Redes de Computadores (RCOMP) – 2016/2017

Project 1 proposal

• Structured cabling systems project. • Layer 2 network devices configuration. • IPv4 networks dimensioning and static routeing. • Cisco routers configuration.	• Cisco Packet Tracer Student network simulation tool.

General terms for carrying out the project

- Implemented by a group of 3 or 4 students, they all must belong to the same PL class.

- Partially carried out in laboratory classes, however, significant extra classes work is required.

- Organized in three sprints, each ending up with a scheduled submission to be assessed.

- First submission - Structured cabling. Due until **March 12**, at 23.55.

- Second submission - Layer two. Due until **March 19**, at 23.55.

- Third submission - Layer three. Due until **March 26**, at 23.55.

- Submissions are made on the Moodle service. Once deadlines expire, submissions are blocked.

- Students with special status are allowed to make either all or some submissions until June 11, at 23.55.

- The first submission is a written project report, it should be submitted in PDF format, using the filename:

{PL Class}_{Student Number}_{Student Number}_{Student Number}[_{Student Number}].pdf

, e.g. **2DE_1022222_1033333_1044444_1055555.pdf**

- Second and third submissions will also include the Packet Tracer Student saved file. These submissions should be in ZIP format, using the filename:

{PL Class}_{Student Number}_{Student Number}_{Student Number}[_{Student Number}].zip

, e.g. **2DE_1022222_1033333_1044444_1055555.zip**

- Project 1 final assessment is dependent on the mandatory presentation to be held in the second PL class on the week after the third submission (all group members must attend).

- Students with special status submitting after the normal deadline, will have their presentations scheduled subsequently by the PL teacher.

- Students with special status, and wishing to take advantage of the extended deadline, must settle separate groups. They can never integrate groups with members without special status.

Project´s summary

Given a physical context with schematic plans of buildings and a set of client provided requirements, the project should result in the following products: **three written reports and two network simulations**.

1. First submission items

1.1. Written report

Structured cabling system project, including outlets and cross-connects deployment plan, cable pathways plan and hardware inventories. All calculations and technical decisions justifications should be included.

2. Second submission items

2.1. Written report

Required layer two and layer three devices specification (inventories). Layer two devices configuration. Including VLANs and access-points 2.4 GHz band channels.

2.2. Network simulation

Layer two Packet Tracer Student simulation. Including required VLANs, VTP and STP.

3. Third (and final) submission items

3.1. Written report

IPv4 networks' addresses and static routeing tables. Layer three devices configuration.

3.2. Network simulation

The full project (layers two and three) Packet Tracer Student simulation. Including all routers and IPv4 networks, DHCP service for all users' networks, static routeing and VoIP telephony services. **Every node must be able to communicate with any other node.**

Relative weights on Project 1 assessment	
1.1. Written Report (Structured Cabling Project)	**35%**
2.1. Written Report (Layer two infrastructure)	**10%**
2.2. Network Simulation (Layer two)	**10%**
3.1. Written Report (Layer three)	**15%**
3.2. Network Simulation (Layer three)	**30%**

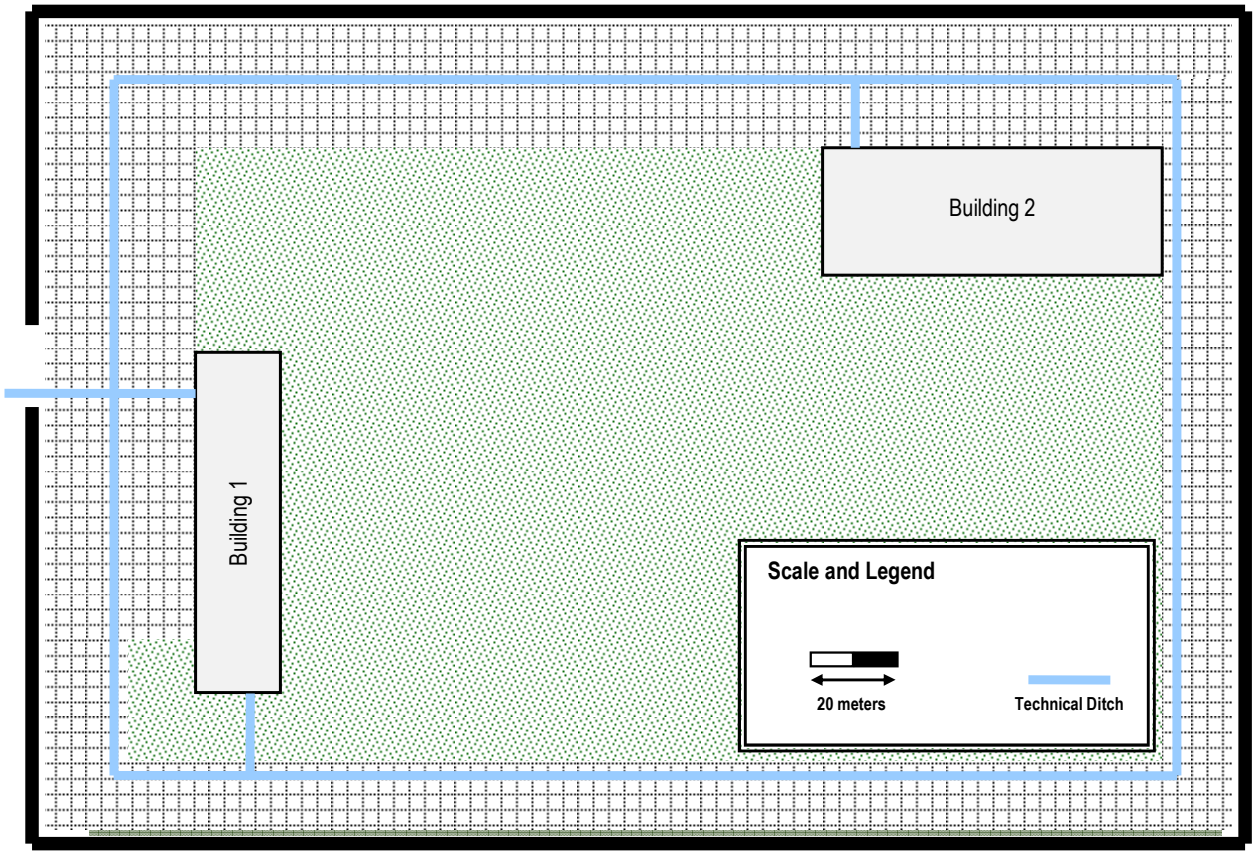
1. On scale buildings deployment plan

- The organisation complex is made up of two buildings within a private closed area, designated as Building 1 and Building 2.

- The plan below also shows a road circling the buildings. The road is provided with an underground technical ditch (in light blue) connected to buildings and provided with cable raceways suitable for telecommunications cabling.

- Building 1 horizontal dimensions are, approximately, 80 x 20 meters, it has three floors.

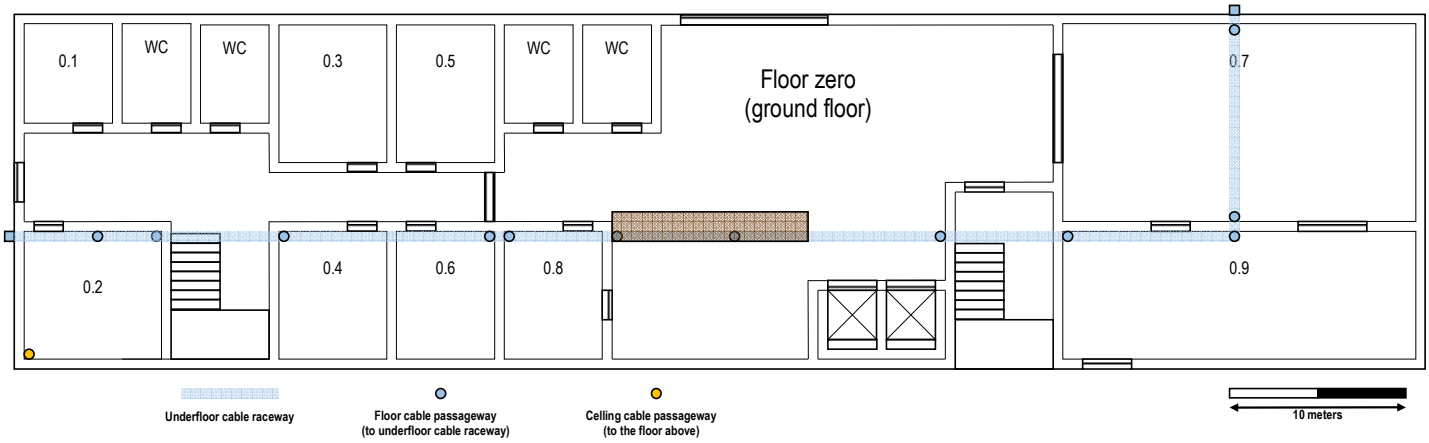
- Building 2 horizontal dimensions are, approximately, 80 x 30 meters, it has two floors.



2. On scale Building 1 plans

2.1. Floor zero (ground floor) plan

Unlike other floors on this building, the ground floor holds an underfloor cable raceway connected to the external technical ditch. Access to the underfloor cable raceway is available at points marked over the plan.



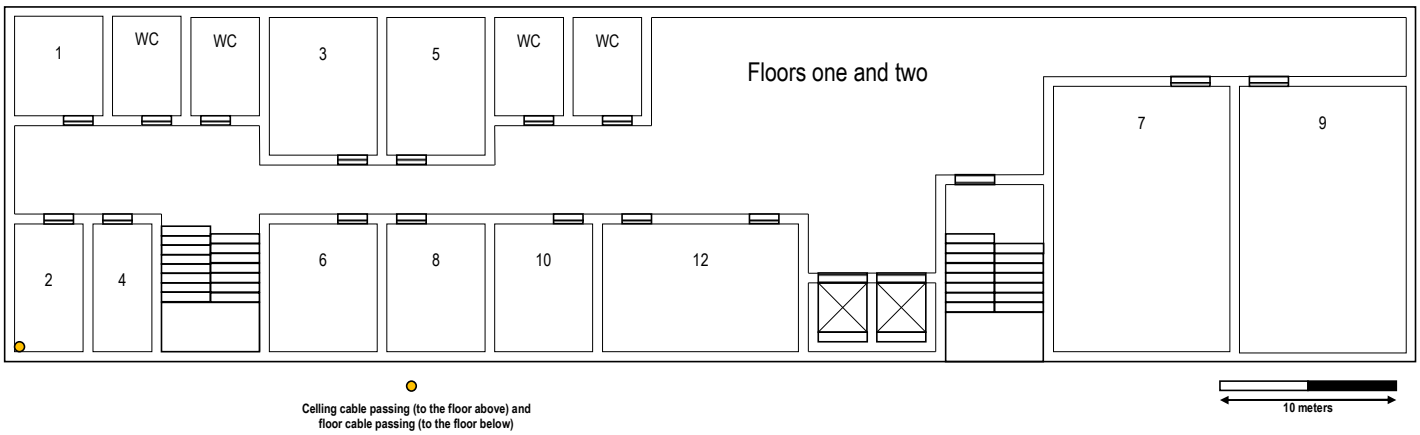
Room 0.2 is intended to hold network infrastructure equipment and is the suggested housing for the main cross-connect. Beyond two floor passageways to the underfloor cable raceway, this room has also a cable passageway to the floor above.

The ceiling height on floor zero is 4 meters. However, rooms 0.1, 0.2, 0.3, 0.4, 0.5, 0.6 and 0.8 are provided with a removable dropped ceiling, placed 3 meters from the ground. The hallways in front of the mentioned rooms are also provided with the same type of dropped ceiling. Walls above the dropped ceiling can be perforated for cable passageways.

2.2. Floors one and two plans

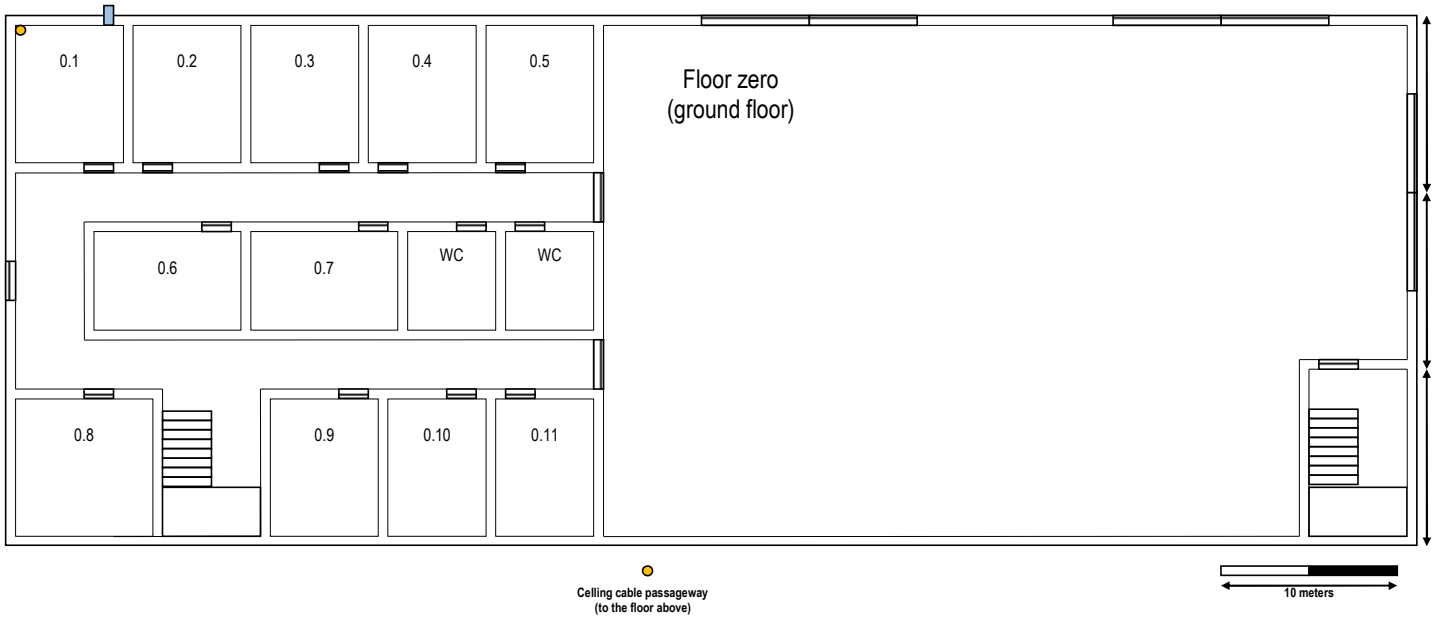
Floors one and two have identical plans. No underfloor cable raceways exist on these floors.

The ceiling height is 3 meters, however, the entire floors area is provided with removable dropped ceiling, placed 2.5 meters from the ground. Walls above the dropped ceiling can be perforated for cable passageways.



3. On scale Building 2 plans

3.1. Floor zero (ground floor) plan



Room 0.1 is intended to hold network infrastructure equipment and is the suggested housing for a cross-connect, it has direct access to the external underground ditch.

The floor ceiling height is 5 meters, however, the plan left side area (with rooms and hallways) is provided with a removable dropped ceiling, placed 2.5 meters above the ground. Walls above the dropped ceiling can be perforated for cable passageways.

3.2. Floor one plan

The ceiling height is 3 meters, however, the floor is provided with a removable dropped ceiling, placed 2.5 meters from the ground. Again, walls above the dropped ceiling can be perforated for cable passageways.

4. Other requirements

4.1. Client requirements

- Room 0.2 on Building 1 ground floor is meant to be the computer centre. It will house some servers and external connections: internet and phone.

- All floors must have wireless network coverage, network outlets for access-points must be available at appropriate locations.

- User network outlets are not to be installed in common areas like halls, hallways and restrooms. Building 2 ground floor right side open area, is also user network outlets free, wireless coverage is though required.

- The layer two infrastructure must be completely flexible, allowing to set up any layer three infrastructure over it. **Specifically, the IPv4 network assigned to any outlet must be remotely changeable.**

4.2. Routers and IPv4 networks (layer three)

Although the required layer two infrastructure allows any layer three network configuration, originally is intended as follows:

- Two routers must be installed: R1 in Building 1 and R2 in Building 2.

- IPv4 addresses to be used must all belong to the **10.0.160.0/20** addresses block, containing 4096 private addresses.

- Addresses assignments to the required networks must meet specifications ahead, also excessive oversizing is to be avoided.

- The ISP connection is made by a telephone line (DSL). The ISP router's address is **171.41.41.41/30**.

- Several IPv4 networks will be required, of course, for each a VLAN is also required. The following table presents the required IPV4 networks, and specifications:

Name	**Purpose**	***Connected Routers***	**Covered areas**	**Maximum expected nodes**
DMZ	Servers	R1	Building 1, ground floor, room 0.2	80
BACK	Routers interconnection	R1; R2		10
VoIP	VoIP (all buildings)	R1	Building 1 and Building 2	250
WiFi1	Wireless coverage for Building 1	R1	Building 1	500
WiFi2	Wireless coverage for Building 2	R2	Building 2	500
LAN10	Network outlets	R1	Building 1 ground floor	200
LAN11	Network outlets	R1	Building 1, floor one	300
LAN12	Network outlets	R1	Building 1, floor two	300
LAN20	Network outlets	R2	Building 2 ground floor	200
LAN21	Network outlets	R2	Building 2, floor one	600