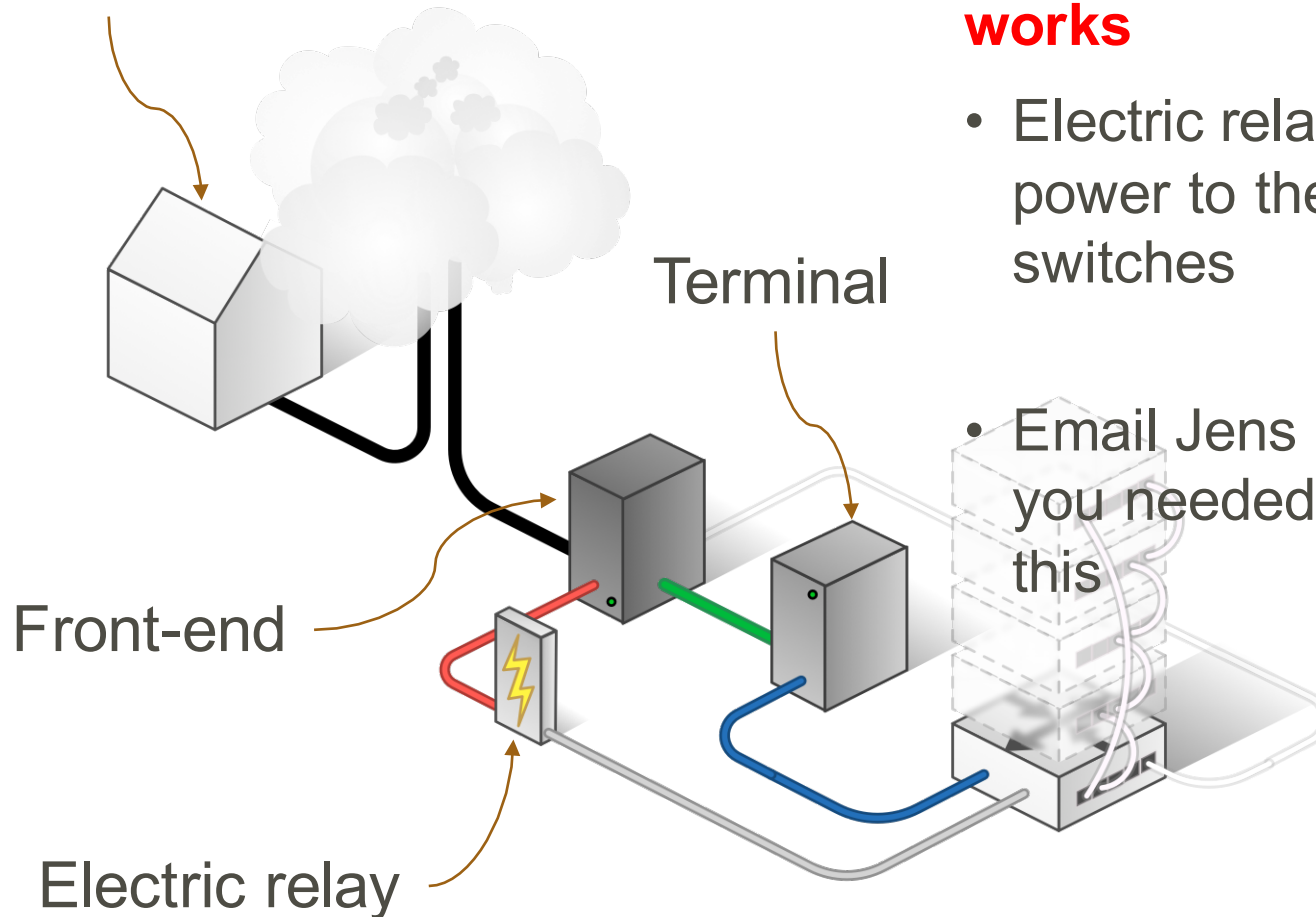
- Review which commands you just entered
- Restart the routers
  - **reload**
- Revert to default configuration
  - **copy flash:rtr1-conf startup-config**
  - **copy tftp startup-config**



# If something goes horribly wrong

---

Student



**ONLY if nothing else works**

- Electric relay do cut power to the switches
- Email Jens and me if you needed to do this



# Electric relay

---

From the front-end server:

```
k8056 [-S|-C|-T]<router number>
```

S = set

C = clear

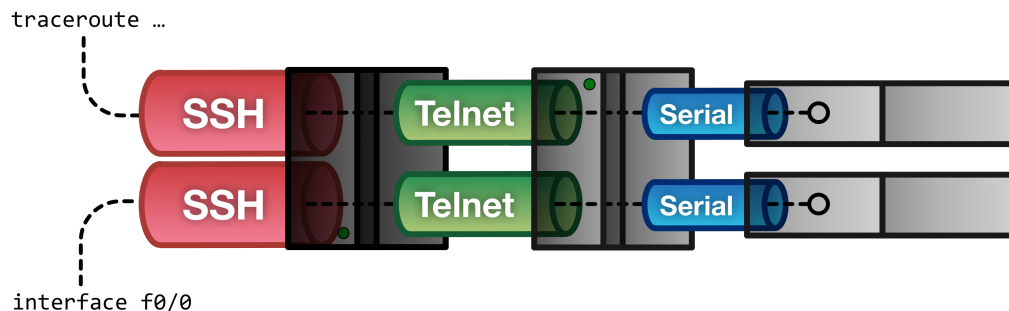
T = toggle



# Tips

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- The assignments cannot be completed in just 4 hours.
- You need to be thoroughly prepared
- Dont misspell the commands:
  - Translating "**enable**"...domain server (255.255.255.255)
- Use multiple SSH connections, from one computer, to access multiple routers.





# Tips

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- **Shorts**

- term = terminalen. *Instead of 192.168.255.11*
- srv = front-end. *Instead of 192.168.101.10*

- **Mode**

- EXEC: `rtr1>`
- PRIVILEGED: `rtr1#`
- CONFIG: `rtr1(config..)#`

- Command completion (Tab): sh -> show



# Clean up

---

- Save your configuration files
- Restore the default configuration on all routers
- Disconnect all connections properly



# How to proceed

---

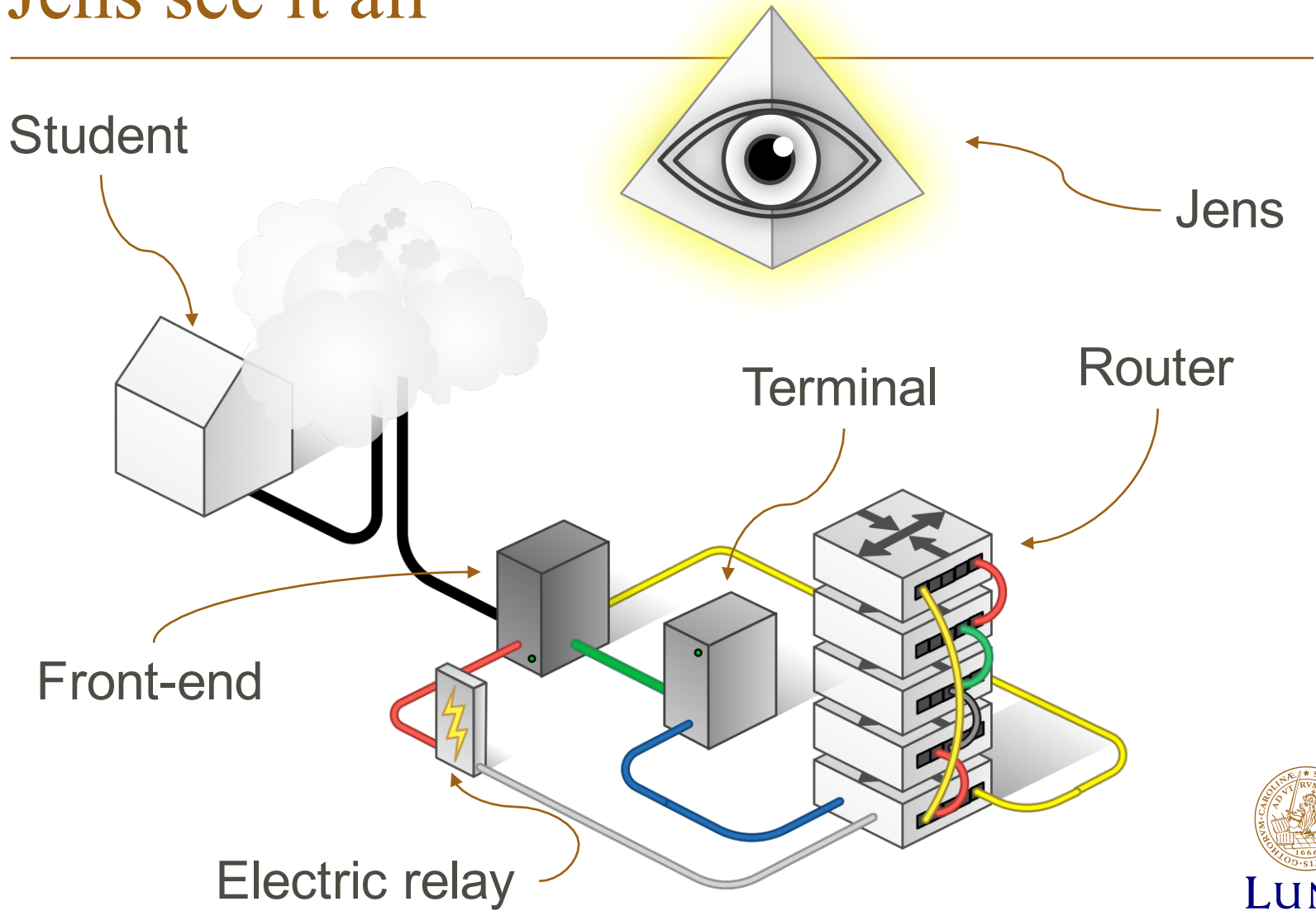
## 1. Reference Guide to the Router Lab

- Lab Layout
- Cisco Router Configuration Tutorial
- Cisco IOS 15.0M Resources
- Cisco IOS 15.0M Command referenc
- How to configure IP addresses
- How to configure RIP (see the required steps)
- How to configure OSPF
- How to configure BGP
- Cisco 1800 Series Integrated Services Routers

## 2. Lab manual and assignment for ETSF10



# Jens see it all



**Deadline - December 11 2015  
= 5 weeks from NOW**





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