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ETSF10 2018
Routing Project

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The project

- **Objective: compare routing protocols in different error conditions**
- **First phase – Getting familiar with it all**
  - Configure the routers and the lab environment
- **Second phase – Experimentation**
  - Explore two different routing protocols and observe how they deal with failures and changes in the network.
- **Challenges**
  - Study/Learning on your own material needed for the project
  - Typical engineering task

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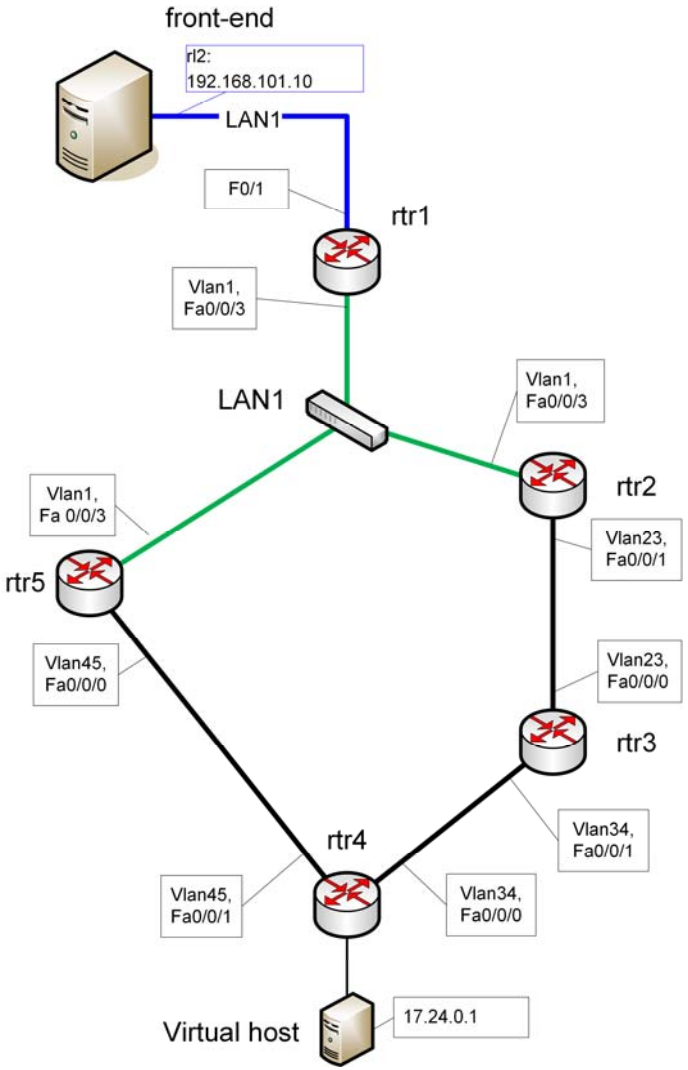
The task



Study

- Two routing protocols
  - RIP
  - OSPF
- Two different error conditions
  - Loss of Link
  - Loss of Neighbour
- Both **failure onset** and **recover to normal conditions** of interest

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Routing protocols

- Routers in a decentralised control plane network have to
  - Learn the outline of the network
    - » Information from other routers
  - Calculate best paths
    - » Two principles
      - Distance Vector (RIP)
      - Link State (OSPF)
  - Forward packets accordingly

Project Documents: Milestones and Deliverables

- Milestones:
  - Project internal documents
  - Base for deliverables
  - Aimed for the project itself
  - In our case: Base for discussion with the supervisor
- Deliverables
  - Project external document
  - Project results
  - Aimed for the project stakeholder

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Deadlines

Date (approx.)	Document	
2018-11-08	M1	Forming of groups
2018-11-18	M2	Get to know the lab
2018-11-25	M3	Hands on
2018-12-02	M4	RIP
2018-12-09	M5	OSPF
2018-12-16	D1	Final report

For current deadlines see moodle.

It is of course perfectly ok to submit before deadlines

Supervision

- Supervisor
  - Jens Andersson
- E-mail
- Telephone/SMS/WhatsApp 0705-284725
- E-mail to book a time if you need hands-on support
- Open-office?
  - If needed
  - Video conferens (Zoom?)?

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Submission

- M1
  - Start forming groups now.
  - Submission via mail to supervisor
- M2-M5
  - Submit through elearning.eit.lth.se (a.k.a. moodle)
  - **Your answers must include the text for that question.**
  - **Avoid screen dumps! Your own words!**
  - **All other formats are rejected**

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Submissions (cont…)

Final report (D1)

- **Individual assignment!!**
- A comparison of distance vector and link state based routing protocols in two different error situation
- Based on your observations (mainly milestones M4, M5)
- Submit to moodle AND Urkund (plagiarism detection system, see http://www.urkund.se)

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Register groups

1. ~~Enroll to the course instance at elearning.eit.lth.se (moodle)~~
2. Mail to jens_a.andersson@eit.lth.se
   - The mail **must contain**
     - Line 1 (one line): Gorup members full name:
       Given_name1 Sirname 1<space>;<space>given_name2 sirname2
     - Line 2 (one line): Group members full mail addresses:
       Mail1<space>Mail2
   - Example:

John Doe ; Jane Roe
john@test.com jane@test.com

Note! Used only characters A-Z, a-z, 0..9, -_

Group registrations not following this outline will not be accepted.

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How to book the lab

- Book at: https://rtrlab.eit.lth.se
  - Use VPN if outside of campus
- 24 slots in a day.
- Policy:
  - You can reserve up to 4 slots concurrently
  - Use or cancel slots to make new reservations
  - Book consecutive slots as you consume them.
- Warning message when 15 minutes left

- On moodle: Video on how to book the lab

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Warning before you are kicked out

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.)
```

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The lab environment

The lab - IRL

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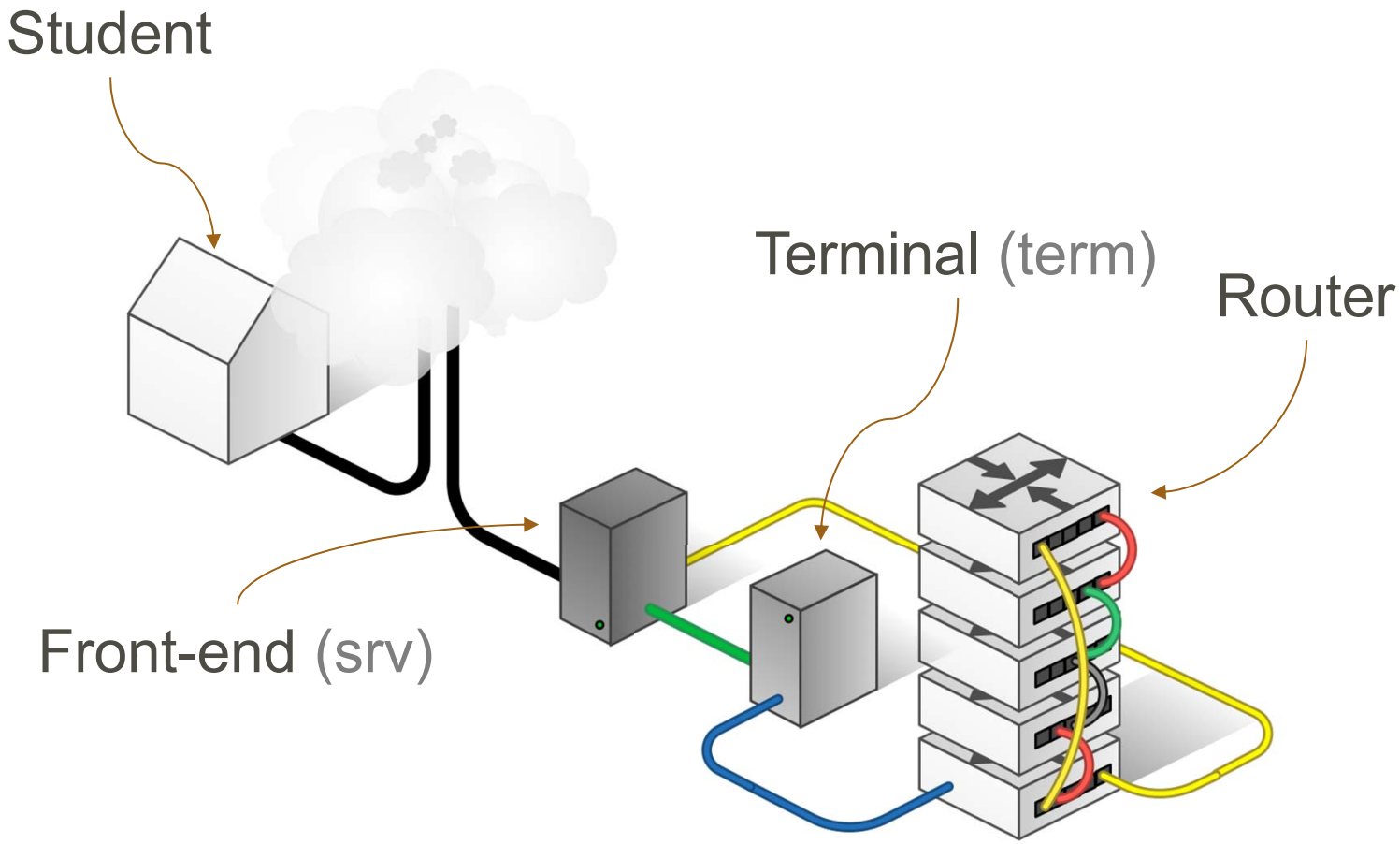
The lab environment



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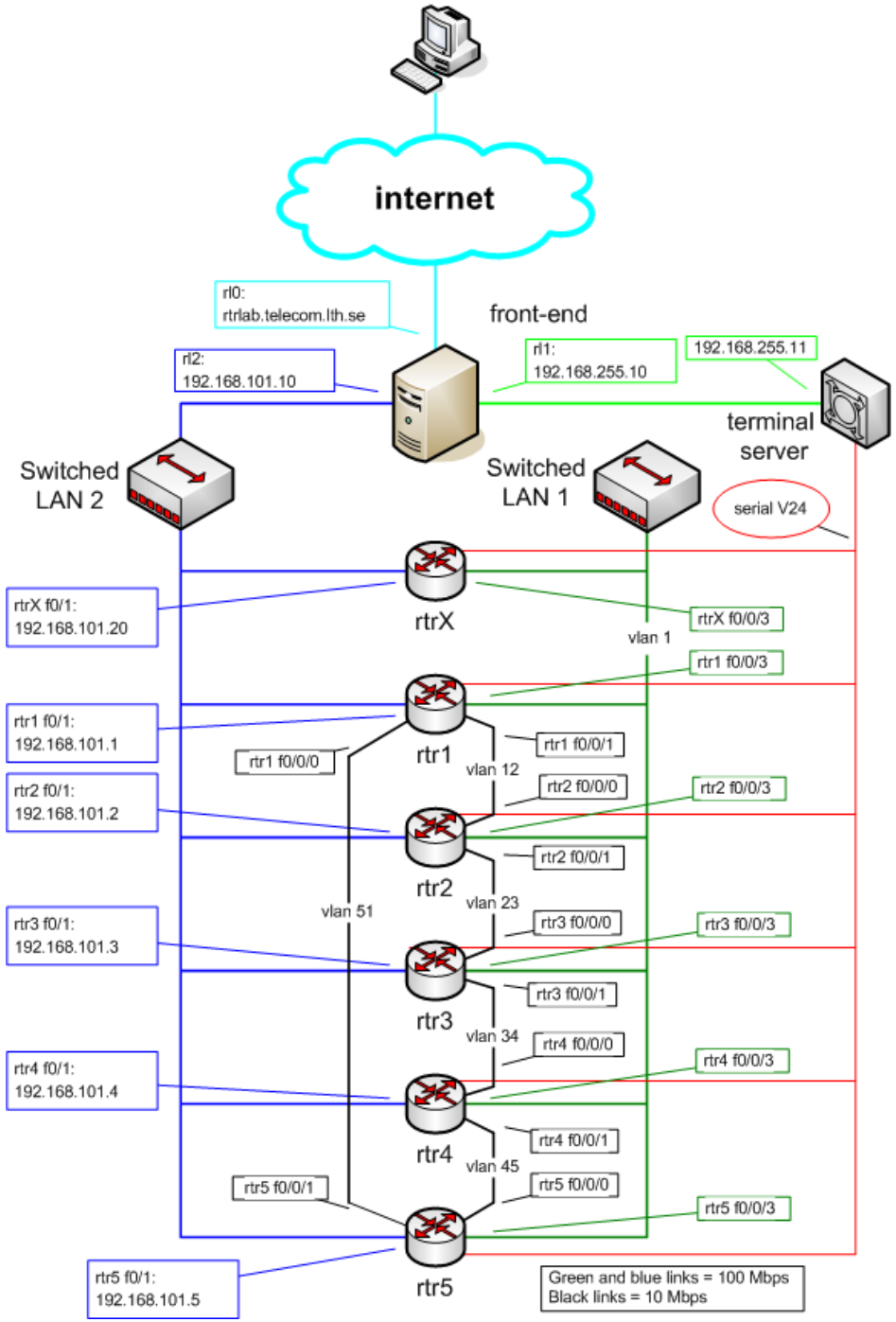

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The Front-End

- Unix (OpenBSD)
- Only Command Line Interpreter (CLI)
- Help with commands:
  - Man pages
  - man cp
- Some commands:
  - Ctrl'd to log out
  - **`cd`** change directory
  - **`cp`** copy files
  - **`mv`** rename/move files
  - **`rm`** delete files

On moodle: Video on Shell and CLI

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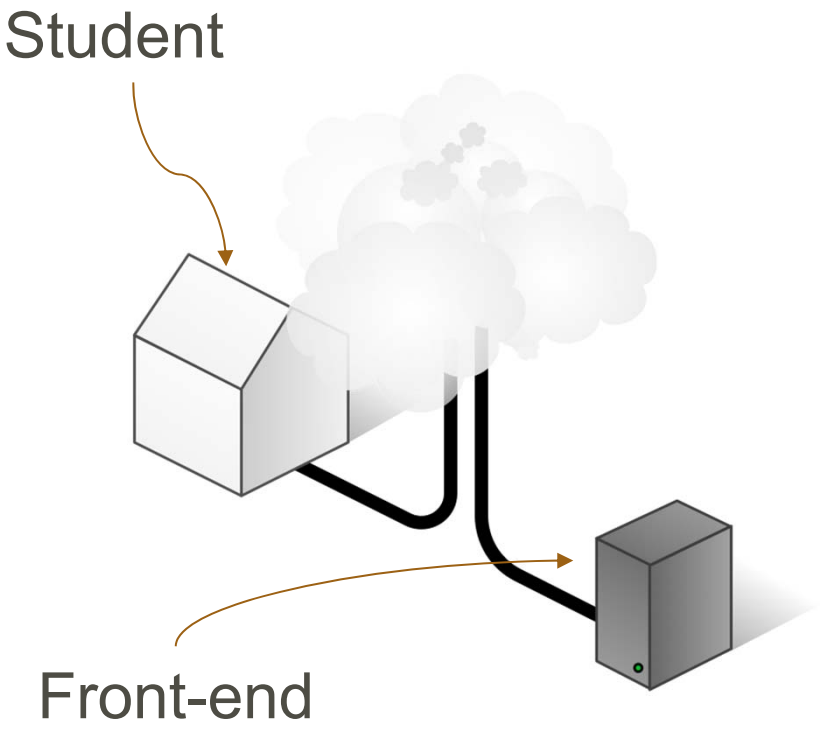
Student to Front end - SSH



- 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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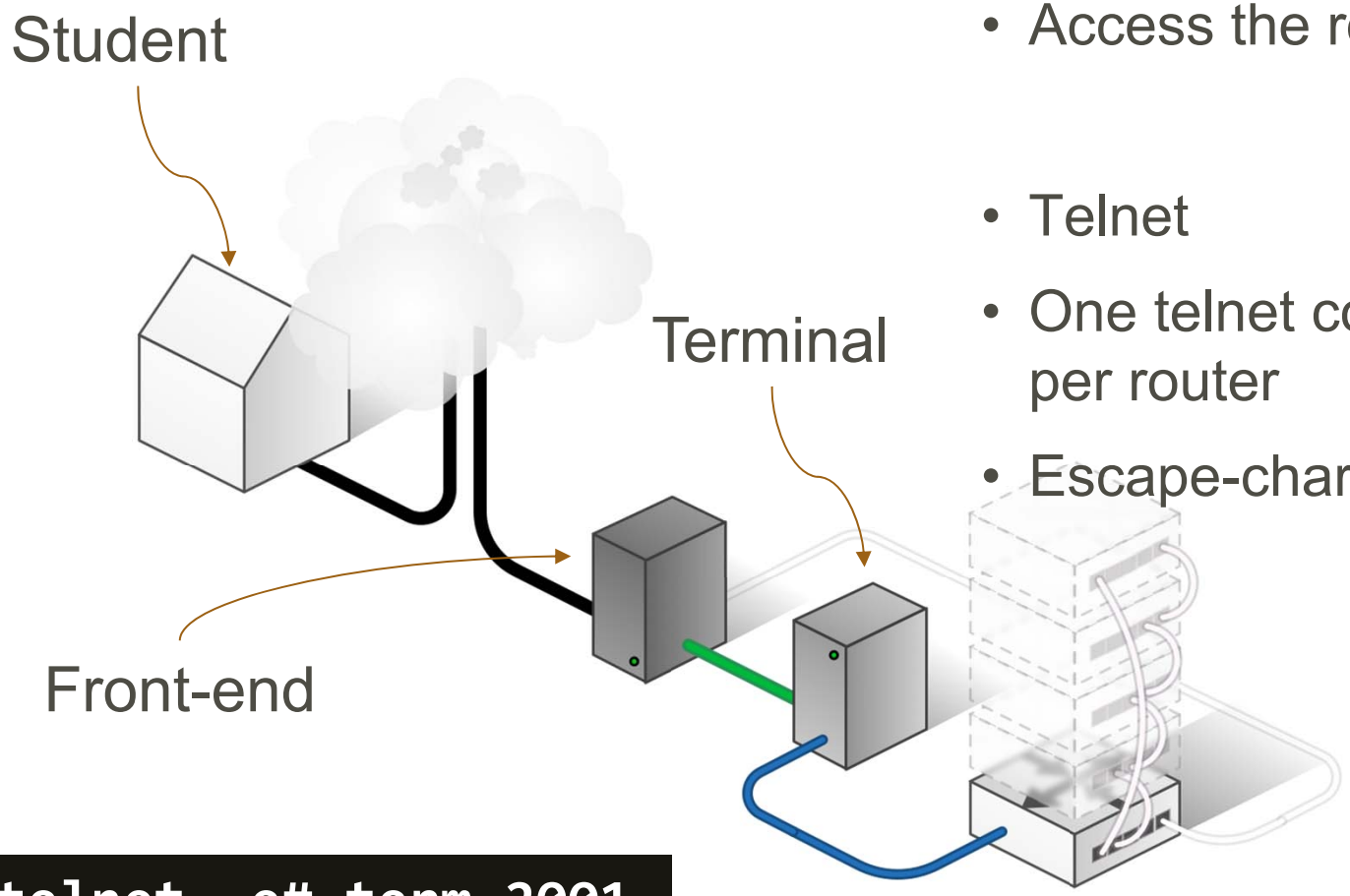
Front-end to Terminal - Telnet



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

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

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One TCP port per router

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

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Router interfaces: Two types

- ”Normal” (compare with your computer)
  - `f0/<n>`
  - 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

On moodle: Video on the lab and the routers

Understanding the lab environment

IOS CLI: Modes

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

On moodle: Video on Cisco IOS CLI, and also on the configuration files.

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Some show command (EXEC)

- **sh**ow **cdp nei**ghbor
- **sh**ow **in**terface <if name>
- **sh**ow **ip int**erface
- **sh**ow **ip int**erface **br**ief
- **sh**ow **ip ro**ute
- **(sh**ow **run**ning-config (PRIVILEGED)**)**

Ping and Traceroute (EXEC)

- **`ping <remote host>`**
  - Exampel: `ping srv`
- **`trace`**`route` **`<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 (PRIVILEDGED)

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

CONFIG

Overview

On-line configuration

Commands active immediately when entered!

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

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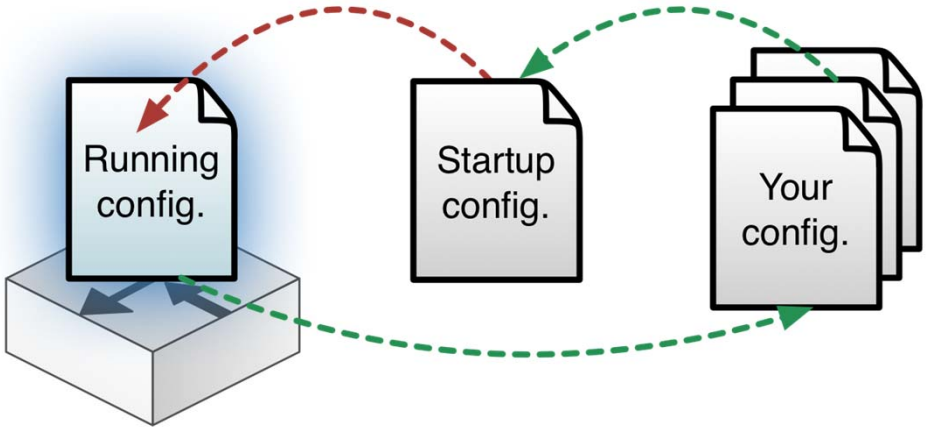
CONFIG

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



RUNNING-CONFIG
On-line

Changes made in CONFIG-mode are directly made to RUNNING_CONFIG

STARTUP-CONFIG
Activated after restart

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

Own configuration file in `/tftpboot` under your home directory

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Configuration files

Revert

```
config replace
flash:rtr1-confg


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


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

- Revert to the default configuration from flash
- Revert to lab configuation on front-end over TFTP
- Revert to defalt configuation on front-end over FTP
- Tftp and ftp requires working path to srv!

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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 configration file from your home directly on front-end to STARTUP-CONFIG over FTP

(How to resume a lab)

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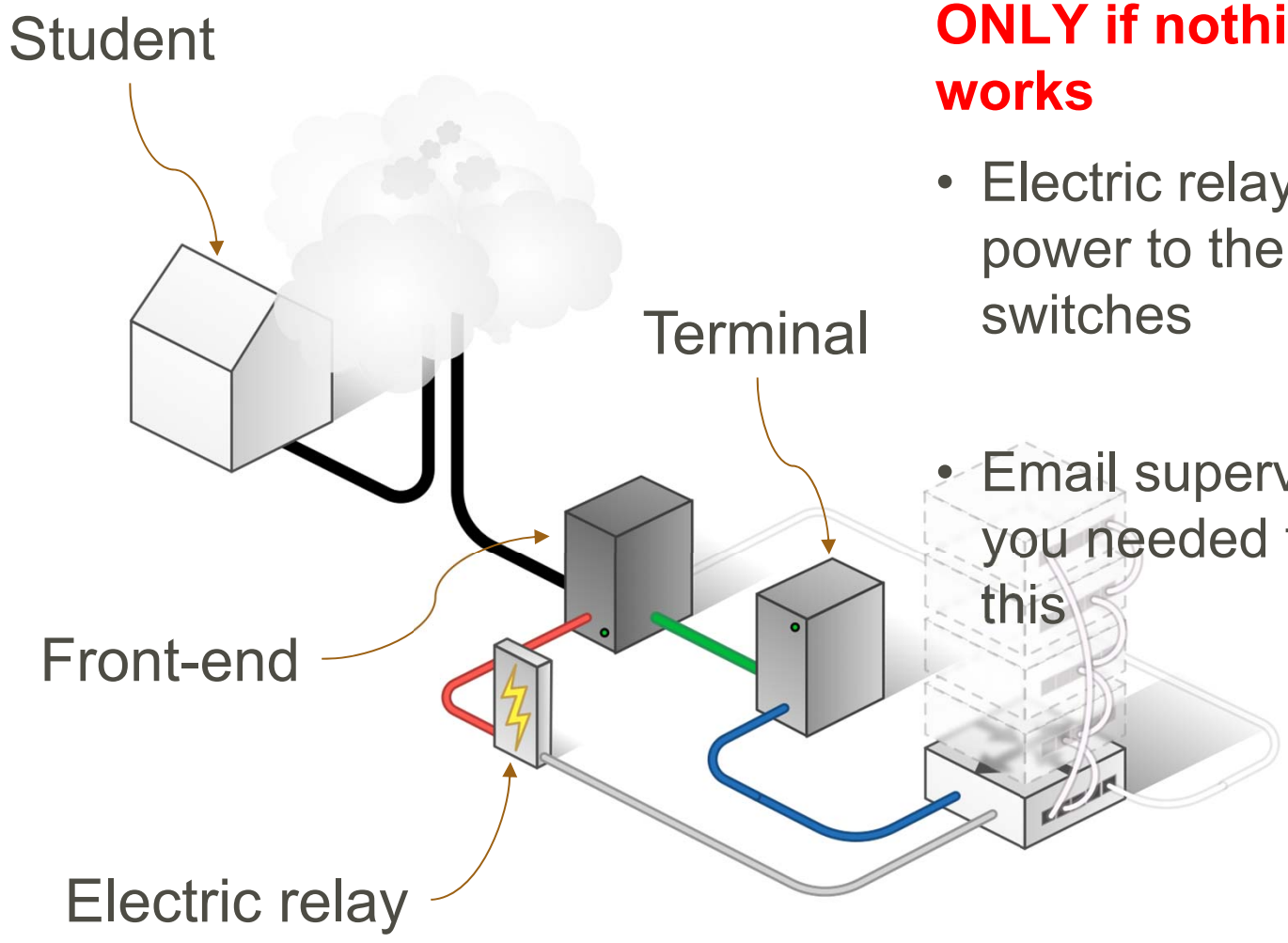
If configuration is not working

- Review which commands you just entered
- Revert to a working config
  - **config replace**
- Restart the routers
  - **reload**
- Revert to default configuration and restart
  - `copy flash:rtr1-conf startup-config`
  - `reload`

On moodle: Video on trouble shooting and solving

If something goes horribly wrong



ONLY if nothing else works

- Electric relay do cut power to the switches
- Email supervisor if you needed to do this

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Electric relay

From the front-end server:

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

S = set
C = clear
T = toggle

Have patience!

- Cold start takes time.
- Long periods with no print out on the console

K8056 is not the cure for this!

```
Trying 192.168.255.11...
Connected to term.
Escape character is '#'.
Connection closed by foreign host.

/home/group $ killalltelnet

<enter your group's password>
```

- Check the video on trouble shooting and solving.

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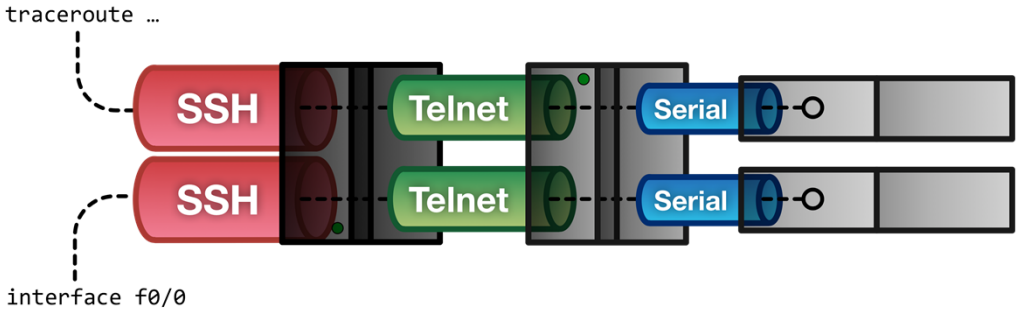
Tips

- The assignments cannot be completed in just 4 hours.
- You need to be thoroughly prepaird
- Don’t rely on eduroam
- Don’t misspell the commands:
  - `Translating "enabel"...domain server (255.255.255.255)`
- Use multiple SSH connections, from one computer, to access multiple routers.



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Tips

- **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 completetion (Tab): sh -> show

Warning!

Never, ever, copy anything to flash:

Clean up

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

Tips from the coach

- Read the Reference Guide and check the videos on moodle
- Read and understand the lab manual **before** you access the lab
  - If in doubt ask the supervisor before you access the lab
- Practise linux/cli if you lack experience
- Discuss with the supervisor
  - Mail
  - Telephone/SMS/WhatsUp

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