



SZABIST

CNDC Project Report

Course Name: CSC3205 - Computer Networks and Data Communications

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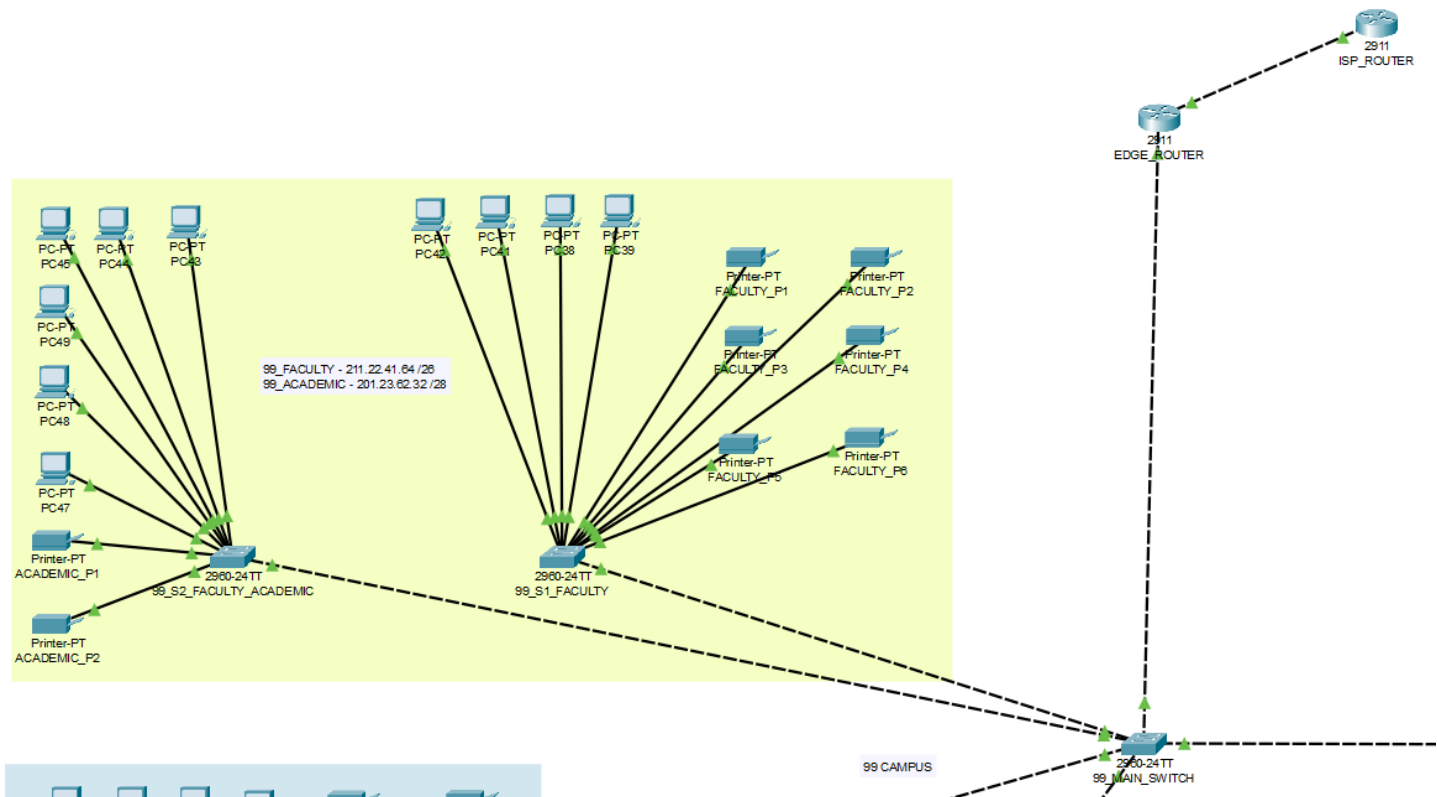
Network Design and Implementation

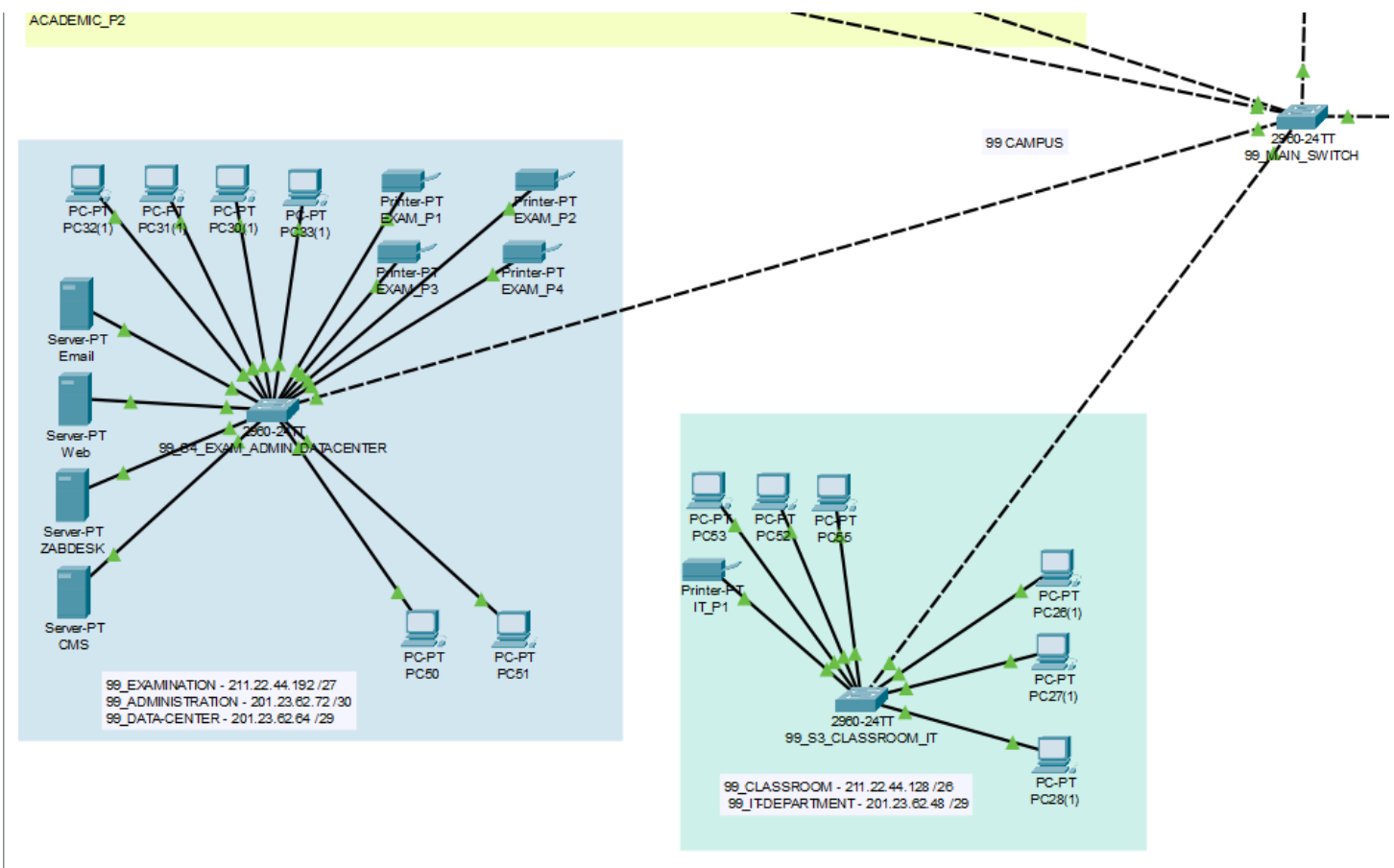
This section describes the networking infrastructure for each building within the SZABIST Karachi campus.

99 Campus Requirements

- There are 18 classrooms in 99-building, each classroom has one PC.
- There are around 32 PCs belonging to faculty and 6 printers.
- There are 6 PCs and 2 printers belonging to the Academic department.
- There are 4 PCs and 1 printer belonging to the IT department.
- There are 12 PCs and 4 printers belonging to the EXAMINATION department.
- There are 2 PCs who belong to the ADMINISTRATION department.
- There are 4 servers in a data center: Web, ZABDESK, Email and CMS.
- EDGE router is located at 99-Campus Building.

99 Campus Topology

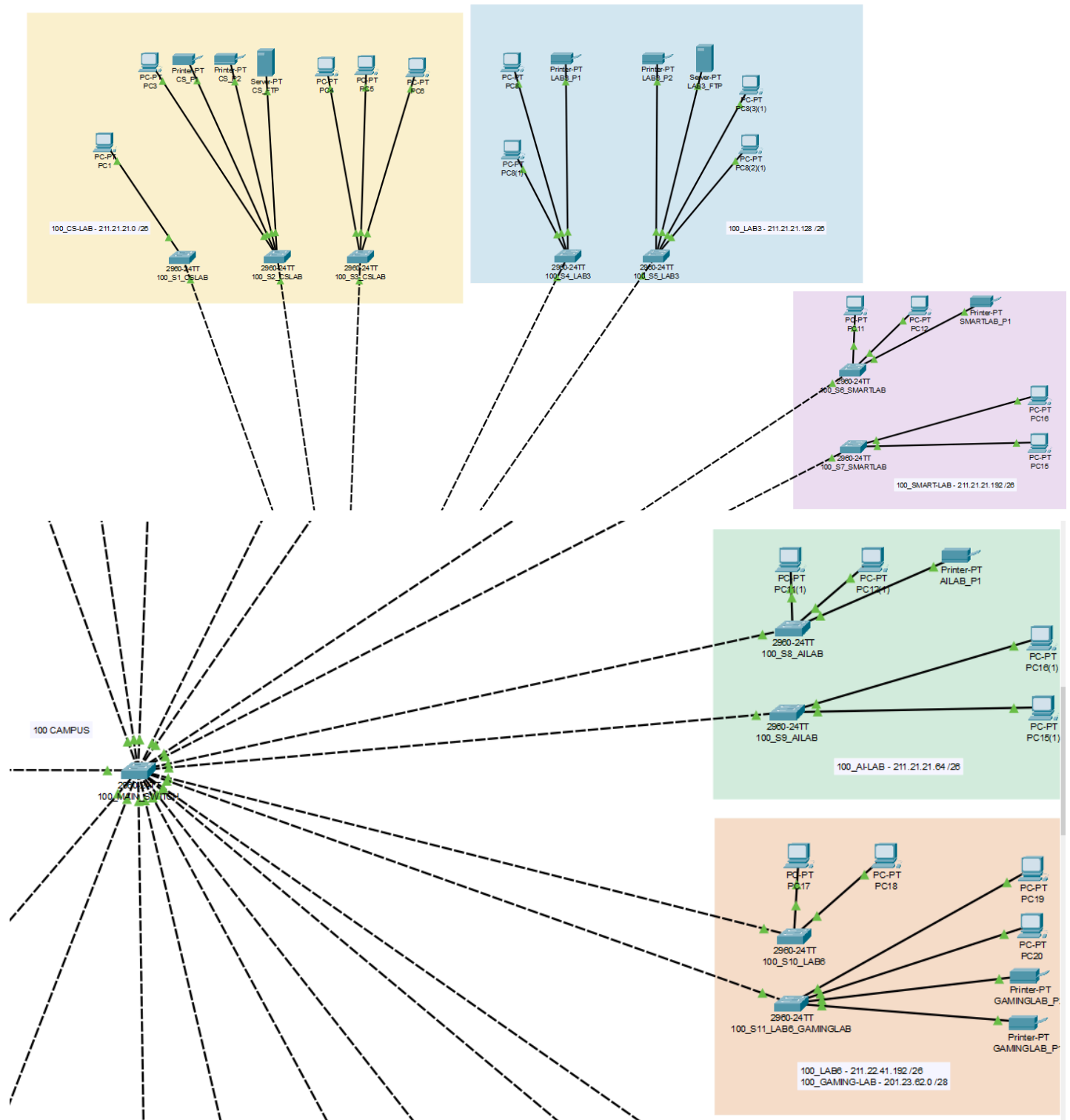




100 Campus Requirements

- There are seven labs in 100 building with following number of devices:
 - CS Lab has 58 PCs, 2 Printer and 1 ftp server.
 - AI Lab has 48 PCs and 1 Printer
 - Lab-3 has 38 PCs, 2 Printers and 1 ftp server.
 - Lab-4 has 35 PCs and 2 Printers.
 - Lab-5 has 35 PCs, 2 Printers and 1 ftp server.
 - Lab-6 have 35 PCs only
 - Smart Lab has 40 PCs and 1 Printer.
 - Gaming Lab has 9 PCs and 2 Printers.
- There are 20 classrooms in 100-building, each classroom has one PC.
- There are around 25 PCs and 4 printers belonging to faculty.
- There are 5 PCs and 3 printers belonging to the Academic department.
- There are 4 PCs belonging to the ADMINISTRATION department.
- There are 10 PCs and 2 printers belongs to IT department.

100 Campus Topology



Variable Length Subnet Masking (VLSM)

| Name | HOSTS NEEDED | HOSTS AVAILABLE | UNUSED HOSTS | NETWORK ADDRESS | MASK | SLASH | USABLE RANGE | BROADCAST |
|--------------------|--------------|-----------------|--------------|-----------------|-----------------|-------|-------------------------------|---------------|
| 100_CS-LAB | 62 | 62 | 0 | 211.21.21.0 | 255.255.255.192 | /26 | 211.21.21.1 - 211.21.21.62 | 211.21.21.63 |
| 100_AI-LAB | 50 | 62 | 12 | 211.21.21.64 | 255.255.255.192 | /26 | 211.21.21.65 - 211.21.21.126 | 211.21.21.127 |
| 100_LAB3 | 42 | 62 | 20 | 211.21.21.128 | 255.255.255.192 | /26 | 211.21.21.129 - 211.21.21.190 | 211.21.21.191 |
| 100_SMART-LAB | 42 | 62 | 20 | 211.21.21.192 | 255.255.255.192 | /26 | 211.21.21.193 - 211.21.21.254 | 211.21.21.255 |
| 100_LAB5 | 39 | 62 | 23 | 211.22.41.0 | 255.255.255.192 | /26 | 211.22.41.1 - 211.22.41.62 | 211.22.41.63 |
| 99_FACULTY | 39 | 62 | 23 | 211.22.41.64 | 255.255.255.192 | /26 | 211.22.41.65 - 211.22.41.126 | 211.22.41.127 |
| 100_LAB4 | 38 | 62 | 24 | 211.22.41.128 | 255.255.255.192 | /26 | 211.22.41.129 - 211.22.41.190 | 211.22.41.191 |
| 100_LAB6 | 36 | 62 | 26 | 211.22.41.192 | 255.255.255.192 | /26 | 211.22.41.193 - 211.22.41.254 | 211.22.41.255 |
| 100_FACULTY | 39 | 62 | 23 | 211.22.44.0 | 255.255.255.192 | /26 | 211.22.44.1 - 211.22.44.62 | 211.22.44.63 |
| 100_CLASSROOM | 38 | 62 | 24 | 211.22.44.64 | 255.255.255.192 | /26 | 211.22.44.65 - 211.22.44.126 | 211.22.44.127 |
| 99_CLASSROOM | 36 | 62 | 26 | 211.22.44.128 | 255.255.255.192 | /26 | 211.22.44.129 - 211.22.44.190 | 211.22.44.191 |
| 99_EXAMINATION | 30 | 30 | 0 | 211.22.44.192 | 255.255.255.224 | /27 | 211.22.44.193 - 211.22.44.222 | 211.22.44.223 |
| 100_IT-DEPARTMENT | 21 | 30 | 9 | 211.22.44.224 | 255.255.255.224 | /27 | 211.22.44.225 - 211.22.44.254 | 211.22.44.255 |
| 100_GAMING-LAB | 12 | 14 | 2 | 201.23.62.0 | 255.255.255.240 | /28 | 201.23.62.1 - 201.23.62.14 | 201.23.62.15 |
| 100_ACADEMIC | 9 | 14 | 5 | 201.23.62.16 | 255.255.255.240 | /28 | 201.23.62.17 - 201.23.62.30 | 201.23.62.31 |
| 99_ACADEMIC | 9 | 14 | 5 | 201.23.62.32 | 255.255.255.240 | /28 | 201.23.62.33 - 201.23.62.46 | 201.23.62.47 |
| 99_IT-DEPARTMENT | 6 | 6 | 0 | 201.23.62.48 | 255.255.255.248 | /29 | 201.23.62.49 - 201.23.62.54 | 201.23.62.55 |
| 100_ADMINISTRATION | 5 | 6 | 1 | 201.23.62.56 | 255.255.255.248 | /29 | 201.23.62.57 - 201.23.62.62 | 201.23.62.63 |
| 99_DATA-CENTER | 5 | 6 | 1 | 201.23.62.64 | 255.255.255.248 | /29 | 201.23.62.65 - 201.23.62.70 | 201.23.62.71 |
| 99_ADMINISTRATION | 2 | 2 | 0 | 201.23.62.72 | 255.255.255.252 | /30 | 201.23.62.73 - 201.23.62.74 | 201.23.62.75 |

VLANs and Port Assigning Table

| 100 CAMPUS | | | | |
|------------|--------------------|------------------------|-----------------|------------|
| VLAN | Name | Switchport Number | | Trunk Port |
| | | Access Port | | |
| 2 | 100_CS-LAB | 100_S1_CSLAB | fa0/1 - fa0/24 | g0/0 |
| | | 100_S2_CSLAB | fa0/1 - fa0/24 | g0/0 |
| | | 100_S3_CSLAB | fa0/1 - fa0/13 | g0/0 |
| 3 | 100_AI-LAB | 100_S8_AILAB | fa0/1 - fa0/24 | g0/0 |
| | | 100_S9_AILAB | fa0/1 - fa0/24 | g0/0 |
| | | | g0/1 | g0/0 |
| 4 | 100_LAB3 | 100_S4_LAB3 | fa0/1 - fa0/24 | g0/0 |
| | | 100_S5_LAB3 | fa0/1 - fa0/17 | g0/0 |
| 5 | 100_SMART-LAB | 100_S6_SMARTLAB | fa0/1 - fa0/24 | g0/0 |
| | | 100_S7_SMARTLAB | fa0/1 - fa0/17 | g0/0 |
| 6 | 100_LAB5 | 100_S14_LAB5 | fa0/1 - fa0/24 | g0/0 |
| | | 100_S15_LAB5 | fa0/1 - fa0/14 | g0/0 |
| 8 | 100_LAB4 | 100_S12_LAB4 | fa0/1 - fa0/24 | g0/0 |
| | | 100_S13_LAB4 | fa0/1 - fa0/13 | g0/0 |
| 9 | 100_LAB6 | 100_S10_LAB6 | fa0/1 - fa0/24 | g0/0 |
| | | 100_S11_LAB6_GAMINGLAB | fa0/1 - fa0/11 | g0/0 |
| 10 | 100_FACULTY | 100_S16_FACULTY | fa0/1 - fa0/24 | g0/0 |
| | | 100_S17_FACULTY_IT | fa0/1 - fa0/5 | g0/0 |
| 11 | 100_CLASSROOM | 100_S19_CLASSROOM | fa0/1 - fa0/20 | g0/0 |
| 14 | 100_IT-DEPARTMENT | 100_S17_FACULTY_IT | fa0/6 - fa0/18 | g0/0 |
| 15 | 100_GAMING-LAB | 100_S11_LAB6_GAMINGLAB | fa0/12 - fa0/23 | g0/0 |
| 16 | 100_ACADEMIC | 100_S18_ACADEMIC_ADMIN | fa0/1 - fa0/8 | g0/0 |
| 19 | 100_ADMINISTRATION | 100_S18_ACADEMIC_ADMIN | fa0/9 - fa0/13 | g0/0 |

| 99 CAMPUS | | | | |
|-----------|-------------------|-----------------------------|-----------------|------------|
| VLAN | Name | Switchport Number | | Trunk Port |
| | | Access Port | | |
| 7 | 99_FACULTY | 99_S1_FACULTY | fa0/1 - fa0/24 | g0/0 |
| | | 99_S2_FACULTY_ACADEMIC | fa0/1 - fa0/14 | g0/0 |
| 12 | 99_CLASSROOM | 99_S3_CLASSROOM_IT | fa0/1 - fa0/18 | g0/0 |
| 13 | 99_EXAMINATION | 99_S4_EXAM_ADMIN_DATACENTER | fa0/1 - fa0/16 | g0/0 |
| 17 | 99_ACADEMIC | 99_S2_FACULTY_ACADEMIC | fa0/15 - fa0/22 | g0/0 |
| 18 | 99_IT-DEPARTMENT | 99_S3_CLASSROOM_IT | fa0/19 - fa0/24 | g0/0 |
| 20 | 99_DATA-CENTER | 99_S4_EXAM_ADMIN_DATACENTER | fa0/19 - fa0/22 | g0/0 |
| 21 | 99_ADMINISTRATION | 99_S4_EXAM_ADMIN_DATACENTER | fa0/17 - fa0/18 | g0/0 |

Addressing Table

| 100 CAMPUS | | | | |
|-----------------|-----------|---------------|-----------------|-----------------|
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| CS_P1 | NIC | 211.21.21.2 | 255.255.255.192 | 211.21.21.1 |
| CS_P2 | NIC | 211.21.21.3 | 255.255.255.192 | 211.21.21.1 |
| CS_FTP | NIC | 211.21.21.4 | 255.255.255.192 | 211.21.21.1 |
| LAB3_P1 | NIC | 211.21.21.130 | 255.255.255.192 | 211.21.21.129 |
| LAB3_P2 | NIC | 211.21.21.131 | 255.255.255.192 | 211.21.21.129 |
| LAB3_FTP | NIC | 211.21.21.132 | 255.255.255.192 | 211.21.21.129 |
| SMARTLAB_P1 | NIC | 211.21.21.194 | 255.255.255.192 | 211.21.21.193 |
| AILAB_P1 | NIC | 211.21.21.66 | 255.255.255.192 | 211.21.21.65 |
| GAMINGLAB_P1 | NIC | 201.23.62.2 | 255.255.255.240 | 201.23.62.1 |
| GAMINGLAB_P2 | NIC | 201.23.62.3 | 255.255.255.240 | 201.23.62.1 |
| LAB4_P1 | NIC | 211.22.41.130 | 255.255.255.192 | 211.22.41.129 |
| LAB4_P2 | NIC | 211.22.41.131 | 255.255.255.192 | 211.22.41.129 |
| LAB5_P1 | NIC | 211.22.41.2 | 255.255.255.192 | 211.22.41.1 |
| LAB5_P2 | NIC | 211.22.41.3 | 255.255.255.192 | 211.22.41.1 |
| LAB5_FTP | NIC | 211.22.41.4 | 255.255.255.192 | 211.22.41.1 |
| 100_FACULTY_P1 | NIC | 211.22.44.2 | 255.255.255.192 | 211.22.41.1 |
| 100_FACULTY_P2 | NIC | 211.22.44.3 | 255.255.255.192 | 211.22.41.1 |
| 100_FACULTY_P3 | NIC | 211.22.44.4 | 255.255.255.192 | 211.22.41.1 |
| 100_FACULTY_P4 | NIC | 211.22.44.5 | 255.255.255.192 | 211.22.41.1 |
| 100_IT_P1 | NIC | 211.22.44.226 | 255.255.255.224 | 211.22.44.225 |
| 100_IT_P2 | NIC | 211.22.44.227 | 255.255.255.224 | 211.22.44.225 |
| 100_ACADEMIC_P1 | NIC | 201.23.62.18 | 255.255.255.240 | 201.23.62.17 |
| 100_ACADEMIC_P2 | NIC | 201.23.62.19 | 255.255.255.240 | 201.23.62.17 |
| 100_ACADEMIC_P3 | NIC | 201.23.62.20 | 255.255.255.240 | 201.23.62.17 |
| 100_MAIN_SWITCH | VLAN 1 | 192.168.0.6 | 255.255.255.224 | 192.168.0.1 |
| 100_S1_CSLAB | VLAN 1 | 192.168.0.7 | 255.255.255.224 | 192.168.0.1 |
| 100_S2_CSLAB | VLAN 1 | 192.168.0.8 | 255.255.255.224 | 192.168.0.1 |
| 100_S3_CSLAB | VLAN 1 | 192.168.0.9 | 255.255.255.224 | 192.168.0.1 |
| 100_S8_AILAB | VLAN 1 | 192.168.0.10 | 255.255.255.224 | 192.168.0.1 |
| 100_S9_AILAB | VLAN 1 | 192.168.0.11 | 255.255.255.224 | 192.168.0.1 |
| 100_S4_LAB3 | VLAN 1 | 192.168.0.12 | 255.255.255.224 | 192.168.0.1 |
| 100_S5_LAB3 | VLAN 1 | 192.168.0.13 | 255.255.255.224 | 192.168.0.1 |
| 100_S6_SMARTLAB | VLAN 1 | 192.168.0.14 | 255.255.255.224 | 192.168.0.1 |
| 100_S7_SMARTLAB | VLAN 1 | 192.168.0.15 | 255.255.255.224 | 192.168.0.1 |

| | | | | |
|------------------------|--------|--------------|-----------------|-------------|
| 100_S14_LAB5 | VLAN 1 | 192.168.0.16 | 255.255.255.224 | 192.168.0.1 |
| 100_S15_LAB5 | VLAN 1 | 192.168.0.17 | 255.255.255.224 | 192.168.0.1 |
| 100_S12_LAB4 | VLAN 1 | 192.168.0.18 | 255.255.255.224 | 192.168.0.1 |
| 100_S13_LAB4 | VLAN 1 | 192.168.0.19 | 255.255.255.224 | 192.168.0.1 |
| 100_S10_LAB6 | VLAN 1 | 192.168.0.20 | 255.255.255.224 | 192.168.0.1 |
| 100_S11_LAB6_GAMINGLAB | VLAN 1 | 192.168.0.21 | 255.255.255.224 | 192.168.0.1 |
| 100_S16_FACULTY | VLAN 1 | 192.168.0.22 | 255.255.255.224 | 192.168.0.1 |
| 100_S17_FACULTY_IT | VLAN 1 | 192.168.0.23 | 255.255.255.224 | 192.168.0.1 |
| 100_S19_CLASSROOM | VLAN 1 | 192.168.0.24 | 255.255.255.224 | 192.168.0.1 |
| 100_S18_ACADEMIC_ADMIN | VLAN 1 | 192.168.0.25 | 255.255.255.224 | 192.168.0.1 |

| 99 CAMPUS | | | | |
|-------------|-----------|---------------|-----------------|-----------------|
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| EDGE_ROUTER | g0/0 | 192.168.0.1 | 255.255.255.224 | - |
| | g0/0.2 | 211.21.21.1 | 255.255.255.192 | - |
| | g0/0.3 | 211.21.21.65 | 255.255.255.192 | - |
| | g0/0.4 | 211.21.21.129 | 255.255.255.192 | - |
| | g0/0.5 | 211.21.21.193 | 255.255.255.192 | - |
| | g0/0.6 | 211.22.41.1 | 255.255.255.192 | - |
| | g0/0.7 | 211.22.41.65 | 255.255.255.192 | - |
| | g0/0.8 | 211.22.41.129 | 255.255.255.192 | - |
| | g0/0.9 | 211.22.41.193 | 255.255.255.192 | - |
| | g0/0.10 | 211.22.44.1 | 255.255.255.192 | - |
| | g0/0.11 | 211.22.44.65 | 255.255.255.192 | - |
| | g0/0.12 | 211.22.44.129 | 255.255.255.192 | - |
| | g0/0.13 | 211.22.44.193 | 255.255.255.224 | - |
| | g0/0.14 | 211.22.44.225 | 255.255.255.224 | - |
| | g0/0.15 | 201.23.62.1 | 255.255.255.240 | - |
| | g0/0.16 | 201.23.62.17 | 255.255.255.240 | - |
| | g0/0.17 | 201.23.62.33 | 255.255.255.240 | - |
| | g0/0.18 | 201.23.62.49 | 255.255.255.248 | - |
| | g0/0.19 | 201.23.62.57 | 255.255.255.248 | - |
| | g0/0.20 | 201.23.62.65 | 255.255.255.248 | - |
| | g0/0.21 | 201.23.62.73 | 255.255.255.252 | - |

| | | | | |
|------------|-----|--------------|-----------------|--------------|
| FACULTY_P1 | NIC | 211.22.41.66 | 255.255.255.192 | 211.22.41.65 |
| FACULTY_P2 | NIC | 211.22.41.67 | 255.255.255.192 | 211.22.41.65 |
| FACULTY_P3 | NIC | 211.22.41.68 | 255.255.255.192 | 211.22.41.65 |
| FACULTY_P4 | NIC | 211.22.41.69 | 255.255.255.192 | 211.22.41.65 |
| FACULTY_P5 | NIC | 211.22.41.70 | 255.255.255.192 | 211.22.41.65 |
| FACULTY_P6 | NIC | 211.22.41.71 | 255.255.255.192 | 211.22.41.65 |

| | | | | |
|-----------------------------|--------|---------------|-----------------|---------------|
| ACADEMIC_P1 | NIC | 201.23.62.34 | 255.255.255.240 | 201.23.62.33 |
| ACADEMIC_P2 | NIC | 201.23.62.35 | 255.255.255.240 | 201.23.62.33 |
| IT_P1 | NIC | 201.23.62.50 | 255.255.255.248 | 201.23.62.33 |
| EXAM_P1 | NIC | 211.22.44.194 | 255.255.255.224 | 211.22.44.193 |
| EXAM_P2 | NIC | 211.22.44.195 | 255.255.255.224 | 211.22.44.193 |
| EXAM_P3 | NIC | 211.22.44.196 | 255.255.255.224 | 211.22.44.193 |
| EXAM_P4 | NIC | 211.22.44.197 | 255.255.255.224 | 211.22.44.193 |
| EMAIL | NIC | 201.23.62.66 | 255.255.255.248 | 201.23.62.65 |
| WEB | NIC | 201.23.62.67 | 255.255.255.248 | 201.23.62.65 |
| ZABDESK | NIC | 201.23.62.68 | 255.255.255.248 | 201.23.62.65 |
| CMS | NIC | 201.23.62.69 | 255.255.255.248 | 201.23.62.65 |
| 99_S1_FACULTY | VLAN 1 | 192.168.0.2 | 255.255.255.224 | 192.168.0.1 |
| 99_S2_FACULTY_ACADEMIC | VLAN 1 | 192.168.0.3 | 255.255.255.224 | 192.168.0.1 |
| 99_S3_CLASSROOM_IT | VLAN 1 | 192.168.0.4 | 255.255.255.224 | 192.168.0.1 |
| 99_S4_EXAM_ADMIN_DATACENTER | VLAN 1 | 192.168.0.5 | 255.255.255.224 | 192.168.0.1 |
| 99_MAIN_SWITCH | VLAN 1 | 192.168.0.26 | 255.255.255.224 | 192.168.0.1 |