Designing Campus Networks

LINGI2142 - Group project

Administrivia

- Groups of 4 students
- Group meetings of 10 min during course slots
- 6 weeks before first submission (Mar. 19)
- Inter-group reviews by Mar. 30
- Final submission by Apr. 27

Designing Campus Networks

- Multiple geographical sites
- Multiple types of users
- Multiple services provided

Designing Campus Networks

- Multiple geographical sites
- Multiple types of users
- Multiple services provided

Presentation of the UCL network

by Quentin Hunin next **Friday (Feb. 9) 8.30**

Designing Campus Networks

- Configure
- Document
- Validate

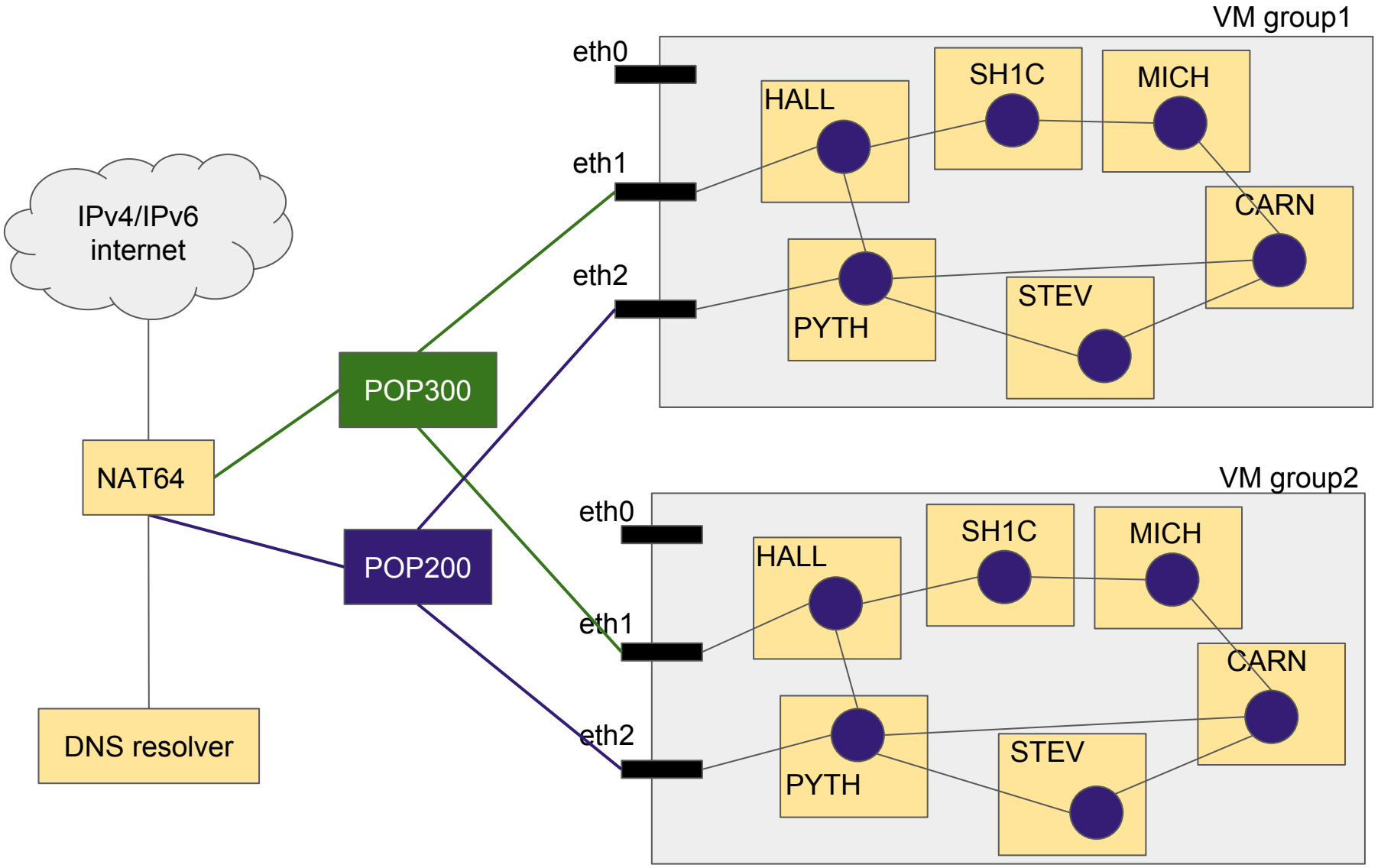
Project goals

- Surviving failure of **any** network element
- Justify **every** configuration knob
- Written report as a `How-to design a campus network`

Environment

- Emulated network in virtual machines
  - CLI access to a remote group instance
  - Instance for your own machine
- Open source routing daemons and tools
- IPv6-only

Remote VM topology



POP<asn> in the remote host

- IPv6 prefix:
  fd00:<asn>::/48 for the POP LAN
  IPv6 prefix allocated to VM to announce over BGP
  fd00:<asn>:<group#>::/48

- BGP peering: fd00:<asn>::b
  Groups can peer with source address
  fd00:<asn>::<group#>
  [On the VM]
  ip address add dev ethX fd00:<asn>::<group#>/48

- IPv4 is dropped on the POP switch

- Cross-VM peerings are allowed (and encouraged!)

DNS resolver

- Use the DNS resolver on the host machine:
  echo “nameserver fd00::d” > /etc/resolv.conf

- Requires a working BGP peering!

- New TLD: *.ingi*
  belneta.ingi (BGP peering address for POP300)
  belnetb.ingi (BGP peering address for POP200)
  ns1.ingi ns2.ingi (nameservers for .ingi)
  groupX.ingi (Delegated to group X)

- Email me once you have a running DNS server for your group VM to enable DNS resolution of your sub-TLD

Topology properties

- Each network is **dual-homed**
- **At least one LAN** per router
- Add hosts as you need them

Individual Design tasks

- Routing using only BGP (see RFC7938)
- Security (ip6tables)
- End-user management (DNS, DHCP/SLAAC)
- Services (ssh, www, load-balancer)

Individual Design tasks

- Routing using only BGP (see RFC7938)

Monitoring, reporting, testing

(SNMP, syslog, scripts, ...)

- Services (ssh, www, load-balancer)

This week

- Register groups on Moodle
- Build and run the sample network in the VM
- Take a look/run projects from last year
- Allocate individual tasks
- Define testing and monitoring strategy
- Define an IPv6 addressing plan
- Attend Friday’s presentation!

Tips

- **Use a VCS!**
- **Automate** (script) everything
- Leverage IPv6 features/**Do not** try to emulate **IPv4**